STATE OF PUBLIC HEALTH
in the Caribbean Region

INAUGURAL REPORT
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4 Medicines Regulation</td>
<td>201</td>
</tr>
<tr>
<td>5.4.1 Medicines Policies</td>
<td>201</td>
</tr>
<tr>
<td>5.4.2 Legislation and Regulatory Framework</td>
<td>202</td>
</tr>
<tr>
<td>5.4.3 Human Resources for Medicines Regulation</td>
<td>202</td>
</tr>
<tr>
<td>5.4.4 Licensing Activities</td>
<td>202</td>
</tr>
<tr>
<td>5.4.5 Product Assessment and Registration</td>
<td>202</td>
</tr>
<tr>
<td>5.4.6 Quality Control</td>
<td>203</td>
</tr>
<tr>
<td>5.4.7 PAHO Pharmaceutical Situation in the Caribbean</td>
<td>204</td>
</tr>
<tr>
<td>5.4.8 Activity in the Region</td>
<td>205</td>
</tr>
<tr>
<td>5.4.9 Human Resources for Medicines Regulation</td>
<td>206</td>
</tr>
<tr>
<td>5.4.10 Medicines Policies</td>
<td>206</td>
</tr>
<tr>
<td>5.4.11 CCH III Progress</td>
<td>206</td>
</tr>
<tr>
<td>5.4.12 Caribbean Pharmaceutical Policy Designed and Implemented</td>
<td>206</td>
</tr>
<tr>
<td>5.4.13 Harmonised Medicines Supply Systems and Sub-Regional Negotiation</td>
<td>207</td>
</tr>
<tr>
<td>5.4.14 Caribbean Strategy for Rational Use of Medicines Approved and Implemented</td>
<td>207</td>
</tr>
<tr>
<td>5.5 Medicines Policies for Health</td>
<td>208</td>
</tr>
<tr>
<td>5.5.1 Medicines Programme</td>
<td>209</td>
</tr>
<tr>
<td>5.5.2 National Health Research Systems</td>
<td>210</td>
</tr>
<tr>
<td>5.5.3 Current Status of Regional Health Research Systems</td>
<td>211</td>
</tr>
<tr>
<td>5.5.3.1 Health Policy for the Caribbean</td>
<td>211</td>
</tr>
<tr>
<td>5.5.3.2 Health Research Agenda for the Caribbean</td>
<td>211</td>
</tr>
<tr>
<td>5.5.3.3 Essential National Health Research Councils/Committees</td>
<td>212</td>
</tr>
<tr>
<td>5.5.3.4 Research Ethics Committees (REC)</td>
<td>212</td>
</tr>
<tr>
<td>5.5.3.5 CARPHA’s Research Ethics Committees</td>
<td>213</td>
</tr>
<tr>
<td>5.5.4 Financing Research</td>
<td>214</td>
</tr>
<tr>
<td>5.5.4.1 CARPHA’s Research Grants Programme</td>
<td>214</td>
</tr>
<tr>
<td>5.5.5 Creating and Sustaining Resources</td>
<td>215</td>
</tr>
<tr>
<td>5.5.5.1 Health Training Programmes</td>
<td>215</td>
</tr>
<tr>
<td>5.5.5.2 CARPHA’s Capacity Building</td>
<td>215</td>
</tr>
<tr>
<td>5.5.5.3 Tropical Medicine Research Institute (TMRI)</td>
<td>216</td>
</tr>
<tr>
<td>5.5.6 Producing and Using Research</td>
<td>216</td>
</tr>
<tr>
<td>5.5.6.1 CARPHA Annual Health Research Conference</td>
<td>216</td>
</tr>
<tr>
<td>5.5.6.2 Research Outputs of Regional and Academic Research Institutions</td>
<td>216</td>
</tr>
<tr>
<td>5.5.6.3 Caribbean Cochrane Collaboration</td>
<td>217</td>
</tr>
<tr>
<td>5.5.6.4 Evidence-Informed Policy Network (EIPN)</td>
<td>217</td>
</tr>
<tr>
<td>5.5.6.5 Clinical Guidelines</td>
<td>218</td>
</tr>
<tr>
<td>5.6 Health Communication</td>
<td>219</td>
</tr>
<tr>
<td>5.6.1 Health Communication in the Caribbean Region</td>
<td>219</td>
</tr>
<tr>
<td>5.6.2 Investigations in Health Communications and/or Health Promotion in the Region</td>
<td>220</td>
</tr>
<tr>
<td>5.6.2.1 Key Achievements and Successes</td>
<td>220</td>
</tr>
<tr>
<td>5.6.2.2 Challenges facing the Region</td>
<td>220</td>
</tr>
<tr>
<td>5.6.2.3 The Way Forward</td>
<td>220</td>
</tr>
<tr>
<td>5.7 Human Resources for Health</td>
<td>221</td>
</tr>
<tr>
<td>5.7.1 Introduction</td>
<td>221</td>
</tr>
<tr>
<td>5.7.2 Plans/Planned activities</td>
<td>226</td>
</tr>
<tr>
<td>5.8 Health Financing in the Caribbean</td>
<td>228</td>
</tr>
<tr>
<td>5.8.1 Introduction</td>
<td>228</td>
</tr>
<tr>
<td>5.8.2 Health, Development and Political Commitment to Universal Health Coverage (UHC)</td>
<td>228</td>
</tr>
<tr>
<td>5.8.3 Patterns and Magnitudes of Health Financing in the Caribbean</td>
<td>231</td>
</tr>
<tr>
<td>5.8.4 Health Spending by Programmes</td>
<td>235</td>
</tr>
<tr>
<td>5.8.5 Challenges facing Health Financing Systems in the Caribbean</td>
<td>237</td>
</tr>
<tr>
<td>5.8.6 Health Financing for the Caribbean: The Vision and the Philosophy</td>
<td>240</td>
</tr>
<tr>
<td>5.8.6.1 Sources and Context of Health Financing</td>
<td>240</td>
</tr>
<tr>
<td>5.8.6.2 The Caribbean Environment</td>
<td>241</td>
</tr>
<tr>
<td>5.8.6.3 Philosophy of Health Financing</td>
<td>241</td>
</tr>
<tr>
<td>5.9 Monitoring and Evaluation for Public Health in the Caribbean</td>
<td>244</td>
</tr>
<tr>
<td>5.9.1 Human Resources, Partnerships and Planning</td>
<td>245</td>
</tr>
<tr>
<td>5.9.1.1 Component 1: Organisational Structures with M&amp;E Functions</td>
<td>245</td>
</tr>
<tr>
<td>5.9.1.2 Component 2: Human Capacity for M&amp;E</td>
<td>246</td>
</tr>
<tr>
<td>5.9.1.3 Component 3: Partnerships to Plan, Coordinate and Manage the M&amp;E System</td>
<td>246</td>
</tr>
<tr>
<td>5.9.1.4 Component 4: M&amp;E Plan</td>
<td>247</td>
</tr>
<tr>
<td>5.9.1.5 Component 5: Annual, Costed, National M&amp;E Work Plan</td>
<td>247</td>
</tr>
<tr>
<td>5.9.1.6 Component 6: Communication, Advocacy and Culture for M&amp;E</td>
<td>247</td>
</tr>
<tr>
<td>5.9.2 Data Collection, Verification and Analysis</td>
<td>248</td>
</tr>
<tr>
<td>5.9.2.1 Component 7: Routine Programme Monitoring</td>
<td>248</td>
</tr>
<tr>
<td>5.9.2.2 Component 8: Surveys and Surveillance</td>
<td>248</td>
</tr>
<tr>
<td>5.9.2.3 Component 9: National and Sub-National Databases</td>
<td>248</td>
</tr>
<tr>
<td>5.9.2.4 Component 10: Supportive Supervision and Data Auditing</td>
<td>249</td>
</tr>
<tr>
<td>5.9.2.5 Component 11: Evaluation and Research Agenda</td>
<td>249</td>
</tr>
<tr>
<td>5.9.3 Data Dissemination and Use</td>
<td>250</td>
</tr>
<tr>
<td>5.9.3.1 Component 12: Data Dissemination and Use</td>
<td>250</td>
</tr>
<tr>
<td>References</td>
<td>251</td>
</tr>
<tr>
<td>6.1 Tourism Migration</td>
<td>253</td>
</tr>
<tr>
<td>6.1.1 Stay-Over (Air Travel) Arrivals</td>
<td>255</td>
</tr>
<tr>
<td>6.1.2 Cruise Ship Arrivals</td>
<td>256</td>
</tr>
<tr>
<td>6.1.3 Suspected Spread of Chikungunya in 2013 Through Intra and Interregional Travel</td>
<td>259</td>
</tr>
<tr>
<td>References</td>
<td>260</td>
</tr>
<tr>
<td>Index</td>
<td>261</td>
</tr>
</tbody>
</table>
VISION
A Caribbean in which the health and wellness of the people are promoted and protected from disease, injury and disability, thereby enabling human development in keeping with the belief that the health of the Region is the wealth of the Region.

MISSION
To provide strategic direction in analysing, defining and responding to public health priorities of the Caribbean, in order to prevent disease, promote health and respond to public health threats and emergencies.

PREVENTING DISEASE, PROMOTING AND PROTECTING HEALTH
Abbreviations and Acronyms

ADR  Adverse Drug Reaction
AFP  Acute Flaccid Paralysis
AGE  Acute gastroenteritis
AIDS  Acquired Immune Deficiency Syndrome
ARI  Acute Respiratory Infection
ART  Antiretroviral Therapy
BCG  Bacille Calmette-Guerin vaccine
BMGF  Bill & Melinda Gates Foundation
BMI  Body Mass Index
BVI  British Virgin Islands
cVDPV  circulating Vaccine-Derived Poliovirus
CAREC  Caribbean Epidemiology Centre
CARICOM  Caribbean Community
CARPHA  Caribbean Public Health Agency
CCH  Caribbean Corporation in Health
CDC  US Centers for Disease Control and Prevention
CEP  Caribbean Environment Programme
CFNI  Caribbean Food and Nutrition Institute
CNCDs  Chronic Non-Communicable Diseases
CFL  Compact Fluorescent Lamp
CFP  Ciguatera Fish Poisoning
CHRC  Caribbean Health Research Council
CHOGM  Caribbean Heads of Government Meeting
CHTA  Caribbean Hotel and Tourism Association
CI  Confidence Interval
CMO  Chief Medical Officer
CMS  CARPHA Member States
COHRED  Council on Health Research for Development
COHSD  Council for Human and Social Development
COTED  Council for Trade and Development
CPI  Consumer Price Index
CPP  Caribbean Pharmaceutical Policy
CRDTL  Caribbean Regional Drug Testing Laboratory
CRA  Caribbean Regulatory Authority
CRS  Congenital Rubella Syndrome
CRSF  Caribbean Regulatory System Framework
CTO  Caribbean Tourism Organization
DHF  Dengue Haemorrhagic Fever
DSS  Dengue Shock Syndrome
Executive Summary

The Caribbean Public Health Agency (CARPHA) serves 26 Member States, including Haiti, with a total population of approximately 17 million. Member States vary greatly in population size (1,300 to 10 million) and needs. This diversity provides both opportunities and challenges in the provision of services. The Region is tropical or sub-tropical, a wet and dry season, and prone to a range of natural disasters, particularly hurricanes and storms, which are increasing with climate change. Earthquakes, volcanoes and floods are also risks. Politically, the countries can be grouped as CARICOM Member States including Haiti, the UK overseas territories, the Dutch Caribbean, the French Departments and the Hispanic countries.

The population of the region is undergoing an accelerating demographic shift, with the population over 60 years old expanding most rapidly. Programs of healthy ageing therefore assume greater importance to reduce rates of dementia, which are increasing, disability, high health care costs and poverty after retirement. Indeed, healthy ageing becomes an economic imperative to avoid health costs outstripping pension costs.

Approximately 40% of CARPHA Member States are classified as high-income, another 40% as upper middle-income, with Guyana and Haiti being low-middle income and low-income respectively. Most countries are highly indebted, however, and struggle to fund their public health programmes. Having graduated to upper middle-income or high-income status, based on per capita GDP, many members find it difficult to attract development funding, even though small size and island status pose particular challenges of vulnerability to external shocks, both man-made and natural, with the mainly Small Island Developing States (SIDS) being very vulnerable to climate change.

Overall, the economy of the region is heavily dependent on tourism, with financial services, agriculture, gas and oil (Trinidad and Tobago primarily) and light manufacturing being major contributors to the economy. More females are receiving and completing secondary and tertiary education, but more men are employed. There is a generally high level of literacy and communications media in the region, and a very high level of cellular phone coverage, with more phones than there are people. These augur well for developing a regional media and communications partnership to improve health and well-being.

Environment and Climate Change

An increasing population and rapid development has led to critical environmental issues, with an overarching threat of global climate change, to which Caribbean countries are particularly vulnerable. Increasing demand for freshwater leads to water storage and contributes to vector borne diseases like Dengue and Chikungunya. Many fresh water sources and the ocean are polluted due to agriculture, industry, and tourism facilities. Deforestation is leading to decreased rainfall so that water management becomes an increasingly strategic issue for the Region. The volume of solid waste and the demand for landfills is increasing. Increases in cars and vehicular traffic means less walking and biking, which contributes to the epidemic of obesity and non-communicable diseases (NCDs), to energy insecurity, and to higher foreign exchange bills for fuel. Climate change is leading to coral bleaching with attendant food insecurity, and more frequent and powerful hurricanes, to which small states are particularly vulnerable. The vast majority of households have piped water, with the exception of Haiti, and the majority have improved sanitation, with the exception of Haiti.
Family and Community Health

In the area of family and community health, while vaccination rates are high and polio, measles and rubella elimination states have been maintained, there are significant challenges in all areas. With respect to reproductive health, all countries except Haiti have greater than 90% access to prenatal care and skilled birth attendants (Haiti, 85% and 54%). The infant mortality rate for most countries is in the range of 10-20/1,000 live births; for Haiti its 53/1,000. The under-five mortality rate is on track meeting the Millennium Development Goal (MDG) target. Efforts to protect gains in vaccination need to continue, and address vaccine hesitancy. At the same time, rates of overweight and obesity in children and adolescents in the range of 25%-35% are of deep concern, given the health and cost implications, as well as stigma, mental health and employment related issues. Urgent action is needed to tackle the obesogenic environments which are driving the problem, including policy and legislative measures for more supportive environments.

Data on male health indices are noticeably absent and there are few health services for males. However, many aspects of male health, including shorter lifespan, higher levels of risk, violence and injuries, lower levels of educational attainment, and alcohol and substance abuse, are of deep concern.

Behavioural Risks

A quarter to half of adolescents aged 12-16 years report being sexually active, boys more so than girls. Two thirds to three quarters reported using a condom on their last encounter. Between 5%-25% report being current smokers. Between a third and fourth fifths are current drinkers; and 15%-25% reported binge drinking in the past month, with little difference between boys and girls. This high level of harmful use of alcohol in adolescents, and in older age groups, is a major public health and social issue for the Region, contributing to violence and injuries of all types, sexually transmitted infections, mental health problems, absenteeism at work, as well as NCDs.

Ageing

About one third of those older than 60 years are greater than 75 years. One in three men and one in six women over 60 years old are in the workforce, but experience regular income-insecurity. Disability in this age group is four times higher than the general population, particularly for women. There is a higher burden of all chronic diseases among the elderly. Healthy ageing will be largely based on prevention and control of NCDs, as well as addressing issues of elder abuse.

Violence and Injury

Homicide and road traffic accidents are major causes of death for men aged 15-44 years old. Homicide rates in 13 countries have risen from an average of 17.7/100,000 in 2002 to 25/100,000 in 2010, the highest increases being seen in Bahamas, Bermuda, Dominica, St. Kitts and Nevis and Trinidad and Tobago. By comparison, homicide rates in Canada or the UK are 1-1.5/100,000. Jamaica, which for many years had the highest homicide rate in the region, has experienced some decline in the last three years. Three Member States, Guyana, Suriname and Trinidad and Tobago have very high rates of suicide; the former two being in the global top-10. There is a need for more information on all injuries as well as child, domestic and elder abuse. Injuries and violence were recognised as one of the super priorities in health by the Caribbean Commission on Health and Development, along with NCDs and HIV/AIDS, but there has not yet been a commensurate regional public health response. This is urgently needed to complement measures by the CARICOM Implementation Agency for Crime and Security (IMPACS). There is much scope for an evidence-informed public health approach to violence and injuries in the region and CARPHA will seek to partner with IMPACS.

Non-Communicable Diseases (NCDs)

Regarding NCDs and obesity in adults, these now account for eight of 10 deaths and most of the avoidable health care costs (3%-8% negative GDP impact in one study in Jamaica, Barbados and Trinidad and Tobago). Diabetes, ischaemic heart disease and strokes are among the top three causes of death in Member States. The estimated lifetime cancer risk is 18%-20% for men and 16%-18% for women. Prostate, breast, colorectal and cervical cancer are the commonest types of preventable cancer. Cervical cancer is the most preventable, yet in many countries, only half the women have had a cervical cancer screening test.

Obesity among adults has reached epidemic proportions, driving increased rates of diabetes, cancer, cardiovascular disease, depression and anxiety, and employment related problems. Fruit and vegetable consumption is very low; the vast majority of the population do not get five servings of fruit and vegetables per day, which is protective against cardiovascular disease and cancer. More than 60% of the population in Member States is overweight and 20%-40% are obese. A person who is overweight will experience on average 50%-higher lifetime health costs, so that prevention and measures to avoid costly complications are priorities. Most persons are insufficiently physically active and are at greater risk. Between a half and two thirds of men and 14%-20% of women are current drinkers. Alcohol and depression are the two major mental health issues in the region with co-morbidities and co-benefits from action to prevent and control NCDs.

In most countries, 40%-50% of the adult population have three or more risk factors for NCDs, with persons 45-64yrs and women at greater risk. This has policy implications, as the majority of NCDs and associated cost will occur in these populations with multiple risks, so that screening, early detection and preventive treatment and lifestyle change are priorities. Counterintuitively, higher levels of obesity, tobacco use, and harmful use of alcohol are occurring in the poorer and less educated segments of the population. Poverty reduction programmes should therefore include attention to NCDs.

In 2007, Caribbean countries held the historic Port of Spain Summit on NCDs, which issued the Declaration of POS, “Uniting to Stop the Epidemic of NCDs,” which led to the UN High Level Meeting (UNHLM) on NCDs in 2011. Annual monitoring of the implementation of the 26 commitments in the POS Declaration shows good progress in some areas, but little in others which require multi-sectoral action, such as measures to improve nutrition, diet and food security, as well as the promotion of physical activity. An evaluation of the POS Declaration to accelerate multi-sector action has commenced with partners University of the West Indies, CARPHA, CARICOM, University of Toronto and PAHO, funded by International Development Research Centre, Canada. This is relevant to the monitoring of the progress with the Global Monitoring Framework for NCDs and risk factors and the Sustainable Development Goals.

Countries have been making progress, based on the annual Caribbean “NCD Scorecard”. Chronic disease national plans have been achieved in 13 countries, 10 with budgets. Secondary prevention has been scaled up, e.g., Jamaica (National Health Fund) and Trinidad and Tobago (Chronic Disease Action Programme), Five countries have achieved smoke-free public places and the vision of a “smoke-free Caribbean by 2020” is gaining traction. However, no countries have reduced salt consumption or childhood obesity, yet the former is a public health “Best Buy”. Multi-sector responses are not yet fully established, and few NCD National Commissions are functioning effectively. The adoption in 2014 of a Global Monitoring Framework and targets for NCDs gives a renewed focus to this priority area and these targets will be incorporated in Caribbean Cooperation in Health IV (CCH IV). These NCD targets are included in the post-2015 Sustainable Development Goals (SDGs), particularly SGD-3, “Ensure Healthy Lives and Promote Wellbeing for All at All Ages”.
Communicable Diseases

Communicable diseases are decreasing in some areas, and increasing in others. Overall 231 outbreaks were reported in the past 10 years, mostly food or vector borne, or respiratory. The region is polio-, measles- and rubella-free. Most countries continue to achieve >90% coverage for childhood vaccines. However, in the absence of cases, maintaining vaccination coverage and surveillance becomes even more challenging, and vaccine hesitancy is emerging in some countries. Malaria cases decreased from 2005 to 2009 in Belize and Guyana, then Guyana had a resurgence in 2010. Cases in Haiti has continued to increase.

HIV/AIDS was the 6th leading cause of death in 2000; 9th in 2008; and is now out of the top 10. Vertical transmission of HIV from mother to child has been nearly eliminated, and some countries are preparing for certification of elimination of mother to child transmission (MTCT). However, vulnerable groups, such as men who have sex with men and commercial sex workers, as well as the populations in Hispaniola, remain of concern. Lack of a supportive environment, stigma and discrimination continue to contribute to transmission. Integrated primary health care services for people with chronic diseases, whether NCDs or HIV, are emerging in some countries as a promising way forward.

The Caribbean had the highest rate of tuberculosis in the Americas in 2011 (75/100,000 pop); the only Region not on track for meeting the MDG target. The Caribbean also has the highest HIV/TB co-infection rates (21% on average) - Belize, Trinidad and Tobago and Suriname: 37%, 33% and 33% respectively. Dengue and dengue hemorrhagic fever have increased steadily in the past three decades. Emerging/re-emerging disease threats include cholera in Hispaniola, respiratory illnesses, norovirus outbreaks, and Chikungunya virus, which entered the Region in Sint Maarten in December 2013 and within three months spread to nearly all countries in the Region, given susceptible populations, abundant Aedes aegypti mosquito vectors and widespread travel between countries. Food-borne diseases remain a significant concern and are the commonest traveller’s health problem. Recently-concluded burden of illness studies have shown significant economic impact is also occurring as a result.

The threat of Ebola loomed large in 2014 and led to many countries realizing the need to strengthen a range of measures in port health, infection control, and public education. Although there were no cases in the Region, it was realized that a single case would be catastrophic. A CARICOM Heads Special meeting in November 2014 approved a 10-point plan of action to Stop Ebola there and here, including establishment of a Regional Coordination Mechanism on Ebola (RCME) and other threats. This is evolving into a broader regional coordination mechanism on health security.

Tourism and Health

With nearly 50 million stay over and cruise ship arrivals per year, the Caribbean is the most tourism dependent Region in the world. Yet, the industry is vulnerable to a range of health and environment threats, and also contributes to adverse environmental impacts. Diseases in any part of the world can arrive in the Region within 24 hours. These challenges can largely be addressed through collaborative action on monitoring and rapid response systems, training in health and environmental management standards and certification programs. These are being pursued jointly with the Caribbean Tourism Organization (CTO), and the Caribbean Hotel and Tourism Association (CHTA). Travel and tourism is also the region’s largest employer, with over 2 million employees, so that health and wellness programmes for the tourism workforce can potentially have a significant, population-wide impact.

Health Systems

Health systems, including human resources for health, need strengthening. Total health expenditure ranges from 5.2-8.5% of GDP, while health expenditure per capita varied from $134 in Guyana to $995 in Trinidad and Tobago. Private out-of-pocket health expenditure ranged from 18-61% of total health expenditure. There are established routine information collection systems in various sectors of health, but often inadequate coordination, use and dissemination at the central level. This has been a recognised challenge for at least two decades, and many resources have been expended towards this end, often on information technology without adequate consideration of the overall system. Timely, relevant and accurate information is essential for policy, planning and evaluation of services and programmes. There is a need for a Health Information Policy Framework and Unit at central level and local electronic systems that are sustainable and interoperable. On the plus side many countries have IT infrastructure that could support electronic and cloud-based systems, and that can be knitted into a regional public health information system.

Public Health Laboratories

There are seven public health laboratories in Member States, and the CARPHA laboratories provide reference and referral, training and advisory services, as well as coordination for the regional public health laboratory network. For most countries, the hospital laboratory performs both clinical and public health functions. Laboratory Quality Management System Stepwise Improvement (LQMS-SIP), is the agreed approach. Five laboratories in the Region serve as ‘centres of excellence’ for testing of HIV, Malaria, Tuberculosis, Dengue, Leptospirosis, Shigella, and Salmonella. Most are part of a national alert/response system and regularly send data to national surveillance units. Seven laboratories do some environmental testing, and three engage in drug and/or pharmaceutical testing. The diversity and increasing capability in some Member States point to the need for a Caribbean Public Health Laboratory Network, which is to be launched in 2015.

Pharmaceuticals

A few countries have private pharmaceutical manufacturing plants. Importers, wholesalers and retail pharmacies are also an important part of the landscape. The Caribbean lags far behind Central and South America in key indicators of regulatory capacity in a recent study by PAHO. Legislation is absent on clinical trials, pharmacovigilance and advertising. Seven countries require registration by law and six have mechanisms for this, with four having official medicine control labs. One in six samples to the CARPHA drug testing laboratory are found to be unsatisfactory. The Advisory Committee on pharmaceuticals, “TECHPHARM”, has developed a proposal for a Caribbean Regulatory System on pharmaceuticals and medical technologies to be coordinated by CARPHA, and this was accepted by Council for Human and Social Development (COHSOD) in 2010, and is in the process of being implemented in collaboration with PAHO/WHO and CARICOM.

All CARPHA Member States have extensions to 2016 to meet International Health Regulations (IHR) requirements. Though the threat of Ebola saw most Member States making progress with the core capacities of the IHR, within the broader region, the French Territories are the only ones compliant with the 2005 IHR. Areas of most concern include radiation and chemical emergencies, human resources and preparedness. There is a need to develop a regional approach and plan to the IHR in support of Member States, jointly with PAHO.

There is also a need to strengthen public health leadership and field capacity, given the complexity of the health situation and many health and environment threats in a globalised environment. Several MPH programs are now available in the Region, and UWI Jamaica has launched a Doctorate in Public Health programme (DrPH). In 2013, CARPHA launched a Field Epidemiology and Laboratory Training Programme (FELTP), with support from the US Centers for Disease Control and Prevention (CDC), which will assist Member States in building capacity and help to meet the IHR requirements.

Health research is another key aspect of the health system capacity, where there is room for improvement. There is a Health Research Policy and Research Agenda for the Caribbean. A regional research ethics committee will be established at CARPHA in 2015 to provide support to Member States. A network of Research Ethics Committees will also be established to link the 10 countries which have research ethics committees. The CARPHA Annual Health Research Conference, which is in its 60th year, continues to be a major platform for sharing research findings.
Figure 3.13 Prevalence of Alcohol Use, 2006 - 2012 ...................................................................................................................... 133
Figure 3.14 Harmful Use of Alcohol, 2006- 2012 ...................................................................................................................... 133
Figure 3.15 Consumption of Fruits and Vegetables .................................................................................................................. 134
Figure 3.16 Overweight and Obesity in the Caribbean, 2006-2012 .......................................................................................... 135
Figure 3.17 Abdominal Obesity, 2006 – 2012 .......................................................................................................................... 135
Figure 3.18 Raised Blood Pressure, 2006 - 2012 ......................................................................................................................... 136
Figure 3.19 Prevalence of Raised Risk for the Development of Chronic Diseases in 15-44 and 25-44 Year Olds....137
Figure 3.20 Epidemiologic Transition .......................................................................................................................................... 139
Figure 3.21 Obesity Prevalence (Selected Age Groups and Countries) .................................................................................. 140
Figure 3.22 Changes in Childhood (0-5 Years) Underweight and Overweight Status During the Decade.........141
Figure 3.23 Change in Energy Consumption in Selected English-Speaking Caribbean Countries 1990-1992; 1995-1997; 2003-2005 .................................................................................................................................................. 141
Figure 3.24 Trends in Fat Availability in 10 Selected Caribbean Countries, 2000-2009 (Grams/Caput Per Day)....142
Figure 3.25 Trends in Sugar Availability in 10 Selected Caribbean Countries, 2000-2009 (Grams Sugar /Caput/Day) ............................................................................................................................................................................. 142
Figure 3.26 Trends in Sugar Consumption in the Caribbean 1961-2003 ................................................................................... 143
Figure 3.27 Trends in Fruit and Vegetable Consumption in the Caribbean 1961-2003 ................................................................. 143
Figure 3.28 Fruit and Vegetable Consumption (in Grams) by Caribbean Countries 2003-2005 .......................................................... 144
Figure 3.29 Activity Levels of Adolescents 12-15 Years, 2007 – 2011 .......................................................................................... 145
Figure 3.30 Body Mass index (BMI) by Muscular Strength, 2007 – 2011 ..................................................................................... 146
Figure 3.31 Physical Activity Levels and the Consumption of Carbonated Beverages (12-15 Year Olds), 2007 – 2011 .......................................................................................................................................................................................... 146
Figure 3.32 Exclusive Breastfeeding Rates .............................................................................................................................. 147
Figure 3.33 Deaths from Respiratory Diseases, 2000-2012 ....................................................................................................... 155
Figure 3.34 Deaths from Chronic Lower Respiratory Diseases, 2000-2012 .............................................................................. 156
Figure 3.35 Deaths due to Injuries as a Percentage of Total Deaths, 2000-2012 ............................................................................. 159
Figure 3.36 Percentage of Deaths Due to Injuries by Gender in CARPHA Member States, 2000-2012 ..................160
Figure 3.37 Potential Years of Life Lost due to Violence, CARPHA Member States 2000-2012 ................................................... 161
Figure 3.38 Potential Years of Life Lost due to Traffic Accidents, CARPHA Member States .............................................. 161
Figure 3.39 Rate of Deaths Due to Road Traffic Accidents Per 100,000 by Select Countries, 2001-2008...........162
Figure 3.40 Total Reported Deaths Due to Drowning, CARPHA Member States, 2000-2008 .................................................... 162
Figure 3.41 Rate of Deaths Due to Self-inflicted Injuries Per 100,000 Population, 2001-2008....................................................... 163
Figure 3.42 Demand on Health Sector Cause by Injuries ......................................................................................................... 164
Figure 3.43 Percentage of Motor Vehicle Related Injuries Seen in Jamaican Government Hospitals, 2004...........165
Figure 3.5.1 Visualising Universal Health Coverage ...................................................................................................................... 231
Figure 3.5.2 The Health Financing Dilemma in the Caribbean ........................................................................................................ 238
Figure 3.5.3 Gross Debt as % of GDP, CARICOM Countries, 2012 .............................................................................................. 239
Figure 3.5.4 Disease and the Economic System Linkage Mechanisms ........................................................................................... 241
Figure 3.5.5 Components of a Functional M&E System ................................................................................................................. 244
Table 3.6.1 International Stay Over and Cruise Ship Tourist Arrivals (Million), Caribbean 2000 – 2013 .......................... 255
Table 3.7.1 Monthly Tourist (Stop-Over) Arrivals .......................................................................................................................... 256

Tables

Table 1.1 CARPHA Member States ............................................................................................................................................... 28
Table 1.2 Estimated Life Expectancy at Birth (in Years) for CARPHA Member States, 2003-2012 ................................................................................................................................................................................ 33
Table 1.3 Health Expenditure Data for Selected CARPHA Member States ................................................................................. 41
Table 1.4 Annual Health Expenditure, 2011, for Selected CARPHA Member States ........................................................................ 42
Table 1.5 Health Expenditure, 2000 - 2012, for Selected CARPHA Member States ........................................................................ 42
Table 1.6 Literacy Rates Among Adults 15 years and older, for Select CARPHA Member States ........................................................................ 44
Table 1.7 Human development Index Dimensions Grouped for CARPHA Member States and Comparison Countries .................................................................................................................................................... 45
Table 1.8 Top Three Leading Causes of Death by Country, for the English- and Dutch-speaking Caribbean 50
Table 2.1 Circulating Dengue Serotypes reported in CARPHA Member States 2009-2013 ................................. 68
Table 2.2 Countries with OTP3 Coverage >90% and over 80% of Municipalities with Coverage > 80% ............91
Table 2.3 Test Results of Fever and Rash Samples Received at CARPHA in 2014 ........................ 92
Table 2.4 New HIV Cases by Age Group in CARPHA Member States 2008-2013 96
Table 2.5 Detection of MDR-TB and MDR-TB Estimates in the Caribbean, 2013 ........................................................................ 105
Table 2.6 MDR-TB cases in 11 Caribbean Countries based on Laboratory Tests of Samples Referred to CARPHA Laboratory, 2013 ........................................................................................................................................... 105
Table 2.7 HIV Testing and HIV-TB Confection in Caribbean TB Patients, 2013 ................................................................. 106
Table 2.8 Overview of Country Progress and Gaps in the Caribbean towards Targets for TB control in 2013 .................................. 108
Table 2.9 Number of Outbreak Cases Reported by CMS for the Period 2002 - 2013 ........................................................................ 113
Table 3.1.1 Standardized Mortality Rates <70 years ..................................................................................................................... 125
Table 3.2 Potential Years of Life Lost in CARPHA Member States ............................................................................................. 129
Table 3.3 Risk Factor Surveys 2006-2012 ................................................................................................................................. 130
Table 3.4 Raised Risk for Chronic Diseases - 45-65 years, 2006 – 2012 ........................................................................ 138
Table 3.5 PYLL Rates per 100,000 by Broad Disease Groups ................................................................................................. 160
Table 3.6 Timeliness of Reporting of Communicable Diseases in CARPHA (2010-2013) ........................... 194
Table 3.7 Reporting of Mortality Data to CARPHA (2000-2012) .............................................................................................. 195
Table 3.8 Proportion of Deaths Attributed to Garbage Codes by CARPHA Member States, 2000-2010 ................... 197
Table 3.9 Reasons for Submission of Samples .......................................................................................................................... 203
Table 3.10 Percentage of Products Found to be Out-of-Specification ........................................................................................ 204
Table 3.11 Functions of Health Research Systems .................................................................................................................... 210
Table 3.12 Findings of Two Studies to Assess HRS in the Caribbean ............................................................................................. 211
Table 3.13 Status of REGS in the Caribbean .................................................................................................................................. 213
Table 3.14 Research Grants Approved for the Period 2009-2013 .............................................................................................. 214
Table 3.15 Snapshot of Research Grant Funding of Regional Health, Academic and Research Institutions reported in 2012 Annual Reports ........................................................................................................... 214
Table 3.16 Training Workshops delivered by CARPHA (CHR) for the period (2009-2013) ...................................................... 215
Table 3.17 Oral and Poster Presentation delivered at CARPHA’s Annual Health Research Conference over the past Five Years .................................................................................................................................................... 216
Table 3.18 Research Outputs of Research and Academic Institutions extracted from 2012 Annual Reports ............................................................................................................................................................ 217
Table 3.19 Major Public-sector HRH workers per 10,000 Population ....................................................................................... 222
Table 5.15 Ratio of Qualified Nurses to Physicians ................................................................. 222
Table 5.16 Major Public-sector HRH Workers per 10,000 Population ........................................... 223
Table 5.17 Density ratio of Professions allied to Medicine (per 10,000 population) ................. 223
Table 5.18 Caribbean Regional Field Epidemiology and Laboratory Training Programme ........................................ 227
Table 5.19 How Health Influences Socio-economic Development ............................................. 229
Table 5.20 Health Financing Responsibilities/Systems in CARPHA Countries ............................. 232
Table 5.21 Health Expenditure Data for CARPHA Member States (2000, 2005, 2010 and 2012) .... 233
Table 5.22 Health Expenditure in Select CARPHA Countries in 2010 ...................................... 235
Table 6.1 Tourist Arrivals to the Caribbean By Main Market (‘000), 2009-2013 .......................... 257
Table 6.2 Intra-Caribbean Arrivals to the Caribbean by Sub Region, (‘000), 2009-2013 ............ 258
Table 6.3 Cruise Passenger Arrivals to the Caribbean (‘000), 2009-2013 ............................... 258
1.1 Demographics

1.1.1 The Caribbean Region

The Caribbean region is made up of multiple islands and mainland territories and countries (Figure 1.1). The Region is remarkably diverse with a mix of ethnicities and languages, and countries that have varying geographic landscapes, population sizes and political systems.

The Region comprises several islands that border the Caribbean Plate and includes the groups of islands to the north such as Cuba, Haiti, the Dominican Republic, the Turks and Caicos Islands, the Bahamas Archipelago and Bermuda as well as the Central America mainland country of Belize and the South American mainland countries of Guyana and Suriname.

The Caribbean has a rich mix of people from varying ethnic backgrounds including indigenous peoples, Aboriginal Indians, Africans, Asian Indians, Chinese, Europeans, Indonesian Javanese, and many mixed ethnicities. In the Caribbean there are four primary languages—Spanish, English, Dutch and French, and several different dialects including Patois, Creole and Papiamentu.
The islands along the northern and eastern borders of the Caribbean plate are mostly made of volcanic rock with varied extinct, dormant and active underwater and above ground volcanoes along the arc of islands. The islands that are volcanic in origin include Dominica, Grenada, Martinique, Montserrat, Saba, St Eustatius, St Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines.

The other islands are mostly limestone in nature characterized by relatively flat landscapes. Limestone islands include Anguilla, Antigua and Barbuda, Bahamas, Barbados, the British Virgin Islands, the Cayman Islands and the Turks and Caicos Islands. Some islands such as Jamaica and Guadeloupe are a combination of volcanic and limestone features. The mainland countries share geographic situations of remote interiors that are difficult to reach and have mineral deposits that have played major economic roles at various times.

The Caribbean is dominated by a tropical climate with very little temperature variation throughout the day and throughout the year. There are two seasons; a rainy or wet season that roughly runs from June to December and a dry season from November to May.

The Region is prone to hurricanes during the rainy season as well as earthquakes related to the movement of the Caribbean tectonic plate. It is also particularly vulnerable to increased temperatures, sea level rise and increased intensity of hurricanes which are expected to result from climate change and global warming.

Politically, the countries can be broadly grouped into the CARICOM Member States, the UK Overseas Territories (UKOTs), the Dutch Caribbean (both countries and municipalities in the Netherlands), the French Departments and the Hispanic countries. The Caribbean Community (CARICOM) consists of 15 Member States inclusive of the Organisation of Eastern Caribbean States (OECS), which is made up of 9 member countries that share a single currency and a common market and economy. The United Kingdom Overseas Territories (UKOTs) are associate Member States of CARICOM.

### 1.1.1.1 Demographic overview of CARPHA Member States

The Caribbean Public Health Agency (CARPHA) membership currently includes all CARICOM Member States and associate Member States as well as the Dutch Caribbean (Table 1.1).

<table>
<thead>
<tr>
<th>CARICOM</th>
<th>CARICOM Associate</th>
<th>Dutch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member States</td>
<td>Members</td>
<td>Caribbean</td>
</tr>
<tr>
<td>Antigua and Barbuda*</td>
<td>Anguilla*</td>
<td>Aruba</td>
</tr>
<tr>
<td>Bahamas</td>
<td>Bermuda</td>
<td>Bonaire</td>
</tr>
<tr>
<td>Barbados</td>
<td>British Virgin Islands*</td>
<td>Saba</td>
</tr>
<tr>
<td>Belize</td>
<td>Cayman Islands</td>
<td>Curacao</td>
</tr>
<tr>
<td>Dominica*</td>
<td>Turks and Caicos Islands</td>
<td>St. Eustatius</td>
</tr>
<tr>
<td>Grenada*</td>
<td></td>
<td>Sint Maarten</td>
</tr>
<tr>
<td>Guyana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montserrat*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saint Lucia*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Kitts and Nevis*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Vincent and the Grenadines*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suriname</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* OECS Member States

Population sizes in CARPHA Member States vary from 1,300 on the island of Saba to over 10 million people in Haiti (Figure 1.2). The total population of the Member States is just over 17 million people. In CARPHA Member States the population growth rate in 2013 ranged from -0.3% in St. Vincent and the Grenadines to 2.2% in the Cayman Islands. In 2012, the average growth rate for the member countries was 1.0% compared to 1.4% in 2008 and 3.3% in 2005.

![Figure 1.2 Map showing population distribution among CARPHA Member States](image)

Population ageing is occurring in almost all countries in the world and has major social and financial consequences. There is clear evidence of this effect in CARPHA Member States when the combined population pyramid from the early 90s is compared to that from two decades later (Figure 1.3). In 2013 the average percentage of persons over 60 years of age was 12.4%, while in 2000 it was 9.9% and by 2025 it is projected to be 16.1%. In 2013, the percentage of people aged 60 years or more ranged from 6.7% in Haiti to 16.9% in Aruba.
Conversely, in the Caribbean Region the percentages of people under 15 years of age, has steadily decreased. In 2013 the average proportion of the population less than 15 years was 25.2%; while in 2000, it was 29.5%. Birth rates and death rates in CARPHA Member States have also showed changing trends in the last decade. In 2012, the average crude birth rate was 15.2 per 1,000 population; while in 2003, the average crude death rate was 16.7 per 1,000 population. Throughout the Region, there has been a general decreasing trend with the exception of Montserrat which showed an increased birth rate in 2012 (see Figure 1.4). The crude death rate for CARPHA Member States showed a decreasing trend over the ten year period 2003-2013 (see Figure 1.5). In CARPHA Member States the average crude death rate for 2012 was 6.6 per 1,000 population compared to 7.2 per 1,000 population in 2003. The crude death rate for 2012 ranged from 3.0 per 1,000 population in the Turks and Caicos Islands to 8.7 per 1,000 population in Haiti (PAHO/WHO, 2013). Barbados and Trinidad and Tobago also showed high rates with crude death rates of 8.4 per 1,000 population and 8.2 per 1,000 population, respectively.

Overall, life expectancy at birth for CARPHA Member States has steadily improved over the period 2003-2012 (see Table 1.2). In 2013, life expectancy for CARPHA Member States ranged from 63.1 years in Haiti to 81.1 years in Anguilla, up from 58.4 and 79.5 respectively.

In terms of economic and social development, most CARPHA Member States have a high Human Development Index (HDI). Belize, Suriname and Guyana, the three mainland countries, have a medium HDI, Haiti has a low HDI while Barbados is the only CARPHA Member State with a very high HDI.

The Caribbean is heavily tourism-dependent with an estimated 25.1 million tourists visiting the Region in 2013. In the same year, the cruise industry brought a further 21.8 million passengers to the Region. This movement of persons through the Region has important economic, cultural, environmental and public health implications.
1.1.2 Migration

Migration is an integral part of life of the Caribbean people. This is influenced by trends in global and regional socio-economic developments. Within the last ten years, migration patterns have evolved, mainly due to factors such as education (scholarships/non-scholarships), job mobility, business prospects and family security.

The dynamics of migration encompass the interaction of global, regional and national conditions. Global events affect the economic stability of a country whereby manipulating labour selection and legislation. Regional events affect the countries at a national level with an increase in migration of persons across borders. In turn, these events impact economic, social, demographic and political factors, thus influencing the economic and social benefits and opportunities for people to access.

In the Caribbean, there are two types of migration— intra- and extra-regional; both are based on the characteristics of job mobility, age and sex and education within the Region and internationally. Job mobility within the region affords migrants with socio-economic benefits of the host country, migrants that are highly skilled move towards specific occupational categories that encourages economic growth and this is reflected in the host country economic growth sectors. The distribution of age and sex with intra-regional migrants reflects the varied reasons which determined their migration in the first place. As the nature of the migration streams show, many of the major movements in the Region occurred prior to 1980, indicating relatively stable and, therefore, mature migrant population profiles.

The distribution by sex also varies from one country to another, depending on the initial occupational selectivity of the migrants. Notably, there is no major gender imbalance in any of the populations. The levels of education of migrants within the Region are either higher or more skilled than the population that they have left and the one they have entered into. This indicates that the proportion of migrants to nationals that has tertiary education is higher.

The migration to extra-regional areas of the Caribbean correlated to the ageing population and the demand for skilled and unskilled labour with higher wage incentives were the major influence that pushed workers to migrate to the US, UK and Canada in order to seek new opportunities.

Intra-regional and extra-regional migrants are neither based on the least educated of the society nor the poorest and least employable, reinforcing the observation that international migration is a 'selection of the fittest'.

Intra- and extra-regional migration has become a highly selective process in all aspects and at all locations both in the originating country and the selected migrant destination. Due to this, the Caribbean countries have lost an inordinate amount of educated and skilled persons through migration, and this has had a negative impact upon small, developing Caribbean countries. The migration of persons, internally and externally, within or from a region affects the Caribbean States in a multitude of ways as mentioned below:

- The main migration effect is the loss of skilled persons from any Caribbean State, resulting in the need to find qualified persons to fill occupational gaps. In cases like this, migrants from other parts of the region or outside the region are chosen. This trend is expected to continue in the future, given the ageing populations and the skill gaps that have been projected by developed countries.
- Better remuneration packages for the skill levels and socio-economic class of migrants are being sought after, due to their desired lifestyle and the way their incomes are disposed. This is the key factors that influence migrants.
- As both intra-regional and extra-regional migration continually increases, many employers are seeking to utilize cheaper labour from abroad. Very often these migrants will come from an informal economy.

In conclusion, migration patterns in the Caribbean region do not happen in isolation, but is dependent on migratory factors. Given the fact that there are economic and social development gaps that exist with the sending and receiving countries, migration will continue intra- and extra-regionally to destinations that provide the migrants with job sustainability/mobility, education, business prospects and family security.

1.2 Socio-Economic Profile

This section presents an overview of the socio-economic profile of CARPHA Member States. A review of the relative performance of the countries as measured by per capita Gross Domestic Product (GDP), as well as the overall performance of their economies as measured by real GDP is provided. The structure of Caribbean economies is examined and this shows marked variations in reliance on agriculture, services and manufacturing sectors across countries. Other socio-economic indices such as primary school enrollment and literacy rates, access to potable water, urbanization and the overall human development index are also discussed.

1.2.1 Gross Domestic Product (GDP) Per Capita

GDP is the total amount of gross value, from all resident producers within a country economy, in the value of products. As seen in Figure 1.6, the overall GDP per capita for 2012, declined from that in 2006 for several CARPHA Member States, with the exception of Antigua and Barbuda and the Bahamas.

Figure 1.6 Change in GDP per Capita from 2006 to 2012 Selected CARPHA Member States

Source: CARICOM, n.d.
Real GDP

Real GDP is an inflation-adjusted economic measure that reflects the value of all goods and services that are produced within a given year. Real GDP growth is used to measure how fast the country’s economy is growing. When a country’s economic diversity is expanding, there is positive growth in business, jobs and personal income. This is an important indicator of economic health and a positive real GDP growth rate is indicative of economic growth.

When the real GDP growth rate in 2012 was compared to that of 2006, it was noted that the growth declined in several CMS, with the exception of Grenada (Figure 1.7).

Figure 1.7 Change in Real GDP Growth from 2006 to 2012 Selected CARPHA Member States

Source: CARICOM, n.d.

Gross National Income (GNI) Per Capita

Gross National Income (GNI) is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. This indicator is used to measure incomes received by a country from both domestic and overseas sources. GNI per capita is calculated by dividing the GNI by the mid-year population. GNI per capita, based on purchasing power parity (PPP), is used to reflect the standard of living for the population.

GNI per capita for CARPHA Member States in 2011 showed an increase when compared to 2006 for Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines (Figure 1.8). For Belize, GNI per capita decreased in 2011, when compared to 2006.

Figure 1.8 Change in Gross National Income (GNI) per Capita from 2006 to 2012 Selected CARPHA Member States

Source: WHO, 2014

Structure of GDP

The percentage (%) contribution to GDP by agriculture, mining and quarry, manufacturing and services in 2010 was compared to that reported in 2006.

Agriculture

The percentage contribution to GDP by the agricultural sector in 2010, as compared to that in 2006, varied by country.

Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname and Trinidad and Tobago showed an increase in the percentage contribution to GDP by the agricultural sector in 2010 compared to that of 2006. Conversely, Bahamas, Barbados, Belize, Guyana, Jamaica and Saint Lucia showed a decrease in the percentage contribution to GDP by the agricultural sector in 2010 compared to that of 2006.
Mining and Quarrying

The contribution of the mining and quarrying sector to GDP in 2010, when compared to that of 2006 also varied by country. Antigua and Barbuda, Bahamas, Grenada and Jamaica showed a decline, while Guyana, Suriname and Trinidad and Tobago showed an increase.

Manufacturing

As with other sectors, the contribution to GDP by the manufacturing sector in 2010, compared to that of 2006 varied by country. Bahamas, Barbados, Dominica, Guyana, Jamaica and Saint Lucia showed a decline, while Belize, Dominica, St. Kitts and Nevis, Suriname and Trinidad and Tobago showed an increase. Notably, Trinidad and Tobago reported the largest increase.

Services

As with other sectors, the contribution to GDP by the manufacturing sector in 2010, compared to that of 2006 varied by country. Antigua and Barbuda, the Bahamas, Barbados, Grenada and Trinidad and Tobago showed a decline in services, while Belize, Guyana, Jamaica, Saint Lucia and Suriname showed an increase.
The annual percentage change in the Consumer Price Index (CPI) is a measure of inflation. In 2009, Jamaica reported an annual average inflation rate of 10.2%, the highest within the Region, followed by Trinidad and Tobago with 7.2%. In 2010, the inflation rate in Jamaica increased to 11.7% while in Trinidad and Tobago it increased to 10.6%. In general, inflation rates increased across the Region in 2010; however in the Bahamas, Montserrat and St. Kitts and Nevis inflation rates fell below the rates reported for 2009.

Debt Service Ratio

Debt service ratio is the ratio of debt service payments made by or due from a country to that country’s export earnings. The ratio of debt service is calculated by using the interest and principal payments due during a year, which is expressed as a percentage of exports, in the form of goods and services, for that year. The debt service ratio is a key indicator of a country’s debt burden.

As illustrated in Figure 1.13, in 2009, the debt service ratio for St. Vincent and the Grenadines was the highest while Dominica and Belize ranked the second and third highest, respectively. In 2009, Trinidad and Tobago and Suriname had the lowest debt service ratios within the Region. In 2010, the debt service ratio increased in Dominica and St. Vincent and the Grenadines. However, Belize’s debt service ratio decreased.

1.2.2 Health Expenditure Data for CARPHA Member States

Table 1.3 shows the total health expenditure as a percentage of GDP for CARPHA Member States, for 2000, 2005, 2010 and 2012. This is an indicator of CARPHA Member States commitment to health.

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Health Expenditure as a percentage of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>4.8</td>
</tr>
<tr>
<td>Bahamas</td>
<td>5.2</td>
</tr>
<tr>
<td>Barbados</td>
<td>6.3</td>
</tr>
<tr>
<td>Belize</td>
<td>4.0</td>
</tr>
<tr>
<td>Dominica</td>
<td>4.9</td>
</tr>
<tr>
<td>Grenada</td>
<td>6.6</td>
</tr>
<tr>
<td>Guyana</td>
<td>5.8</td>
</tr>
<tr>
<td>Haiti</td>
<td>6.1</td>
</tr>
<tr>
<td>Jamaica</td>
<td>5.5</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>4.7</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>5.8</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>3.7</td>
</tr>
<tr>
<td>Suriname</td>
<td>8.7</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td><strong>5.4</strong></td>
</tr>
</tbody>
</table>

The Commonwealth of the Bahamas, followed by Barbados had the highest per capita health expenditure for 2011, while Haiti had the lowest expenditure (Table 1.4).

<table>
<thead>
<tr>
<th>Country</th>
<th>National Health expenditure per capita (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua</td>
<td>724</td>
</tr>
<tr>
<td>Bahamas</td>
<td>1642</td>
</tr>
<tr>
<td>Barbados</td>
<td>1036</td>
</tr>
<tr>
<td>Belize</td>
<td>246</td>
</tr>
<tr>
<td>Dominica</td>
<td>418</td>
</tr>
<tr>
<td>Grenada</td>
<td>464</td>
</tr>
<tr>
<td>Guyana</td>
<td>232</td>
</tr>
<tr>
<td>Haiti</td>
<td>77</td>
</tr>
<tr>
<td>Jamaica</td>
<td>280</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>808</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>546</td>
</tr>
<tr>
<td>St. Vincent</td>
<td>309</td>
</tr>
<tr>
<td>Suriname</td>
<td>501</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>892</td>
</tr>
</tbody>
</table>

Source: PAHO, 2012

For most countries, government health expenditure (GHE) exceeded private health expenditure (PHE), as most nationals and residents avail themselves of primary and secondary/tertiary public health services (Table 1.5). The notable exception was Haiti where substantially more is spent on private health. Several factors influence the choice of and expenditure on public over private services – availability, accessibility, quality of and confidence in the public services as well as the amount of disposable household income available for health expenses. Also noted is the reversal of public/private health expenditure in St. Kitts and Nevis between 2000 and 2012.

<table>
<thead>
<tr>
<th>Country</th>
<th>Government Health Expenditure as a percentage of Total Health Expenditure (%)</th>
<th>Private Health Expenditure as a percentage of Total Health Expenditure (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>69.0</td>
<td>67.4</td>
</tr>
<tr>
<td>Bahamas</td>
<td>48.1</td>
<td>50.1</td>
</tr>
<tr>
<td>Barbados</td>
<td>65.8</td>
<td>63.5</td>
</tr>
<tr>
<td>Belize</td>
<td>52.1</td>
<td>56.4</td>
</tr>
<tr>
<td>Dominica</td>
<td>69.0</td>
<td>64.5</td>
</tr>
<tr>
<td>Grenada</td>
<td>52.0</td>
<td>65.4</td>
</tr>
<tr>
<td>Guyana</td>
<td>84.7</td>
<td>83.6</td>
</tr>
<tr>
<td>Haiti</td>
<td>27.7</td>
<td>51.3</td>
</tr>
<tr>
<td>Jamaica</td>
<td>52.6</td>
<td>48.8</td>
</tr>
<tr>
<td>St. Kitts and Nevis</td>
<td>60.4</td>
<td>63.1</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>54.0</td>
<td>56.2</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>82.2</td>
<td>62.9</td>
</tr>
<tr>
<td>Suriname</td>
<td>53.4</td>
<td>47.1</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>43.0</td>
<td>53.7</td>
</tr>
<tr>
<td><strong>AVERAGE</strong></td>
<td>58.1</td>
<td>59.6</td>
</tr>
</tbody>
</table>

Source: WHO, 2014

Altogether, the GDP, the debt service ratio and GNI are all reflections of the financial health of a country and its residents. The latter statistic indicates what proportion of residents may have the finances to purchase the health services that they desire. By describing the country’s ability to generate sufficient revenue to provide services and pay its debts, the former indicators indirectly speak to whether or not a country may have the resources needed to provide health services of reasonable quality. CMSs spent between 55 and 8% of GDP on health during the period 2010-2012, the exception being Haiti which spent 10%.

**Net Primary School Enrolment Rate**

Net primary school enrolment rate (NER) is the ratio of children of official school age who are enrolled in school to the entire population of similar aged children, expressed as a percentage. NER is an important indicator of the number of children that have access to education.

NER was found for twelve CARPHA Member States (Figure 1.14). For the period 2006 - 2012, female enrolment rates were higher than males, with the exception of Antigua and Barbuda and Trinidad and Tobago. Guyana had the lowest enrolment rate for males and females for the period under review.

**Literacy rate among adults aged 15 years and older, 2006-2012**

The United Nations defines literacy as the ability to read and write and to understand simple statements. The level of literacy and educational advancement is an important indicator of social development. The literacy rate is the ratio of the number of literate persons aged 15 years and over to the corresponding age group population, expressed as a percentage.

A high level of education influences the process of modernisation, while affecting demographic behaviour concerning marriage, fertility, mortality, migration and participation in the labour force.

Table 1.6 indicates the reported literacy rates among adults aged 15 years and older for the period 2006-2012 for six CARPHA Member States. Adult literacy rates for persons aged 15 years and older varied by country with Haiti having the lowest literacy rate (49%) and Trinidad and Tobago having the highest literacy rate (99%).
Table 1.6 Literacy Rates Among Adults 15 years and older, for Select CARPHA Member States

<table>
<thead>
<tr>
<th>Country</th>
<th>Literacy Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>99</td>
</tr>
<tr>
<td>Guyana</td>
<td>85</td>
</tr>
<tr>
<td>Jamaica</td>
<td>87</td>
</tr>
<tr>
<td>Haiti</td>
<td>49</td>
</tr>
<tr>
<td>Suriname</td>
<td>95</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>99</td>
</tr>
</tbody>
</table>

Source: WHO, 2014

Percentage of Population Living in Urban Areas, 2006 and 2012

In 2012, CARPHA Member States, Antigua and Barbuda, the Bahamas, Barbados, Belize, Saint Lucia and Suriname, showed a decline in the population living in urban areas, compared to 2006, while Grenada, Haiti, St. Vincent and the Grenadines and Trinidad and Tobago showed an increase. Guyana showed no change over that time period.

Figure 1.15 illustrates the percentage of the population living in urban areas in 2006 and in 2012 for fourteen CARPHA Member States.

Figure 1.15 Percentage Population Living in Urban Areas in Selected CARPHA Member States 2006 and 2012

Human Development Index

In 2012 the United Nations Development Programme (UNDP) produced a Caribbean Human Development report for fourteen CARICOM member countries, and calculated the human development index (HDI) for those countries. UNDP defined HDI as the “average composite measure of human development based on a country’s performance in three basic dimensions of human development: long and healthy life, access to knowledge, and a decent standard of living.”

The indicators used for the three dimensions were life expectancy in years, mean years of schooling and GNI per capita. Based on the HDI values, countries are then grouped into either one of the four categories: Very High HDI, High HDI, Medium HDI and Low HDI (Table 1.7).

Most CARICOM member countries fell into the category of high HDI while Guyana fell into the category of medium HDI and Haiti low HDI (PAHO and CARICOM, 2006).

Table 1.7 Human Development Index Dimensions Grouped for CARPHA Member States and Comparison Countries

Population with access to improved drinking water source

Within the Caribbean region, there are two primary sources of water which are accessible by each country: ground and surface.

Forested and mountainous countries, such as the volcanic countries, have enough rainfall and rivers with tributaries that they can rely on, and in dryer areas, these surface water sources can be supplemented by aquifers. Countries that are limestone in nature and have flat terrain, such as Anguilla, Antigua and Barbuda, Bahamas, Barbados, Bermuda and Cayman Islands, are more stressed for water. Such countries are dependent on desalination and rainfall to meet their demands.

In 2012, the World Health Organization noted that pipe borne water on premises is relatively high in the Caribbean region with the exception of Haiti. Haiti had infrastructural damage to its water and sanitation systems in 2012 following a large earthquake.

Between 2006 and 2012, increases in percentages of population using improved drinking water were marginal, except for Saint Lucia which decreased slightly (Figure 1.16).

Figure 1.16 Comparison of the Percentage of Population Using Improved Drinking Water in Selected CARPHA Member States, 2006 and 2012

Population with access to improved sanitation facilities

An improved sanitation facility is defined as one that hygienically separates human excreta from human contact. Improved sanitation facilities include the use of flush toilet, connection to a piped sewer system, connection to a septic tank, pit latrine (closed with slab) and composting toilets. Figure 1.17 shows the percentage of the population using improved sanitation facilities for selected CARPHA Member States in 2006 and in 2012. Percentages of the population with access to improved sanitation facilities increased from 2006 to 2012 for Grenada, Guyana and Haiti, while they declined for Bahamas, Jamaica and Suriname.

Figure 1.17 Comparison of the Percentage (%) of Population Using Improved Sanitation Facilities in Selected CARPHA Member States 2006 and 2012

1.3 Mortality – Leading Causes of Death

1.3.1 Leading Causes of Death in CARPHA Member States (CMS)

Cause of death data represent a longstanding source for health-related information at the national and regional level in the Caribbean. The use of cause of death data to inform and evaluate national and regional public health policies and programmes has enormous potential, as these data can also be used to monitor trends over time within countries and to make comparisons between countries and regions. Such data also play a key role in estimating the burden of premature death due to diseases and provide a useful indicator of the general health of the population.

CMS report annual cause of death data to CARPHA. These data are typically presented by age, gender and underlying cause of death (UC). The UC refers to the disease that started the train of morbid events leading directly to death or the circumstances of the incident (the external cause) that produced the fatal injury. The UC is considered to be the primary target for disease prevention and control.

The top ten leading causes of death for the English and Dutch speaking Caribbean for the period 2000-2012 are presented below. Data for Haiti are presented separately as they are only available sub-nationally and for a limited time period.

1.3.2 Conditions Causing Death in the English and Dutch-speaking Caribbean, 2000-2012

During the 13-year period 2000-2012, 475,652 deaths were reported from 21 English and Dutch-speaking Caribbean countries. Of these the majority occurred among males (54.4%). For deaths in all age groups, except those aged 65 years and older, there were equal or more male deaths than female (Figure 1.18).
During this millennium, non-communicable diseases were the leading causes of death in the English and Dutch-speaking Caribbean, replacing communicable diseases which were responsible for most mortality and morbidity in the 1980’s and earlier (Figure 1.19). This figure shows the growing contribution of injuries to mortality over the review period.

During the period 2000-2012, the 5 leading causes of death, were non-communicable diseases (NCDs) the top three of which were cerebrovascular disease, diabetes mellitus and ischaemic heart disease (Figure 1.20). Other cardiovascular diseases and hypertensive heart disease ranked fourth and fifth respectively.

The improvements made in treatment and care for HIV/AIDS are reflected in the decreasing trend in deaths due to this cause. Formerly the sixth leading cause of death from 2000-2006, HIV/AIDS was the ninth leading cause of death in 2012.

Malignant neoplasms collectively contributed significantly to mortality with proportional mortality rates that ranged from 7.4% in Guyana in 2006 to 30.1% in Bermuda in 2009. By site, prostate cancer was the only malignant neoplasm that ranked in the top ten causes of death. There was a slight increase in trend for deaths from lower respiratory infections which ranked in the 7th–9th position over the period 2000-2007 but was the sixth leading cause of death from 2008-2012.

Other digestive diseases were consistently the tenth leading cause of death over the reporting period, except in 2010 where it ranked as the 8th leading cause of death.

A review of leading causes of death by country provides useful insight into the national situation. Table 1.8 gives the top three leading causes of death by country, using the most recent year of available data.
Consistent with the regional profile, non-communicable diseases accounted for the top three leading causes of death in the majority of English and Dutch-speaking Caribbean countries. However, injuries, both unintentional and intentional, factored into the top three leading causes of death for four countries, namely Belize, British Virgin Islands (BVI), Jamaica and Turks and Caicos. HIV/AIDS in Belize in 2012 and lower respiratory infections in Bermuda in 2010 were the only instances of communicable diseases among the three leading causes of death.

These data highlight the need for country-specific interventions and targeted programmes to address diseases and injuries which are disproportionately affecting countries within the Region.

Investigating cause of death data by age group and gender also provides key information to inform interventions and policies (Figure 1.21).

**Table 1.8 Top Three Leading Causes of Death by Country, for the English- and Dutch-Speaking Caribbean, Using the Most Recent Year of Available Data**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Top 3 leading causes of death*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>2012</td>
<td>Diabetes Mellitus, Hypertensive Heart Disease, Other Cardiovascular Diseases</td>
</tr>
<tr>
<td>Antigua &amp; Barbuda</td>
<td>2012</td>
<td>Other Cardiovascular Diseases, Ischemic Heart Disease, Diabetes Mellitus</td>
</tr>
<tr>
<td>Aruba</td>
<td>2012</td>
<td>Other Cardiovascular Diseases, Cerebrovascular Disease, Ischemic Heart Disease</td>
</tr>
<tr>
<td>Bahamas</td>
<td>2012</td>
<td>Hypertensive Heart Disease, Ischemic Heart Disease, Other Cardiovascular Diseases</td>
</tr>
<tr>
<td>Barbados</td>
<td>2011</td>
<td>Cerebrovascular Disease, Diabetes Mellitus, Other Cardiovascular Diseases</td>
</tr>
<tr>
<td>Belize</td>
<td>2012</td>
<td>Diabetes Mellitus, Violence, HIV/AIDS</td>
</tr>
<tr>
<td>Bermuda</td>
<td>2010</td>
<td>Ischemic Heart Disease, Lower Respiratory Infections, Other Cardiovascular Diseases</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>2010</td>
<td>Drownings, Diabetes Mellitus, Ischemic Heart Disease</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>2010</td>
<td>Hypertensive Heart Disease, Other Cardiovascular Diseases, Ischemic Heart Disease</td>
</tr>
<tr>
<td>Curacao</td>
<td>2009</td>
<td>Other Cardiovascular Diseases, Ischemic Heart Disease, Cerebrovascular Disease</td>
</tr>
<tr>
<td>Dominica</td>
<td>2012</td>
<td>Other Cardiovascular Diseases, Diabetes Mellitus, Cerebrovascular Disease</td>
</tr>
<tr>
<td>Grenada</td>
<td>2012</td>
<td>Cerebrovascular Disease, Diabetes Mellitus, Ischemic Heart Disease</td>
</tr>
<tr>
<td>Guyana</td>
<td>2011</td>
<td>Cerebrovascular Disease, Ischemic Heart Disease, Diabetes Mellitus</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2008</td>
<td>Cerebrovascular Disease, Diabetes Mellitus, Violence</td>
</tr>
<tr>
<td>Montserrat</td>
<td>2012</td>
<td>Diabetes Mellitus, Hypertensive Heart Disease, Ischemic Heart Disease</td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td>2012</td>
<td>Cerebrovascular Disease, Diabetes Mellitus, Ischemic Heart Disease</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>2012</td>
<td>Cerebrovascular Disease, Diabetes Mellitus, Hypertensive Heart Disease</td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td>2012</td>
<td>Ischemic Heart Disease, Diabetes Mellitus, Cerebrovascular Disease</td>
</tr>
<tr>
<td>Suriname</td>
<td>2012</td>
<td>Cerebrovascular Disease, Ischemic Heart Disease, Diabetes Mellitus</td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td>2009</td>
<td>Ischemic Heart Disease, Diabetes Mellitus, Cerebrovascular Disease</td>
</tr>
<tr>
<td>Turks &amp; Caicos Islands</td>
<td>2009</td>
<td>Other unintentional injuries, Other Cardiovascular Diseases, Hypertensive Heart Disease</td>
</tr>
</tbody>
</table>

* Excluding Symptoms, Signs and Ill-Defined Conditions

Classification of conditions: Non-communicable diseases, Communicable diseases, Injuries

**Figure 1.21 Causes of Death Data by Age Group and Gender**

Persons less than 1 year

- Pneumonia and Low Birth Weight
- Neonatal Infections and Other Conditions
- Birth Asphyxia and Birth Trauma
- Other Congenital Anomalies
- Congenital Heart Anomaly
- Lower Respiratory Infections
- Diarrhoeal Diseases
- Other Infectious Diseases
- HIV/AIDS
- Other unintentional injuries

- 0%
- 2%
- 4%
- 6%
- 8%
- 10%
- 12%
- 14% Percentage of total deaths among persons <1 year

- Babies
- Peces
Among infants less than 1 year of age, the largest proportion of deaths were due to prematurity and low birth weight (22.0%), followed by neonatal infections and other conditions (17.6%) and birth asphyxia and birth trauma (12.3%). Congenital heart anomaly and other congenital anomalies ranked as the 4th and 5th leading causes of death respectively, followed by lower respiratory infections, diarrhoeal diseases, other infectious diseases and HIV/AIDS. Other unintentional injuries ranked as the tenth leading cause of death in infants.

Deaths among children 1 - 4 years of age were dominated by infectious diseases with HIV/AIDS being the leading cause of death, accounting for 6.5% of deaths. This was followed by congenital anomalies, lower respiratory infections, epilepsy and diarrhoeal diseases. Drowning was the 10th leading cause of death among children and this was far more common among boys.

Road traffic accidents were the leading cause of death for both males and females among those aged 5-14 years, accounting for 10.8% of all deaths in this age grouping. Among males, drowning, epilepsy, other unintentional injuries and violence were the next ranked causes, whereas for females, they were epilepsy, HIV/AIDS, endocrine disorders and other malignant neoplasms.

Among males aged 15-24 years, assaults (17.0%) followed by road traffic accidents (8.4%), self-inflicted injuries (4.4%) and other unintentional injuries (4.3%) were the leading causes of death. Among females in this age group, the leading cause of death was HIV/AIDS (4.2%), followed by road traffic accidents (2.3%), assaults (2.2%) and self-inflicted injuries (2.2%).

HIV/AIDS was the leading cause of death among those aged 25-64 years (9.3%). Among males this was followed by ischemic heart disease (5.8%), assaults (4.4%), diabetes mellitus (4.3%), cerebrovascular disease (3.7%) and road traffic accidents (2.5%). However, among females, the leading cause of death was diabetes mellitus (4.5%), followed by HIV/AIDS (3.4%), ischemic heart disease (2.9%), cerebrovascular disease (2.8%) and breast cancer (2.4%).

As expected, non-communicable diseases were the most frequently occurring causes of death among persons 65 years and older. Cerebrovascular disease (14.0%), diabetes mellitus (11.9%) and ischemic heart disease (11.5%) were the three leading causes of death in this age group. Among males, these were followed by prostate cancer, other cardiovascular diseases and hypertensive heart disease, while among females other cardiovascular diseases, hypertensive heart disease and lower respiratory infections were the next ranked leading causes of death.
1.3.3 Conditions Causing Death in Haiti

As noted previously, national cause of death data are not readily available for Haiti. PAHO estimates that the average annual deaths over the period 2000-2012 has steadily declined from roughly 94,000 to just over 88,300 (Figure 1.22).

Sub-national cause of death data for Haiti were available for the years 1997, 1999 and 2001-2004. Data available represents less than 10% of the estimated number of deaths and therefore can provide interesting information, but, should not be considered representative of the entire population.

The age and gender distribution among deaths reported for the period under review was consistent across the reporting years (Figures 1.23 and 1.24). Equal numbers of deaths were reported among males and females in 1997, 1999 and 2001. In 2002, slightly fewer deaths among males were reported, while in 2003 and 2004 more female deaths were reported than male deaths.
The age breakdown of deaths in Haiti is markedly different from that of the English- and Dutch-speaking Caribbean (Figure 1.24). For the period 2000-2012, for the English- and Dutch-speaking Caribbean, over three-quarters of deaths are among persons 45 years or older; whereas in Haiti, for the years under review, less than 50% of deaths were among persons older than 45 years of age. Additionally, the proportion of deaths among persons less than 1 year of age in Haiti in 1997 was almost three times that of the English- and Dutch-speaking Caribbean (2000-2012).

A review of the conditions causing death in Haiti also reveals important differences between Haiti and the English- and Dutch-speaking Caribbean (Figure 1.25). Overall, communicable diseases and non-communicable diseases account for roughly equal proportions of deaths, with a substantial proportion of deaths attributed to ill-defined causes.

Reviewing the data available for the 6 years, the top fifteen leading causes of death in Haiti are presented in Figure 1.26. HIV/AIDS and diarrhoeal diseases account for the top two leading causes of death, accounting for 12% of all deaths. This is followed by a mixture of non-communicable diseases, communicable diseases and injuries.
1.3.4 Challenges and Limitations

The importance and extensive usefulness of cause of death data should not be undervalued because of its limitations. However, in the interpretation and use of such data, these limitations must be taken into account.

The quality, timeliness and coverage of national cause of death data are influenced by several factors, including the collection, registration and processing practices of data at the national level, the degree of completion of medical cause of death certificates by certifying physicians and the mortality coding practices used. Such factors are further impacted by limited resources, high staff turnover with little succession planning, and dated legislation that governs the registration of deaths.

National systems vary from country to country and over time and can result in data that do not represent 100% of all deaths or include death records with causes that are uninformative or ill-defined.

1.3.5 CARPHA’s Role

CARPHA continues to provide technical support to strengthen national mortality surveillance systems to all CMS.

National mortality data submitted to CARPHA are validated, in conjunction with Member States, to ensure that the reported causes of death are appropriate and valid for their age and gender. CARPHA also provides training for mortality coders in both manual and automated ICD-10 mortality coding and underlying cause of death selection. Training is also provided to certifying physicians on the importance of the medical cause of death certificate and on the correct technique for completion of these certificates. CARPHA continues to develop and maintain a cause of death data capture and reporting software for country use to encourage best data handling and processing practices. Furthermore, CARPHA conducts routine assessments of national mortality surveillance systems to evaluate existing systems and make recommendations for improvements. Coded and processed national cause of death data are also routinely audited by CARPHA to ensure correct coding practices and adherence to international coding rules and guidelines.

From the regional perspective, CARPHA continues to maintain a regional repository of national cause of death data and to produce routine, useful regional and sub-regional reports and information products. Furthermore, CARPHA represents the Caribbean region in regional and international forums, such as the Latin American and the Caribbean Network to Strengthen Health Information Systems (RELACSIS) and the WHO Family of International Classifications (WHO-FIC) Network.

References

- Ferguson, K. Migration in the Caribbean: Haiti, the Dominican Republic and Beyond. Available online at http://www.oas.org/atip/regional%20reports/migrationintheCaribbean.pdf
- Kairi Consultants LTD, Human mobility in the Caribbean: Circulation of skills and immigration from the South
- Pan America Health Organization, 2012. Health in the Americas. s.l.s.n.
- Pienkos, Andrew: Caribbean labour migration: Minimizing losses and optimizing benefits
- Thomas-Hope, E. Regional Special Topic Monograph on International Migration
• World Health Organization, (2013). (Online) Available at: http://apps.who.int/nha/database

Section 2
COMMUNICABLE DISEASES
2.1 Diseases of Endemic Potential

2.1.1 Vector-borne Diseases

Vector-borne diseases are infectious diseases that usually do not transmit from individual to individual directly but need to go through an additional organism which is called a vector. The vector, which is well adapted to transmit specific diseases, may be ticks, sand flies or biting midges but by far the most important group of arthropods for transmitting infections are mosquitoes. Vector-borne diseases are an important cause of illness in the world today especially in the tropical and subtropical regions and are estimated to account for 17% of the estimated global burden of all infectious diseases. Malaria which is spread by the Anopheles mosquito infects over 200 million persons per year and causes 600 thousand deaths every year primarily in Africa. Dengue fever which is transmitted by the *Aedes aegypti* mosquito infects 390 million people worldwide and has become well established in the Caribbean and the Americas. It is the world’s fastest growing vector-borne disease with a 30-fold increase in disease incidence over the last 50 years.

Without effective vaccines the only way to prevent infection by vector-borne diseases is to prevent contact with the mosquito by use of personal protection or the reduction of the mosquito vector through the implementation of effective vector control programmes on a community basis to reduce vector populations to a level where transmission cannot be continued.

2.1.1.1 Chikungunya

Chikungunya fever is a new emerging mosquito-borne disease in the Caribbean caused by the Alphavirus Chikungunya virus (CHIKV). This disease is transmitted by *Aedes aegypti* in the Caribbean due to absence of *Aedes albopictus*. Prior to 2013, Chikungunya outbreaks had been identified in countries in Africa, Asia, Europe, and the Indian and Pacific Oceans which also resulted in nine imported cases detected in the French territories in the Americas, three in Martinique, three in Guadeloupe and three in French Guyana. In December 2013 the first locally acquired transmission of Chikungunya was detected in Saint Martin in the Caribbean and it soon spread throughout many countries in the Caribbean due to the universal lack of immunity to this new virus by the Caribbean population and also due to the abundant presence of the mosquito vector.

2.1.1.2 Dengue

Dengue, described as the most important arthropod-borne viral disease, continues to pose a serious problem in the Caribbean Region. During 2004-2013, there was a general increase in the reported numbers of dengue cases with 43,770 dengue cases reported from the English-and Dutch-speaking CARPHA Member States (Figure 2.1). The largest number of reported cases during 2004-2013 was from Trinidad and Tobago (8,203) followed by Belize (6323). In 2012 and 2013, Trinidad and Tobago accounted for 75% and 50% of the total number of reported dengue cases from the English-and Dutch-speaking CARPHA Member States. During the same period, 956 cases of Dengue haemorrhagic fever/Dengue shock syndrome (DHF/DSS) were reported, with the majority of cases reported from Suriname (492) followed by Belize (243) which accounted for 51% and 25% of the reported cases, respectively.
Between 2007 and 2013, the gender ratio of reported Dengue cases was approximately 1:1 with 10,945 males and 11,399 females affected (Figure 2.2). A similar distribution was reported for cases of DHF/DSS syndrome with 373 and 304 reported cases respectively. The majority of reported cases of Dengue and DHF/DSS were within the 25 - 44 year age group with 6,565 and 188 cases respectively (Figure 2.3). The number of deaths attributed to Dengue between 2004 and 2013 was 78, with the highest number (29) reported in 2008.

All Dengue serotypes (DEN-1, DEN-2, DEN-3, and DEN-4) were identified in the English-and Dutch-speaking Caribbean during the period 2004-2013 (Figure 2.4). The Turks and Caicos Islands was the only country which reported one serotype in circulation (DEN-1); eight countries had a situation of hyperendemicity with all four serotypes reported. During the last 5 years, 2009-2013, DEN-1 and DEN-2 were the most dominant serotypes identified with 10 and 12 countries, respectively, reporting circulation of both serotypes in 2010 (Table 2.1). DEN-1 and DEN-4 were the predominant serotypes identified in 2011 while DEN-1 and DEN-4 were the main serotypes identified in 2012 and 2013, respectively. DEN-3 was reported in a few countries in 2009 and 2010 but since 2011 has not been reported. This has implications for more severe outbreaks when DEN-3 reappears since a population which is susceptible to DEN-3 is being built up.
2.1.3 Malaria

Malaria was eradicated from most of the Caribbean when global eradication efforts were undertaken in the 1950s and 1960s. However, malaria continues to be endemic in the Dominican Republic and in CMS such as Belize, Haiti, Guyana and Suriname. In 1992, the Global Malaria Strategy was launched because it was recognized that malaria eradication would have been impossible without it or components of it. Subsequently in 1998, the Roll Back Malaria (RBM) Initiative was launched, the goal of which was to reduce the burden of malaria by 50% between 2000 and 2010. The United Nations Millennium Development Goals (MDGs) in its efforts to promote control of malaria further added an additional 25% and established the milestone of a 75% reduction in malaria incidence by 2015.

During the period 2004-2013, although there was a general decrease in the number of indigenous cases of malaria, 231,849 cases were reported from seven English and Dutch-speaking Caribbean territories (Figure 2.5).

The highest numbers of cases reported were from Guyana (192,569), followed by Suriname (35,374) and Belize (3,684). Bahamas, Trinidad and Tobago and the Turks and Caicos Islands reported small numbers of locally transmitted cases (≤16). Jamaica reported an outbreak of malaria in 2006 in which 158 cases were recorded. Between September 2006 and December 2009, 406 cases were confirmed as part of the Jamaica outbreak, all of which were due to *Plasmodium falciparum*. The outbreak was successfully contained as there have been no reported autochthonous cases of malaria reported since 2012.

The major species of *Plasmodium* parasite involved in malaria transmission in Belize and Suriname is *Plasmodium vivax*, while in Guyana and Haiti, *Plasmodium falciparum* accounted for the majority of confirmed cases. The main mosquito vectors in Belize are *Anopheles albimanus* and *Anopheles darlingi*; in Guyana, *Anopheles aquasalis* and *Anopheles darlingi*; in Haiti and Jamaica *Anopheles albimanus* and in Suriname, *Anopheles darlingi*.

All malaria-endemic CMS are in the control phase of their malaria programmes, except Belize, which is the only CMS in the pre-elimination stage (since December 2013) as it is on track for the Roll Back Malaria (RBM) target of a > 75% reduction in malaria incidence from 2000 – 2015. Guyana and Suriname have reported declines in malaria incidence during the last decade, although there was an increase in the incidence of malaria in Guyana from 2000-2012. This is possibly due to a breakdown in the programme and an increase in mining activities. The latter causes ecologic damage that increases breeding sites for the mosquito and may result in the exposure of susceptible persons.

Haiti reported an increase in the number of malaria cases between 2005 and 2009. However, due to the inconsistency in data reporting, it is not clear if the reported increase is a real increase or due to changes in reporting or diagnostic testing. The *Plasmodium* species in circulation in Haiti is *Plasmodium falciparum* and the major malaria vector is *Anopheles albimanus*.

Control measures for malaria in malaria-endemic CMS involve the use of several strategies which include the distribution of insecticide treated bednets free of charge to all age groups within the populations; larval mosquito control (except in Guyana and Haiti); indoor residual spraying of homes (except Haiti and Suriname). Surveillance oftentimes involves mass screening and malaria diagnosis and treatment is offered free of charge to the public.

Re-emergence of malaria in CMS is possible as evidenced by the 2006 outbreak in Jamaica and the number of imported cases reported each year. Travel between endemic and non-endemic malaria countries, the presence of the Anopheles vectors and the ideal climatic conditions for proliferation of the mosquito vector are
some of the conditions which can contribute to the re-emergence. Vector surveillance and control activities geared towards mapping and treating Anopheles breeding sites along with increased vigilance in malaria surveillance is necessary in order to detect transmission before it becomes established and spreads.

### 2.1.1.4 Leptospirosis

Leptospirosis is a zoonotic disease which is a public health problem in the tropics and subtropics. It is a disease with epidemic potential which has symptoms which can be confused with dengue, malaria or other vector-borne diseases, hence it sometimes underreported or misdiagnosed. Between 2004 and 2013, a total of 4,461 cases of leptospirosis was reported from CMS (Figure 2.6). The highest number of cases was reported in 2005 (1315) but since then there has been a noted decline in the number of reported cases with 273 cases reported in 2013, the lowest number during the ten-year period.

![Figure 2.6 Reported cases of Leptospirosis in the English- and Dutch-speaking Caribbean 2004 - 2013](image)

**2.1.2 Vector-borne Disease Control**

The emergence and re-emergence of major vector-borne diseases such as Dengue and Chikungunya is attributed to several factors which include the ubiquitous presence of the main vector, *Aedes aegypti*. These include unplanned urbanization, inadequate infrastructure, increasing temperatures and changing precipitation patterns, increased travel and susceptible human populations. The lack of adequate facilities and breakdown in the provision of basic services has led to situations in which there is irregular collection of solid waste and unreliable supply of potable water. This has led to the practice of illicit dumping of garbage and the storage of water in drums and barrels for domestic purposes. These practices have resulted in the proliferation of breeding sites for the *Aedes aegypti* mosquito. Control measures targeted at the mosquito vector have largely been ineffective mainly due to the incorrect application of insecticides and the development of resistance to the insecticides commonly used.

The real impact of Dengue on public health is usually felt during outbreaks. This is due to the fact that surveillance in the interepidemic period is oftentimes poor and there are no preparedness or emergency response plans in place. The epidemic is not usually detected or recognized as Dengue until near the peak of transmission. By that time the number of cases can be grossly over reported and the health care facilities swamped with persons displaying a range of symptoms. Emergency mosquito control operations, which are largely based on the use of insecticides, are usually initiated when it is too late and these efforts which are oftentimes misdirected do not have the intended impact. Current entomological indicators which focus on mosquito larval indices are not sensitive enough to predict the transmission threshold required for sustained Dengue transmission.

It has long been realized that the prevention and control of dengue will not be achieved without an integrated approach. In 2009, the Integrated Management Strategy (IMS-Dengue, which was adopted by PAHO in 2003, was introduced in the Caribbean. This strategy is a multi-pronged approach including epidemiology surveillance, communication and health promotion, integrated vector management, laboratory and patient care. The adoption of this strategy in the Caribbean countries will contribute to the strengthening of national dengue prevention and control programmes. It will also contribute to the integration of all sectors, including health, using a multidisciplinary and inter-programmatic approach and the implementation of contingency plans to prevent and control Dengue outbreaks and epidemics.

### 2.1.3 CARPHA Recommendations and Role in Controlling Vector-borne Diseases

Control of vector-borne diseases is difficult under any circumstance but especially if disease transmission is not detected early and effective coordinated control activities initiated immediately. This means that there needs to be constant routine communication between laboratory diagnostic services, epidemiology and those responsible for a coordinated vector control response in order to detect and locate where cases and transmission are first detected and to apply an effective vector control response.

The application of insecticides remains an important part in the control of vector-borne diseases. In order to apply an effective control response one has to ensure that the insecticides are effective. This means conducting routine insecticide resistance testing to ensure that the local vector population is effectively controlled by the insecticides deployed. This can also be accomplished by post application monitoring of control activities and implementing simulated field trials or cage trials to ensure that the mosquitoes were killed by the control activities and that the insecticides are effective.

Training of staff and supervisors in the safe use, calibration and proper application of insecticides will ensure that insecticides act effectively.

Most vector control programmes have few staff and many houses and locations that require inspections on a routine basis. If every house is to be inspected, inspection of all of the houses may take months to a year to complete. Keeping accurate records in a georeferenced database will assist in determining priority areas for control activities. Using the same database to record when and where cases were reported and transmission is occurring will assist in focusing control efforts. Multi-year review of the information collected may permit prioritization of areas that are repeat problem areas. Reporting (including year-end reviews and analyses) will assist in preparing for the next transmission season.

In addition all vector control programmes are faced with the reality that they cannot control the vector population without strong support by the community who need to do their part in eliminating sources of mosquitoes in and around their homes and places of business. Programme messages such as inspecting ones premises and the vacant lots around for 10 minutes once a week every week in order to prevent yards from producing mosquitoes can be very effective in reducing the risk of vector-borne disease transmission in one’s neighbourhood.

CARPHA remains available to provide training and support to national vector-borne disease control programmes to ensure that vector control is conducted safely and effectively.
2.2.1 Food Security, Food Safety and Foodborne Diseases

Food safety is a global priority and an important public health issue since foodborne diseases (FBD) are a major cause of morbidity, mortality and economic burden worldwide. The frequency of FBD outbreaks and their consequences on health and trade have alerted countries to the need to improve food safety programs and review the measures established for the prevention and control of FBD. Increased food production, globalisation, travel and trade, more frequent food consumption outside the home and the emergence of new or antibiotic-resistant pathogens are increasingly challenging food safety and security.

The World Health Organization (WHO) estimated that in 2005, 1.8 million people died worldwide from diarrheal illness, at least 70% of diarrheal illness is foodborne, and that over 3000 deaths occur daily due to FBD. Developing countries bear the brunt of the problem since they report a higher prevalence of diarrhea and a wide range of FBD, including parasites. FBD is also the leading causes of illness and death in less developed countries, causing 2.2 million deaths/year, 1.9 million of which are children. Recognizing the importance of food safety and FBD as an important cause of illness and death worldwide, the WHO adopted Resolution WHA 53.15 in 2002, establishing food safety and the surveillance prevention and control of FBD as a priority in 2002 and then again in 2010. Similarly, the Pan American Health Organization (PAHO) with responsibility for health in the Americas identified food safety as a priority and included improving food safety as one of its strategic objectives in their 2008-2012 Strategic Plan. FBD are of greater concern today because of the increasing number of large outbreaks reported, multi-jurisdictional outbreaks, new agents causing life-threatening conditions and the globalisation of trade and travel.

More than 250 different types of FBD have been described. However, globally, Salmonella, Norovirus, Clostridium botulinum, Shigella, pathogenic Escherichia coli, Campylobacter, Vibrio cholerae and parasites are the most important agents causing human foodborne illness.

A study in the United States reported that 9.4 million people became ill and 1350 deaths occur/year due to 31 major pathogens. Of these, Norovirus, Salmonella, Clostridium and Campylobacter were the main causes of FBD. The magnitude of FBD is also underestimated since only a fraction (10-15%) is reported and most are of unknown etiology.

Food safety and food security are interrelated concepts with a profound impact on quality of human life and are affected by external factors (Figure 2.7). Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe, nutritious food which meets their dietary needs and food preferences for an active healthy life. It was estimated that there were 925 million people undernourished in 2010. A large part of food security is assuring the food is safe from a chemical, physical or biological hazard. Food safety encompasses the many facets of handling, preparation and storage of food to prevent illness and injury and includes the chemical, microphysical and microbiological aspects of food safety. The increasing numbers of FBD due to microbial contamination of food has made microbiological quality of foods the most important aspect of food safety. Thus, food safety primarily focuses on the control of contamination of foods by pathogens and the reduction of FBD.

![Figure 2.7 Interrelated Concepts of Food Safety and Food Security](https://example.com/figure27.png)

2.2.2 Food Safety and Foodborne Diseases Surveillance in the Caribbean

In the Caribbean, FBD also pose a significant human threat, as reflected by the increasing number of reported cases and outbreaks of acute gastroenteritis (AGE) and FBD pathogens reported to the Caribbean Epidemiology Centre (CAREC) since 1990. In responding to one of the Caribbean Cooperation in Health Initiative priorities, CAREC, in collaboration with PAHO, developed a strategic plan and established the Foodborne Disease Program at CAREC in February 2003. The purpose was to strengthen national and regional capacity to develop and sustain effective integrated, multidisciplinary FBD surveillance, prevention and control systems in the Caribbean. This program promoted and implemented the WHO recommended strategy of a multidisciplinary, intersectoral, farm to table approach to FBD surveillance and food safety, integrating the epidemiological, laboratory, environmental and veterinary aspects of FBD surveillance and response into a coordinated programmatic approach.

Ensuring the safe supply of food in the Caribbean is a complex challenge. The Region is characterized by small populations, varying levels of development, epidemiological and laboratory skills and capacities, intense movement via trade, labour and tourism, and complex health situations. The Caribbean is also the most tourism dependent region in the world with tourism representing 25-65% of the GDP in most countries. Additionally, 70% of the foods consumed are imported from outside the Region. FBD not only affects the health of the Caribbean population, but that of its visitors and has significant economic implications.
2.2.3 Foodborne Disease Trends, Caribbean, 2005-2012

During 2005-2012, reported human FBD pathogens (laboratory-confirmed Salmonella, Shigella, Vibrio, Campylobacter, Escherichia coli, Norovirus and clinically-diagnosed Ciguatera) in the Caribbean increased by 32%, from 1064 cases in 2005 to 1399 in 2012. Non-typhoidal Salmonella was the most common infection (50%), followed by Ciguatera (25%), Shigella (9%), Campylobacter (5%), Typhi (5%) and Norovirus (3.7%) (Figure 2.8). Whilst Salmonella was the most common reported FBD pathogen, from 2010 onwards, there was a decreasing prevalence of this pathogen and an increasing prevalence of Ciguatera, Campylobacter and Norovirus (Figure 2.9). A wider range of FBD pathogens were reported from 2010 onwards. FBD was reported by 17 CMS, however the types and proportion of reported FBD pathogens varied by country.

2.2.3.1 Salmonellosis in the Caribbean, 2005-2012

Non-typhoidal Salmonella was the most commonly reported FBD each year from 2005 to 2012. Salmonellosis was the most commonly reported cause of FBD in the Caribbean in 2005-2012, causing between 43-65% of the infections. Reported Salmonella cases and their proportion to the total reported FBD pathogens increased from 452 cases (43%) in 2005, peaked at 911 (65%) in 2010 and decreased to 43% in 2012. Salmonella cases were reported from 16 countries during 2005-2012, but the majority (>70%) of isolates were from seven countries (Guyana, Barbados, Bahamas, Suriname, Jamaica, Bermuda and Trinidad and Tobago) (Figure 2.10). Marked variations were observed in the temporal trends in CMS.

The finding that Salmonella was the dominant reported cause of FBD in the Caribbean from 2005-2012 is similar to previous trends in the Caribbean and globally since 1990. It confirms that Salmonella infection should be targeted, especially in Guyana, Barbados, Bahamas, Suriname, Jamaica, Bermuda and Trinidad and Tobago. Implementing measures to reduce Salmonella, its sources and risk factors would greatly contribute to reducing FBD infections in the Caribbean. Salmonella can contaminate a wide range of foods including meats, poultry, eggs and produce. Different serotypes tend to have different animal reservoirs and food sources, making control a challenge. Effective measures from farm to table include preventing contamination of meat at slaughter and foods during processing and preparation, cooking meat thoroughly, detecting and investigating outbreaks and recalling contaminated food.

2.2.3.2 Salmonella Serotypes Trends

During 2005-2010, 2173 (60%) of the total 3585 reported Salmonella isolates were differentiated by serotyping by CAREC and CMS. Of these, 146 serotypes were identified. However, 12-15 serotypes consistently accounted for over 75% of all Salmonella serotyped (Figure 2.11). The proportion of Salmonella isolates serotyped varied by year (from a peak of 95% of Salmonella serotyped in 2006, to a low of 38% in 2007) and by CMS from whose isolates were serotyped. Of the 16 CMSs who reported Salmonella during 2005 to 2010, serotyping data was consistently available for Barbados, Jamaica, Suriname, Saint Lucia, Trinidad and Tobago and for Bermuda and Grenada from 2009 onwards. These countries have generally accounted for >70% of reported salmonellosis since 2005. Salmonella serotyping data indicated that Enteritidis (SE) and Typhimurium (ST) were the two most prevalent human serotypes isolated during
The dominance of SE followed by ST has been well documented in the Caribbean, the USA and Europe since 1996. Consequently, measures aimed at reducing infection by these serotypes are warranted to reduce salmonellosis in the region. Our data also suggest that the global pandemic of Enteritidis noted in 1988 (29), is continuing in the Caribbean, facilitated by global changes in technology, trade, travel, food demands and susceptible populations.

SE infections are transmitted to humans through eggs or meat from reservoirs in chickens. Investigations of SE infections in Barbados, Jamaica, Trinidad and Tobago revealed that the consumption of raw and undercooked egg dishes was the main risk factor for acquiring SE infection and practices such as pooling of eggs, inadequate cooking and holding temperatures; and unsanitary farm conditions contributed to the spread of this pathogen (18-20). A ‘farm to table’ approach is recommended for effective prevention and control of Enteritidis. ST is present among many animal species and is most likely to infect humans through contaminated foods of animal origin. ST-specific efforts should especially focus in Barbados since 60-80% of the ST isolates from 2005-2010 were referred from Barbados and it is their most common serotype. The proportion of ST noted in Barbados is similar to that seen in South East Asia, Western Pacific and Africa. Further research is needed to understand the risk factors associated with this serotype, so as to guide appropriate interventions.

The predominance of S. Mississippi in Bermuda is interesting since this is not a common serotype in the Caribbean, nor worldwide. The reservoir for Mississippi is in the wildlife population, including native birds and risk factors included indirect exposure to native animal species, untreated drinking water and contact with pet fancies. The prevalence of S. Weltevreden in Saint Lucia is also noteworthy. Globally, S. Weltevreden is most common in the South East Asian region and it is frequently isolated from sea food, meats, poultry products and water.

**2.2.3.3 Ciguatera (fish toxin) poisoning**

Ciguatera was the second most common reported FBD causing human illness from 2005-2012. Ciguatera infections were only reported from six countries Anguilla, Antigua and Barbuda, Bahamas, Cayman Islands, Jamaica and Montserrat. Reported Ciguatera Fish Poisoning (CFP) in the Caribbean is based on clinical diagnoses unlike the laboratory-confirmed FBD infections. This is because CFP is caused by eating large predator reef fish that contain the ciguatera toxin, and in addition to gastrointestinal symptoms, CFP produces specific neurological and cardiovascular symptoms that have provided distinguishing evidence for doctors to diagnose as CFP. The toxin comes from algae found in reef waters in the northern areas of the Caribbean Sea. Hence the toxin is mainly found in large reef fish, most commonly barracuda, grouper, red snapper, eel, amberjack, sea bass, and Spanish mackerel. Gastrointestinal symptoms such as diarrhea, vomiting and abdominal pain tend to occur first, followed by neurological dysfunction including reversal of temperature sensation, muscular aches, dizziness, anxiety, sweating, numbness and tingling of the mouth. Paralysis and death have been documented.

The occurrence of even small numbers of Ciguatera poisoning in the Caribbean is of grave concern since it is a toxin that cannot be killed by cooking and can result in severe life-threatening illness. Therefore there is the urgent need to implement CFP-prevention measures in countries where it has been isolated. Measures to ensure that fish is harvested from safe waters in these countries is necessary. Abstinence from eating any large tropical reef fish is key to prevention of intoxication as there is currently no practical way to routinely measure ciguatoxin in seafood product prior to consumption. Capacity for laboratory diagnoses of this toxin in food should also be introduced in these CMS.

**2.2.3.4 Shigellosis and Campylobacteriosis**

Shigellosis infections was the third most common reported FBD pathogen from 2005- 2012. Reported Shigella decreased from 152 cases (14%) in 2005 to 74 in 2008 (7.4%) and 137 cases (9.7%) in 2010, showing an overall 4.5% decline from 2005 to 2010. Shigella was reported from 11 countries during 2005-2010, with >60% of cases reported from Bahamas, Belize, Bermuda, Jamaica and Suriname.

Campylobacteriosis was first reported to CAREC in 2006. Reported cases increased from 19 cases in 2006 (1% of total FBD) to a peak of 153 cases in 2009 (13%). This infection was only reported from six countries during 2005-2010, with
most (>60%) cases from Aruba, Barbados, Bermuda and Jamaica. This is reflective of limited laboratory capacity, its fragile nature when exposed to the atmosphere and the availability of specific media to isolate this organism. The prevalence of Campylobacter is therefore likely to be greatly underestimated. The CMS that reported hygiene and use of effective environmental disinfectants. Consistent enforcement of measures such as strict hand

caribbean. Control of Norovirus outbreaks depends on the rapid growing tourist industry in the Caribbean. There is a significant increase because of its association with cruise-ships, which is a primary risk factor for campylobacteriosis.

2.2.3.5 Norovirus

Norovirus infections increased from 3 laboratory confirmed cases in 2005 (0.28% of total reported FBD) to 23 cases in 2012 (1.6%). Norovirus was reported from Barbados, Bermuda, Dominica, Guyana, Jamaica, Saint Lucia and Trinidad and Tobago. Reported Norovirus were primarily from outbreaks occurring in these countries, linked to cruise ships, hotels and homes for the aged.

Isolation of Norovirus in the Caribbean and its increasing prevalence are also reflective of enhanced capacity in selected countries through the burden of illness initiative from 2009 onwards. Norovirus is a very infectious viral pathogen that is highly transmissible through person-to-person contact and from contaminated food, water and environmental surfaces. Its low infectious dose (< 10 particles) required for transmission, in addition to its environmental persistence and prolonged shedding after recovery, predisposes facilities like long-term care, hotels and cruise ships to outbreaks with high attack rates.

The emergence and increasing prevalence of Norovirus in the Caribbean is of serious concern, and more so because of its association with cruise-ships, which is a rapidly growing tourist industry in the Caribbean. There is the need for thorough and deep disinfection of premises after outbreaks for prevention of spread. There is the urgent need to enhance the laboratory surveillance for Norovirus, to conduct thorough outbreak investigations and research studies to understand the epidemiology of this highly infectious emerging pathogen in the Caribbean. Control of Norovirus outbreaks depends on consistent enforcement of measures such as strict hand hygiene and use of effective environmental disinfectants.

2.2.4 Conclusions and Recommendations

The epidemiological profile for FBD for 2005-2012, demonstrate that Salmonella, Ciguatera poisoning, Shigellosis, Campylobacter and Norovirus are the common reported causes of FBD in the Caribbean and that Salmonella continues to be the leading cause, responsible for over half of all reported FBD. The reported increases in Salmonella, Campylobacter and Norovirus and declining trend of Typhi, Ciguatera and Shigellosis from 2005 to 2012 suggest a changing and evolving epidemiology of FBD in the Caribbean. This is informative for guiding appropriate enhanced surveillance and FBD prevention measures. The continued dominance of Salmonella implies that implementing measures to reduce Salmonella would significantly reduce FBD infections in the Region. The increasing prevalence of Campylobacter and Norovirus suggest the need for pathogen-specific prevention measures. The emergence and increasing prevalence of Norovirus is of concern because of the propensity of large outbreaks in closed settings, for example, cruise ships.

The data also demonstrated that the epidemiology of FBD varies in different countries shown by marked differences observed in the types and proportion of reported FBD pathogens by the countries from 2005 to 2012. This implies that different sources of infection/risk factors for FBD may prevail in the different CMS. This is also instructive for guiding relevant public health actions for preventing FBD in different countries and it may also be reflective of the laboratory surveillance capacity of countries.

To meaningfully monitor increases or decreases in FBD requires effective surveillance systems at national, regional and international levels. There is a strong need to strengthen national and regional surveillance systems for FBD in the Caribbean. Improved FBD surveillance that combines subtyping methods, cluster identification and collaborative epidemiologic investigation and which can identify and halt outbreaks is also needed. Outbreak investigations and case-control studies can identify sources of infection and guide the development of specific prevention strategies. To date, resources have been limited for most countries and regions to do this, and our current knowledge is based, for the most part, on passive reporting mechanisms.

2.2.5 Limits/ Challenges

The data in this report was subject to several limitations which likely underestimates the reported FBD pathogens in the Caribbean. There is marked variation in the national surveillance systems for FBD in CMS. There is also no CMS with a fully integrated FBD surveillance system that integrates human, food and animal surveillance data. Reporting frequency and completeness also vary widely by country. Stool specimens are also not commonly collected from patients with acute gastroenteritis (AGE), significantly affecting the determination of etiology and prevalent FBD that cause human illness. This is perhaps the single most limiting factor for FBD surveillance in the Caribbean. There is also marked variation in the laboratory capacity for diagnoses of food borne diseases in CMS.

2.2.6 CARPHA’s Role Going Forward

Food borne diseases (FBD) and food safety continue to be a priority under CARPHA, continuing in the role of its predecessor CAREC, with respect to the integrated farm to table multisectoral approach to FBD surveillance.
2.3 Respiratory Viral Illness

2.3.1 Background

Respiratory viral illness surveillance in the Caribbean sub-region occurs through two main activities. The first of these is Caribbean-wide syndromic surveillance for patients with fever and respiratory symptoms (Acute Respiratory Illness – ARI). This system focuses on mild upper respiratory infections among ambulatory patients seen at health centers within six member country sentinel sites. Although predominantly a syndromic monitoring system, laboratory specimens are collected from a small subset of patients to provide additional data about respiratory virus patterns. Since 2006, ARI surveillance data has been collected by the national epidemiology unit in sentinel countries. This information is then forwarded to CARPHA for additional analysis.

The second form of surveillance in the Caribbean is for severe acute respiratory infections (SARI) and includes patients who have been hospitalized at designated sentinel sites within six CARPHA member countries. Because this system is specifically designed to detect influenza and other respiratory viruses circulating in the Region, laboratory specimens are collected from all of the patients who meet the case definition for SARI. Many samples are tested at CARPHA's laboratory, but certain member countries use alternative laboratories for testing. In those cases, results are subsequently reported to CARPHA.

These two surveillance activities enable the Caribbean region to detect unusual or unexpected viral respiratory outbreaks, determine the epidemiologic characteristics of influenza and other viral respiratory diseases, monitor circulating influenza virus strains, make recommendations for annual vaccine composition and detect the emergence of new subtypes in a timely manner. They also allow for the estimation of the burden of SARI in the Region and guide the development of research, policies and guidelines for influenza prevention and control.

2.3.2 Data Trends

2.3.2.1 Acute Respiratory Illness

Acute Respiratory Illness (ARI) data presented includes data from all CARPHA member countries except Aruba and Haiti. It should be noted that while syndromic surveillance officially began in 2006, it was not uniformly implemented at once. Therefore, the data for 2006 and 2007 are lower than the following years which likely reflects low levels of reporting from sites rather than low levels of respiratory illness.

Based on data summarizing the years 2008-2013 (see Figures 2.13 and 2.14), there was a similar pattern of fever with respiratory symptoms in both the under-five and over-five populations. For both age groups, a wave-like pattern in disease activity can be noted, with a rise around week 5, another small rise around week 25, and a larger annual peak around week 40. The latter peak likely relates to the start of the academic year, where children spend time in close quarters, allowing for the exchange and spread of respiratory viruses. In 2009 and 2010, with the spread of pandemic H1N1 influenza, this peak is especially high. The peak around week 5 may be explained by illness subsequent to gatherings and travel over the Christmas holidays. It may also relate to an influx of samples for testing after the holiday.

The peak in summer months is likely due to increased travel within the Region during school holidays.

Figure 2.13 Fever and Respiratory Symptoms > 5 years reported by CARPHA Member States* by Epidemiological Week, 2006-2013 (*with the exception of Aruba and Haiti)

Figure 2.14 Fever and Respiratory Symptoms ≤ 5 years reported by CARPHA Member States* by Epidemiological Week, 2006-2013 (*with the exception of Aruba and Haiti)
2.3.2.2 Severe Acute Respiratory Illness

Severe Acute Respiratory Illness (SARI) surveillance incorporates hospital data from the following CARPHA member countries: Barbados, Belize, Dominica, Guyana, Jamaica, Saint Lucia, St. Vincent and Grenadines, Suriname and Trinidad and Tobago. Data for Barbados, Dominica, Jamaica, St. Vincent and Grenadines and Trinidad and Tobago spans 2007-2013. Reporting for Saint Lucia began in 2010, for Belize in 2011, and for Suriname in 2012. Data reported for Guyana was only available for 2012.

The SARI hospital admission rate for select Member States (Figure 2.15) fluctuated throughout the reporting period, with a recent rise from 2012-2013. This trend appears to be driven by data from the Member States of Saint Lucia, Belize and Suriname. When separated by age group (Figure 2.16), an increase in admissions since 2011 is evident, with the sharpest increase in the pediatric age groups, especially children aged 6-11 months.

Interestingly, in 2013 (Figure 2.17) SARI trends imitate the annual ARI trends with a high peak around week 43 and two smaller peaks around weeks 6 and 28. However, the mortality data does not follow the same trend. Instead, mortality peaks around week 30, 2 weeks after the summer peak in admissions. This may suggest that the respiratory viruses circulating at that time – mainly adenovirus, respiratory syncytial virus (RSV), paramyxovirus and influenza B caused more severe disease than the influenza A circulating at high levels later in the year.

Within respiratory infections, lower respiratory infections caused the greatest number of deaths (n = 1543) with a mortality rate of 0.248.
2.3.2.3 Respiratory Virus Trends

Previously published CAREC data outlined the H1N1 influenza epidemic in 2009 to 2010, and the shift from H1N1 to H3N2 and RSV in the post-pandemic 2010 to 2011 period. In 2012 and 2013 data on viruses detected in both ARI and SARI cases were additionally compiled and analyzed (Figures 2.18-2.21).

In 2012, between 10 and 68 samples were tested per week, with a peak in samples tested at week 42 and general increased numbers between weeks 37 and 47, corresponding to the peak in cases of respiratory illness at this time. The proportion of positive samples peaked around week 23 and again around week 46.

In 2012, Flu A strain H3N2 predominated over H1N1 in samples that were typed, especially in the latter half of the year. Flu B cases increased in the latter half of the year and, along with RSV, made up a large proportion of the peak in cases seen around week 43. Parainfluenza and adenovirus cases occurred at low levels year-round, with greater frequency of adenovirus cases during the first two-thirds of the calendar year.

In terms of the age distribution of cases in 2012, by far the greatest number of cases occurred in children under 5 years old. In this age group, a greater proportion of cases due to RSV, rhinovirus, parainfluenza and adenovirus were seen when compared to other age groups. Influenza A – both H1N1 and H3N2 strains – was present in all age groups tested.

In 2013, the peak in cases around week 40 was predominantly due to influenza A, with a greater proportion of the H1N1 strain than H3N2. RSV also contributed to the same peak, although to a lesser extent than in 2012. RSV, parainfluenza, and adenovirus cases were present at low levels year-round, though parainfluenza and adenovirus cases contributed proportionally more to the number of cases during the first two thirds of the year. The proportion of “other” viruses (which includes rhinoviruses and metapneumoviruses) was also higher during that time of year.

The finding that influenza B along with H1N1 and H3N2 strains of influenza A remain in circulation in the Region is consistent with studies in Latin America. It may be difficult to predict which strain will prevail in any given year, as the same studies showed wide variation within the same region.
2.3.2.4 Emerging Respiratory Viruses

Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV)

In September of 2012, a series of deaths in Saudi Arabia secondary to acute respiratory failure prompted investigations leading to the discovery of the Middle Eastern Respiratory Syndrome Coronavirus. To date, no cases have been reported in the Caribbean region or detected at the CARPHA laboratory.

H7N9

Human respiratory infection with the novel H7N9 influenza strain were reported in China as early as 2013 and associated with severe disease. Travel-associated cases have been reported from other countries including Malaysia and Canada during 2014. To date, the cases have been associated with contact with infected poultry; no evidence of sustained human-to-human transmission has been reported. No suspected cases of H7N9 have been reported in the Caribbean region.

Enterovirus D68 (EV-D68)

In August to November of 2014, an outbreak of Enterovirus D-68 (EV-D68) was described in North America. The virus caused bronchiolitis and pneumonia in children, especially those with underlying respiratory conditions. Epidemiologically, the virus was also loosely associated with acute flaccid paralysis.

Recently, respiratory samples from 2014 from the CARPHA Member States of Bermuda and Dominica have tested positive for EV-D68. Sequencing was undertaken in collaboration with the USCDC and efforts will be made to compare these samples to those circulating in Canada and the U.S.

CARPHA’s laboratory now has test capabilities for the detection of EV-D68.

2.3.3 Prevention and Control Strategies

ARI and SARI data submitted by CARPHA Member States are monitored and compared to average and seasonal rates. Rates that are significantly higher than average, trigger an investigation process involving collaboration between CARPHA and Member States. This regularly includes collection of clinical and epidemiological data, submission of additional samples for testing, and additional monitoring with the goal of early outbreak detection and containment.

2.3.4 CARPHA Regional Role

CARPHA’s laboratory is one of two Influenza Centres along with Jamaica, in the Caribbean region. This means that this laboratory has the capacity to undertake high level influenza testing within the Region. It serves as a reference laboratory for Member States, providing respiratory virus testing services for those countries which are not able to perform them, and quality assurance of both IFA and PCR for member countries who do perform testing. In cases of emergency or shortage, CARPHA has also supplied back-up reagents or testing.

CARPHA’s capacity for respiratory virus testing has expanded in the past decade. While initially, testing for influenza A and B only was available, CARPHA is now able to subtype both influenza A and B and detect a gamut of other respiratory viruses, including RSV, adenovirus, rhinovirus, enterovirus, parainfluenza and metapneumovirus. CARPHA has also demonstrated the ability to adapt to emerging threats, developing capabilities for the detection of coronaviruses, H7N9 influenza and EV-D68.

CARPHA maintains a high level of proficiency since 2006, the laboratory has successfully participated in the WHO External Quality Proficiency Influenza panel annually.

CARPHA’s goals, in addition to respiratory virus testing, include training, troubleshooting and capacity-building in Member State laboratories. In 2013-4, CARPHA conducted influenza laboratory training in Barbados, Belize, Guyana, and Suriname.
2.3.5 Plans for Action and Future Challenges

Awareness of respiratory virus trends can allow for better preparation and disease prevention. Knowing that respiratory viruses tend to peak around Epidemiological week 40 should ideally be translated into more timely messaging regarding disease control, and better allocation of resources both for laboratory testing and clinical settings. While the CARPHA laboratory already contributes viral samples to the CDC as part of the annual influenza vaccine development and production process, an awareness of the strains circulating locally early in the year may help to estimate the effectiveness of a vaccine in that year and thus the impact of respiratory illness.

ARI and SARI data, in addition to providing information about circulating viruses, also allows for the monitoring of disease activity with the potential for outbreak prevention and control. Work must continue towards closer collaboration between the laboratory and epidemiologic branches in CARPHA to take advantage of this potential and to capitalize on research opportunities. There are many challenges in the monitoring of respiratory illnesses. Limited human and financial resources are a common source of difficulties, as staff in Member States may receive laboratory or epidemiologic training but then move elsewhere for better opportunities or compensation, leaving a gap. This can create difficulties with data collection and interpretation as samples may be sent inconsistently. From a laboratory perspective, procuring reagents and equipment from overseas can be an obstacle to timely testing, as delays or shipping procedures may cause reagents to expire or samples to be damaged. The ongoing development of laboratory expertise within the Region so that testing can be done locally may be one potential solution.

In conclusion, the Influenza 2009 H1N1 pandemic highlighted the need for enhanced support to the national authorities for preparedness to handle outbreaks or any major public health issues that may arise. It is also important to continue enforcing the IHR requirements as this will strengthen the Region’s capacity to deal with such events.

2.4 Immunization

2.4.1 Overview of the Immunization Program

The Expanded Program on Immunization (EPI) was initiated in 1974 by the World Health Organization with the aim to ensure child vaccination throughout the world and by 1984, a standardized vaccination schedule for the original EPI vaccines: Bacillus Calmette-Guérin (BCG), diphtheria-tetanus-pertussis (DTP), oral polio and measles was established. The EPI is included nowadays within the framework of the Global Vaccine Action Plan (GVAP), approved by the World Health Assembly in May 2012 to achieve the Decade of Vaccines (2011–2020) vision of promoting and facilitating universal access to immunization. The mission outlined in the GVAP is to improve health by extending by 2020 and beyond, the full benefits of immunization to all people, regardless of where they are born, who they are, or where they live.

The Governments of the Caribbean Community (CARICOM), CARPHA as well as the predecessor CAREC and the Pan American Health Organization (PAHO), have been committed since the beginning to the sustainability of the program which has been proven to be the most successful health intervention.

CARPHA is engaged in the work to maintain control and elimination of Vaccine Preventable Diseases (VPDs). A vaccination coverage of 95% is the goal for all of the countries in the Caribbean Community. The objective has been achieved in many countries, though low-vaccination coverage is still a challenge in some zones and districts within the countries.

In keeping with the goals of the Decade of Vaccines and the strategic objectives of the Global Vaccine Action Plan (GVAP), the objectives of the EPI program remain in the Caribbean as follows:

- To achieve equity in the provision of vaccine services by achieving and maintaining > 95% coverage for all antigens at national, municipal and district levels
- To maintain the polio eradication status
- To maintain measles, rubella and congenital rubella syndrome (CRS) elimination status
- To maintain and strengthen surveillance for VPDs with emphasis on measles, rubella, CRS and polio
- To advocate for the introduction of new and underutilized vaccines using an evidence based approach

CARPHA promotes and supports regional strategic vaccination planning as this is necessary in order to succeed. Furthermore, monitoring activities such as Laboratory surveillance and evaluation of the implementation are key factors in which CARPHA is engaged.
Regional vaccination coverage and vaccine introduction

National coverage levels remain nowadays over 90% throughout the Caribbean region with an average of 94% coverage for all the antigens reported (BCG, DTP, Polio, Haemophilus influenza B (Hib), Hepatitis B (HepB) and measles-mumps-rubella (MMR1)). However, the objective of at least 95% has been consecutively achieved only for the BCG vaccine over the past seven years in the Caribbean Community. MMR2 coverage is the only antigen under 90% of coverage but maintained over 80% for the last 3 years.

Table 2.2 Countries with DTP3 Coverage >90% and over 80% of Municipalities with Coverage > 80%

<table>
<thead>
<tr>
<th>Country</th>
<th>DTP 3 coverage-2013</th>
<th>% Municipalities with &gt;80% coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Turks and Caicos Islands</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>St. Vincent and the Grenadines</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Guyana</td>
<td>98</td>
<td>100</td>
</tr>
<tr>
<td>Dominica</td>
<td>97</td>
<td>100</td>
</tr>
<tr>
<td>Belize</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Jamaica</td>
<td>93</td>
<td>100</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>Sint Maarten</td>
<td>92</td>
<td>100</td>
</tr>
<tr>
<td>Bahamas</td>
<td>97</td>
<td>97.8</td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td>97</td>
<td>94.1</td>
</tr>
<tr>
<td>Antigua</td>
<td>99</td>
<td>93.3</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>100</td>
<td>86.1</td>
</tr>
<tr>
<td>Grenada</td>
<td>100</td>
<td>85.7</td>
</tr>
</tbody>
</table>

Countries continue to introduce new and underutilized vaccines in the routine immunization schedule in the public sector. Over the last 2 years, nineteen countries were using the influenza vaccine for various prioritized risk groups and 12 countries (Aruba, Bahamas, Barbados, Bermuda, Bonaire, Cayman Islands, Curacao, Guyana, Sabia, St. Eustatius, Sint Maarten and Trinidad and Tobago) were using the conjugated pneumococcal vaccine (half using the 10-valent and half using the 13-valent formulation). Jamaica continues to administer this vaccine only to the at-risk infant population. The 4-valent human papilloma virus (HPV) vaccine is now being administered in 10 countries, meningococcal vaccine in 5 countries, varicella vaccine in 8 countries and yellow fever vaccine in 3 countries. The rotavirus vaccine remains administered in only 2 countries, Guyana and the Cayman Islands, introduced since 2010. BCG vaccine is now administered in twelve countries.

2.4.2 Rash and Fever Surveillance in the Caribbean and the role of CARPHA

The fever/rash surveillance system implemented in countries in 1991 has shown that indigenous measles cases have been eliminated and no indigenous measles cases have been reported since 1991. However, the Caribbean Region continues to remain at high risk for the importation of measles and rubella cases due to the high intensity of international travel related to the large tourism sector.

In the Caribbean, the objectives of the Rash and Fever Surveillance are to:

i. maintain elimination of measles, rubella and CRS
ii. achieve timely, complete, regular and accurate surveillance for measles and rubella with active case finding
iii. maintain > 95% coverage for measles and rubella vaccine for each birth cohort
iv. ensure all measles, rubella and CRS Indicators are met in each country and,
v. ensure no established local transmission of measles and rubella following importations.

Laboratory confirmation is essential for adequate, integrated measles and rubella surveillance. CARPHA’s laboratory serves as the reference regional laboratory for the English and Dutch-speaking countries in the Caribbean. The test of choice for suspected measles and rubella samples is Immunoglobulin M electronimmunoassay (IgM EIA), using Enzygnost Anti- Measles Virus and Anti-Rubella Virus IgM kits (Siemens). Confirmation of positive samples is performed at CDC by testing with in-house IgM enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) for both measles and rubella.
From January 2014 to December 2014, a total of 424 samples from patients with fever and rash coming from 12 countries were received and analyzed in the laboratory as shown in Table 2.3 below. All samples were found to be negative for anti-measles/anti-rubella IgM except for three positive anti-rubella IgM samples from Jamaica which were considered to be related to recent vaccination. Moreover, 28 samples from pregnant women with suspected rubella infection and 8 samples from children with suspected CRS were tested and found to be negative for anti-rubella IgM.

The number of samples from patients with fever and rash received in the laboratory in 2014 was higher compared to the total number of samples received in 2013 (347) mostly due to an increase of samples received from Jamaica (186 in 2013 versus 238 in 2014).

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of samples</th>
<th>Measles IgM Negative</th>
<th>Measles IgM Positive</th>
<th>Rubella IgM Negative</th>
<th>Rubella IgM Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahamas</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Barbados</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Belize</td>
<td>70</td>
<td>70</td>
<td>0</td>
<td>70</td>
<td>0</td>
</tr>
<tr>
<td>Dominica</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>11</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Guyana</td>
<td>37</td>
<td>37</td>
<td>0</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Haiti</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Jamaica</td>
<td>238</td>
<td>237</td>
<td>0</td>
<td>235</td>
<td>3*</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>St. Kitts</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Suriname</td>
<td>38</td>
<td>38</td>
<td>0</td>
<td>38</td>
<td>0</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>424</td>
<td>421</td>
<td>0</td>
<td>419</td>
<td>3*</td>
</tr>
</tbody>
</table>

* Related to recent Rubella vaccination

Some performance indicators were analyzed. All the samples were collected within the first 28 days after rash onset. Core data such as age was reported in more than 99% of the cases although vaccination status was missing in 47%. Laboratory test results were reported to all countries in less than 5 days.

Finally, in order to analyze the impact of Chikungunya on the surveillance of fever and rash, 122 samples received in the laboratory for Chikungunya testing with a history of fever and rash but with no severe joint pain were selected. Positive result for Chikungunya and dengue was obtained in 58 of these samples. The remaining samples were tested for anti-measles and anti-rubella IgM. From all samples, three were tested positive for rubella and two of those were also positive for measles. However, due to epidemiological and clinical evidence, positives were considered to be vaccination related and not true infections.

During 2014, fever and rash cases were reported, primarily by Jamaica (51%), Suriname (16%), Barbados (6%), though to date all have been discarded as measles/rubella. Out of 445 suspected cases in 2014, 39% were adequately investigated, 82% had adequate samples taken, 12% of samples were received in the lab within 5 days and 91% of the lab results were returned to the reporting country within 4 days. Challenges with flight schedules and in-country transportation of samples to the national level for shipment have been the major factors which have affected the timely submission of samples and the achievement of this indicator. In terms of congenital rubella syndrome, in 2014 there were 3 suspected cases, none of which was confirmed.

In conclusion, surveillance indicators for measles, rubella and CRS need strengthening especially adequate investigations and timely delivery of samples to CARPHA.

Countries must improve efforts to maintain >95% coverage for MMR1 and MMR2 at both the national level and district levels. It is also essential that countries must remain vigilant for importation of cases and there must be measures in place for the timely response to imported cases.

2.4.3 Polio coverage and Acute Flaccid Paralysis (AFP) Surveillance in the Caribbean

The last confirmed polio case in the Caribbean was in 1982. However, the countries of the Caribbean remain at risk for importation of wild Poliovirus and circulating Vaccine-Derived Poliovirus (cVDPV). In keeping with the Global Polio Eradication Initiative and the polio Eradication and Endgame Strategic Plan 2013-2018, CARPHA along with PAHO and the Caribbean countries have been making efforts to strengthen surveillance for polio using the proxy condition of acute flaccid paralysis as well as increasing efforts to improve population immunity. The polio vaccine coverage has been >90% steadily maintained in the region over the last five years, and though in 2013, due to stock-out of vaccines in a couple countries the coverage fell to 92%, efforts improving the polio vaccine coverage were sustained.

The objectives of the AFP surveillance for the Caribbean remained as follows:

- To achieve timely, complete and effective surveillance for acute flaccid paralysis (AFP).
- To ensure all AFP Indicators are met in countries.
- To have a rate of detection of AFP cases in countries of at least 1.0/100,000 population <15 years.

Annually, and based on population calculations, a total of some 20 AFP cases in the <15 year population should be reported from the countries. In 2014 up to Epidemiological Week (EW) 44, there were a total of 25 cases reported, 11 of whom were in children <15 years of age resulting in a case detection rate of 0.54 per 100,000 population <15 years. Since 1988, the Caribbean has only twice realized the expected rate of detection of AFP cases of 1 per 100,000 population <15 years.

Figure 2.23 Rate of Detection of AFP Cases per 100,000 Population <15 years in the Caribbean Sub-Region 1988-2014 (EW 44)
The quality of surveillance for AFP cases has been on the decline since 2012 with a decline in the rate of achievement of the indicators for monitoring. In 2013, only 62% of the surveillance sites for AFP reported on time (weekly) and only 50% had an adequate stool sample collected. From all cases, 28% were adequately investigated and 45% had stool sample submitted to CARPHA within 14 days of the onset of paralysis. In comparison, in 2014 up to Epidemiological week 44, 70% of sites reported weekly, 45% of cases had adequate stool sample collected, 55% were adequately investigated and 40% of samples were submitted to CARPHA within 14 days of the onset of paralysis. Despite this low rate of achievement of the surveillance indicators, no case of polio was confirmed.

Polio vaccination coverage and surveillance has declined over the past 2 years and internal evaluation and validation of the AFP surveillance system needs to be done in each country.

2.5 HIV/AIDS in the Caribbean Region

2.5.1 The Regional HIV Response

The management of Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) in the Caribbean is a priority public health issue for CARPHA. Indeed, four of the five regional institutions that were merged to establish CARPHA played critical roles in the regional response to HIV for over two decades. CAREC, Caribbean Health Research Council (CHRC), Caribbean Food and Nutrition Institute (CFNI) and Caribbean Regional Drug Testing Laboratory (CRDTL) have been key partners in the Region’s fight against HIV/AIDS. The work of these institutions alongside the many others that joined forces in the Pan Caribbean Partnership against HIV and AIDS (PANCAP) resulted in the Caribbean making significant progress in combatting HIV.

From its inception CARPHA, as the new regional public health agency, joined the fight, becoming a member of PANCAP and contributing to the development of the third (2014-2018) iteration of the Caribbean Regional Strategic Framework (CRSF) for HIV.

The decommissioning of the PAHO HIV Caribbean Office (PHCO) in 2014 necessitated that CARPHA review its HIV agenda, given the uncertainty related to the future of activities that were previously conducted by PHCO. CARPHA has established agreements with PAHO and with Centres for Disease Control and Prevention, under the President’s Emergency Plan For AIDS Relief (PEPFAR), in this regard, and has outlined clear roles for its functioning in several domains, including HIV/AIDS/STI Surveillance; HIV Case Based Surveillance; HIV Drug Resistance Prevention and Surveillance; HIV/AIDS/STI Prevention, Treatment and Care; Laboratory Support for HIV/AIDS/STI Surveillance; Health Information Systems; and Monitoring and Evaluation (M&E).

2.5.2 Epidemiology

The face of the HIV/AIDS epidemic has changed significantly over the past decade. At one point HIV/AIDS was described as the greatest health crisis faced by the world. Today, significant gains have been made that have turned the tide against this globally devastating disease. Nevertheless, challenges remain, and efforts must continue to be made in order to sustain and improve upon the progress that has been achieved.

Worldwide, it was estimated that 35.3 (32.2–38.8) million individuals were living with HIV in 2013. This was a noted increase from previous years, and is due to the fact that more persons received life-sustaining antiretroviral therapy (ART). There were 2.3 (1.9–2.7) million new HIV infections reported, reflecting a 33% decline in the number of new
infections when compared to 3.4 (3.1–3.7) million in 2001. Concurrently, the number of deaths due to AIDS is also decreasing with 1.6 (1.4–1.9) million estimated deaths in 2013, a decline from 2.3 (2.1–2.6) million in 2005.

The targets of the United Nations Millennium Development Goal 6 include a reversal of the spread of the virus, as well as, achieving universal access to treatment for HIV/AIDS, reaching an estimated 15 million people in need. Countries worldwide have placed major emphasis on achieving this particular goal and have re-structured national HIV/AIDS public health strategies to reflect this.

2.5.3 Situation in the Caribbean Region

The Caribbean reports the second highest prevalence of HIV/AIDS in the world, after Sub-Saharan Africa. In 2013, 250,000 adults and children were estimated to be living with HIV/AIDS in the Caribbean, and 12,000 new infections were projected for that same year. However, the incidence rate of new infections is decreasing, falling by as much as 49% since 2001. Similar trends are also being seen in the numbers of HIV/AIDS related deaths. HIV prevalence, however, remains above 1.5% in the Bahamas, Jamaica, Haiti and Trinidad and Tobago. Migration between Caribbean islands is common, contributing to the spread of HIV and blurring the boundaries between different national epidemics.

New infections are still occurring, mostly within the 15 – 44 year age group (Table 2.4). In Suriname, during 2008 – 2013 the rate of new HIV infections fell by 86% and in the Dominican Republic by 73%. A greater than 50% decline was observed in Bahamas, Barbados, Belize and Haiti. In Jamaica and Trinidad and Tobago, new HIV infections fell by more than 33%. The primary cause of these decreases has been the scale up of ART. This has been a key element of national HIV/AIDS prevention and control initiatives, working towards establishing universal access throughout the Caribbean. The total ART coverage in the Region was approximately 67% at the end of 2011.

Table 2.4 New HIV Cases by Age Group in CARPHA Member States 2008-2013

<table>
<thead>
<tr>
<th>Country</th>
<th>&lt;1</th>
<th>1-4</th>
<th>5-14</th>
<th>15-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55-64</th>
<th>65 and &gt;</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>25</td>
<td>13</td>
<td>0</td>
<td>6</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Aruba</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Barbados</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Botswana</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Bahamas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cape Verde</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Curaçao</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dominica</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>El Salvador</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>French Guiana</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Grenada</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Guyana</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Guatemala</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Haiti</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Jamaica</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Martinique</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Montserrat</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Panama</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saint Kitts and Nevis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saint Vincent and the Grenadines</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Suriname</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Turks and Caicos Islands</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Venezuela</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

In the Caribbean the spread of HIV is still driven primarily by heterosexual intercourse (the documented mode of transmission in at least three-quarters of all AIDS cases), with commercial sex being a prominent factor. This is set against a backdrop of poverty, high unemployment and gender inequalities especially in some communities. In-depth research on the interplay between the sex industry and HIV transmission, however, remains comparatively limited in the Caribbean.

HIV prevalence amongst sex workers varies across the Region, from 1% in Cuba, up to 17% in Goyana. Countries with limited HIV prevention programmes for sex workers tend to report higher HIV prevalence among this group, indicating the impact that targeted HIV prevention can have on reducing HIV transmission. The most distinct example is Guyana, where prevention programmes reach only 21% of sex workers, and HIV prevalence (in this population) is very high, approaching 17%. The overall share of reported HIV infections attributed to sex between men is approximately 7%, but homophobia and socio-cultural restrictions that stigmatize same sex relations mean that the actual proportion could be larger. Injecting drug use is responsible for a minority of HIV infections currently; only in Puerto Rico does it contribute significantly to the spread of HIV.

HIV prevalence seems to be approximately equal in men and women (Figure 2.24) within recent years according to data reported to the CARPHA. However, other reports indicate that infection rates are higher among women. In Trinidad and Tobago, for example, HIV infection levels are six times higher among 15–19 year-old females than among males of the same age. Earlier studies indicated that women younger than 24 years in the Dominican Republic were almost twice as likely, and teenage girls in Jamaica were two-and-a half times more likely to be HIV-infected, when compared to their male counterparts.

Girls’ and young women’s physiological susceptibility to infection partly accounts for such discrepancies, but also important is the relatively common practice of younger women establishing relationships with older men, which increases the likelihood of exposure of these women to HIV infection.
2.5.3.1 Preventing Mother to Child Transmission (pMTCT)

The majority of HIV-1 infected infants die within a year of birth. Early diagnosis of such infants is vital, as HIV-1 positive children can be placed on ART thereby lengthening and enhancing the quality of life experienced by the child. In the Caribbean approximately 22,000 children < 15 years of age are living with HIV/AIDS, with approximately 3000 infants being newly infected each year.

In 2011, 79% of HIV positive pregnant women requiring treatment for pMTCT in the Caribbean received it. Among low- and middle-income countries the figure was 57%. Healthcare systems in the Caribbean have been scaling up HIV testing for all pregnant women and administering the combination therapy approach to treatment. Barbados has experienced success with their national pMTCT programme as there were no reports of mother-to-child transmission of HIV during pregnancy for the period 2007-2010. However, breastfeeding among HIV positive mothers, despite advice and counselling, still remains an issue to be addressed.

2.5.3.2 Stigma and Discrimination

Stigma surrounding HIV is common in the Caribbean. This is due primarily to a lack of education on the subject, fostering many false beliefs about transmission and HIV associated homosexuality. Only a few of the Caribbean countries have legalised same sex relationships. In the countries where the latter is illegal, the stigma surrounding homosexuality is heightened, contributing to a lower uptake of HIV services by patients.

2.5.3.3 Voluntary testing and Counselling

HIV testing in the Caribbean varies regionally. In 2011, the Bahamas and Haiti reported that just 5% of the population had been tested for HIV. Figures were higher for Jamaica, with 59% taking an HIV test in 2011. In the MSM group, Cuba had the lowest testing rate (23%), and Suriname the highest (97%). A similar trend is seen for sex workers with HIV testing rates of 31% in Cuba, and 95% in Suriname.

2.5.3.4 Role of Laboratories in Universal Access to Healthcare

The capacity of laboratories to support HIV/AIDS programmes is a critical determinant in increasing access to HIV prevention, care, treatment and support services. Advances over the last decade in new HIV diagnostic technologies have offered new alternatives for rapid HIV screening, confirmation and monitoring of infection in individuals at country level. Rapid testing algorithms have been implemented in the majority, if not all Caribbean countries, typically at Voluntary Counselling and Testing (VCT) sites and other health centres. Consistent monitoring and evaluation is essential to ensure rapid testing programme quality.

HIV molecular diagnostic capacity, which includes services such as HIV DNA PCR for early infant diagnosis and HIV viral load testing, is available in countries such as Barbados, Bahamas, Dominican Republic, Guyana, Haiti, Jamaica, Trinidad and Tobago, and Suriname. Barbados also acts as a hub for the provision of HIV molecular diagnostic testing to the OECs countries. More recently, laboratory diagnostic technologies are placing services such as these within the point of care arena, as opposed to a centralized laboratory service. Within the next few years, patient monitoring will be further improved by offering rapid results to patients during clinic visits, as opposed to waiting a week or more for results. Similar progress has been made in CD4 point of care testing.

HIV drug resistance testing is currently available in the Caribbean through two WHO regional collaborating centres, based in Martinique and Puerto Rico. Capacity is being built in Jamaica and Barbados for the provision of the services on a national level.

Of significant need in the Caribbean is the provision of improved laboratory testing services for the diagnosis of opportunistic infections. The provision of mycology services in particular has been a major concern regionally for health care providers, but there are no laboratories in the Caribbean that can provide an adequate reference service.

2.5.4 Conclusions and Recommendations

Although substantial headway has been made in the fight against HIV/AIDS regionally, there is still a pressing need to mobilize financial resources and provide leadership and support to countries in order to sustain efforts and reach targeted goals. Closing the AIDS resource gap has been identified as a key priority in the majority of Caribbean countries and this target has been integrated into national strategic plans.

One recommendation includes strengthening public-private partnerships that mobilize private sector resources for use in public health programmes. Additional mechanisms for sustainable funding include fund pooling, placing HIV services under national social protection and health insurance schemes, and also a potential use of new levies or taxes to generate funding. It is essential that the international community does not reduce the HIV response, especially at a time when progress will be hampered by funding uncertainty. This is especially important in the Caribbean as even with increased domestic allocations, some states, especially those with few resources and a high HIV burden, will be unable to meet goals without external aid.

Countries are being encouraged to pursue an investment approach to HIV financing, focusing limited resources on interventions, settings and populations where impact is likely to be greatest. An increasing number of countries on a global scale are developing ‘investment cases’ that promote mobilization of sufficient resources to do the ‘right things’ at the ‘right scale’ in order to maximize impact and minimise future costs. Jamaica is one such country regionally, that has developed an investment case, while other countries may initiate mechanisms to develop the latter.

The continued spread of HIV regionally is strongly associated with social and cultural factors, gender norms, and the stigma associated with HIV and homosexuality. However, in order to control the HIV epidemic, the Caribbean leaders and people must address basic structural barriers in society that deny marginalized individuals their rights, undercut public health goals and impede universal access to HIV prevention, treatment, and care.
2.6 Tuberculosis in the Caribbean*

2.6.1 Introduction

Tuberculosis (TB) is one of the most ancient diseases of mankind. This disease is acquired when someone inhales air that is laden with bacteria expelled from an infected person who has coughed, sneezed or spat. TB can be fatal without proper treatment. An estimated two billion worldwide -1 in every 3 to 4 persons- are infected with Mycobacterium tuberculosis, the causal agent of TB, and 1 in 10 will develop active TB in their lifetime. Despite being preventable, diagnosable and curable, and major successes reducing its global prevalence and mortality rates, TB remains a worldwide pandemic and is one of the greatest infectious disease killers globally, only slightly behind HIV and AIDS. In 2013, an estimated 9.0 million people developed TB; about 3 million, 1 in 3, did not get the care they needed; about 1.5 million people died from TB; and about 360,000 of those who died also had HIV.

Major challenges to control TB include poor health-care infrastructures, spreading HIV infection, and lack of political will. Multidrug-resistant TB (MDR-TB) is another emerging threat to TB eradication and is a result of deficient or deteriorating TB control programs and of unregulated health care leading to widespread use of first-line and second-line anti-TB drugs.

In the Caribbean, TB remains a public health priority with around 30,000 new cases occurring every year. More than 20% of these cases are not diagnosed, and 20% of the detected cases are not successfully treated. Therefore, every year more than 11,500 patients with TB do not get the care needed and may contribute to perpetuation of the disease. A shortage of laboratory capacity, limited treatment success and program funding gaps are among the factors favouring TB continuing to pose a significant health threat in the Region.

*This report includes data of the Caribbean Islands of Anguilla, Antigua and Barbuda, Bahamas, Barbados, Bermuda, British Virgin Islands, Cayman Islands, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Montserrat, Netherlands Antilles, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, and Turks and Caicos Islands, plus the continental Caribbean countries of Belize, Guyana and Suriname.

2.6.2 The Burden of Tuberculosis in the Caribbean

In 2013, it was estimated that 30,300 new TB cases occurred in the Region, 900 less than in 2012. More than two-thirds (70.3%) of the estimated TB cases are not successfully treated. Therefore, every year more than 11,500 patients with TB do not get the care needed and may contribute to perpetuation of the disease. A shortage of laboratory capacity, limited treatment success and program funding gaps are among the factors favouring TB continuing to pose a significant health threat in the Region.

The overall number of TB incident cases per 100,000 population was 79, which situates the Caribbean in the group of medium TB incidence Regions (Figure 2.25). This rate is significantly lower than in Africa and Asia (rate 280 and 183, respectively) and than the 126 found globally. However it is currently 2.7 and 2 times higher compared to the Americas and Europe (rate 29 and 39, respectively). The number of incident cases relative to population size varies considerably among Caribbean countries (Figure 2.26). It was highest in Haiti (206) and higher than 100 per 100,000 population in Guyana (109), indicating that these two countries still belong to the group of high TB incidence countries. Six other countries have rates around 21 to 60 cases per 100,000 population per year, which classifies them in the group of medium TB incidence. The majority of the countries belong to the group of low TB incidence with rates below 15 cases per 100,000 population per year, and with no TB cases reported in 2013 in four of them. The incident rates are declining or constant relative to 2012 in all countries except for Antigua and Barbuda, British Virgin Islands and Saint Lucia. Overall, the incident rate declined 2% in the Caribbean relative to 2012.

Figure 2.25 Incidence of TB Cases in 2013 in the Caribbean Compared to the Global Situation

Note: The cases of the Americas include the Caribbean
2.6.2.2 Prevalence

It is also estimated that in 2013 there were 36,200 prevalent TB cases in the Region that represents a TB prevalence rate of 95 per 100,000 population. Like the incidence rate, the prevalence rate is significantly lower than Africa’s and Asia’s (rate 300 and 244, respectively) and the global rate of 159. However, it is currently 2.5 and 1.9 times higher than those of the Americas and Europe (rate 36 and 51 respectively). The number of TB prevalent cases relative to population size also varies considerably among Caribbean countries (Figure 2.27), ranging from 254 TB prevalent cases per 100,000 population in Haiti to 1 or less TB prevalent cases per 100,000 population in Bermuda and Montserrat.

2.6.2.3 Mortality

Tuberculosis deaths* in 2013 in the Caribbean are estimated to be 3,400. Approximately 76% of them occurred in Haiti and 17% in the Dominican Republic. The number of TB deaths per 100,000 population averaged 9 in the Region, with considerable variation among countries, ranging from 26 deaths per 100,000 population in Haiti to under 1 TB death per 100,000 population in other countries (Figure 2.28). Although the Caribbean TB mortality rate is significantly lower than Africa’s (rate 42), and the global rate of 16, it is 10.7 times higher than the Americas’ (rate 1.5). Overall, the TB mortality rate in 2013 increased 8.5% in the Caribbean relative to 2012.
2.6.2.4 Drug resistant TB

Drug-resistant tuberculosis threatens TB control and is a major public health concern in several countries. Among 30,000 patients with TB that were notified in 2013 in the Caribbean, an estimated 800 had MDR-TB (Table 2.5). That number represents 3.4% of all notified TB patients, slightly lower than the 5% estimated globally. Two countries (Haiti and Dominican Republic) account for 92% of the estimated MDR-TB cases. Most of the remaining estimated cases occurred in Belize (4.4%), and 1 to 9 cases occurred in other 7 Caribbean countries. Only 27% of all estimated MDR-TB cases in the Caribbean were laboratory-confirmed.

<table>
<thead>
<tr>
<th>Country</th>
<th>MDR-TB cases among notified, 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated Number</td>
</tr>
<tr>
<td>Bahamas</td>
<td>1</td>
</tr>
<tr>
<td>Belize</td>
<td>6</td>
</tr>
<tr>
<td>Cuba</td>
<td>7</td>
</tr>
<tr>
<td>Curacao</td>
<td>1</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>340</td>
</tr>
<tr>
<td>Guyana</td>
<td>35</td>
</tr>
<tr>
<td>Haiti</td>
<td>390</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2</td>
</tr>
<tr>
<td>Suriname</td>
<td>4</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>795</td>
</tr>
</tbody>
</table>

The CARPHA laboratory serves as the regional reference and referral laboratory for the diagnosis of TB and drug resistant TB in the English- and Dutch-speaking Caribbean countries. The Agency also provides assistance to TB programs in its Member States and investigates TB outbreaks. CARPHA is equipped with a molecular diagnostic system (GeneXpert®) for the fast detection of TB and for TB resistant to Rifampicin (the first line antibiotics used to treat TB that serves as MDR-TB indicator). In 2013, a total of 128 cases of TB were identified among samples from 516 suspected patients referred from 11 countries (Table 2.6). MDR-TB was laboratory-confirmed in 12 patients from Belize, Jamaica and Trinidad and Tobago.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of TB suspects tested</th>
<th>Number of TB cases detected</th>
<th>Number of MDR-TB cases confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Barbados</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Belize</td>
<td>29</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Jamaica</td>
<td>170</td>
<td>70</td>
<td>2</td>
</tr>
<tr>
<td>Montserrat</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Saint Kitts and Nevis</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>48</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Saint Vincent and the Grenadines</td>
<td>29</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Suriname</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>221</td>
<td>38</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>516</td>
<td>128</td>
<td>12</td>
</tr>
</tbody>
</table>
2.6.2.5 TB and HIV coinfection

The increase in TB in the Caribbean during the last two decades is closely related to the HIV epidemic. HIV affects the progression of TB disease both by reactivation of latent TB infection to TB disease in HIV-positive individuals and by rapid progression from recent TB infection to TB disease. One out of 10 persons with both HIV and TB infection will go on to develop TB disease each year with over 50% developing TB in their lifetime. In contrast, in the absence of HIV infection, the lifetime risk of TB infected people to developing TB disease is approximately 10%.

Among the notified TB cases in 2013 in the Caribbean, 85% had a documented HIV test resulting in 4,062 patients with HIV coinfection (Table 2.7). This percentage of TB patients with documented HIV test results is among the highest in the world and higher than the overall percentage in the Americas (69%). Approximately 70% of HIV-TB coinfection cases of the Region occurred in Haiti and 20% in the Dominican Republic. Overall, the rate of HIV-TB coinfection in the Region was 20%, ranging from 50% in Antigua and Barbuda to 8.6% in Cuba. Although the Regional rate is similar to the global rate (18%), it is significantly higher than the rates found in all regions of the world except in Africa (41%).

Table 2.7 HIV Testing and HIV-TB Coinfection in Caribbean TB Patients, 2013

<table>
<thead>
<tr>
<th>Country</th>
<th>number TB patients with known HIV status</th>
<th>number of HIV positive</th>
<th>% of tested TB patients HIV positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>10</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Aruba</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Bahamas</td>
<td>33</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Barbados</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Belize</td>
<td>121</td>
<td>25</td>
<td>21</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>5</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Cuba</td>
<td>710</td>
<td>61</td>
<td>8.6</td>
</tr>
<tr>
<td>Dominica</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Dominican Republic</td>
<td>3289</td>
<td>813</td>
<td>25</td>
</tr>
<tr>
<td>Guyana</td>
<td>705</td>
<td>180</td>
<td>26</td>
</tr>
<tr>
<td>Haiti</td>
<td>14668</td>
<td>2857</td>
<td>19</td>
</tr>
<tr>
<td>Jamaica</td>
<td>74</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Saint Lucia</td>
<td>6</td>
<td>2</td>
<td>33</td>
</tr>
<tr>
<td>Suriname</td>
<td>135</td>
<td>31</td>
<td>23</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>265</td>
<td>56</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>20026</td>
<td>4062</td>
<td>20.3</td>
</tr>
</tbody>
</table>

Progress made since the WHO declaration of TB global public health emergency, and gaps in attaining MDGs for 2015

In the Region of the Americas, estimated TB incidence rates have been declining continuously and the United Nations Millennium Development Goal (MDG) 2015 targets for reduced TB incidence, prevalence and mortality have already been achieved. However, progress toward TB control in the Caribbean has been slow, despite recognition that emergent and/or increasing trends for the disease pose a threat to public health. The Caribbean, as a region, still has to increase its efforts in order to achieve 2015 international TB control targets which are to reduce by 50% the burden of TB (disease prevalence and deaths) relative to the 1990 levels, to detect 90% of TB cases, and to successfully treat 90% of TB cases. The top priority actions required to achieve and/or move beyond 2015 targets are to reach the missed TB cases, to accelerate the response to TB/HIV, to address MDR-TB as a public health crisis, to increase financing to close all resource gaps and to ensure rapid uptake of innovations.

TB incidence

Since 1990, the regional TB incidence declined only 1.6 % annually, below the global rate of decline (2%). Although the Caribbean has achieved the MDG to halt and reverse the TB incidence by 2015, the rate of decline per year was observed only in recent years and remains slow. At country level, the TB incidence rates have fallen in most of the Caribbean countries (Table 2.8). Among the Caribbean countries with the highest burden of TB, significant improvement has been achieved in Cuba, the Dominican Republic and Suriname, and at a lower grade in Haiti. However, several countries had increased their incidence rate compared to 1990. The increases with the highest impact occurred in Antigua and Barbuda (an almost six-fold increase), Trinidad and Tobago (90%) and Guyana that moved to the group of high TB incidence rate countries (>100 cases per 100,000 population).

TB prevalence

By 2013, the TB prevalence rates compared to 1990 fell by ≥50% in only 40% of Caribbean countries. In six countries, the TB prevalence rates did not fall but increased (Table 2.8). Although considerable progress has been made in part of the Caribbean, an acceleration in the current rate of regional decline is required to reach the global target of a 50% reduction by 2015.

TB mortality

By 2013, the target of halving the TB mortality rates in HIV negative patients compared to 1990 has been achieved in less than half of the Caribbean countries (Table 2.8). Limited progress has been made in Jamaica and in Trinidad and Tobago, and no progress has been made in Guyana and Belize, where TB mortality rates have increased more than 2 times in this period.

Case detection

Most of the Caribbean countries have made considerable progress to improve the case detection rates (Table 2.8). Barbados, Belize and Trinidad and Tobago meet the 2015 target of detection of 90% of incident cases.

Treatment success

By 2013, six Caribbean countries have met the 2015 target of success treatment of 90% of TB cases (Table 2.8). However, four Caribbean countries have made no progress to improve the treatment success rate, and most of the countries with the higher TB burden in the Region show a limited progress.
2.6.3 Sustainable Development and the Post-2015 TB Strategy

The end of 2015 marks a transition from the MDGs to a post-2015 development framework. WHO has developed a post-2015 global TB strategy (the End TB Strategy) that was approved by all Member States at the May 2014 World Health Assembly. The overall goal of the strategy is to end the global TB epidemic, with corresponding 2035 targets of 95% reduction in TB deaths and 90% reduction in TB incidence, both compared with 2015, and a target of zero catastrophic costs for TB affected families by 2020.  

The framework outlines an initial pre-elimination phase, aiming to have fewer than 10 new TB cases per million people per year by 2035, and the virtual elimination of TB as a public health problem worldwide by 2050, defined as <1 case per 1 million population per year.  

To achieve the new targets is the Caribbean Region’s collective responsibility. Significant changes need to be made in the way the countries organize and run their TB interventions and programs, and efforts to combat TB must be accelerated if the post-2015 targets are to be met. TB is a disease associated with inequality and the prioritization of resources for TB control in vulnerable populations will be critical to effectively reduce the TB burden to minimal levels.  

Political commitment, fund allocation, as well as communication, cooperation and collaboration with healthcare workers at all levels of the health sector and the population at large, are essential for the achievement of TB program goals. In order to make further progress towards the new MDG goals, TB control must be mainstreamed into the health agenda as with HIV, and include broader strategic planning approaches and financial frameworks aimed at poverty reduction. Caribbean countries have to ensure high quality TB services through implementing the components of the Stop TB Strategy. The prevention and control activities have to be targeted to fit their respective epidemiological situation. Efforts should be strengthened to ensure workforce reinforcement and good quality TB programmes with a multidisciplinary approach that enable prompt identification and adequate management of people with TB, as well as necessary infection control measures and integration of TB and HIV services. This includes strengthening of HIV counselling and testing among people with TB, making Antiretroviral Therapy (ART) available for all people with TB living with HIV, and better data to assess the performance of TB/HIV collaborative activities including prevention of TB among people living with HIV in the population. The response needs to be sustained through effective leadership, predictable funding, continued national, regional and international cooperation, and improved surveillance, monitoring and evaluation programs.

2.6.4 Challenges to Decrease the Burden of TB

Several Caribbean countries still face important challenges in their struggle against TB, including more than 11,500 patients that do not receive the care that they need - they are undiagnosed, untreated or not cured - and that contributes to perpetuating the disease. One of the major constraints is the limited political and financial commitment. The absence of coordinated quality laboratory support, the relative shortage of persons with knowledge about TB and the HIV/TB coinfection also contribute to the slow reversal of the TB epidemics. Additional factors are the weak TB-related health policies, systems and services and the lack of advocacy, communication and social mobilization. The involvement of primary health care in TB control and the monitoring and evaluation programs also remain insufficient to accelerate the progress towards the bold goal of ending TB by 2035.

2.6.4.1 Opportunities for New Initiatives

The next 5-year Global plan to Stop TB 2016-2020

The WHO “End TB” strategy centers on three action areas to help accelerate TB elimination:  

1. integrated patient-centered TB care and prevention  
2. development of policies and systems for prevention and care, and,  
3. intensified research and innovation.

The next Global Plan to Stop TB 2016-2020 under preparation will cover the ground between the long perspective of the Post-2015 strategy and the focus of the plans that countries will develop with a three-phased approach:
• Phase 1: Country classification/groups. Rather than simply stratifying countries on the nature of their TB epidemic, the plan will group countries based on a combination of epidemiological, health system-related and social/political/economical factors that together form a specific set of challenges, constraints and opportunities for each region.
• Phase 2: Produce global TB impact estimates in relation to Post 2015 Targets framework and Global Plan intervention packages, similar to HIV and other diseases. It will also feature different investment packages comprising of clinical and systems investments prioritized to reflect the challenges, constraints and opportunities specific to country groups.
• Phase 3: Cost country TB plans and produce global price tag of TB Global Plan.

The TB Global Plan will provide a large-scale, costed blueprint for how global TB efforts can become significantly more ambitious and effective over the next five years on the road towards the 2035 targets, and represents a timely opportunity to develop and implement a Caribbean Regional strategic plan for TB control.

2.6.4.2 The Global Fund Support to Human Rights
Addressing TB from transmission to treatment - requires involving a wide range of human rights issues; since human rights abuses are an important factor impacting the TB crisis. People with TB that are either not diagnosed or not treated are among the most vulnerable. Legal, social and economical barriers to accessing care affect mainly the poor, migrants, indigenous people, drug users, and women and girls who particularly face inequalitites in accessing gender-sensitive health services. The Global Fund to Fight AIDS, Tuberculosis and Malaria is making efforts in supporting human rights by focusing on a right-to-health approach that places the people who use these services at the centre by giving them a voice to ensure that health services are designed in a way that is accessible to them. This funding model provides the opportunity to reach the undiagnosed, untreated or not cured TB patients among the most vulnerable to TB.

2.6.4.3 Preventive Treatment of the Population Infected by Mycobacterium Tuberculosis
Current efforts to control TB focus predominantly on treating active TB disease, while allowing the source of that disease - vast pools of TB infections that often lay dormant in the body for many years - to perpetuate. Without antibiotics, approximately 5% of immunocompetent persons who acquire latent TB infection (LTB) can be expected to have their infections progress to TB disease within the first 2 years following infection, and another 5% over the further course of their lifetimes. Besides fast and complete treatment of active TB, control of LTBI has been newly emphasized as a strategic component of worldwide TB elimination.

A simple test can identify a TB infection, which can usually be eliminated with a single, simple, three-month course of antibiotics. For someone who has progressed to become an active case, treatment takes twice as long and requires four or more different antibiotics. If drug resistance develops, treatment time escalates to 24 months and requires a potentially toxic cocktail of antibiotics. Treating a TB infection versus the full-blown disease is dramatically less costly and complex. Devoting resources to screening and combatting early infections before they progress to become an active, contagious disease may be a cost-effective intervention to achieve and sustain TB elimination.

2.7 Outbreaks

The Caribbean comprises small countries with fragile economies. It is the most tourism-dependent region in the world and tourism is inordinately sensitive to disease outbreaks and environmental threats. Effective public health surveillance systems are necessary to facilitate timely detection of outbreaks in order to initiate appropriate control activities that would limit the spread of the outbreak, thereby reducing morbidity, mortality and economic impact.

CARPHA promotes and coordinates the development and implementation of the regional Communicable Disease Surveillance System for CARPHA Member States (CMS) to build country capacity in epidemiology, laboratory and related public health disciplines; provide prompt epidemiological assistance and advice on outbreak prevention, mitigation and control; provide laboratory support during outbreak investigations to confirm aetiology and monitor trends; support an integrated, multidisciplinary approach to outbreak investigation; and issue timely alerts and information of disease outbreaks and threats to CMS and relevant partners.

In a world of increasing travel, globalization and social and environmental changes, emerging and re-emerging infectious diseases have become more prominent. In response, the World Health Organization introduced a second edition of the International Health Regulations (2005) (IHR). The revised IHR emphasizes a stronger role in global communicable disease surveillance and control. This legally-binding agreement contributes to global public health security by providing a framework for the coordination and management of events that may constitute a public health emergency of international concern. All CMS as signatories to the IHR have a responsibility to ensure that they have the capacity to detect, assess, notify and respond to public health threats.

Prevention and control of disease emergence serve the IHR requirement to manage acute public health events that can cross borders by developing and strengthening capacities at designated ports, airports and ground crossings. The pandemic H1N1 of 2009 was the first Public Health Emergency of International Concern to occur since the revised IHR came into effect. It exposed vulnerabilities in national and regional public-health capacities, gaps in available scientific knowledge, difficulties in decision-making under conditions of uncertainty and challenges in communication.

The IHR core capacities are yet to be fully implemented in any of the 24 CMS. However all Member States are required to achieve full IHR compliance by the end of 2016. Acceleration of regional and national preparedness efforts at all levels of the health system and other sectors, both public and private, is critical for building a platform for long term regional health security.

During 2002 – 2013 a number of outbreaks occurred throughout the Region. Details regarding reported cases as well as CAREC’s and now CARPHA’s response are provided below.
A total of two hundred and thirty-one (n=231) outbreaks were reported by CMS from 2002 – 2013. Foodborne outbreaks (n=118, 51%) accounted for the majority of outbreaks reported. The second largest number of reported outbreaks were respiratory in nature (n=37, 16%) and outbreaks categorized as other accounted for (n=33, 14%). The aetiology for eight of the reported outbreaks (3%) was unknown.

The largest number of outbreaks occurred in the year 2010 (n=61, 26%), followed by 2009 (n=37, 16%) and 2012 (n=28, 12%).

### Table 2.9 Number of Outbreak Cases Reported by CMS for the Period 2002 - 2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Food-borne</th>
<th>Respiratory</th>
<th>Unknown</th>
<th>Vector-borne</th>
<th>Water-borne</th>
<th>*Other</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>383</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>383</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>68</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>68</td>
</tr>
<tr>
<td>2004</td>
<td>328</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>328</td>
</tr>
<tr>
<td>2005</td>
<td>0</td>
<td>0</td>
<td>3233</td>
<td>200</td>
<td>20</td>
<td>0</td>
<td>3565</td>
</tr>
<tr>
<td>2006</td>
<td>600</td>
<td>0</td>
<td>19</td>
<td>0</td>
<td>0</td>
<td>619</td>
<td>1244</td>
</tr>
<tr>
<td>2007</td>
<td>56</td>
<td>521</td>
<td>0</td>
<td>180</td>
<td>0</td>
<td>0</td>
<td>757</td>
</tr>
<tr>
<td>2008</td>
<td>241</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>241</td>
</tr>
<tr>
<td>2009</td>
<td>944</td>
<td>6339</td>
<td>54</td>
<td>408</td>
<td>0</td>
<td>0</td>
<td>8774</td>
</tr>
<tr>
<td>2010</td>
<td>670</td>
<td>1662</td>
<td>642</td>
<td>9236</td>
<td>40</td>
<td>52</td>
<td>12302</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>4</td>
<td>21</td>
<td>400</td>
<td>0</td>
<td>57</td>
<td>502</td>
</tr>
<tr>
<td>2012</td>
<td>2691</td>
<td>148</td>
<td>0</td>
<td>3498</td>
<td>0</td>
<td>0</td>
<td>6337</td>
</tr>
<tr>
<td>2013</td>
<td>348</td>
<td>123</td>
<td>0</td>
<td>2763</td>
<td>0</td>
<td>0</td>
<td>3234</td>
</tr>
<tr>
<td>TOTAL</td>
<td>6393</td>
<td>8865</td>
<td>717</td>
<td>19737</td>
<td>240</td>
<td>1158</td>
<td>37110</td>
</tr>
</tbody>
</table>

A total of 37,110 outbreak cases were reported by CMS during 2002-2013. Overall, the largest number of cases were reported by vector-borne outbreaks (n=19737, 53%), followed by respiratory (n=8865, 24%) and foodborne (n=6393, 17%). The highest number of outbreak cases were reported in 2010 (n=12302, 33%), 2009 (n= 8774, 24%) and 2012 (n=6337, 17%) respectively. The least number of outbreak cases were reported in 2003 (n=68, 0.2%).

### 2.7.1 Pandemic Influenza

In late April 2009, the World Health Organization (WHO) received reports of sustained human-to-human infections with a new influenza A (H1N1) virus in Mexico and the United States. In less than nine weeks, the virus had spread to all six WHO regions. On April 25, 2009, the Director-General of WHO announced a Public Health Emergency of International Concern and by June 11, 2009, WHO declared that an influenza pandemic was underway because sustained human-to-human transmission was occurring at the community level in countries in two or more WHO regions. The 2009 influenza pandemic spread internationally with unprecedented speed and pandemic viruses were reported in all WHO regions in less than six weeks.

In June 2009 the first cases of pandemic influenza occurred in the English and Dutch speaking Caribbean just prior to the WHO declaration of pandemic level six. During June to December 2009 the virus spread rapidly throughout the Region. In response to the pandemic the situation room was activated with two 24/7 emergency phone lines.
and a multi-disciplinary Flu Team was established. The Flu Team met regularly and participated in regional and international sessions in order to keep up with the rapidly changing situation. Regional guidelines and protocols were developed which along with situation updates and other relevant information were posted on the organization's website. The laboratory testing algorithm for influenza was reviewed and continuously adapted to the changing pandemic situation and specimen collectionkits, laboratory supplies and reagents were sent to Member States as needed. Surveillance wasstrengthened for Acute Respiratory Infections (ARI) and Severe Acute Respiratory Infections (SARI) at selected sentinel sites. Additionally, Member States revised and implemented their Influenza plans. There was also ongoing collaboration with the second WHO National Influenza Centre in the Caribbean in Jamaica.

During the pandemic period, April 19, 2009 to August 10, 2010, a total of 10,003 cases from the English- and Dutch-speaking Caribbean were tested for pathogens causing respiratory illnesses and 1,517 cases (15%) were laboratory confirmed as H1N1 pdm09. The majority of cases (76%) were < 30 years old and only 31% (2%) were aged ≥ 60 years. Data on gender was available for 1,474 cases, with an overall male to female ratio of 1:1. The majority of cases (76%) were aged less than 30 years, with children of school age being most affected. Most cases (89%) presented with symptoms of the respiratory tract and smaller proportions (20 - 40%) presented with gastrointestinal and other symptoms. A quarter of cases required hospitalization and the case fatality rate was 1.8%. During the pandemic, there were 27 reported deaths associated with A (H1N1) pdm09 from eight countries (Bahamas (1), Barbados (3), Cayman Islands (1), Jamaica (7), St. Kitts and Nevis (2), Saint Lucia (1), Suriname (2) and Trinidad and Tobago (10)). The largest proportion of deaths (60%) occurred among those aged 20–45 years. In early August 2010, the World Health Organization officially announced the end of Phase 6 of the Influenza Pandemic Alert. The H1N1 virus began to take on the characteristics normally seen during seasonal flu, thus fulfilling the criteria for declaration of the post-pandemic phase.

2.7.2 Cholera

In January 2010, a magnitude 7.0 earthquake struck Haiti with an epicentre about 15 km southwest of the capital, Port-au-Prince leading to 220,000 deaths and the destruction of large parts of the infrastructure. Before the earthquake, many Haitian households lacked running water and lived in inadequate housing and unsanitary conditions. Following on the heels of the devastating earthquake the country was faced with an outbreak of Cholera. On October 19, 2010, the Ministère de la Santé Publique et de la Population (MSPPP) was notified of a sudden increase in patients with acute watery diarrhea and dehydration in the Artibonite and Plateau Centrale Departments. The Laboratoire National de Santé Publique tested stool cultures collected that same day and confirmed V. cholerae serogroup O1, biotype Ogawa, on October 21. The outbreak was publicly announced on October 22, 2010.

Since the beginning of the epidemic and until 21 November 2014, there have been 717,203 reported cases, of which 404,371 were hospitalized (56%) and 8,721 died. Case numbers have decreased from approximately 185,000 in 2010 to 21,000 in 2014 but continue to persist. In February 2013, the government of Haiti launched a 10-year National Cholera Elimination Plan to focus on the long-term elimination of cholera through the large-scale development of public health and sanitation infrastructure. In the short-term, the United Nations (UN) has developed a two-year support plan which supports the 10-year National Plan focusing on epidemiological surveillance, health promotion, medical treatment and water, hygiene and sanitation.

There have been no reported cases of Cholera in CMS following the outbreak in Haiti in 2010 however, surveillance for AGE occurring in St. Martin in December 2013 to provide them with a situation update and outline the guidelines to be used as part of the CMS preparedness strategy. CARPHA provided and continues to provide technical support to CARPHA Member States (CMS), many of whom have implemented enhanced surveillance, detection and rapid response activities.

2.7.3 Chikungunya

On December 6, 2013 two laboratory confirmed cases of Chikungunya were reported from St. Martin in the midst of a Dengue outbreak which was simultaneously occurring on the island. The infected persons did not demonstrate a history of travel from chikungunya endemic areas thereby signifying the first documented occurrence of autochthonous transmission in the Americas. The risk for the introduction of chikungunya into the Americas was anticipated due to the broad distribution of the Aedes aegypti vector, suitable climatic conditions and the intensity of travel between the Caribbean and countries currently recognized as being endemic for chikungunya.

The Pan American Health Organization/World Health Organization (PAHO/WHO) with collaboration from the US Centers for Disease Control (US CDC) Division of Vector-borne Diseases (DVBD), established a working group to assess the potential threat of this virus to the Region and proposed measures to mitigate this public health threat. The working group produced preparedness guidelines which are currently being utilized across the Region. Subsequently, PAHO/WHO, with the support of the US CDC DVBD, conducted a training workshop titled ‘Preparedness and Response Plan for Chikungunya Virus Introduction in the Caribbean Sub-Region in 2012. The objective of this workshop was to increase the capacity of Caribbean countries for the timely identification of Chikungunya through surveillance, case detection, investigation, and the initiation of appropriate public health actions.

Upon notification of confirmed Chikungunya cases occurring in St. Martin in December 2013, an Incident Management Team was established at CARPHA to coordinate the Region’s response to the situation. The IMT held a virtual conference with CMS on December 12, 2013 to provide them with a situation update and outline the guidelines to be used as part of the CMS preparedness strategy. CARPHA provided and continues to provide technical support to CARPHA Member States (CMS), many of whom have implemented enhanced surveillance, detection and rapid response activities.
CARPHA continues to encourage Member States about educating members of the public on current and accurate information to avoid confusion or misinformation on the disease. Overall, it is CARPHA’s recommendation that a coordinated, collaborative multinational and multisectoral effort needs to be mounted to combat this threat.

2.7.4 Regional Outcomes and Next Steps

Outbreaks continue to be a major public health concern causing considerable socioeconomic disruption as well as loss of life. In addition to human suffering, outbreaks cause panic, attract media attention, can deter tourists, can be costly and can impede development in affected communities. They can also result in unjustified panic-induced reactions by other countries including the curtailment of travel from other countries where outbreaks are occurring or import restrictions on certain foods.

In the past decade, CAREC and now CARPHA took important steps towards making the Region less vulnerable to the impacts of infectious disease outbreaks. While the challenge is ongoing and work remains, the Caribbean has improved its capacity to prepare for and respond to infectious disease threats. Rapid and effective response to a number of outbreaks and other public health emergencies over the years, in collaboration with other stakeholders, demonstrates that the Region’s capacity and commitment to respond to potential threats.

CARPHA continues to collaborate with public health partners to implement measures such as rapid communication to Member States and training tools and guidelines to ensure that they are able to detect disease outbreaks. The Agency has worked closely with Member States to develop and maintain syndromic surveillance systems to detect and report new diseases and unusual activity.

CARPHA regularly monitors global outbreak alert networks such as the Global Public Health Intelligence Network (GPHIN) to become aware of diseases and outbreaks abroad and advises Member States accordingly. The Agency recently received a high-level containment “Level 3” laboratory, the only existing laboratory in the Caribbean, for the safe manipulation of high risk infectious organisms. Whilst significant progress has been made, there is still much to be done. Some of the next steps moving forward include:

1. Strengthening the Region’s public health capacity including surveillance and laboratory capabilities. Work in this area is on-going. Several regional workshops and in-country advisory visits have occurred and continue to occur to aid in improving regional capacities in these areas.

2. A great deal of work is currently underway within the Agency regarding information sharing. Arrangements for information sharing tends to be based on good networking and relationships, rather than formal protocols or procedures with respect to data sharing. There is a need for clearer protocols on the level of information that can be shared for various purposes in different situations.

3. CARPHA is working with other regional institutions such as the CARICOM Implementation Agency for Crime and Security (IMPACS), the Caribbean Disaster Management Agency (CDEMA) and other critical stakeholders for the creation of a “Virtual Crisis Situation Room” utilizing existing mechanisms established for the Caribbean Region. This will ensure the centralization of real-time information for evidence-based decision-making.

4. The Agency is exploring the establishment of an Emergency Stockpile System to ensure that supplies and equipment are available for rapid mobilization to be better able to respond to public health risks.

5. CARPHA will continue to provide technical assistance to Member States for the implementation of plans of action as CMS countries work towards achieving the capacity to implement IHR (2005).

6. There has been a great thrust to work with regional and international partners on the intersection between animal, human and ecosystem health since recent outbreaks have illustrated how intimately connected human health is with the health and welfare of animals.

7. The strengthening of existing collaborations with traditional and non-traditional partners such as the media and mobile communication networks has been seen as important in responding to public health emergencies and there has been a great thrust to engage partners.

References

- CAREC Surveillance Reports
- CAREC. Reported cases of Salmonellosis, CAREC member countries. 1985-1999. Weekly Communicable Disease Reports. 2001. Trinidad. CAREC.
- CARPHA Surveillance Reports
- Caribbean Epidemiology Centre (CAREC) Annual Report 2009.
- Caribbean Poultry Association
- CDC-PAHO. Preparedness and Response for Chikungunya Virus Introduction in the Americas. Washington, DC2011


• World Health Organization (2013). World Malaria Report


• World Health Organization. Fourth meeting, 12 September 2001 WPR/RC52 ... Food safety by the Fifty-fourth World Health Assembly in resolution ... www.wpro.who.int/mediacentre/news/statements/2010/h1n1_vpc_20100810/en/


3.1 Mortality

The CARPHA Member States (CMS) have undergone the epidemiological transition with non-communicable diseases (NCDs) now contributing to most of the mortality and morbidity in the sub-region. Mortality data reported by CMS (excluding Haiti) show that NCDs have been the top 5 leading causes of death since 2000 with only very slight fluctuations over the period. The apparent reduction in the proportions of deaths due to NCDs in 2010-2012 (Figure 3.1) may be a consequence of incomplete reporting to CARPHA on mortality for those years.

Figure 3.1 Proportional Mortality Rates of Leading Causes of Death in CMS 2002-2012

Although deaths from NCDs occur at all ages, the percentage contribution to deaths from NCDs begin to gain prominence in the most productive segments of the population 25-44 years (Figure 3.2). As can be expected, the proportion of deaths from NCDs continues to increase in the 45-64 year age group and beyond.
3.1.1 Premature Mortality

NCDs are the main contributors to premature mortality in the English and Dutch-speaking Caribbean (Figure 3.3) with Ischaemic heart disease and diabetes being responsible for the highest numbers of premature deaths in the < 65 year age group.

In 2008 (the year with the most complete reporting by CMS), premature deaths due to cardiovascular diseases, neoplasms, unintentional and intentional injuries seemed to be on the increase, with slight decreases in premature deaths <65 years from diabetes and injuries with undetermined intent (Figure 3.4). Such decreases may have been influenced by incompleteness of reporting for some of the years under review as not all of the CMS had submitted their mortality data.

Table 3.1 Age-Standardized Mortality Rates <70 years

<table>
<thead>
<tr>
<th>Selected Conditions</th>
<th>Antigua</th>
<th>Barbados</th>
<th>Barbuda</th>
<th>Belize</th>
<th>Bermuda</th>
<th>Dominica</th>
<th>Grenada</th>
<th>Guyana</th>
<th>Jamaica</th>
<th>St. Kitts</th>
<th>St. Lucia</th>
<th>Suriname</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant Neoplasms (Total)</td>
<td>46.0</td>
<td>26.8</td>
<td>71.4</td>
<td>79.6</td>
<td>44.4</td>
<td>49.4</td>
<td>85.1</td>
<td>91.5</td>
<td>58.8</td>
<td>68.1</td>
<td>87.7</td>
<td>72.1</td>
</tr>
<tr>
<td>External Causes</td>
<td>34.0</td>
<td>0.0</td>
<td>63.2</td>
<td>91.4</td>
<td>39.3</td>
<td>91.2</td>
<td>50.1</td>
<td>32.8</td>
<td>46.3</td>
<td>30.2</td>
<td>41.5</td>
<td>31.2</td>
</tr>
<tr>
<td>Land Transport Accidents</td>
<td>17.1</td>
<td>0.0</td>
<td>16.5</td>
<td>7.1</td>
<td>16.0</td>
<td>18.2</td>
<td>16.0</td>
<td>3.5</td>
<td>19.5</td>
<td>10.0</td>
<td>4.2</td>
<td>5.0</td>
</tr>
<tr>
<td>Ischaemic Heart Disease</td>
<td>14.7</td>
<td>16.2</td>
<td>23.8</td>
<td>18.3</td>
<td>27.3</td>
<td>17.1</td>
<td>33.5</td>
<td>43.8</td>
<td>18.0</td>
<td>56.8</td>
<td>13.1</td>
<td>38.6</td>
</tr>
<tr>
<td>Diabetes</td>
<td>12.9</td>
<td>25.0</td>
<td>18.0</td>
<td>36.6</td>
<td>38.7</td>
<td>6.1</td>
<td>24.1</td>
<td>31.6</td>
<td>61.3</td>
<td>26.8</td>
<td>8.7</td>
<td>4.5</td>
</tr>
<tr>
<td>Cancer of the Digestive System</td>
<td>12.6</td>
<td>8.3</td>
<td>18.9</td>
<td>24.0</td>
<td>8.7</td>
<td>11.0</td>
<td>15.4</td>
<td>23.8</td>
<td>8.6</td>
<td>10.5</td>
<td>18.4</td>
<td>16.6</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>11.8</td>
<td>0.0</td>
<td>17.3</td>
<td>13.1</td>
<td>17.1</td>
<td>8.4</td>
<td>18.7</td>
<td>28.0</td>
<td>63.5</td>
<td>18.0</td>
<td>16.7</td>
<td>42.3</td>
</tr>
<tr>
<td>Lung Cancer including Trachea, Bronchus and Lung</td>
<td>8.2</td>
<td>0.0</td>
<td>6.0</td>
<td>2.7</td>
<td>5.7</td>
<td>14.6</td>
<td>3.1</td>
<td>4.0</td>
<td>2.1</td>
<td>10.5</td>
<td>4.0</td>
<td>2.8</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>3.7</td>
<td>0.0</td>
<td>3.7</td>
<td>5.1</td>
<td>7.1</td>
<td>2.3</td>
<td>5.1</td>
<td>3.9</td>
<td>4.2</td>
<td>8.11</td>
<td>4.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Assault (Homicide)</td>
<td>2.8</td>
<td>0.0</td>
<td>26.8</td>
<td>17.7</td>
<td>27.8</td>
<td>5.9</td>
<td>6.8</td>
<td>0.0</td>
<td>17.1</td>
<td>91.9</td>
<td>9.2</td>
<td>5.7</td>
</tr>
</tbody>
</table>
Cancers accounted for the greatest proportion of premature deaths in the majority of reporting countries, ranging from 4% in Guyana in 2006 to 30.1% in Bermuda in 2009. This was followed by deaths from external causes which include unintentional and intentional injuries and which ranged from 3.4% in Barbados in 2008 to 19.9% in Belize, also in 2008. Early mortality due to external causes exceeded that due to neoplasms in Guyana, Jamaica, Belize and Suriname (95.8, 82.2 and 73.4 per 100,000 pop. respectively). ASMRs for ischaemic heart disease was highest in Guyana (83.3 per 100,000 pop.), followed by 58.8 per 100,000 pop. in St. Vincent and the Grenadines. Guyana reported the highest number of premature deaths from ischaemic heart disease and stroke among both males and females. Aruba reported the lowest numbers of premature deaths due to ischaemic heart disease; 14.7 per 100,000 pop. Males had higher ASMRs due to ischaemic heart disease and cerebrovascular disease than females in all countries except in St. Vincent and the Grenadines (Figures 3.5 and 3.6). As also shown in Figure 3.5, a high number of premature deaths (60 per 100,000 pop.) from stroke particularly among men was reported by Suriname.

Premature deaths from cervical cancer, among females aged <70 years, were reported by most of the countries, with the highest number of deaths being reported by St. Vincent and the Grenadines, Guyana, Dominica and the Bahamas respectively. This high rate of reported premature deaths from cervical cancer is very alarming, since this is a completely preventable cancer. Premature deaths from female breast cancer were also quite high in the reporting countries, with the greatest number reported by St. Vincent and the Grenadines (Figure 3.7).

Potential years of life lost (PYLL)

While knowing the number of deaths due to a particular disease or condition is important to understanding the health of the CMS, so too is knowing the age at which those deaths occur. Measuring the number of potential years of life lost (PYLL) to premature death provides a better sense of the impact that a given disease or condition has on the health of a country’s population.

When measured in terms of PYLLs, the contribution of non-communicable diseases is even more striking. Non-communicable diseases contributed to the greatest number of PYLLs in all age groupings among females, with the greatest number of premature deaths occurring in 45-64 year olds (Figure 3.8): 10,453 per 100,000 population. In contrast, injuries contributed to the greatest amount of PYLLs in the 15-24 and the 25-44 age groupings among males in the CMS. However in the 45-64 age groups, NCDs are by far the greatest contributors to PYLLs among males, exceeding the PYLL from injuries and communicable diseases, maternal, perinatal and nutritional conditions by almost ten times (Figure 3.9).
When individual conditions were considered, homicide was the greatest contributor to PYLL in the 15–24 year age grouping, followed by road traffic accidents. Among 25-44 year olds homicide was also the leading cause of PYLL, followed by HIV/AIDS, malignant neoplasms and road traffic accidents. Malignant neoplasms were the greatest contributor to PYLLs in the 45-64 year age grouping, followed by diabetes mellitus and ischemic heart disease (Figure 3.10).

Malignant neoplasms and deaths from external causes of injuries which include homicides and land transport accidents contributed the most PYLLs (<70 years) in the 14 countries which reported on the NCD Minimum Data Set in 2011. Diabetes, ischemic heart disease cerebrovascular disease were also contributors to a high number of PYLLs due to chronic NCDs as reported by these countries (Table 3.2).

Table 3.2 Potential Years of Life Lost in CARPHA Member States

<table>
<thead>
<tr>
<th>Selected Conditions</th>
<th>Aruba</th>
<th>Bahamas</th>
<th>Barbados</th>
<th>Belize</th>
<th>Bermuda</th>
<th>Dominica</th>
<th>Jamaica</th>
<th>St. Lucia</th>
<th>Suriname</th>
<th>SVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential years of life lost (PYLL) Rate per 100,000 Population</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malignant Neoplasms</td>
<td>1,099</td>
<td>1,277</td>
<td>1,712</td>
<td>639</td>
<td>1,473</td>
<td>1,350</td>
<td>682</td>
<td>3,447</td>
<td>706</td>
<td>1,434</td>
</tr>
<tr>
<td>External Causes</td>
<td>1,051</td>
<td>2,145</td>
<td>2,318</td>
<td>2,815</td>
<td>1,295</td>
<td>1,454</td>
<td>3,195</td>
<td>1,183</td>
<td>2,287</td>
<td>2,090</td>
</tr>
<tr>
<td>Land Transport Accidents</td>
<td>634</td>
<td>704</td>
<td>210</td>
<td>1,010</td>
<td>728</td>
<td>476</td>
<td>360</td>
<td>423</td>
<td>509</td>
<td>106</td>
</tr>
<tr>
<td>Cancer of the Digestive System</td>
<td>277</td>
<td>315</td>
<td>527</td>
<td>97</td>
<td>388</td>
<td>196</td>
<td>1,34</td>
<td>850</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>265</td>
<td>297</td>
<td>411</td>
<td>504</td>
<td>146</td>
<td>351</td>
<td>305</td>
<td>216</td>
<td>244</td>
<td>45</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>236</td>
<td>294</td>
<td>368</td>
<td>179</td>
<td>249</td>
<td>364</td>
<td>259</td>
<td>929</td>
<td>471</td>
<td></td>
</tr>
<tr>
<td>Lung Cancer Including Trachea, Bronchus and Lung</td>
<td>216</td>
<td>77</td>
<td>41</td>
<td>62</td>
<td>408</td>
<td>53</td>
<td>115</td>
<td>173</td>
<td>52</td>
<td>18</td>
</tr>
<tr>
<td>Ischaemic Heart Disease</td>
<td>127</td>
<td>163</td>
<td>382</td>
<td>216</td>
<td>201</td>
<td>249</td>
<td>167</td>
<td>641</td>
<td>444</td>
<td>632</td>
</tr>
<tr>
<td>Assault (Homicide)</td>
<td>97</td>
<td>1,112</td>
<td>744</td>
<td>1,086</td>
<td>248</td>
<td>159</td>
<td>2,080</td>
<td>429</td>
<td>79</td>
<td>405</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases</td>
<td>81</td>
<td>54</td>
<td>196</td>
<td>117</td>
<td>71</td>
<td>106</td>
<td>81</td>
<td>216</td>
<td>34</td>
<td>59</td>
</tr>
</tbody>
</table>
3.1.2 Risk Factors for Chronic Diseases

Common preventable risk factors underlie most chronic non-communicable diseases. Most NCDs are strongly associated and causally linked to high blood pressure, tobacco use, elevated blood glucose, elevated blood cholesterol, physical inactivity, overweight and obesity, harmful use of alcohol and unhealthy diets.

Since 2006, risk factor surveys have been implemented in the English and Dutch Speaking Caribbean countries as a starting point for instituting risk factor surveillance. To date, 11 countries have completed at least one risk factor survey. This overview of risk factors is based on data collected from the 10 countries which have completed risk factor surveys using the WHO STEPS methodology between the years 2006 to 2012.

The sample size and the age group interviewed varied among the countries as shown in Table 3.3. The response rate also varied with the highest response rates being achieved in Trinidad and Tobago (90.2%), followed by Aruba (73%). The data collection for each risk factor survey was done by trained interviewers using the STEPS instruments. Biological risk factors were examined using physical measurements.

The Global Status Report on Non-Communicable Diseases 2010 was used to guide the variables presented in this overview.

3.1.3 Tobacco Use

The percentage of current smokers was highest in Trinidad and Tobago (23.5%), followed by Grenada (18.4%) and Bahamas (16.7%). The smallest proportion of smokers (6.2%) was in the Virgin Islands (UK), which may have been the result of policies implemented to promote smoking cessation in 2006. In all countries men smoked significantly more than women. The largest difference was in St. Kitts and Nevis where men smoked on average about 16 times more than women. Daily smoking was also more frequent among men as compared to women with no significant difference between males (3.8% 95% CI 0.2-7.3) and females (2.3% 95% CI 0.0-6.3) who smoked daily (Figure 3.11). Age of smoking initiation ranged from 17-20 years for males and 20-21 years for females.

Risks to health arise not only from direct exposure to tobacco through use but also through second hand smoke. There was wide variation among the countries which reported on proportion of the population exposed to second hand smoke. Although Aruba reported 16% prevalence of current tobacco use, only 2% of the population reported exposure to second hand smoke, while in contrast Belize and Bermuda reported high prevalences of exposure to second-hand smoke of 50.4% and 46% respectively. St. Kitts and Nevis, British Virgin Islands (UK) and Dominica reported prevalence of exposure to second hand smoke at the work place of 12%, 12.2% and 16% respectively.

3.1.4 Physical Inactivity

In all countries, higher percentages of women than men had low levels of activity, with the biggest difference (2.4 times greater in women) being in Dominica. Barbados had the highest percentages (51.3%) of low activity levels in both sexes, followed closely by the Bahamas (49.9%) and Trinidad and Tobago (45.8%). Bahamas had the lowest levels of physical activity (63.2%) among females, followed by Barbados (59%) and Trinidad and Tobago (55.5%). Males in Barbados (42.5%) and Aruba (41.6%) reported the lowest levels of physical activity (Figure 3.12). Males and females in the reporting countries in this sub-region exceeded the average low levels of physical activity globally in 2008 [31% for adults aged 15 years and above (men 28% and women 34%) and in the Americas Region ~40%, as reported by WHO.```
3.1.5 Alcohol Consumption

Harmful use of alcohol is a major risk factor for premature death and disability due to disease and injury. Drinking was more common among males than females in all countries (Figure 3.13). Saint Lucia had the highest percentage (59.3%; 95% C.I.: 50.8-67.8) of current drinkers (had drank alcohol in the past 30 days), followed by Dominica (51.3%; 95% C.I.: 47.7-55.0), Grenada (43.3%; 95% C.I.: 39.4-40.1) and Trinidad and Tobago (42.7%; 95% C.I.: 39.6-45.8). Among females, alcohol use was most common in Saint Lucia, where almost half of the females (44.7%) were current drinkers. They were closely followed by females (39.4%) in the Cayman Islands and Dominica (37.3%).

Men engaged in harmful use of alcohol more than women in most countries (Figure 3.14). Among the current drinkers, just under half of the males in Saint Lucia (49.5%; 95% C.I.: 42.5-56.4), and Aruba (48.6%; 95% C.I.: 47.5-49.6) reported harmful alcohol use. A third or more of males reported abuse of alcohol in Grenada (38.2%; 95% C.I.: 31.2-45.3), Trinidad and Tobago (36.1%; 95% C.I.: 31.6-40.5) and Dominica (33%; C.I.: 25.9-40.9) respectively.

Among females, Aruba (34.4%; 95% C.I.: 33.0-35.7) had the highest levels of harmful use of alcohol. There was no significant difference in abuse of alcohol by men (20.1%; 95% C.I.: 10.1-30.1) and women (20.7%; 95% C.I.: 10.3-31.1) in St. Kitts. The country with the least amount of harmful drinking among females was Virgin Islands (UK) (7.8%; 95% C.I.: 4.3-11.3), while St. Kitts (20.1%; 95% C.I.: 10.1-30.1) had the lowest prevalence of alcohol abuse among males.

Figure 3.12 Levels of Physical Activity, 2006 - 2012

Figure 3.13 Prevalence of Alcohol Use, 2006 - 2012

Figure 3.14 Harmful Use of Alcohol, 2006 - 2012
3.1.6 Unhealthy Diets

Consumption of adequate amounts of fruits and vegetables is protective against the development of some non-communicable diseases. Average servings of fruits and vegetables consumed daily vary between 0.8 and 2.0 in each of the reporting countries. Results showed that the proportion of persons who have a healthy diet, measured by fruit and vegetable consumption (≥ 5 servings of fruits and vegetables per day) is far below this recommendation in all countries (Figure 3.15).

Figure 3.15 Consumption of Fruits and Vegetables

3.1.7 Obesity and Overweight

In 2008, 35% of adults aged 20 years and older were overweight (BMI ≥ 25 kg/m² - (34% men and 35% of women) globally, according to WHO data. Prevalence of overweight in each of the CMS was higher than the global prevalence, except among Dominican males. While females exceeded males in the overweight category in most countries, males in Aruba were more overweight than females. The proportion of those who were obese (BMI ≥ 30kg/m²) was also quite high in these countries. Women tended to be more overweight and obese than men, particularly in Dominica and Grenada, where the differences between males and females were statistically significant: Dominica, (males 30.8%; 95% C.I.: 26.3-35.3 and females 63%; 95% C.I.: 58.7-67.3) and Grenada (males 48.3%; 95% C.I.:43.0-53.6 and females 69.2%; 95% C.I.: 64.9-73.5). More than half of the females were obese in Bahamas (50.7%) and St. Kitts (52.5%) with 1/3 being obese in the remaining countries (Figure 3.16). In Aruba (46.7%) and Bahamas (47.7%) almost 50% of males were obese. Dominica had the lowest percentage of obesity in males (8.6%).

3.1.7.1 Abdominal Obesity

Abdominal obesity is a major risk factor for the development of cardiovascular diseases and diabetes. Females in all CMS had waist circumferences above what is considered normal for females except for Dominica (Figure 3.17). In most of the countries there was no significant difference in waist circumference between males and females. This indicates that the overwhelming majority of females in all CMS are at increased risk of developing cardiovascular diseases and diabetes. Males in Trinidad and Tobago are also at increased risk of cardiovascular diseases with average waist circumferences exceeding 40 inches.

Figure 3.16 Overweight and Obesity in the Caribbean, 2006 -2012

Figure 3.17 Abdominal obesity, 2006 - 2012
3.1.8 Raised Blood Pressure

For this report raised blood pressure was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg or currently on medication for high blood pressure. Aruba had highest levels of elevated blood pressure, with 39.2% of the population having raised blood pressure, followed by Grenada (38.1%), Virgin Islands UK (36.4%) and St. Kitts (35%) (Figure 3.18). A slightly higher proportion of males had raised blood pressure than females in all countries except for Aruba, where there was no significant differences between sexes; males (48.9%; 95% C.I.: 47.8-50.1), females (28.2%; 95% C.I.: 27.3-29.1). Most countries showed values slightly lower than the global prevalence, which in 2008 was approximately 40% in adults aged 25 and over.

3.1.9 Combined Risk Factors for Chronic Diseases

Persons having three or more of the aforementioned risk factors were considered at increased risk for chronic diseases. Although there were differences between sexes, high proportions of the population in each of the countries were identified as having raised risk for chronic diseases. Figure 3.19 shows the percentage of 25 - 44 years old by sex identified as having a raised risk for chronic diseases. In this very productive sector of the population, more than half of the females in the Bahamas (54.6%) and half in St. Kitts (49.7%) were at raised risk for chronic diseases – having 3 or more risk factors. Almost half the females in the Cayman Islands (44.8%), Trinidad and Tobago (44.3%) and the Virgin Islands (UK) (42.7%) also had raised risk for chronic diseases. For the males in that age group, more than half the males in Aruba (62.7%) had raised risk of chronic diseases with half of the men in the Bahamas (50.1%) being in that category also. Barbados was excluded from this analysis, due to the low response rates in some areas of the survey.

When raised risk is examined for chronic diseases in the older segments of the productive population, the 45-64 year olds, are at high risk of chronic diseases, ranging from 48.4%-73% among females and 40.4%-72.4% among males in all the countries. There were no significant differences in levels of raised risk between males and females in the countries except for Dominica, the most rural country (Table 3.4).

The loss of productivity which could arise from this huge potential burden of chronic diseases in the CMS will negatively impact the economies of the individual countries and the entire region. Such high levels of raised risk for chronic diseases signal the need for urgent action if we are to avert stress on the health, social, and economic sectors of the countries and the Region.
3.1.10 Challenges to NCD Prevention and Control in the Caribbean

While close to half of the CMS have now implemented at least one risk factor survey as a means of starting risk factor surveillance, this satisfies one of the requirements of the Port of Spain Declaration on Chronic Diseases (2007). Country progress with implementing cost effective interventions for reducing and preventing chronic diseases, based on the outcome of these surveys has been limited. This is as a result of not only limitations in dedicated human and financial resources, but lack of involvement of other government and non-governmental sectors required to make changes and implement interventions which will impact on the NCD Prevention and control in individual countries as and the Region. More information also needs to be made available on the impact of NCDs on the economies of our small countries so that the true economic burden of the disease for the Region will be made known.

3.1.11 CARPHA’s Role

CARPHA will continue to advocate for regional and international action for the prevention and control of NCDs. Innovative comprehensive multi-sectorial strategies for impacting the problem of NCDs and their risk factors at the population and individual levels could be identified and implemented as demonstration sites in selected CMS. The process of implementing such strategies could be documented and published so that the lessons learnt would benefit of the rest of the Region and the international community. CARPHA will also have a role in evaluating the outcomes and possible impact of such interventions.

3.2 Nutrition

3.2.1 Description and Analysis of the Current Nutritional Status in the Region

Over the past 35 years, nutrition has played a major role in the main causes of death in the Region. Despite the increased availability of food for consumption, poor diets are resulting in both obesity and undernutrition. Obesity and its co-morbidities, non-communicable diseases (NCDs), are the Region’s main public health problems, and are linked to food intakes and lifestyle. The Region is experiencing a nutrition transition reflected in a shift in diets away from indigenous staples (Cereals and starchy roots, fruits and tubers); locally grown fruits, vegetables, legumes, and limited foods from animals, to diets that are more varied and energy-dense, consisting of foods that are more processed (including processed beverages), more from animals, more added sugars, high in fats/oils and sodium, and often more alcohol. This shift is partially due to the demographic transition with a distinct rural/urban migration pattern which has implications for life expectancy, number of children, lifestyle and health outcomes.

The nutritional transition, coupled with improved health care is ultimately reflected in a reduction in malnutrition (under) and infectious diseases and an increasing prevalence of overweight and obesity, a main risk factor in NCDs, such as diabetes, hypertension, stroke, heart diseases and some forms of cancers (an epidemiological transition). This trend has been seen since 1971. (Figure 3.20).

![Figure 3.20 Epidemiologic Transition](image)


<table>
<thead>
<tr>
<th>Raised Risk of Chronic Diseases %</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aruba</td>
<td>73</td>
<td>72.4</td>
</tr>
<tr>
<td>Bahamas</td>
<td>73</td>
<td>64.4</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>48.4</td>
<td>49.8</td>
</tr>
<tr>
<td>Dominica</td>
<td>65.5</td>
<td>31.4</td>
</tr>
<tr>
<td>Grenada</td>
<td>52.7</td>
<td>40.4</td>
</tr>
<tr>
<td>St. Kitts</td>
<td>70</td>
<td>64.9</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>49.4</td>
<td>42.3</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>64.6</td>
<td>63.5</td>
</tr>
<tr>
<td>Virgin Islands (UK)</td>
<td>50.7</td>
<td>51.5</td>
</tr>
</tbody>
</table>
About 25% of adult Caribbean women are obese, almost twice as many as their male counterparts. Child and adolescent obesity is also high. Moreover, adult obesity is associated with child obesity and this risk increases when either parent is also obese. After adolescence there is a clear and consistent increase in obesity through to older adults (Figure 3.21).

3.2.2 Obesity

During the period 2000-2010, obesity prevalence in the Caribbean has increased. Currently, about 25% of adult Caribbean women are obese (BMI > 30), which is almost twice as many as their male counterparts. The evidence of a direct overall relationship between body weight and mortality is compelling, but it should be recognized that the body weight is often not the most important problem. It is the morbidity associated with metabolic complications that is of major concern. The approach to obesity management in the Region must continue to show a range of strategies from prevention through weight maintenance and management of obesity comorbidities to weight loss.

Among adolescent and adult populations across the Region, over 60% of the population were classified as either overweight or obese using the BMI scale. This range from 62.6% in Trinidad to 78.5% in St Kitts and Nevis. Women are more obese than men with a larger proportion measuring ≥ 30kg/m². (This was true in all results with the exception of Aruba). More men fell into the overweight category than women (≥25kg/m²), with the exception of Barbados (male 54.6% / female 55.2%) and Dominica (male 29.3 / female 43.1). With regards to mean waist circumference, men range from 82-104cm (normal <94cm) while women range from 88-95 (normal <80cm) across the Region. Obesity in children has serious immediate and long term health effects. Children and adolescents who are obese are likely to be obese as adults and are therefore at greater risk of adult health problems such as heart disease, diabetes, cancers and stroke. Over the years there has been an increase in overweight and obese children in the 0-5 age group as shown in Figure 3.22.

Several attempts have been made to implement high-level policy frameworks for nutrition security for the Region with varying degrees of implementation and success by Member States. Poor dietary patterns, and other lifestyle practices such as physical inactivity, have been directly associated with the increased risk for disability and premature death from chronic non-communicable diseases. Food availability data reflect continued increases in the amount of total energy, fat and protein available for consumption. Figure 3.23 shows that current energy intakes are well in excess of the current recommended regional energy intake goal of 2250 kcal per day, and the problem has been getting worse with time.

Source: Henry, 2004

Source: CFNI, 2010

Source: FAO Statistics Division, 2007
Much of this excess energy comes from the indiscriminate consumption of animal meats and products, fats and oils, and simple sugars (Figure 3.24).

The energy contribution from protein and fat shows similar trends of increases in energy – mostly attributable to high intakes of foods from animals. Most of the countries exceed the WHO-recommended upper limit of 30% of daily total energy intake from fats – approximately 675 kcal out of 2250 kcal and way over the 25% (562 kcal out of 2250) set for the Caribbean region. Protein consumption seems to be less than the intake goal set internationally at 10-15% - approximately 337 kcal out of 2250 kcal but is definitely sufficient when compared to the 10% set for the Region which approximates 225 kcal out of the 2250. The population is consuming much more than they should. Much of this excess fat is saturated fat and trans fats that elicit an atherogenic effect and increases the risk for cardiovascular diseases. Total and saturated fat intake generally increase with protein intake (Appendix 3.1 and 3.2).

Sufficient evidence links excessive sugar consumption with concomitant fat intake, excessive total energy consumption, micronutrient inadequacies, impaired glucose tolerance and poor weight management. Figure 3.25 shows the trends in sugar availability in 10 selected Caribbean countries over a 10-year period. The actual sugar availability per country over a 10 year period can be seen in Appendix 3.3.

The Region sees trends in sugar consumption that are way above the Population Nutrient Intake Goal. Despite the sufficiency of supply from local sources, there are still increasingly high levels of imports. (See Figure 3.26)

The Caribbean Population Nutrient Intake Goal for fruits should be at least 4% of total energy consumption and 6% from vegetables for the maintenance of good health. Fruits and vegetable consumption, as indicated by availability from local and imported sources, though improving, remains way below the Caribbean Population Food Goals as shown in Figure 3.27.
The World Cancer Research Fund (WCRF) of the American Institute for Cancer Research suggests that daily non-starchy fruit and vegetable intakes within 400 – 800 grams are likely to reduce the risk of cancer development: a likelihood that increases with intakes of at least 600 grams daily. Given the Region’s current disease burden, a daily non-starchy fruit and vegetable intake of at least 600 grams is both appropriate and feasible for the population. Figure 3.28 shows the fruit and vegetable consumption by country based on the minimum WHO recommendation.

![Figure 3.28](image)

Using the 600 grams, recommended for the Region, then most of the countries would not be achieving this goal and be having inadequate consumption. A summary of the comparison between actual consumption and the population goals for the Caribbean is captured in Appendix 3.4.

### 3.2.3 Undernutrition and Vulnerable Households

Food security is defined broadly to include not only the physical availability of food supplies over time and space, but also the socio-economic and nutritional aspects of having adequate economic and physical access to safe and nutritious food supplies. Although severe childhood malnutrition (undernutrition) declined and was low in most Caribbean countries it remained a public health problem in some. Childhood malnutrition was affected not only by household and national factors but global factors as well. In addition to the problem of overweight/obesity in Caribbean countries, and despite growth in per capita income levels, in many countries there is still some mortality from nutritional deficiency diseases. Despite considerable economic progress in the post-independence Caribbean, poverty and inequalities in income and access to resources are at unacceptably high levels, and continue to be major challenges in this Region.

### 3.2.4 Physical Activity

Based on the WHO STEPwise approach to risk factor surveillance (STEPS) Survey, in general men are more active than women. With the exception of Barbados (36.6% men /19% women), in most countries over 50% (50.3% – 75.3%) of men are involved in a high level of physical activity (≥ 3000 MET minutes per week). This is significantly higher than women (19% - 42.5%), who have a mean time of physical activity about half of the men in most countries. Of note is that around 65% of the physical activity for both men and women are work related, when compared with travel activities and leisure time. Results from the Global School Health Survey (GSHS)2007 paints a different picture with adolescents 12-15 years being more sedentary than moderately physically active for 60 minutes at least 5 days per week. Figure 3.29 below compares the level of sedentarism and physical activity for 60 minutes.

![Figure 3.29](image)

This trend in lack of physical activity was evident when adolescents from four Caribbean countries were assessed for fitness using the health fitness components (Muscular Strength; Muscular Endurance; Flexibility; and Aerobic Capacity) and the Prudential FITNESSGRAM (Coopers) Standards. As shown in Figure 3.30, there was a reduction in muscular strength with increased body fat.

1 The Metabolic Equivalent of Task (MET), or simply metabolic equivalent, is a physiological measure expressing the energy cost of physical activities. Low levels of physical activity is defined as less than 5 days of moderate-intensity activity or 30 minutes walking (<600 MET minutes of physical activity per week). One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour.
Data on adolescents from the GSHS, indicate that there was a positive correlation between sedentarism and the consumption of carbonated beverages that are high in sugar. This reinforces the point that diet and physical activity need to be considered together if we are to achieve behaviour modification in individuals (Figure 3.31).

**3.2.5 Iron Deficiency Anaemia**

At any point in time, specific nutrient deficiencies may also be present among the population. This is partially due to the fact that many households in the Caribbean cannot meet their basic food needs. This is particularly prevalent in children whose families are at the economic margin of society and who are more vulnerable to food insecurity. Food insecurity exists when people do not have access to sufficient, safe, nutritious food to maintain a healthy and active life.

Iron deficiency anaemia is common in the Caribbean particularly among pregnant women, adolescents and pre-school children. The global prevalence of anaemia in pregnant women is approximately 42% and the regional prevalence is also significant. Surveys conducted between 1993 and 2005 showed that of the 35 countries which comprise the Americas (including the countries of the Caribbean), data on the anaemia status of pregnant women was available for only 15 of those countries. Data from those 15 countries showed that 53.8% of pregnant women in the Americas were anaemic. This is alarming considering the range of negative outcomes associated with anaemia during pregnancy. Additionally, data from the World Health Organization (WHO) shows that within the Americas, the Caribbean is most affected with a prevalence of 39%. The last data received on anaemia in pregnant women stood at over 30% in 1998 and in recent times, there have been ad hoc reports received on the number of low birth weight babies and maternal morbidity and mortality, which are indicators that anaemia prevalence is still high.

Data on anaemia (haemoglobin measurement) is not routinely recorded at prenatal and antenatal clinics making prevalence estimates difficult to obtain. Iron deficiency anaemia has declined but is still highly prevalent in the Caribbean with some countries showing rates of more than 50% in certain population groups: pregnant women, preschool and school age children. The prevalence of anaemia among pregnant women in the region ranges from 27% to 75% and 15% to 80% in young children. Action to reduce this dual effect remains urgent.

**3.2.6 Breastfeeding**

Infant and young child feeding practices are far from optimal in the Region. Exclusive breastfeeding rates are falling (Figure 3.32) and the early introduction of complementary foods that are now being observed exacerbates the problem of iron deficiency anaemia, undernutrition and the increase in childhood obesity.
3.2.7 Low Birth Weight (LBW)

The prevalence of Low Birth Weight (LBW) newborns has been reduced but remains between 6 and 9% in the Caribbean. The epidemiological transition and nutrition transition have led to much discussion of the postulate of "foetal origins" of adult disease. The basic hypothesis is that insults during critical stages of fetal development or early childhood followed by relative affluence result in increased risk for chronic disease later in life. Such studies showing the association between low birth weight and adult disease makes urgent the concern of these high LBW prevalence rates in the Caribbean.

3.2.8 HIV/AIDS

Nutrition continues to be the most neglected aspect of HIV/AIDS management and care in the Caribbean region, despite the fact that nutrition is essential to maintain an immune system and to achieve optimal quality of life. Weight loss and wasting are the primary nutritional disorders of HIV infection.

3.2.9 Progress and gaps in attaining Regional Health goals/objectives

Attaining regional health goals have proven challenging for some of the CARPHA Member States (CMS). The goal set for CCH III is "to achieve optimal health and enhance development through the improvement of nutrition, food safety and food security" for the period 2010-2015. The three critical sub-priorities of the Food and Nutrition Component of the CCH III are:

- Nutritional deficiency diseases
- Obesity and Co-morbidities
- Food Security and Safety

Most countries have policies (written or unwritten) in place to deal with these sub-priorities but are in varying stages of implementation and evaluation.

With respect to the Millennium Development Goals (MDGs) there is a false perception that nutrition is related only to MDG 1 - extreme poverty and hunger. Nutrition has a crucial role to play directly or indirectly in attaining the development outcomes embodied in the first six of the MDGs:

- MDG 1 - Eradicating extreme poverty and hunger
- MDG 2 - Achieving universal primary education
- MDG 3 - Promoting gender equality and empowerment of women
- MDG 4 - Reducing child mortality
- MDG 5 - Improving maternal health
- MDG 6 - Combating HIV/AIDS, malaria and other diseases

With respect to MDG 1 most Caribbean countries have poverty rates between 13% and 35%, but this poverty range has many dimensions. The steady shift from agriculture to service economies poses major challenges for poverty and hunger in Caribbean populations. The recent global Food, Fuel and Financial (FFF) crisis has negatively impacted on food security and malnutrition and this Region did not escape these effects. Nevertheless, with the required commitment and investments, the targets for MDG 1 can be reached in 2015.

Caribbean countries, in responding to MDG 2, have attained and maintained relatively high enrollment rates and high rates of literacy compared with other regions: better nourished children are more likely to enroll and stay in school. In recent years, however, there is widespread availability in schools of "empty calories" i.e. unbalanced foods and snacks – high in calories but low in nutrients. These foods threaten to erode the gains in nutritional status and consequently, performance.

For many Caribbean countries, the gender ratio (MDG 3) is favourable for females with regard to literacy and participation in secondary and tertiary education. Unlike many other developing countries there is no obvious and consistent gender difference in nutritional status among young children in this region. This allows girls to be equally educated and attend school as boys. The main nutritional problem in the region is obesity and from young adulthood onwards there are twice as many females overweight than males. The impact of obesity on insulin resistance is well known and as a consequence we note a disproportionate number of women with Type 2 diabetes as well. This gender difference in health outcome needs to be addressed urgently as it places a disproportionate burden on women in this region.

With respect to MDG 4, the good nutritional status of young children in the Region is mainly responsible for almost all Caribbean countries falling below the global "high" categories of under five mortality. Poor nutritional status contributes to more than half the deaths in preschool children and micronutrient deficiencies reduce the chances of survival in young children. The rapid decline in malnutrition in preschool children over the last few decades provides optimism that child mortality will remain low. Infant mortality declines have also been impressive in the last 40 years but some countries need to make some improvements. Breastfeeding and appropriate complementary feeding practices are essential elements to low childhood mortality, and to adequate nutrition and human development.

The goal of reducing maternal mortality by 75% (MDG 5) in the English-speaking Caribbean by 2015 is a major challenge where rates range from 60 to 170 per 100,000 live births. Although all countries in the Region have high rates of skilled birth attendants, mortality rates continue to be unacceptable high. A more comprehensive approach will be needed in the next decade recognizing that maternal health is compromised by poor nutritional intake and that iron, vitamin A, plate and calcium are associated with pregnancy complications.

In an attempt to combat HIV/AIDS (MDG 6), a major response with effective therapy has recently begun. The estimated percentage of the English-speaking Caribbean population living with AIDS ranges from 1 to 5 %. An important, but neglected, part of comprehensive care in the Region is nutrition intervention. Malnutrition hastens the onset of AIDS among HIV positive persons and it may compromise the efficacy of antiretroviral treatment.

For a few Caribbean countries malaria is still endemic in some locations. Often those same locations have poor nutritional status and it is important to emphasize that malnutrition reduces malaria survival rates. Chronic diseases are not explicit in the MDGs but they fall under "other diseases". These chronic diseases such as cardiovascular disease, diabetes, stroke and cancer are the dominant health concerns in the Caribbean as they account for over 50% of all deaths. Nutrition is central to their prevention and management and can postpone these premature deaths in over 60% of the cases. The MDGs provide excellent targets and development benchmarks for the populations of the world and, as shown above, investments in nutrition will help to attain and surpass these goals in this Region.

In advancing the commitments to the Port of Spain Declaration of 2007, many countries now have National Food and Nutrition Security Policies that were developed by multisectoral and multidisciplinary teams. Most of those policies are aligned with the Regional Food and Nutrition Security Policy (2010) and Plan of Action (2011). In many countries Physical Education is a mandatory subject at all levels. Trade agreements utilized to meet national food and nutrition goals have been initiated in only one or two Member States but work is aggressively being pursued to have more countries examine their trade commitments to ensure food and nutrition security (Appendix 3.5). Some countries are also working on obtaining trans fat free food supplies. Studies to determine the Trans Fatty Acid Content of Common Processed Foods and the Plasma Fatty Acid Profile of the Population have been done in a couple of countries. (See Appendix 3.6).

These studies can provide significant evidence to inform further work in this area. There is now a CARPHA Public Health Nutrition Advisory Committee which is initially focusing on Childhood Obesity and a draft model legislative brief is being developed. With respect to mandatory labelling of packaged foods for nutrition content, some countries have started to develop national labelling standards using the regional and international standards. A few countries have started to develop standards for promoting healthy eating in schools and these will form part of National School Nutrition Policies.

Key achievements / successes

- Increased availability of food for consumption
- Reduced malnutrition (under nutrition). These rates have fallen from 20% in the 1950s to less than 5% in most countries today.
- Reduction in infectious diseases
- Reduction in Iron deficiency anaemia
- Enhanced capacity in countries to collect and analyze data to develop policies in the area of Food and Nutrition Security and Infant and Young Child Nutrition
- Enhanced human resource capacity in food and nutrition security
The strategic approach will mainly be to:

- Develop action plans for the reduction of obesity in populations throughout the life course.
- Implement the Childhood Obesity Action Plan.
- Assist with the development of public policies to tackle obesogenic environments.
- Promote Food Chain Incentives.
- Advocate for tougher standards on the fat content of processed foods and provide guidelines on nutrient content in food labels.
- Work with countries to develop multi-sectoral approaches to address the marketing of unhealthy food to children.
- Develop guidelines for the development, implementation and evaluation of school feeding programmes in the Caribbean.
- Develop policies and plans which promote healthy eating and physical activity.
- Advocate for reinforcing environments in schools, workplaces, communities and homes which enable sustainable healthy dietary and exercise behaviours.
- Advocate for policy to reduce the availability of pre-packaged foods high in trans fats, salts and sugars.
- Continue to collaborate with the private sector and other partners to influence manufacturers of those products.
- Advocate for mandatory nutrition labelling and the development of Nutrition Standards and Guidelines for schools and other institutions.

With respect to obesity and co-morbidities, CARPHA will:

1. Formulate policies in support of food and nutrition security related objectives.
2. Provide the framework for the implementation of the internationally accepted standards in the development, processing, manufacturing and marketing of foods; and
3. Empower the public through public education on food safety.

Some critical challenges to improved nutritional status in the Region include:

1. Caribbean governments have been slow in realizing the high economic costs of under-nutrition and more importantly of obesity and its co-morbidities.
2. The critical and profound influence of poor nutrition as the most important underlying cause of death and disability in the Caribbean.
3. The lack of appreciation for the vast contributions that other sectors can make to improve nutrition.
4. Nutrition programmes are located in the health sector in most Caribbean countries.
5. The mismatch between nutrition service needs and qualified personnel.
6. Non-recognition of proven cost-effective programmes on a large scale to improve nutritional status.
7. Most school feeding programmes in the Region need improvement and many actually contribute to the obesity problem in school children.
8. Development partners’ lack of a common vision to combat obesity and under-nutrition.
9. Lack of appreciation of the global forces which affect household food and nutrition security.
10. Limited financial and appropriate human resources in-country in relation to the enormity of the dual problem of under nutrition and obesity.
11. Insufficient partnerships with the private sector.
12. Paucity of nutrition professionals in the Region.
13. Getting countries to translate knowledge into practice.
14. Lack of co-ordination of activities.

### 3.2.10 CARPHA’s Role

The achievement of food security and safety goals require active participation and collaboration between the private and public sectors. Food safety and security both emphasize how food and nutrition policy overlaps with many other sectors - health, trade, agriculture, environment, marketing and culture. Several partners must be involved because food safety and security are integral parts of a process of nutrition and health development. The strategic approach will mainly be to:

1. Advocate for policy to address increased/improved supplementation and fortification programmes.
2. Build alliances with private and public sector groups and non-governmental organizations.
3. Foster awareness in the general population about the magnitude, severity, consequences and feasible solutions available for iron deficiency and anaemia.
4. Review/carry out studies on iron content of local foods (food composition studies).
5. Review/carry out studies on consumption of foods which affect iron status (food consumption studies).
6. Review/carry out studies on iron status as it relates to maternal and child health.

Nutritional support can improve the nutritional status of “People Living with HIV/AIDS” (PLHIV), as it is a function of intake, absorption and metabolism. CARPHA will:

1. Develop appropriate nutrition/dietary information and adequate training to equip healthcare workers and caregivers to help combat HIV/AIDS.
2. Promote adequate, balanced diets for weight maintenance and prevention of vitamin and mineral deficiencies in asymptomatic persons.
3. Provide technical information on various supplemental regimes for the later stages of the disease.
4. Support the implementation of the algorithms and toolkits developed to manage nutrition in HIV/AIDS in different settings.
5. Nutrition through the life course overlaps with other lines of action. The important aspect here is to implement a holistic reinforcing life course approach into current policies and programs to enhance their effectiveness. Maternal nutrition, foetal growth and young child nutrition, adolescent nutrition should be given special attention to prevent and control the epidemic of nutrition related chronic disease in the Caribbean. CARPHA will spearhead the implementation of several WHO nutrition-related strategies in the Caribbean.

With respect to iron deficiency anaemia CARPHA will:

1. Review/carry out studies on iron content of local foods (food composition studies).
2. Review/carry out studies on consumption of foods which affect iron status (food consumption studies).
3. Foster awareness in the general population about the magnitude, severity, consequences and feasible solutions available for iron deficiency and anaemia.
4. Review/carry out studies on iron status as it relates to maternal and child health.

Nutritional support can improve the nutritional status of “People Living with HIV/AIDS” (PLHIV), as it is a function of intake, absorption and metabolism. CARPHA will:

1. Develop appropriate nutrition/dietary information and adequate training to equip healthcare workers and caregivers to help combat HIV/AIDS.
2. Promote adequate, balanced diets for weight maintenance and prevention of vitamin and mineral deficiencies in asymptomatic persons.
3. Provide technical information on various supplemental regimes for the later stages of the disease.
4. Support the implementation of the algorithms and toolkits developed to manage nutrition in HIV/AIDS in different settings.
5. Nutrition through the life course overlaps with other lines of action. The important aspect here is to implement a holistic reinforcing life course approach into current policies and programs to enhance their effectiveness. Maternal nutrition, foetal growth and young child nutrition, adolescent nutrition should be given special attention to prevent and control the epidemic of nutrition related chronic disease in the Caribbean. CARPHA will spearhead the implementation of several WHO nutrition-related strategies in the Caribbean.
Most of the countries exceed the WHO-recommended upper limit of 30% of daily total energy intake from fats - approximately 675 kcal out of 2250 kcal. Much of this excess fat is saturated fat that elicits an atherogenic effect and increases the risk for cardiovascular diseases. Total and saturated fat intake generally increase as protein intake increases – a detrimental effect of consuming too much protein from animal sources. Protein consumption seems to be less than the intake goal set internationally (337 kcal) but is definitely sufficient when compared to the 10% for the Region which approximates 225kcal.
Appendix 3.5 Progress in the Caribbean with the nutrition components of the Port of Spain Declaration 2010 - 2013

Appendix 3.6 Number of Caribbean Countries actively pursuing Transfat free food supplies and utilizing Trade Agreements to meet national food security and health goals, 2011 - 2013

3.3 Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD) is defined as any disorder that persistently obstructs bronchial airflow. COPD mainly involves two related diseases – chronic bronchitis and emphysema. Both diseases cause chronic obstruction of the air flowing through the airways and in and out of the lungs. The obstruction is generally permanent and progressive. Thus morbidity from COPD is long lasting and debilitating. Asthma is also a pulmonary disease in which there is obstruction of the airflow but such obstruction is usually reversible. COPD is also known as chronic lower respiratory disease.

There is no morbidity data available on COPD for the countries of the Region. Therefore what will be presented are the deaths reported to CARPHA by Member States for the period 2000 - 2012. There was a slight increasing trend for deaths from lower respiratory infections over the period under review. These diseases ranked in the 7th-9th position over the period 2000-2007 but was the sixth leading cause of death from 2008-2012. As seen in Figure 3.33, deaths from chronic lower respiratory diseases contributed to approximately 30% of deaths from respiratory diseases for the CARPHA Member States.

Figure 3.33 Deaths from Respiratory Diseases, 2000 - 2012
When the chronic lower respiratory diseases are further examined (Figure 3.34), it is seen that emphysema and chronic bronchitis contributed to just over 10% of deaths over the period under review, with the percentage having decreased somewhat in recent years (2010-2012). Deaths from asthma contributed to 15-20% of deaths from chronic lower respiratory diseases. Meanwhile deaths categorized as “other chronic obstructive pulmonary diseases” contributed to >50% of deaths over the period, with such deaths increasing overtime. This suggests that the differential diagnosis for COPD may be unclear and in need of standardization for the Region.

CARPHA can play a leading role in working towards the standardizing of the differential diagnosis of COPD. This will facilitate improved surveillance of the disease in the Region and the subsequent development of policy for prevention and control of the disease.

3.4 Mental Health

Mental health is a fundamental component of health and wellbeing, critical to satisfactory and fulfilling interpersonal relationships, the realisation of an individual’s potential, and maintaining economic productivity. There has been a growing acknowledgment of the importance of mental health in public health.

There have been no large scale population based surveys done in the Caribbean to establish the prevalence of mental health problems but estimates of major depression among chronic disease patients and diabetics estimate that the range of depression to be 25-30%. Depression is associated with poorer treatment adherence, greater risk of hospitalisation and poorer prognosis when co-morbid with the chronic NCDs. A recent study in four Caribbean countries (Jamaica, St Kitts, St Vincent and Bahamas) suggested that 52.1% of adolescents had at least mild depressive symptoms while 29% had moderate to severe symptoms. High rates of suicide in Guyana (4th highest in the world), Suriname and Trinidad also present important public health challenges particularly with regard to use of pesticides and weedicides in self-inflicted injury. The age range most affected is the 15-54 year olds accounting for more than 75% of all suicides.

Maternal mental health remains another poorly investigated phenomenon but one study found the prevalence of postpartum depression to be approximating 25%. Even less is known about the schizophrenic and affective disorders but incidence studies of schizophrenia show that the rates are consistent with those found in other countries although it may be overrepresented in some groups, for example, young males who smoke large amounts of cannabis. Gang membership is also associated with increased cannabis use compared to those not in gangs.

Alcohol and other drug use however has been implicated in early mortality as well as with an increased risk of HIV infection. Alcohol and drug use is also implicated in the high rates of violence and deaths due to accidents and injuries. The Pan American Health Organization published a case for action regarding alcohol and public health. This document stated that alcohol was the leading risk factor for the burden of disease in the population of the Americas surpassing global averages in a range of indices including consumption and alcohol related deaths. Molokhia et al, reporting on 30-year mortality patterns in Tobago that high sessional alcohol intake was responsible for 40% of cardiovascular deaths in men under 60 years. Childhood sexual abuse may be another important risk factor as this is positively associated with most adult psychiatric disorders including substance abuse as well as HIV risk behavior.

The disparity between those needing intervention and those seeking treatment remains high and levels of stigma regarding mental health problems and their treatment remain a significant barrier to addressing the problems in Caribbean populations. Insufficient funding, poor consensus, and weak user and family groups all reduce the effective development of community services for the non-institutional management of mentally ill persons and their successful functioning within the community. However, there is some evidence of a successful transfer and integration of mental health services.
health care into the community primary care health system in Jamaica. The many social problems that beset the Region may also be related to undeveloped child and adolescent services inclusive of school mental health. Undiagnosed developmental conditions (such as attention deficit hyperactivity disorder) may impact on dysfunctional behavior in adulthood and predispose individuals to adult mental illness. Recent work in Jamaica also suggests that personality disorders may be an important contributor to the psychosocial pathology evident around us.

3.5 Violence and Injury Prevention (VIP)

Description and analysis of the current status of violence and injury in the Region. Worldwide, about 5.8 million people die each year from intentional and unintentional injuries, accounting for almost 10% of the world’s deaths. CARPHA Member States (CMS) have been faced with a steady increase in deaths due to injuries and violence resulting in premature deaths, disability costs to the health service, lost productivity with subsequent effects on the family, community and society as a whole. Though there is evidence to suggest that this is a growing public health problem in the Region, the absence of a multifaceted injury surveillance system within member countries and regionally makes the magnitude of the problem difficult to assess.

This chapter reviews the injury related mortality data for CARPHA Member States (excluding Haiti) and morbidity data from studies and other international data sources such as the World Health Organization (WHO).

3.5.1 Overview of Mortality due to Injuries and Violence in CMS

During the period 2000-2012, 41,327 people died from injuries and violence accounting for 9.0% of the total deaths in the English and Dutch speaking Caribbean. There was a more than two fold increase in the proportion of deaths due to injuries, from 5.2% in 2000 to as high as 12.5% in 2008 before decreasing to 10.2% by 2012 (Figure 3.35). Death from injuries and violence ranked fourth in leading cause of death after cerebrovascular disease (10.2%), diabetes mellitus (9.8%) and Ischemic Heart Disease (9.5%).
Mortality data reveal that the majority of the deaths are in the younger population aged 5-44 years (Figure 3.36) and in males (83.1%). The additional burden to the community is reflected in the high number of premature deaths among the younger population as shown through the potential years of life lost (PYLL) indicator (Table 3.5). The PYLLs due to premature deaths from injuries gain importance in the 5-44 years age groups when compared to NCDs and communicable, maternal, perinatal and nutritional conditions. More notably, PYLL as a result of injuries (2828.4 per 100,000) is now higher than that of communicable diseases and other related conditions (2345.0 per 100,000).

**Figure 3.36 Percentage of Deaths Due to Injuries by Gender in CARPHA Member States, 2000-2012**

**Table 3.5 PYLL Rates Per 100,000 by Broad Disease Groups**

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>I. Communicable, Maternal, Perinatal and Nutritional Conditions</th>
<th>II. Non-communicable Diseases</th>
<th>III. Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>15,225</td>
<td>5,114</td>
<td>1,210</td>
</tr>
<tr>
<td>5-14</td>
<td>235</td>
<td>891</td>
<td>786</td>
</tr>
<tr>
<td>15-24</td>
<td>576</td>
<td>1,492</td>
<td>5,018</td>
</tr>
<tr>
<td>25-44</td>
<td>1,783</td>
<td>3,628</td>
<td>4,164</td>
</tr>
<tr>
<td>45-64</td>
<td>1,344</td>
<td>10,415</td>
<td>1,293</td>
</tr>
</tbody>
</table>

The predominant contributors to the high PYLLs in males can be ascribed to deaths due to violence and road traffic injuries. Males contributed the greatest amount of PYLLs per 100,000 in every age group as compared with their female counterparts for whom the PYLLs were considerably less (Figures 3.37 and 3.38). These deaths occurring early in life are a serious loss to the current and future productive workforce of Member States and highlights the emergence of a public health problem that should be addressed.

**Figure 3.37 Potential Years of Life Lost due to Violence, CARPHA Member States 2000-2012**

**Figure 3.38 Potential Years of Life Lost Due to Traffic Accidents, CARPHA Member States**

### 3.5.2 Road Traffic Injuries

Among unintentional injuries, road traffic injuries ranked as the leading cause of death followed by drownings and falls. When considering all deaths, road accidents remained the leading cause of death in the 5-14 year age group (10.8%), and ranked 2nd (8.4%) and 3rd (4.5%) in the 15-24 and 25-44 year age groups respectively. Whereas there was little variation in the mortality rate due to road traffic accidents in the smaller Caribbean territories, the larger states showed a definite increase in road deaths between 2001 and 2008 (Figure 3.39). Guyana had the highest mortality rate of 25.9 per 100,000 population in this category.
3.5.3 Drowning

Deaths due to drowning, had a low mortality rate (2.8/100,000 in 2008), but still contributed to 1,724 deaths between 2000 and 2008 and showed an upward trend over the period (Figure 3.40). It should be mentioned that some of the drowning deaths were due to accidents at sea involving illegal immigrants.

3.5.4 Self-Inflicted Injuries

Self-inflicted injuries, including suicides, ranked 4th in both the 15-24 and 25-44 year age groups, with the higher proportion of 6.6% in the 15-24 year age range. Of note are the distinctly higher rates of self-inflicted injuries in three countries, namely Guyana, Suriname and Trinidad and Tobago as shown in Figure 3.41. Whereas the average mortality rate for the other CMS was 1.3 per 100,000, the three aforementioned countries, averaged a rate of 18.5 per 100,000 between 2001 and 2008. Suriname registered the highest rate of self-inflicted injuries, 28.4 per 100,000 in 2008 almost doubling during the 2001-2008 period. The higher rates in these countries point to the need for an understanding of the underlying factors for targeted awareness and prevention programmes.

3.5.5 Violence

As most of the economies of CMS are dependent on tourism, high levels of violence could adversely affect this. Among the CARICOM states, including Haiti, an average of 30 persons per 100,000 population are killed by assaults annually. This is 1.5 times higher than that of Mexico (well-known for its drug-related violence), and six times that of the global rate of 5 per 100,000.

A marked increase in the mortality rate for violence was noted from 6.2 per 100,000 in 2000 to a high of 24.6 per 100,000 in 2012. Homicides accounted for 19.2% of all injuries in the CMS, making it the leading cause of death in the 15-24 year age group. In this group, males were seven times more likely to die from violence than their female counterparts.
3.5.6 Morbidity from Violence and Injury

According to the WHO Injury and Violence Fact brochure, the millions of deaths that result from injuries represent only a small fraction of persons injured. Tens of millions of people suffer injuries that lead to hospitalization, emergency department or general practitioner treatment or treatment that does not involve formal medical care. Mortality data is therefore only the 'tip of the iceberg' or the 'pyramid' as is so aptly shown in the Injury Pyramid (Figure 3.41).

Figure 3.42 Demand on Health Sector cause by Injuries

To build a more comprehensive picture of the true burden of injury, information is needed from the sources identified in the pyramid, as well as on long-term disabilities, loss of productivity and estimates on the cost to families and the wider society. There is currently a dearth of such data elements at the national level in addition to which the systems for surveillance of morbidity overall are at varying levels of development in CMS. As a result, we are limited in our ability to discuss the magnitude and impact of injury on the society. This underscores the need to develop surveillance systems to inform on the driving factors causing injury morbidity in the Region.

For this report, glimpses are provided of the possible magnitude of the problem in the Region as highlighted through global reports and studies done within countries.

3.5.7 Jamaica Injury Surveillance System (JISS) Report

The Jamaica Injury Surveillance System (JISS) is one of a few national injury surveillance systems in the CMS and informs the interventions and policies for prevention and control of injury and violence in Jamaica. An example of the magnitude of morbidity due to injury in Jamaica is reflected in the JISS 2004 report which summarizes data collected from 22 government hospitals.

The report stated that injuries accounted for as much as 11.0% of registrations in Accident and Emergency (A&E) departments. Registered injuries were distributed thus, unintentional – 45%, violence-related – 38% and motor vehicle related injuries – 17%. Less than 1% of injuries treated at hospitals were due to intentional self-harm. Altogether, 37,800 unintentional injuries were seen at all the government hospitals in Jamaica.

Data collected also revealed that 14 065 road traffic injuries (Figure 3.43) were seen at all of the government hospitals in Jamaica of which 19% required admission to hospital.

Figure 3.43 Percentage of Motor Vehicular Related Injuries seen in Jamaican Government Hospitals, 2004

3.5.8 Interpersonal Violence Studies

Very often in the hospital setting, details on the reason for certain types of injuries are not captured in routine registration/patient history. To garner information on the events leading to many of the presenting injuries, studies have been conducted with various groups of the population. The following studies highlight the need for systematic surveillance and development of interventions to address the levels of interpersonal violence registered by the studies.

High levels of interpersonal violence among persons aged 15-30 years were found in a study conducted in 2003-2004 in three Caribbean countries: Barbados, Jamaica and Trinidad and Tobago. The study reported that among male victims, exposure to physical violence alone ranged from 54.0 to 61.0%. Inclusion of other types of violence increased the range from 63.0 to 73.0%. Among females, the respective proportions ranged from 53.0-58.0% and 65.0-83.0%, respectively. The upper end of these ranges exceeded that reported in surveys worldwide.

The levels of violence and injury occurring among adolescents 13-15 years old was examined in the Global School Health Survey (GSHS) which was conducted in 14 CARPHA Member States between 2007 and 2011. The percentage of students who reported being in a physical fight at least once in the previous 12 months of the study ranged from approximately 35.0% (British Virgin Islands, GSHS:2009) to 50.0% (Jamaica, GSHS: 2010). In all countries, the percentages were higher in boys, ranging mainly from 42.0 – 60.0% while girls reported 22.5 – 39.0% across most countries.

When asked about a serious injury one or more times from any cause over the previous 12 months, the proportion reporting ranged from 29.3% (Suriname, 2009) to 59.3% (Jamaica, 2010). Here too, the proportions were also higher in boys (37.2% to 63.7%) than girls (23.6% to 55%). The percentage of students who were physically attacked at least once in five of the reporting countries ranged from 33.6 - 41.0% with higher rates among boys (41.0 - 55.2%) than girls (24.6 - 32.7%).
### 3.5.9 Violence against Women

Little information is available for the CMS on violence against women, girls and children. A report by Brott et al. 2013 looked at violence against women in Latin America and the Caribbean and focused on data from 12 countries including Jamaica and Haiti, the only two CMSs in the study. 10.1% of women in Haiti and 2.8% of women in Jamaica reported experiencing intimate partner violence in the past 12 months and 10.8% and 7.6% respectively had experienced it in their lifetime. In addition to the sexual violence, another 8.5% and 12.0% of women in Haiti and Jamaica respectively, experienced physical violence only. 63.4% of Jamaican women who experienced intimate partner violence, told family or friends or sought institutional help but 36.4% did not. Neither did 57.7% of Haitian women who experienced violence (physical or sexual) by anyone (partner or non-partner). 68% of the Jamaican women who did not report violence incidents, though such behaviour was normal.

### 3.5.10 Consequences of Injury and Violence

In addition to the emotional and mental toll that injuries and violence inflict, they also cause considerable economic losses to victims, their families and to national economies as a whole. An analysis of the economic costs of injuries due to interpersonal violence in Jamaica in 2006 assessed the direct medical costs at approximately US$31.8M. This accounted for an estimated 12.0% of the country’s total health expenditure, while indirect costs of approximately US$416M accounted for about 4.0% of the GDP.

One of the measures used to determine the loss of productivity is the years lost to disability (YLD). Estimates of YLDs reported by the WHO 2011 Global Burden Health Estimate Summary tables reveal that the Region of the Americas had a YLD rate of 600 (per 100,000) which represented 5.8% of the total YLD (ranked 5th). Falls (36.0%) and road traffic injuries (24.0%) accounted for 60.0% of the YLD.

### 3.5.11 VIP Initiatives in the Region

To determine the way forward, a regional Caribbean VIP roadmap development meeting was hosted in September, 2014 with representation from CARICOM, CARICOM Implementation Agency for Crime and Security (IM-PACS), UWI, PAHO and some CMS. Several VIP initiatives around the Region were highlighted by the institutions present and were as follows:

- **CARICOM**: has been harnessing political support to placing injury and violence on the regional agenda through the CARICOM organs such as the Conference of Heads of Government (COHSOD), Council for Trade and Economic Development (COTED) and CCH III. COHSOD has given due consideration to the following:
  - Adopt strategies to harmonize national policies in relation to domestic violence and youth gangs;
  - Adopt declaration to restrict the proliferation of small arms and light weapons;
  - Address school violence, mandating studies and the development of a regional strategy;
  - Address increasing brutality in schools examining weapon possession and bullying; and
  - Address the medical use and possible decriminalization of Marijuana use

- **PAHO/WHO resolutions demonstrating commitment to VIP include**:  
  - WHA Resolution (2014): Strengthening the role of the health system in addressing violence, in particular against women, girls, and against children.

- **The Human and Social Development Directorate, CARICOM Secretariat produced a Caribbean Community Crime Prevention and Social Development action plan for 2009-2013. Two key projects arising from the plan and piloted in the Region were**:
  - Partnering for Social Development and Crime Prevention
  - Reducing Youth on Violence in Schools and Communities

- **The Institute for Development and Gender Based Studies (IDGBS)**, University of the West Indies has as part of its curriculum several courses on Gender Based Violence (GBV) and conducts research throughout the Region on GBV, interpersonal violence (IPV), media reporting on violence and child abuse. Current IGDS projects with a focus on violence include:
  - Changing Gender Relations in the 21st Century Caribbean (IGDS Regional Project).
  - Men and Masculinities in the Caribbean (RCU).
  - Assistance to countries in reviewing and revising legislation regarding various aspects of GBV violence.

- **A working example of a multi-sectoral approach to VIP was demonstrated by Jamaica by a national committee called the Violence Prevention Alliance (VPA). This committee includes representation from transport, education, law enforcement, trade and industry, media, foreign affairs, social services and health.

- **The Mona Geoinformatics Institute (MGI), UWI pioneering technological solutions in the field of GIS for operational and analytical applications for the security forces and road safety. Initiatives included**:
  - Equipping and training law enforcement with GIS; and
  - The development of a regional strategy; and
  - A working example of a multi-sectoral approach to VIP was demonstrated by Jamaica by a national committee called the Violence Prevention Alliance (VPA). This committee includes representation from transport, education, law enforcement, trade and industry, media, foreign affairs, social services and health.

- **The Human and Social Development Directorate, CARICOM Secretariat produced a Caribbean Community Crime Prevention and Social Development action plan for 2009-2013. Two key projects arising from the plan and piloted in the Region were**:
  - Partnering for Social Development and Crime Prevention
  - Reducing Youth on Violence in Schools and Communities

- **The Institute for Development and Gender Based Studies (IDGBS)**, University of the West Indies has as part of its curriculum several courses on Gender Based Violence (GBV) and conducts research throughout the Region on GBV, interpersonal violence (IPV), media reporting on violence and child abuse. Current IGDS projects with a focus on violence include:
  - Changing Gender Relations in the 21st Century Caribbean (IGDS Regional Project).
  - Men and Masculinities in the Caribbean (RCU).
  - Assistance to countries in reviewing and revising legislation regarding various aspects of GBV violence.

- **A working example of a multi-sectoral approach to VIP was demonstrated by Jamaica by a national committee called the Violence Prevention Alliance (VPA). This committee includes representation from transport, education, law enforcement, trade and industry, media, foreign affairs, social services and health.

- **The Mona Geoinformatics Institute (MGI), UWI pioneering technological solutions in the field of GIS for operational and analytical applications for the security forces and road safety. Initiatives included**:
  - Equipping and training law enforcement with GIS; and
  - The development of a regional strategy; and
  - A working example of a multi-sectoral approach to VIP was demonstrated by Jamaica by a national committee called the Violence Prevention Alliance (VPA). This committee includes representation from transport, education, law enforcement, trade and industry, media, foreign affairs, social services and health.

- **The adoption of various resolutions and declarations points to the resolve of international and regional institutions to address the escalating problem of injuries and violence. However the mechanisms to lead the process of change continue to be a challenge. Regionally, although disparate preventative measures were implemented across the Region, there was no sustained, coordinated effort to create and implement a regional plan and programme for VIP. Nevertheless, noteworthy initiatives continue to seek solutions to the growing problem. However given the causal factors of injury and violence, many of the projects often target social and behavior change. Such transformations require continuity and sustainability which continue to pose a challenge in the current economic environment of diminishing resources.**

In addition, an absence of reliable strategic information on crucial aspects of injuries and violence events, limits our ability to target the roots of the problems, reduce risk and prevent injuries in a sustainable way. Limited mechanisms for sharing knowledge across relevant stakeholders also stymies the success of many of the initiatives. Solutions to these challenges and limitations need to be addressed for any interventions to have a meaningful effect on the reduction of violence and injuries.

### 3.5.12 Current challenges/limitations

CARPHA has identified violence and injury prevention as a major priority for the work of the agency. Given the public health implications of violence and injury, CARPHA will play a critical role in guiding the response using an evidence-based public health approach to VIP. In particular, the human, social and economic impact of the disease demands a multi-sectoral approach and requires a locally coordinated sustained plan of action.
The September, 2014 Regional Caribbean VIP Roadmap Development Meeting was not only to guide the development of a roadmap for VIP in the Region but to identify the work priority areas going forward. The priority areas identified, centred on the following:

- Leadership and partnership
- Resource mobilization
- Assessment of the current situation
- Surveillance
- Research
- Prevention policies
- Health system strengthening

Key recommendations from the meeting for the Caribbean VIP Roadmap:

- Development of the Regional Roadmap for VIP and adoption by COHSOD.
- Development of a mechanism for coordination among stakeholders, with emphasis on a multi-sectoral approach.
- Alignment of plans with existing regional and global strategies and initiatives.
- Guidance to Member States to develop action plans, which should include a situation analysis and monitoring component.
- Establishment of pilot projects to show proof of concept.
- Communication, awareness raising and advocacy.
- Knowledge sharing.
- Legislation and policy development
- Definition of the roles and responsibilities of the various regional partners in the roadmap.

As a regional public health agency, CARPHA has outlined its role in keeping with its mandated responsibilities for providing support for the surveillance, prevention, promotion and control of important public health problems in the Region. CARPHA’s role will be to:

- Provide leadership in advocating for effective public health interventions for VIP in the Caribbean.
- Conduct surveillance of VIP.
- Provide, relevant public health information to various Caribbean and international audiences about CMS.
- Enhance national capacities to deliver public health goods and services in VIP in the CMS.
- Mobilize resources and partners for VIP.

3.5.14 Conclusion

Injury and violence in the CMS present a growing public health concern which impact negatively on the human development of the Region socially, mentally and economically. Most aspects of injury and violence are predictable and largely preventable. An integrated and comprehensive approach that includes the relevant non-health sectors, is needed to put systems in place to measure, analyse and develop intervention strategies to prevent and effect control.

References

- Cummings, IMPACR. CARICOM Frameworks. Paper presented at: CARPHA Regional Caribbean VIP Roadmap Development Meeting; September 2-3, 2014; Port of Spain, Trinidad, W.I.
Section 4
ENVIRONMENTAL HEALTH AND SUSTAINABLE DEVELOPMENT
4.1 Overview

The Caribbean boasts some of the most breath-taking land and seascapes on the planet and is home to a diversity of ecosystems that service communities with everything from clean drinking water, food (crops, livestock and marine resources), protection from natural disasters and economic development opportunities, to simply spiritual peace of mind. As development has hastened with growing populations and economies, the impact on the natural environment has taken its toll, more so in some locations than others, but the effects are nonetheless being manifested across all the Caribbean countries.

The looming threat of climate change and how to adapt now occupy the agendas of most countries. This is the case particularly among the Small Island Developing States (SIDS) given their extreme vulnerability to the likely accelerated change of physical state (mainly in temperature and water regimes) and to the vagaries of the wider global markets and consequent negative impacts on small island economies.

In crafting strategic responses at the CARPHA-agency level to foster improved environmental resource management practices, four primary thematic areas are considered:

1. Water and Wastewater Resources Management (including land resources);
2. Solid Waste Management;
3. Chemicals and Hazardous Substances Management

Climate change considerations underpin these four themes as adaptation to climate change and climate variability is cross-cutting. Improved management of the physical resource base translates to enhanced resiliency to the climate threat. Closely related is disaster risk management. Under increased negative outcomes induced by climate change, the frequency and occurrence of human-induced disasters will likely rise, predisposing communities and economies to further risk. Strengthening the policy, enabling environments and building capacity and awareness-raising for improved natural resources management must be an ongoing process and efforts must be sustained, even hastened to effectively address climate change.

CARPHA’s response to environmental resource management targets the quality of the environment, and the quality of life and livelihoods of communities. This support it provides to its member states through its Environmental Health and Sustainable Development Department is aligned to deliver services and the quality of life and livelihoods of communities. The work of the Department is aligned to deliver services along these four thematic areas with climate change and disaster risk/response cross-cutting all themes. The work of the department will support the wider mandate of the Agency with strong linkages to the hospitality sector in maintaining quality and healthiness of recreational environments, primarily recreational coastal waters. The Agency’s efforts will also serve to control the environmental degradation that creates conducive conditions for proliferation of harmful disease vectors.

4.2 Key Regional and International Natural Resources Management Frameworks

The work of CARPHA’s Environmental Health and Sustainable Development Department in improving environmental resource management and sustainable development, will be guided by a number of key regional and international frameworks. Access to resources from international donors for country interventions are typically tied into these frameworks which form a platform for coordinating regional and national governance and operations. The following provides an overview of the most relevant frameworks (although the list is not exhaustive) to the work of CARPHA.

4.2.1 Regional frameworks

At the CARICOM level matters related to natural resources management falls generally within Article 58 pertaining to Natural Resource Management of the Revised Treaty of Chaguaramas. There are relevant provisions under Article 61 pertaining to Forest Management and Development. The CARICOM Secretariat has been formulating a regional environmental policy with consultative processes planned during 2014. The CARICOM Secretariat has been charged with the formulation of a Common Water Framework following a COTED decision of 2008, however very limited progress has been made.

CARICOM has articulated the CARICOM Regional Framework for Achieving Development Resilient to Climate Change and its Implementation Plan (IP). The IP lays out a framework for enhancing environmental management so as to improve coping mechanisms, particularly in the area of water and land resources management and in the areas of food security within the agriculture and fisheries sectors.

At the Organization of Eastern Caribbean States (OECS) sub-regional level, matters relating to environmental resources management are framed against the Principles for Environmental Sustainability in the OECS or the St. George’s Declaration. The 21-point Principles document establishes policy positions upon which Member State governments are to mainstream natural resources management through national policies, laws and regulations. Environmental sustainability within the OECS Union is outlined in Article 24 of the Revised Treaty of Basseterre.

The Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) mandates Party States to take appropriate measures to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species, and to develop technical and other guidelines for the planning and environmental impact assessments of important development projects to prevent or reduce harmful impacts on the area of application. The Convention is supplemented by three Protocols: (i) the Protocol Concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region; (ii) the Protocol Concerning
Specially Protected Areas and Wildlife in the Wider Caribbean Region, and (iii) the Protocol Concerning Pollution from Land-Based Sources and Activities. The Contracting Parties have designated United Nations Environment Programme (UNEP’s) Caribbean Regional Coordinating Unit as the Secretariat of the Cartagena Convention which implements the provisions of the Convention within the Caribbean Environment Programme (CEP).

The Protocol Concerning Pollution from Land-Based Sources and Activities (LBS Protocol) is of particular interest in water and wastewater management. The LBS Protocol sets forward general obligations and a legal framework for regional co-operation, provides a list of priority source categories, activities and associated pollutants of concern and promotes the establishment of pollution standards and schedules for implementation.

4.2.2 Global frameworks

At the global small island state level, the Barbados Programme of Action and the Mauritius Strategy of Implementation provide the general overarching framework for many of the regional and sub-regional programmes on natural resources management and sustainable development. The framework places emphasis on coping with climate change, sustainable management of terrestrial and marine biodiversity with special reference to coral reef vulnerabilities, sourcing innovative ways for waste management through reuse and recycling, adoption of integrated water resources management (IWRM) approaches and promotion of sustainable tourism. The Third International Conference on Small Island Developing States to be held in September 2014 in Apia, Samoa will focus on (i) assessment of progress to date and the remaining gaps in the implementation, (ii) gaining renewed political commitment by focusing on practical and pragmatic actions for further implementation, (iii) identification of new and emerging challenges and opportunities for the sustainable development of SIDS and means of addressing them and (iv) identification of priorities for the sustainable development of SIDS to be considered in the elaboration of the post-2015 UN development agenda.

The Millennium Development Goal 7 pertaining to Ensuring Environmental Sustainability provides the benchmark for assessing attainment of progress in sustainable natural resource management. The related targets are:

- Target 7.A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources;
- Target 7.B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss;
- Target 7.C: Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.

Caribbean countries have been making progress in meeting this MDG through actions to strengthen policies and regulations and in meeting obligations of regional and international environmental treaties the countries are signatory to the post-2015 Development Agenda is in the review process.

The Strategic Approach to International Chemicals Management (SAICM) is a policy framework to promote chemical safety around the world. SAICM has as its overall objective the achievement of the sound management of chemicals throughout their life cycle so that, by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment. SAICM seeks to harmonize the implementation of national obligations associated with the three main chemicals conventions:

1. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal,
2. The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and

The UN Convention to Combat Desertification (UNCCD) is a key multilateral agreement that fosters the promotion of sustainable land management through policy, regulatory and institutional reforms to facilitate investments in landscape restoration to minimize land degradation and support poverty reduction and enhance environmental sustainability. A Caribbean Sub-Regional Action Plan aligned to the UNCCD 10-year Strategy that covered the period 2011 to 2014 was formulated in 2011.

The UN Convention on Biological Diversity seeks the conservation of biological diversity, the sustainable use of the components of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources. The majority of Caribbean countries have developed National Biodiversity Strategies and Action Plans and are at various stages of implementation.

On the International level, Annex IV of the International Convention for the Prevention of Pollution from Ships MARPOL 73/78 is one of the most important Conventions on the regulation on sewage discharges from the shipping sector. The Annex contains a set of regulations regarding the discharge of sewage into the sea, ships equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage and requirements for survey and certification. It also includes a model International Sewage Pollution Prevention Certificate to be issued by National Shipping Administrations to ships under their jurisdiction.

The Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-based Activities is a programme managed under UNEP that provides guidance to governments and partners for sustainable development of oceans and seas and their resources through coordinated action at the national level. National Action Plans are advocated that adopt a watershed management approach to control pollutant entry into watercourses and ultimately the marine environment.

The UN Convention on International Maritime Safety provides a platform for governments, UN agencies, scientists and the private sector to forge a common agenda for effective nutrient management.

Caribbean countries have submitted 1st and/or 2nd National Communications that speak to adaptation to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner. All of the Caribbean countries have submitted 1st and/or 2nd National Communications that speak to adaptation to the challenges associated with the smallness of the island landmasses and vulnerabilities to sea level rise, the threat of more severe hurricanes and more intense drought episodes.

On the International level, Annex IV of the International Convention for the Prevention of Pollution from Ships MARPOL 73/78 is one of the most important Conventions on the regulation on sewage discharges from the shipping sector. The Annex contains a set of regulations regarding the discharge of sewage into the sea, ships equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage and requirements for survey and certification. It also includes a model International Sewage Pollution Prevention Certificate to be issued by National Shipping Administrations to ships under their jurisdiction.

The Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-based Activities is a programme managed under UNEP that provides guidance to governments and partners for sustainable development of oceans and seas and their resources through coordinated action at the national level. National Action Plans are advocated that adopt a watershed management approach to control pollutant entry into watercourses and ultimately the marine environment.

Under the GPA the Global Partnership on Marine Litter emerged from the Manila Declaration. This seeks, as its main goal, to protect human health and the global environment by the reduction and management of marine litter through several specific objectives, key of which includes:

- the reduction of the impacts of marine litter worldwide on economies, ecosystems, animal welfare and human health
- the enhancement of international cooperation and coordination through the promotion and implementation of the Honolulu Strategy (a global framework for the prevention and management of marine debris) and
- the promotion of knowledge management, information sharing and monitoring of progress on the implementation of the Honolulu Strategy.

Also under the GPA the Global Partnership on Nutrient Management (GPNM) seeks to coordinate global cooperation to help reduce the amount of excess nutrients in the marine environment with focus on nitrogen and phosphorous loading (on account of human activities). The GPNM provides a platform for governments, UN agencies, scientists and the private sector to forge a common agenda for effective nutrient management.
4.3 Situational Analysis and Strategic Responses

The following is a situational analysis of the four main thematic areas within the Caribbean. The influences of climate change are presented as relevant in each of these areas. This is followed by the strategic response and the key areas for intervention and support by CARPHA.

4.3.1 Water and Wastewater Management

This is presented in two parts; (a) water security, which highlights the issues associated with freshwater resource access and management and (b) wastewater which examines the challenges of effluent discharges and pollution of receiving fresh and coastal waters. Elements of poor land management (and sustainable land management) are also considered as implicit in water resources management.

a. Water security

Many of the Caribbean islands rank among the most water scarce SIDS in the world. A country is considered as water scarce at water availabilities of less than 1,000 m3/capita/annum. Antigua and Barbuda, Barbados and the Bahamas rank among these. There are extreme variations of geographical availability of fresh water within and between countries, as well as in the availability of surface and groundwater and as such water is derived from either surface (rivers and lakes) sources, groundwater sources/aquifers, captured rainwater, and desalination. Countries heavily reliant on groundwater resources include Antigua and Barbuda and Barbados. The larger countries such as Jamaica rely on a mix of ground and surface water sources, depending on the geology of local water supply regions. In the majority of the smaller islands surface water abstractions (rivers and reservoirs) dominate. Rain water harvesting is practised in some of the smaller islands and in islands where topographic constraints limit access to the public distribution system in some locations. Application of desalination technologies although expensive in terms of water production costs, is increasing in the more water-stressed Caribbean countries.

The use of water and the manner in which it is used varies by country and by water subsector. As expected, the primary water demand is for domestic use, which is given priority by most countries. The principal water resources subsectors in the Region are (i) water supply and sanitation including water transport of wastes, (ii) irrigation and drainage and (iii) hydropower. Tourism, industry and agriculture are placing significant demands on water supply and are the source of growing conflict between sectors and needs of the communities, a challenge that presents itself more prominently in some countries over others, and particular areas within the countries themselves. This pressure is expected to mount as economies and populations grow, if investment in infrastructure and solutions to improve water use efficiency do not keep pace.

While in most Caribbean countries access to potable water supplies have achieved the MDG targets, there remain serious challenges in the quantity and distribution of water in many communities over the course of the year. This impacts not only water security and health of communities but presents challenges to economic output where commercial, industrial and agricultural production is curtailed by short-falls in water supply. Access to improved sanitation remains a challenge for lower-income communities across all the countries in the Caribbean with implications for maintenance of adequate health standards and occurrence of water-borne disease in particular.

The big challenge in the water supply sector is the age of most of the existing water treatment and distribution networks. In many cases water supply systems are no longer adequate to satisfy the demands of the communities and users they are now required to serve. Additionally, the challenge of financing upgrades to water supply systems to acceptable standards, means that the water supply can be highly erratic, thereby placing affected communities at high risk for disease outbreaks. The situation is often exacerbated by severe drought or catastrophic storms when the already-stressed systems are taxed further. This vulnerability has been well-documented in many CMSs based on data obtained on outbreaks of water-borne diseases such as gastroenteritis, typhoid fever, dysentery, Hepatitis A and other parasites particularly following extreme weather events.

b. Wastewater (and land-based pollutants)

The management of wastewater and land-based sources (LBS) of pollution is a very critical issue across all Caribbean states. Human activities in both coastal and inland areas are threatening the health, productivity, and biodiversity of coastal and marine environments globally as well as in the Caribbean. Pollutants from land-based sources constitute one of the greatest threats to coastal and marine ecosystems and to public health in the Wider Caribbean Region. In fact, pollution of aquatic ecosystems, including sensitive marine and coastal habitats, is the most predominant and recurrent trans-boundary environmental concern in the larger islands. Key point and non-point pollution sources are mainly related to:

- nutrient (nitrogen and phosphorus) loading from discharges grey and untreated black water and run off from agricultural areas
- the discharge of toxic effluents, sedimentation from erosion in upper watershed areas within waterscourses and along the coastal zone;
- improper solid waste disposal.

BOX 4.1 Climate change and water security

Long-range climate modelling using down-scaled climate models for the Caribbean region generally suggests that the Region will see a decrease in annual precipitation of anywhere from 10 to as much as 30 percent resulting in longer dry spells. The temperature regimes will also change in the diurnal ranges; with increasing numbers of extremely hot days and higher night time temperatures. The onset of climate change will have significant impacts in small island states including the Caribbean from a stand-point of water.

It is expected that sea level rise will increase the likelihood of coastal inundation and damage to shorelines and infrastructure from storm surge erosion, with threats to livelihoods. Rising sea levels mean increased likelihood of sea water intrusions into water supply aquifers reducing freshwater availability and presenting challenges for water treatment should CMSs continue to rely upon them. Increasing atmospheric temperatures are warming the oceans and changing prevailing weather patterns that will consequently affect rainfall. This too will impact watershed and aquifer recharge, in turn affecting water availability. The primary direct threats from changing weather patterns are changes in the frequency and intensity of storms that will likely cause more widespread damage to water supply systems, and the occurrence and severity of droughts that will spell hardships in countries that are water-scarce and/or have limited capacity to cope with drought.
The poor disposal of sewage sludge from both on-site domestic and other water treatment systems is also of concern. It is well-known that wastewater sludges are often disposed of illegally in watercourses or in and around landfill areas thereby posing further risks to the downstream environment.

Land-based sources of pollution are estimated to account for 80% - 85% of marine pollution in the Region. UNEP estimates that as much as 60% of wastewater entering the Caribbean Sea is currently untreated. These include industrial, residential and agricultural sources from which pollutants are transported to the coast in streams and water run-off by leaching and infiltration in the soil, as well as direct discharges to the sea. This is compounded by the fact that, because of their small physical size, activities inland could also have serious effects on the coastal and marine areas. In addition, the islands, particularly those in the southern Caribbean, are influenced by continental river runoff. The Pan American Health Organization (PAHO) estimated in 2001 that 51.5% of households in the Region depend on septic tanks and pit latrines, many of which do not comply with minimum technical specifications. Wastewater management has traditionally been on the lower end of national priorities.

The urgent need for control of the pollution that flows into the Caribbean Sea cannot be understated. The Caribbean Sea constitutes the coastal waters of the Region and is the economic basis for the tourism and fisheries sectors in the Region. The Caribbean Sea harbours 10% of the world’s coral reefs and 1,400 species of fish and marine mammals and the World Resources Institute recently estimated that coral reefs in the Region currently provide upwards of US$100 million per year in benefits associated with tourism, US$18 to 33 million in shoreline protection and another US$1 million in benefits to fisheries.

The Caribbean Sea Ecosystem Assessment noted that relative to its size, the Caribbean’s population is more dependent on income from tourism than that of any other part of the world, in 2004 contributing US$28.4 billion to GDP. Land-based pollution and over-extraction of marine resources has taken its toll on the quality of marine biodiversity and consequent impacts on fisheries of coastal communities in terms of reduction or loss of fisheries resources and reduction in recreational diving economic opportunities. The health impacts of poor wastewater management and L&S pollution are well-understood. In coastal communities that rely on use of septic systems, these are often not effective due to the high water tables and the result is discharge of untreated sewerage into the nearshore environment. On many islands there are no centralized sewerage systems and sewage is disposed of mainly through septic tanks and pit latrines, many of which do not comply with minimum technical specifications. Wastewater management has traditionally been on the lower end of national priorities.

A common perception is that the marine environment has the absorptive capacity to accommodate effluents. Inadequately treated sewage waste contributes to health-related problems, both through contamination of drinking water supplies and through the presence of pathogens in the watershed and coastal water environment as a whole. Local public health agencies have documented increases in reports of ear, nose and throat infections from tourists and residents alike, as the quality of coastal waters degrade. This presents a very clear and present danger to economies that are heavily reliant on tourism. Pollution influxes will reduce the aesthetic value of the islands for prospective tourists and will cause losses in revenue from non-returning tourists.

Other land-based sources of pollution are associated with land management, with the most prominent adverse manifestation being excessive sediment and nutrient loading from agricultural and other land development and resource extractive activities (such as mining and quarrying). Sediment from land-clearing and high levels of nutrients from agricultural areas and sewage outflows is often carried in the runoff where the increased nutrients lead to poor water quality and eutrophication, which enhances algal growth on reefs. Sedimentation causes smothering of corals and also interferes with their ability to feed and reproduce. Pesticides, which are known to affect coral reproduction and growth, as well as petroleum products, are also often transported and they pollute the marine environment, threatening coral reef health.

BOX 4.2. Climate change and coastal receiving waters and environments

The impacts of land-based sources of marine pollution will be exacerbated by the effects of climate change. Increased frequency of intense storm events will have immediate and significant impacts on coral reefs, in terms of excessive sedimentation and physical damage from large and powerful waves that often accompany hurricanes and tropical storms.

As global warming trends impact on shallow tropical and subtropical seas, there will likely be an increase in the frequency, severity and scale of coral reef bleaching. Corals have certain ranges of tolerance to water temperature and extended periods of increased sea surface temperature can result in coral bleaching. Mass coral bleaching took place in Jamaica during 1987, 1989, 1990 and 1998 and again in 2005 due to elevated sea surface temperatures, with considerable mortality.

Caribbean beaches are the most dynamic and fast changing parts of the islands’ landscapes. The combination of sea level rise and the impact of storms will compromise the integrity of these economically important assets particularly of the tourism sector.

The strategic response to improved water and wastewater resources management

A critical underpinning will be influences of climate change which will be manifest most significantly in water resources in terms of water availability and security, sanitation and proliferation of disease-carrying vectors. The strategic approach will need to focus on building resilience to climate change in Caribbean countries and enhancing water security through strengthened policy and institutional responses to support investments in integrated water resources management. It should be noted that within the watershed approach, land resource management is implicit.

There is an emerging consensus from the Caribbean region that national development policy and planning must take into account Integrated Water Resources Management (IWRM). The IWRM approach allows for the ordered planning for management of water in all of its forms including wastewater, in an equitable manner so that the interests of all stakeholders are served. This includes making provisions for meeting ecosystem needs to maintain sustained ecological functioning. With the often severe climate change management responses for water must be ‘climate-smart’. This means making the necessary investments in creating resilience and strengthening adaptive capacities within the various management institutions, including water utilities and communities, while ensuring the maintenance of the integrity of ecosystems. Investments in robust or ‘hardened’ water supply infrastructure that can withstand extreme weather events will be needed, not just to cope with greater climatic variability but also to address the issue of ageing infrastructure.

Climate change pressures will strengthen the case for the adoption of IWRM through the need for better integration of water, energy and land management at the resource and service delivery level. At the same time, IWRM through a focus on strengthening of the enabling environment and use of appropriate management instruments will provide improved regulatory oversight, the embedding of climate change adaptation into water management planning and operations and the need for improved monitoring and data collection.
Strategic Recommendations for CARPHA’s support

1. Contribute to the development and adoption of best practices and technical solutions for improved water security measures and water pollution reduction.

2. Build capacity for water resources management amongst health and environmental management professionals and other stakeholders through continued technical support in resource assessment, diagnostic analysis and in the design and implementation of appropriate solutions;

3. Deepen engagement of high level policy makers: In order to improve water resources including wastewater) management in the Region there needs to be sustained engagement at the political decision-making level and renewed efforts in changing attitudes of these stakeholders in how water and wastewater are regarded.

4. Refocus at the CARICOM level on policy and implementation of the regional water framework.


6. Support the strengthening of policies and legislation.

7. Support and contribute to the creation of policies and incentive regimes to facilitate investments in wastewater management.

8. Contribute to enhanced educational outreach.

4.3.2 Solid Waste Management

According to the Caribbean Community Secretariat, the generation of waste is intimately linked to the level of economic activity in a country, and is also an indication of the patterns of utilization of raw materials. Wealthier economies tend to produce more waste. The lack of land areas and resources available for the safe disposal of wastes, population growth, the growing tourism industry and the increase in imports of polluting and hazardous substances combine to make pollution prevention and waste management a critical issue in most Caribbean countries.

The quantity and composition of refuse vary from location to location, depending on economic development, income level, predominant activity sectors, consumption patterns, population size and density and extent of urbanization. There is a relationship between the generation of this waste and the human development index (HDI), which combines economic activity values with health and education levels.

Poor solid waste management harms people’s health and the environment in various ways, and if not handled in accordance with established sanitary standards for storage, collection, transportation and final disposal, this waste can help trigger diseases such as dengue, leptospirosis, gastrointestinal disorders, respiratory problems and skin infections. Conditions such as these multiply among populations lacking basic sanitation services, and often lead to diarrhea and parasitic infections, among other effects. The improper handling of solid waste produced by health facilities endangers the health of patients and health workers, as well as the workers at municipal disposal sites.

Classes of solid wastes generated in the Caribbean typically include:

- food and kitchen wastes
- paper, glass, metal and plastic containers and packaging
- construction wastes (bricks, tiles, concrete, rebar, lumber, sheeting, etc.)
- clothing
- hazardous wastes (medications, batteries, paints, chemicals, etc)

While the effects of poor waste management can affect all segments of the population, as with most hazards, vulnerable groups such as the very young, the elderly and those with pre-existing conditions that make them more susceptible to infections and exposure, will be disproportionately affected. This includes groups with limited socio-economic options such as the indigent.

Poor waste management can have direct and indirect economic consequences. The pollution of the environment can impact health through the burden of health care costs and loss of productivity among the workforce. The revenue earning capacity of the tourism dependent states will be particularly impacted where solid waste impacts the quality of the destination.

UNEP has indicated that developing countries spend up to 80-90% of their solid waste management budget on waste collection alone, compared with about 10% in the developed countries. In the latter, there is a greater allocation for treatment and the overall costs are relatively low as a result of the involvement of communities in waste management.

Solid waste generation in the Region will likely only increase, both in terms of volume and complexity. Given the limitations of SIDS and low lying coastal states, the identification of suitable lands for development of landfills will also be a challenge. Integrated Solid Waste Management, which prioritizes waste diversion strategies and recognizes landfills as a last resort, is not widely implemented. Even where the private sector is engaged to play a major role in waste management, there will still be costs to governments related to monitoring and regulation.

The greatest strides seen recently in solid waste management in the Region have evolved out of the regionally led initiative that was funded by the Caribbean Development Bank: OECS Solid and Ship-generated Waste Management Project. This project assisted six of the OECS states with the development of institutional capacities and legislative and policy frameworks and the selection and implementation of appropriate technologies. These have seen varying levels of success in different countries. However, in the absence of regional support for some of these initiatives, the anticipated benefits have not been fully realized. It appears that the links between the proper management of solid waste and the environmental, social and economic costs and benefits have not been made at the national level.

While there may be some value to regional support for aspects of solid waste management, the reasons for the limited development in the region may be attributed to the failure of the countries to adopt integrated waste management strategies and the inadequate commitment of resources to solid waste management, among other things.

At the regional level there are no integrative frameworks that are concerned specifically with solid waste management. In January 2012 governments endorsed the Honolulu Strategy, a global framework for prevention and management of marine debris. The Manila Declaration also recommended the establishment of a Global Partnership on Marine Litter (GPML) which was launched 18 June 2012. At the global level under UNEP’s Global Programme of Action, the GPML seeks to protect human health and the global environment by the reduction and management of marine litter as its main goal, through several specific objectives as follows:

- To reduce the impacts of marine litter worldwide on economies, ecosystem, animal welfare and human health.
- To enhance international cooperation and coordination through the promotion and implementation of the Honolulu Strategy - a global framework for the prevention and management of marine debris, as well as the Honolulu Commitment – a multi-stakeholder pledge.
- To promote knowledge management, information sharing and monitoring of progress on the implementation of the Honolulu Strategy.
- To promote resource efficiency and economic development through waste prevention (e.g. 4Rs (reduce, re-use, recycle and re-design) and by recovering valuable material and/or energy from waste).
- To increase awareness of sources of marine litter, their fate and impacts.
- To assess emerging issues related to the fate and potential influence of marine litter, including (micro) plastics uptake in the food web and associated transfer of pollutants and impacts on the conservation and welfare of marine fauna.

UNEP’s Caribbean Regional Coordinating Unit based in Jamaica is playing a key role in supporting countries of the wider Caribbean with participation in this partnership and raising awareness amongst professionals and policy makers.
The anticipated changes in temperature and moisture regimes (related to rainfall) will have possible impacts in several ways. During prolonged dry periods and drought, there is the increased likelihood of occurrence of uncontrolled burns within landfills. Buming of tyres and other wastes that can release potentially toxic and/or hazardous particulate matter into the atmosphere is of greatest concern. Mobilization of stockpiles of solid waste and indiscriminate discarded trash during floodwaters associated with severe events are also of concern.

Solid waste clogging watercourses is typically to blame for localized flooding that spreads contaminated waters within urban environments. Solid waste in the marine environment creates problems for marine ecosystems and degrades the quality of recreational waters. Although in Caribbean SIDS, methane gas generation from landfills and contribution to global greenhouse gas emissions is miniscule at the global level, the possibilities of capture and destruction of methane gas for power generation is being explored.

Drivers and Strategic response: The critical pressure point is the unavailability of land for landfilling to handle the volume of waste that is being generated in small islands.

The strategic response to improved solid waste management

A rapidly growing concern is the increase in the generation of electronic waste or e-waste. This is associated with the disposal of consumer electronics from televisions to computers to mobile cellphones. Of particular concern is the fact that electronic waste may contain a range of potentially hazardous materials that include cadmium, lead, beryllium and brominated flame retardants. These, in addition to other compounds are potentially carcinogenic. Disposal of mercury-containing equipment and compact fluorescent lamps (CFLs) is also a growing concern. In the case of CFLs there is limited recycling as most of the disposed bulbs enter the general waste streams for disposal at landfills.

The principle issue with disposal of hazardous wastes particularly at informal and/or unlined dumpsites is the potential for contamination of surface and ground waters, with the eventual exposure of downstream ecosystems and humans who will either come into direct contact with contaminated waters or consume plants and animals that may bio-accumulate these toxic compounds. Uncontrolled burning at dumpsites creates the potential for the release of hazardous substances into the atmosphere with outfall within downwind settlement areas, increasing the risk of human and environmental exposure.

Strategic Recommendations for CARPHA’s support

The following are the key strategic recommendations for improved solid waste management that will form the basis of interventions within CARPHA’s strategic outlook and work programme.

1. Support the design and installation of appropriate engineered solutions for improved waste management, drawing on successes from across the globe;
2. Support waste management policy design;
3. Contribute to advocacy efforts for community-level approaches for recycling, including the 3Rs;
4. Support innovation in incentivizing recycling, waste reduction and cleaner production, including the private sector;
5. Support to sustained advocacy and awareness raising and public education;
6. Strengthening the promotion of occupational health and safety for workers within the sector.

BOX 4.3 Climate change and solid waste management

The reality for the operation on many landfill sites in the Caribbean is that there is not the daily coverage of waste with soil or other suitable compacting material, thereby leaving waste exposed. Climate change models for the Caribbean predict an increase in extreme weather conditions and sea level rise. The increase in hot, dry periods will have possible impacts in several ways. During prolonged dry periods and drought, there is the increased likelihood of occurrence of uncontrolled burns within landfills. Buming of tyres and other wastes that can release potentially toxic and/or hazardous particulate matter into the atmosphere is of greatest concern. Mobilization of stockpiles of solid waste and indiscriminate discarded trash during floodwaters associated with severe events are also of concern.

The principle issue with disposal of hazardous wastes particularly at informal and/or unlined dumpsites is the potential for contamination of surface and ground waters, with the eventual exposure of downstream ecosystems and humans who will either come into direct contact with contaminated waters or consume plants and animals that may bio-accumulate these toxic compounds. Uncontrolled burning at dumpsites creates the potential for the release of hazardous substances into the atmosphere with outfall within downwind settlement areas, increasing the risk of human and environmental exposure.

Strategic Recommendations for CARPHA’s support

The following are the key strategic recommendations for improved solid waste management that will form the basis of interventions within CARPHA’s strategic outlook and work programme.

1. Support the design and installation of appropriate engineered solutions for improved waste management, drawing on successes from across the globe;
2. Support waste management policy design;
3. Contribute to advocacy efforts for community-level approaches for recycling, including the 3Rs;
4. Support innovation in incentivizing recycling, waste reduction and cleaner production, including the private sector;
5. Support to sustained advocacy and awareness raising and public education;
6. Strengthening the promotion of occupational health and safety for workers within the sector.

The effects of chemicals in terms of human and environmental health risks depend not only on their composition and basic properties, but also on their reaction with other chemicals, on the dosage, route and condition of exposure on the susceptibility of the organism exposed and many other factors. The general categories of toxic chemical issues fall within the following:

- Agricultral industry
- Pharmaceutical industry
- Petroleum industry
- Bauxite mining and alumina production
- Gold mining and manufacturing
- Manufacturing of industrial and domestic cleaning products,
- Paint production
- Household and industrial cleaning

The types classes of chemicals imported into the Caribbean include:

- Acids (mineral and organic)
- Bases
- Heavy metals (lead, mercury, cadmium)
- Petroleum hydrocarbons and derivatives
- Pesticides
- Paint, varnishes and lacquers (and precursor compounds such as tolouene)
- Fertilizers

4.3.3 Chemicals and Hazardous Materials Management

Chemicals constitute a significant portion of the regional trade. Some countries in the Region do manufacture while others are recipients of chemicals, as raw materials, intermediaries and as finished products. The bulk of the chemicals in the Region are imported from Europe and North America. These chemicals are a vital part of daily life and provide a wide range of benefits, in particular in increased agricultural output and industrial productivity, and improvement in the control of disease. On the other hand, chemicals also have the potential to cause considerable health and environmental problems throughout their life cycle. Within the Caribbean region, the agriculture and manufacturing sectors are the largest importers of chemicals although large amounts are also used for domestic and institutional (e.g. schools, hospitals) purposes and within the workplace. Chemicals imported into the Caribbean are mainly used in the following industries or purposes:

- Ecotoxicological: related to the contamination of air, water and soil, and contamination of biota;
- Public Health: related to food and water contamination, indoor air quality and ambient air quality;
- Occupational Health and Safety in respect of exposures to adverse air quality and hazardous chemicals within the work environment.

Although progress has been made in the improvement of chemicals management through support mechanisms such as the UNEP’s Strategic Approach for International Chemicals Management (SAICM) Secretariat much work still needs to be done. There is little data available or analysis of the impact of chemicals on human health in the Caribbean. The World Health Organization estimates that more than 25% of the global burden of human disease can be attributed to preventable environmental factors, including exposure to chemicals.
is a lack of a harmonized system for administration

Regional indicates several shortfalls that warrant attention

environmentally sound management of chemicals in the

result that result risk communication strategies are inadequate. A critical gap also lies in the fact that there are no poison centers for the Region.

The Caribbean Poison Information Network located in Jamaica addresses issues related to poisonous and poisonous substances, assists in heightening awareness of the dangers, and provides advice on managing cases of poisoning. At the national level there are generally insufficient resources available for regulating the environmentally sound management of chemicals. There is generally insufficient training of users, handlers, transporters, manufacturers, and other relevant stakeholders including first responders and customs officers. As a consequence, management of chemicals is poorly monitored by the relevant agencies. Countries could therefore benefit from capacity building in the critical areas of occupational hygiene and toxicology to assist in risk reduction. Finally, there is a general lack of research in areas of chemical safety and or environmentally sound management of chemicals.

The strategic response will assist in risk reduction. Finally, there is a general lack of research in areas of chemical safety and or environmentally sound management of chemicals.

Strategic Recommendations for CARPHA’s support

Drivers and Strategic response: With diversification of economies, along with manufacturing and processing sectors, there are increasing volumes and types of chemical agents (and equipment) being imported into the countries. The resultant concern is the improper disposal of spent chemicals and the impacts to human and environmental health once released into the environment. The strategic response will need to focus on working with the private sector to promote cleaner production approaches, investment in appropriate technologies and raise awareness amongst all stakeholders around safe use and management of chemicals.

A critical analysis of the situation with respect to the environmentally sound management of chemicals in the Region indicates several shortfalls that warrant attention in a strategic regional-level response framework. There is a lack of a harmonized system for administration of the life cycle of chemicals (from cradle to grave). In many countries there is still outdated legislation and there is need for national policies on the importation, use, handling, transportation, storage, manufacture and disposal of chemicals. There is often a paucity of knowledge about chemical safety and the environmentally sound management of chemicals with the result that risk communication strategies are inadequate. A critical gap also lies in the fact that there are no poison centers for the Region.

The Agency’s role should be to provide assistance to the Member States in their programs in the environmentally sound management of chemicals and hazardous materials. This will be done in collaboration with the SAICM Secretariat and its regional Centre in Trinidad and Tobago. The following are the key areas of support:

1. Provide guidance to the establishment of poison centres: Encourage the formation of poison centers at the national level that will serve as central information repositories and response nodes;
2. Support knowledge management for decision making: Develop a clearinghouse on chemicals management that will include tracking imports, use and generation of spent products and hazardous wastes;
3. Strengthen management capacities amongst practitioners: This should target users, transporters, storage and handlers of chemicals and hazardous materials, along with first responders to improve the handling of chemical incidents and accidents;
4. Promote and support advocacy: Development of effective risk communication strategies and outreach products for propagation within Member States. This will be in collaboration with regional and international support agencies;
5. Provide technical guidance for assessments and strengthen diagnostic capacities at national level: Assist relevant national agencies to effectively monitor environmental/biological exposures. Provide technical assistance in the development of laboratory capacity and capability in effective management of chemicals and hazardous materials management;
6. Support applied research: Encourage and participate in research on issues related to safer chemicals and hazardous materials management with emphasis on impacts on human health and eco-toxicology.

Air Quality Management

The link between the air quality and health is well-documented as is evident from estimates generated by the World Health Organization. The WHO defines air pollution as contamination of the indoor or outdoor environment by any chemical, physical or biological agent that modifies the natural characteristics of the atmosphere. The level of pollution to which inhabitants are exposed represents a balance between the rate of emission of the pollutant and the rate at which pollutants are dispersed. Poor ambient air quality is a result of a number of factors, including emissions from various sources, both natural and human-induced. Poor indoor air quality is a rapidly growing concern in urban environments given persistent issues with maintenance of air quality handling/air-conditioning units and poor maintenance of building structures themselves. Some of the typical sources of unhealthy air emissions in the Caribbean region are from:

- Industrial processes where there have been a sharp increase in type and range of manufacturing and industrial activities that contribute to atmospheric emissions. This is a concern in the more developed countries, mainly Jamaica and Trinidad and Tobago. However, there can be localized impacts in the smaller countries with communities located close to industrial and processing plants;
- Quarrying and aggregate processing operations that release large quantities of particulate matter;
- Transportation where there have been significant increases in the number of motor vehicles. With growing, aging vehicle fleets coupled with inadequate maintenance, the potential for emission of pollutants such as nitrogen oxides (NOx), volatile organic compounds (VOCs), particulate matter (PM), ozone, carbon monoxide (CO) and oxides of sulphur (SOx) is greatly increased;
- Agriculture through burning of fields for land-clearing and land preparation activities, intensive livestock rearing and in some cases, composting;
- Fires from industrial, household and municipal sources which may release carbon monoxide (CO), toxic chemicals such as dioxins and furans and particulates that may affect communities over wide areas;
- Accidents which may result in chemical spillage with the release of potentially hazardous airborne emissions;
- Indoor sources related to mould, dust and other irritant accumulation as a result of poor air-conditioning operation and maintenance, water seepage and general poor sanitation upkeep of indoor environments.

The common types of ambient air pollution that impact on health and environment include:

- Total suspended particulate matter (TSP)
- Sulphur dioxide (SO2)
- Nitrogen oxides (NOx)
- Volatile organic compounds (VOCs)
- Photochemical oxidants (ozone (O3))
- Carbon monoxide (CO)
- Carbon dioxide (CO2)
- Lead

Other contributing factors to the ambient air quality are greenhouse gases and ozone depleting substances.
4.3.4.1 The strategic response to improved Air Quality Management

Drivers and Strategic response: The maintenance of healthy building environments and ambient urban environments are not given due consideration from a health and safety standpoint. Deteriorated indoor and ambient air quality is expected to worsen given the increasing urbanization and causal agents of air pollution. Climate change stressors related to changes in atmospheric conditions, mainly temperature and humidity regimes could exacerbate negative outcomes. The strategic response for addressing poor indoor air quality will focus on assisting property owners with guidelines for proper maintenance of air handling units and facilities sanitation. With regards to ambient air quality, the scope for intervention is wide, from management of open burning, to vehicle and industrial emissions control, to minimizing dust emissions from quarrying. Approaches will need to combine awareness raising, investment in cleaner production, improving vehicle fleet emission efficiency and developing policy for spatial land planning incorporating air pollution source considerations.

Addressing health impacts of poor air quality is an emerging issue in the Caribbean and countries are beginning to set in place response actions. Some are in their primary stages while others are further ahead with developed programs and activities. In Jamaica an Air Quality Management Program was established in 2010 designed to monitor those standards called criteria pollutants whose levels are important as it relates to human and environmental health in general. National air quality standards and air quality regulations have also been developed.

There has been licensing of facilities in Jamaica as well as establishment of a national air monitoring network. In Trinidad and Tobago the Air Pollution Rules (2013) were drafted and the country is in the process of conducting studies and monitoring of air pollution. Environmental Management Authority (EMA) has installed two ambient air quality monitoring (AAQM) stations within the Point Lisas Industrial Estate at Couva. At this stage however, the system does not provide the ability to extrapolate to the national level the state of ambient air quality for the entire country. In Barbados, there are installations at a few locations in the country to monitor ambient air quality with augmented scientific inputs from UWI and other overseas university institutions in monitoring Saharan dust from the installation at Ragged Point on the island’s east coast. In Saint Lucia initial steps are being made toward the development of an ambient air quality programme with station installation, and there is consideration being given to policy and legislation.

There is great need to put in place air quality management strategies. There are few policy and legislative instruments and programs in place regarding air quality management across CARPHA Member States. Currently, concerns are more acute with respect to indoor air quality (IAQ) mainly in the workplace, because of impacts and potential on workers’ health, with long duration exposure in terms of maintaining physical and mental health, comfort, overall well-being, efficiency and productivity. Poor IAQ can be dangerous depending on the nature of the exposure. The problem appears to be growing as building infrastructure age and are not maintained. This trend is being seen in both the public and private sector infrastructure investments. Compounding this is a general lack of trained personnel to diagnose and address corrective measures and insufficient resources to institute effective measures.

There are several compounding factors that hasten the deterioration of air quality within confined indoor environments. Due to weak urban planning controls, there tends to be little consideration given with respect to siting facilities in proximity to potential sources of airborne pollution. Likewise, offending operations may be inadvertently allowed to operate from locations where their emissions may have adverse impacts on critical facilities such as schools, hospitals and other sensitive infrastructure, located down-wind. Building design and interior room/space configuration may not be informed by appropriate building codes or the codes may be weak, or not relevant for the type of building being constructed. More often than not however, with remodeling and retro-fitting of existing structures, provisions are often not made to ensure that air-handling is upgraded to accommodate changes to the original building plan. There is less dependence on natural ventilation in building design in recent times, given that computing equipment and electronics within the work environment require climate control. In many cases, inappropriate materials for the Caribbean climate are used for interior finishing and these degrade prematurely and contribute to indoor air pollution.
References


• CARICOM (2012). Regional Framework for Achieving Development Resilient to Climate Change and its Implementation Plan available online at http://200.32.211.67/M-Files/openfile.aspx?objtype=0&docid=4878

• CARSEA Caribbean Sea Ecosystem Assessment (2006). Executive Summary. The University of West Indies, and The Copper Foundation.


• Heileman, S., Corbin, C. Assessment of the State of the Environment Relevant to the GPA Source Categories in the Caribbean Small Island Developing States


• The Nature Conservancy. The Caribbean Challenge Initiative is an unprecedented collaboration for a sustainable Caribbean. Available online at http://www.nature.org/initiatives/regions/caribbean/caribbean-challenge.xml


• UNEP (1999a). Assessment of Land-based Sources and Activities Affecting the Marine, Coastal and Associated Freshwater Environment in the Wider Caribbean Region. UNEP Regional Seas Reports and Studies 172. UNEP/GPA Coordination Office and Caribbean Environment Programme.


5.1 Data Quality

Fully functioning national public health surveillance systems support several roles and are essential to guide and monitor the provision of services provided to the public, to manage and evaluate resource allocation and to ensure that areas of public health importance are monitored efficiently and effectively. Such systems serve an important regulatory function and are necessary to effectively guide planning, implementation, and evaluation of cost effective public health policies.

The ability of these systems to feed into wider regional surveillance systems is an indicator of the overall performance of national surveillance systems.

CARPHA Member States currently report routine data to CARPHA in the areas of communicable diseases, non-communicable diseases and their associated mortality.

5.2 Data Reporting

5.2.1 Reporting of Communicable Diseases

A review of the timeliness and completeness of regional reporting of communicable diseases by CARPHA Member States for the period 2010-2013 (see Table 5.1) suggests that there is a high level of variability of national surveillance systems and reporting procedures.

Approximately two-thirds of Member States reported data on syndromes under regional surveillance on time to CARPHA at least 50% of the time for the period 2010-2013. This is important as timely reporting of accurate surveillance data is essential for early detection of and response to outbreaks. Having access to accurate data on cases of communicable diseases is critical to track trends and monitor national and regional interventions. There is data available on communicable diseases under regional surveillance for 20 out of the 23 CARPHA Member States for the period 2010-2013.

Select CARPHA Member States report weekly data on influenza and other respiratory illnesses from sentinel sites to CARPHA. Reporting of such data, including etiologic agents, enables the monitoring of influenza within the Region and the ability of the Agency to generate and disseminate useful routine reports to Member States and to regional partners, and contributes to the information to develop preventive vaccines.

CARPHA Member States are in various stages of implementing HIV case-based surveillance systems. In the interim, reporting of annual HIV/AIDS data to CARPHA has been maintained. In 2013, 60% of Member States had reported annual HIV/AIDS data to CARPHA.
CARPHA remains committed to strengthening national surveillance systems to ensure accurate and timely reporting to inform national and regional programmes and policies. There is much work to do in the area of national health information management systems strengthening and establishing regional policies and guidelines to support accurate, relevant and timely reporting of data to CARPHA.

### 5.2.1 Reporting of Communicable Diseases

<table>
<thead>
<tr>
<th>CARPHA Member State</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua &amp; Barbuda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aruba</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bahamas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barbados</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belize</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bermuda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonaire, Saba, St. Eustatius</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cayman Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curacao</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominican</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grenada</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guyana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montserrat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Lucia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Maarten</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suriname</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turks &amp; Caicos Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.2.2 Reporting of Non-Communicable Diseases

Reporting of non-communicable disease indicators to the regional level was implemented in 2010. To date, at least one report has been submitted from 14 Member States. There are currently plans to revise the indicators being reported following the United Nations High Level meeting in 2011 which resulted in the definition of global indicators for the monitoring and evaluation of NCDs. Consequently, work is underway to incorporate the newly defined global indicators into the NCD reporting requirements for all Member States, beginning in 2015.

CARPHA is committed to providing technical assistance to Member States to further develop existing surveillance systems to ensure the availability of data required for reporting of NCD indicators. Furthermore, CARPHA will continue work towards building country capacity to perform all necessary analyses and establishing systems to facilitate ease of reporting to CARPHA.

### 5.2.3 Reporting of Mortality Data

The overall usefulness of mortality data is determined by its availability, the quality of the cause-of-death data and the representativeness of the data.

A review of the availability of cause-of-death data for CARPHA Member States for the period 2000-2012 (Table 5.2) shows that 78% of annual mortality data are available for this time period.

Cause-of-death data reported by 21 of the 24 CARPHA Member States represent national data. National data are reported by the English- and Dutch-speaking Caribbean, excluding Bonaire, Saba, St. Eustatius and Sint Maarten. Such national data are not readily available for Haiti. Sub-national cause-of-death data for Haiti, are however available for the years 1997, 1999 and 2001-2004 and these data represent less than 10% of the estimated number of deaths.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antigua &amp; Barbuda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aruba</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bahamas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barbados</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belize</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bermuda</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonaire, Saba, St. Eustatius</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cayman Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curacao</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grenada</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guyana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Montserrat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Kitts &amp; Nevis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Lucia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Maarten</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Vincent &amp; the Grenadines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suriname</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trinidad &amp; Tobago</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turks &amp; Caicos Islands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The quality of cause-of-death data for the period 2000-2010 for English and Dutch-speaking Caribbean countries was assessed by quantifying the proportion of deaths attributed to uninformative or ill-defined causes. Such causes have been termed garbage codes (GCs). Table 5.3 illustrates the proportion of deaths attributed to GCs by CARPHA Member State with available data, for the period 2000-2010.
The proportion of deaths attributed to GCs varies widely by Member States and over time. This proportion ranges from 11% to 48%, with 35% of the annual national data having less than 20% of deaths attributed to GCs and 22% having 30-50% of deaths being attributed to GCs. For the period 2000-2004, 32% of the reported data had between 30-50% garbage codes; the proportion of reported data with 30-50% garbage codes reduced to 12.4% for the period 2005-2010.

There is a direct relationship between proportion of GCs and the knowledge of certifying physicians responsible for completion of the medical cause of death certificate and the processing of these certificates by mortality coders. In order to improve the quality of cause of death data for the Region, training and education campaigns need to be conducted and targeted to both certifying physicians and mortality coders.

Under-registration of death remains a problem for some of the larger CARPHA Member States. Quantifying under-registration can be very difficult and due to small population sizes estimates are generally considered not accurate. Further work in this area needs to be conducted.

Table 5.3 Proportion of Deaths attributed to Garbage Codes by CARPHA Member States, 2000-2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Antigua &amp; Barbuda</th>
<th>Anguilla</th>
<th>Barbados</th>
<th>Belize</th>
<th>British Virgin Islands</th>
<th>Dominica</th>
<th>Grenada</th>
<th>Jamaica</th>
<th>Montserrat</th>
<th>Netherlands Antilles</th>
<th>St. Lucia</th>
<th>St. Vincent/Grenadines</th>
<th>Suriname</th>
<th>Turkey &amp; Cyprus Islands</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>31%</td>
<td>49%</td>
<td>19%</td>
<td>29%</td>
<td>41%</td>
<td>29%</td>
<td>29%</td>
<td>25%</td>
<td>22%</td>
<td>33%</td>
<td>39%</td>
<td>15%</td>
<td>30%</td>
<td>31%</td>
</tr>
<tr>
<td>2001</td>
<td>29%</td>
<td>27%</td>
<td>25%</td>
<td>29%</td>
<td>27%</td>
<td>33%</td>
<td>19%</td>
<td>18%</td>
<td>27%</td>
<td>33%</td>
<td>33%</td>
<td>16%</td>
<td>20%</td>
<td>24%</td>
</tr>
<tr>
<td>2002</td>
<td>27%</td>
<td>28%</td>
<td>24%</td>
<td>29%</td>
<td>25%</td>
<td>27%</td>
<td>25%</td>
<td>22%</td>
<td>22%</td>
<td>30%</td>
<td>19%</td>
<td>18%</td>
<td>25%</td>
<td>24%</td>
</tr>
<tr>
<td>2003</td>
<td>26%</td>
<td>22%</td>
<td>23%</td>
<td>23%</td>
<td>22%</td>
<td>23%</td>
<td>23%</td>
<td>23%</td>
<td>22%</td>
<td>29%</td>
<td>24%</td>
<td>17%</td>
<td>21%</td>
<td>21%</td>
</tr>
<tr>
<td>2004</td>
<td>25%</td>
<td>24%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2005</td>
<td>24%</td>
<td>23%</td>
<td>22%</td>
<td>21%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2006</td>
<td>23%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2007</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2008</td>
<td>21%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2009</td>
<td>20%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
<tr>
<td>2010</td>
<td>21%</td>
<td>20%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>21%</td>
<td>29%</td>
<td>24%</td>
<td>18%</td>
<td>20%</td>
<td>21%</td>
</tr>
</tbody>
</table>
5.3 Medical Laboratories

5.3.1 The Role and Need for Comprehensive, Quality Laboratory Services

A major determinant of a country’s healthcare status is the quality of its healthcare facilities, human resources and the level of services provided. Adequate, quality laboratory services are essential at all levels of the public health system. They are critical for supporting disease surveillance and sharing information with neighbouring countries to prevent disease and advance health. They are also key to complying with International Health Regulations 2005 (IHR) which aim to improve early identification of public health emergencies, to reach Millennium Development Goals, to ensure that communities receive appropriate and effective clinical care by providing accurate diagnosis, and guiding the treatment and management of patients.

In the Caribbean, the importance of laboratory data and information is amplified by the key role of regional laboratories in the identification of disease outbreaks e.g. foodborne, Legionella, Dengue, Chikungunya, etc., in order to facilitate rapid and effective public health action. As the most tourism dependent region in the world, the Region’s states share an increasing dependence on the tourism industry as the primary economic driver, and the provision of public health laboratory services is critical to protecting the region’s tourism market and maintaining regional GDPs. The role of laboratory services is also critical to the prevention and control of NCDs and other burdens, a development issue recognized as such by CARICOM Heads of Government in the 2001 ‘Nassau Declaration on Health’.

5.3.2 Overview of Laboratory Services and Networks in the Caribbean

Major efforts have been made over the past decades to improve laboratory services in the Caribbean. The diversity of the territories which make up the Caribbean is mirrored in the level and extension of laboratory services available to their populations. A 2011 census of 21 Member States published by PAHO noted that there are more than 500 medical laboratories with the percentage of public and private laboratories being 45% and 55% respectively. Geographically larger Member States such as the Bahamas, Belize, Jamaica, Haiti, Guyana, Suriname and Trinidad and Tobago have established national laboratory networks with multiple tiers of laboratory services. In these systems, regional laboratories attend to local clinics that perform simple and more regularly requested sample analyses, while referral centres have a higher level of laboratory structure and perform more specialised tests, or those tests which are requested less frequently. In contrast, smaller islands such as Anguilla, Antigua, Grenada and Montserrat each have only one public health laboratory serving their populations. These national reference public health laboratories have a dual purpose of providing information for case management as well as data for surveillance at a national level since these laboratories function within a hospital environment.

Access to centralised national or regional services for the detection of complex or low incidence diseases is of paramount importance given the varying levels of services available in Member States due to carrying capacity and economic feasibility. The CARPHA Microbiology Laboratory, Port of Spain, Trinidad in collaboration with regional airlines and couriers services provides reference services to Member States in the Caribbean Region while maintaining the capacity to provide primary diagnostic testing to support outbreak investigations as well as regional and global initiatives e.g. surveillance of vaccine preventable diseases. The provision of environmental health services in the Region is limited to water quality testing in national reference laboratories in a limited number of countries, with the majority accessing services through the CARPHA Environmental Health Laboratory, Castries, Saint Lucia.

A survey conducted in 2011 by PAHO/CAREC indicated that more than 70% of Member States had improved their capacity for the rapid detection of bacterial microorganisms using standard techniques. The survey however highlighted major gaps in their laboratory systems such as their limited capacity for detection of viral pathogens and, that despite having testing capacity very few countries participate in quality assurance programmes to verify the validity of results produced. In 2012, PAHO and CARPHA conducted an assessment in several countries to determine their national public health laboratory services preparedness to detect, contain and respond to emergencies caused by high risk agents. This survey identified major challenges in the areas of human resources, implementation of a sustainable quality system and limited biosafety and waste management practices. Through the initiative and assistance of WHO/PAHO, CDC and other health partners, the implementation of laboratory specific requirements for the IHR 2005 was improved considerably in 2013 in several countries. However, there remains the need for monitoring and evaluation of interventions and for addressing those factors which affect the sustainability of the improved capacities.

The Region has also benefited from a donation by the Government of Canada’s Global Partnership Programme (GPP) of a state of the art Biosafety Level Three (BSL 3) laboratory facility located at CARPHA headquarters in Port of Spain. The facility will allow CARPHA to use a regional approach in assisting Member States to meet international health commitments, such as the IHR 2005, while strengthening the existing laboratory networks as embodied in the Caribbean Cooperation in Health. The Region will now have improved preparedness and response measures in place to rapidly detect, diagnose and respond to disease outbreaks (natural or deliberate) caused by emerging or re-emerging high risk pathogens. These measures are of paramount importance towards safeguarding regional economies.

Several thematic networks operate within the Region to provide technical support for the provision of laboratory services in specific areas like the prevention and control of HIV/STI and Acute Respiratory Illnesses. These networks work to ensure that capacity to diagnose diseases, identify public health threats and conduct surveillance is done more effectively through quality assured services and hence provide a good entry point for broader laboratory strengthening.

5.3.3 Challenges and Opportunities

In spite of global progress, laboratory services and networks are one of the weakest links in health systems in the Region and remain inadequate to meet all priority needs and international standards. Without appropriate, high quality laboratory support to patients and laboratory based surveillance for public health, significant illnesses can be managed optimally and public health programmes cannot be maximally effective. Contributing areas and themes to be considered at country and regional level for strengthening health laboratory systems include competent governance and network delineation, adequate policies and legislation, appropriate infrastructure, sufficient well-trained and motivated staff, adequate and sustainable funding, appropriate test algorithms and laboratory procedures, efficient quality management programmes, well-organised inventories of equipment and reagents with efficient supply chain management, a robust electronic architecture for reporting, data and information processing and general laboratory management.

One of the areas that has attracted more attention in recent years is the lack of legislation for laboratory quality control for public health and medical facilities...
The effectiveness of public health interventions is wholly dependent on the analysis of laboratory data, since it has been estimated that 80% of medical decisions are influenced by laboratory results. The limited laboratory capacity therefore has major consequences for individuals and the healthcare system. Given the fragility of the economies, a disease outbreak or wide-spread public health issue would have severe ramifications not only on social and economic development, but could also create global isolation. However, raising interest from national and international development partners for funding to support laboratories through a comprehensive approach to strengthen national laboratory services in a staged and sustainable manner by providing graduated levels of performance recognition towards the achievement of the ISO 15189 standard.

Beyond National Laboratory Policies, several countries have developed National Laboratory Strategic Plans (NLPs) addressing technical and logistical matters, and some of them are already in the implementation phase. Strategic Plans differ among countries because of fundamental differences in and varying levels of infrastructure, human capacity, financial resources, and levels of engagement of national and international partners. Further efforts are required to develop and operationalise the Caribbean Public Health Laboratories Network which will allow for the rationalisation of allocation of resources among its members and to complement national disease control efforts. The coordination of the development of this Network is a role of CARPHA as regional public health reference laboratory of the Caribbean Public Health Laboratories Network which is a role of CARPHA as regional public health reference laboratory and to monitor and evaluate implementation of interventions to determine sustainability and consider new initiatives, to advocate for equitable allocation of resources for laboratory services, and to perform operational research to provide data for decision making. The potential of public/private partnerships and of Information and Communication Technologies (ICT) innovations also need to be further explored.
5.4.2 Legislation and Regulatory Framework

The legislative framework provides the basis upon which regulation of medicines and related activities can be undertaken. Whereas all the study countries had some type of legislation dealing with control of pharmaceuticals and the practice of pharmacy, it was found that none was comprehensive. Requirement for the registration of medicines existed in only seven of the study countries. Other key components which were not generally covered included adverse drug reaction monitoring, specific prohibition of counterfeit medicines and control of drug promotion and advertising. It was also reported that laws were not updated on a timely basis and involved lengthy processes.

Six of the study countries had established a system for medicines registration. However, only two of these countries had a national regulatory authority responsible for all regulatory activities. Responsibilities were distributed over other different departments and, in the absence of a body with overall responsibility for regulatory functions, coordination and communication was suboptimal, thus negatively impacting the efficiency and effectiveness of regulatory performance.

5.4.3 Human Resources for Medicines Regulation

The regulation of medicines requires personnel with specialised training to perform the various functions demanded within the system. Without an adequate number of such persons, effective regulation cannot be achieved.

The availability of human resources for medicines regulatory activities was investigated by HERA in 2009. In keeping with the differing extent of medicines regulation in the study countries, differences in the numbers of persons involved in drug regulation was evident. There were three countries in which regulatory activities were essentially non-existent, as there was no evident. There were three countries in which regulatory activities were investigated by HERA in 2009. The availability of human resources for medicines registration. However, only two of these countries had a national regulatory authority responsible for all regulatory activities. Responsibilities were distributed over other different departments and, in the absence of a body with overall responsibility for regulatory functions, coordination and communication was suboptimal, thus negatively impacting the efficiency and effectiveness of regulatory performance.

5.4.4 Licensing Activities

The extent of licensing activities varied depending on the capacity of the countries studied. With respect to licensing of premises, only seven of the study countries reported licensing all relevant premises. For the retail pharmacies category, only eleven countries reported licensing these premises. Although it was acknowledged that unlicensed premises were likely to be involved in the distribution or sale of pharmaceuticals in some countries, the extent of these activities were unknown. With respect to licensing of pharmacists, eleven of the study countries have a requirement for registration of pharmacists. The remaining countries did not appear to have such a provision.

5.4.4.1 Product Assessment and Registration

The assessment of pharmaceutical products prior to registration is critical to ensuring that the products are safe, effective and of good quality and therefore suitable for therapeutic use. The assessment and registration of products and the maintenance of the appropriate register also provides an effective means for identifying unapproved/legal products on the market. Registration of pharmaceuticals was required by law in only seven of the study countries. Of these, only five countries performed the function. One country reported that it performed registration of medicines even though there was no explicit legal requirement. Thus registration activities were performed in six of the study countries.

The category of drug products which required registration prior to marketing differed between the reporting countries. All countries reported however that new drugs and generic drugs for human use required registration. None of the countries provided information on how many of the registered products were available in the respective country markets and only one country reported that a list of registered products was readily available on its website.

Ten study countries did not have a registration system in place. Nonetheless, all reported the implementation of some form of quality assurance measures during the procurement procedures for products destined for use in the public sector. The study authors concluded however, that the situation for pharmaceutical products being imported by the private sector was inadequate in all ten countries.

5.4.4.2 Quality Control

At the time of the HERA study, only four countries reported having a regulatory laboratory. At the regional level, the Caribbean Regional Drug Testing Laboratory (CRDTL) performed quality control tests on request from Member States. The range of tests which could be performed varied between the laboratories, with only one CRDTL able to perform microbiological tests and none of the labs able to perform pyrogen or toxicity tests.

Although the CRDTL had an established surveillance list of drugs approved by its Technical Advisory Committee for the surveillance programme, participation in the surveillance programme declined over the years with requests for pre-registration or pre-tender assessments increasing over time. Post-marketing surveillance is an important regulatory function which should not be neglected.

<table>
<thead>
<tr>
<th>Year</th>
<th>Routine</th>
<th>Pre-Registration/ Pre-Tender</th>
<th>Product in Development</th>
<th>Regulatory Investigation</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td>157</td>
<td>44</td>
<td>7</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>2005-2006</td>
<td>145</td>
<td>73</td>
<td>9</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>2006-2007</td>
<td>259</td>
<td>83</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2007-2008</td>
<td>147</td>
<td>130</td>
<td>8</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>2008-2009</td>
<td>100</td>
<td>178</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2009-2010</td>
<td>148</td>
<td>157</td>
<td>1</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>2010-2011</td>
<td>51</td>
<td>206</td>
<td>6</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>2011-2012</td>
<td>54</td>
<td>131</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Data on out of specification (OOS) results indicates more or less similar rates on OOS results for routine and pre-registration evaluations. The rates in other categories are higher but the numbers of samples are small.

The results of quality tests performed over the years has shown failure rates which have generally exceeded that of products tested. There is clearly room for improvement and supports the case to work towards improvement in regulatory capacity in the Region.
PAHO has been providing support to medicines laboratories with respect to training of laboratory analysts in analytical techniques and the principles of good Laboratory practices. Support was also provided to CROTL in its preparation for application for prequalification on the WHO Prequalification Programme for Quality Control Laboratories. The most recent training activity was the PAHO-Argentina Training for quality control laboratories which took place in three phases during 2013. The trainers were from the national laboratory of Argentina and the participating laboratories were the national labs of Guyana, Jamaica, Suriname and Trinidad and Tobago and the CARPHA Drug Testing Laboratory.

5.4.5 PAHO Pharmaceutical Situation in the Caribbean Report

Recently PAHO published the results of its most recent survey of the Pharmaceutical Situation in the Caribbean. The information-gathering which was done as part of the Pharmaceutical Sector Country Profiles project was based on a set of 20 basic indicators of regulatory capacity included on the Pharmaceutical Level 2 survey. Comparison with the data reported in the HERA study shows disparities in some instances.

5.4.5.1 Medicines Policies

The 2009 HERA report stated that seven countries reported the existence of a National Medicines Policy, however, the PAHO report indicated that only two countries reported the existence of such a policy. As to registration of medicines, the HERA report stated that six countries had established a system for registration of medicines whereas the PAHO report indicated that four countries performed this regulatory function. The reasons for these disparities between the information provided in the two reports are not immediately apparent.

5.4.5.2 Licensing

With respect to licensing activities, the information reported by HERA in the 2009 study is not immediately comparable with that presented in the PAHO 2010-2012 Pharmaceutical Situation report. Whereas in the HERA study, licensing activities which were reported to be performed were disaggregated according to the category of licensing activity, the PAHO study reported licensing activities as a single category.

The HERA study reported on the licensing of manufacturers, importers/distributors, retail pharmacies and retail outlets where over-the-counter products were permitted to be sold. The findings were that:

- Licensing of manufacturers was carried out in all seven countries which had manufacturing establishments
- Eleven of sixteen countries licensed retail pharmacies
- Seven of sixteen countries licensed retail premises
- Nine of fourteen countries licensed importers and distributors
- Licensing of manufacturers was carried out in all seven countries which had manufacturing establishments
- Eleven of sixteen countries licensed retail pharmacies
- Seven of sixteen countries licensed retail premises

The PAHO Pharmaceutical Situation report stated that eight of nine responding countries conducted licensing activities. It is not therefore possible to assess whether any significant change in activities occurred in the intervening period between the two studies.

5.4.5.3 Pharmacovigilance

Pharmacovigilance is defined by WHO as "the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other medicine-related problem." It is concerned not just with adverse drug reactions, but with product quality and medication errors as well. It is an important aspect of drug regulation and an indication of the scope of these activities in the Region was covered in the PAHO Pharmaceutical Situation report.

With respect to the legal basis for these activities, three of the thirteen responding countries reported the existence of legal provisions for pharmacovigilance activities. Two out of twelve countries reported legal provisions for the monitoring of adverse drug reactions (ADRs). Two of twelve countries reported the existence of a National Pharmacovigilance Centre. Notwithstanding this, eleven of twelve countries reported that an official standardised form was used to report ADRs. Since the HERA report indicated that only one country reported having a legal basis for adverse drug reaction monitoring, it would appear that there has been modest improvement regarding the existence of legal provisions for this area of regulatory activity.

The number of countries which reported performing pharmacovigilance functions was seven of nine reporting countries. Two countries reported that ADR data was submitted to the WHO Collaborating Centre in Uppsala, Sweden. There was no discussion of the quantum of ADR reports being collected in the territories and whether analysis of the data was being conducted.

One initiative to foster improvement of pharmacovigilance in the Region was the establishment in 2008 of the Vigicarib network. The mission of Vigicarib was to support the development and the strengthening of Pharmacovigilance through activities and proposals of harmonised regulatory actions that promote the safe and rational use of drugs as a necessary component of Public Health policies in the Caribbean. PAHO/WHO and the WHO Uppsala Drug Monitoring Centre supported its establishment. Three lines of action were identified for strengthening pharmacovigilance in the Region:

1. Promoting dialogue, disseminating information of drug safety and sharing knowledge, criteria and methodologies used in pharmacovigilance
2. Collaborating in pharmacovigilance implementation, analysis and evaluation of the impact in public health and patient safety
3. Harmonising norms, standard procedures and tools (forms) used by the members of the network, including joint research on pharmacovigilance

Information on the achievements of the network are unavailable and the network is currently inactive.

5.4.5.4 Regional Performance in Medicines Regulation

Recently, PAHO also published its first bulletin of the Observatory of the Regional Platform on Access and Innovation for Health Technologies (PRAPIS) in which an analysis of basic medicines regulatory capacity in the Region of the Americas was presented. Twenty basic medicines regulatory indicators were evaluated for twenty five PAHO Member States. It was acknowledged that this was by no means an in-depth study, but it did give a basic indication of the comparative capacities in different regional groupings within the Americas.

An important finding was with regards to the comparison of the level of achievement in four geographical subregions. The non-Latin Caribbean with a level of attainment of 36.6% was well below South America (90%), Central America and Latin Caribbean (93%) and North America (100%). It was also demonstrated that the income level of the countries was not a predictor of the level of regulatory capacity achieved.

5.4.6 Improving Regulatory Capacity

- The findings of the HERA study highlighted constraints impacting the efficiency and effectiveness of medicines regulation in the study countries. It also noted the low level of post-marketing surveillance in the study countries which would make it difficult to detect substandard medicines in circulation. The...
study authors recommended that CARICOM countries should establish a network for cooperation among National Regulatory Authorities (NRAs) to discuss viable approaches to address common challenges. It was also recommended that national medicines policies be developed/updated and implemented. It was further recommended that an overall CARICOM Regional Medicines Policy would be useful to define regional goals, strategies and commitments.

The weaknesses in regulatory capacity were also underscored for capacity building in all facets of medicines regulation generally. Some suggested strategies were:

- Development of harmonised guidelines for application and assessment
- Capacity building of NRAs
- Promoting formal cooperation and exchange of information
- Resource-sharing
- Supporting licensing of medicines in countries without registration system
- Strengthening quality control capacity

5.4.6.1 CCH III Progress

The principal objective with respect to the sub-priority “Pharmaceutical Policy, regulation and management” was to improve access to safe, affordable and efficacious medicines. Four goals were identified to advance this broad objective:

1. Caribbean Pharmaceutical Policy designed and implemented
2. Strengthened regulation of medicines including legislation and medicines registration
3. Harmonised medicines supply systems and sub-regional negotiation mechanism
4. Caribbean strategy for rational use of medicines approved and implemented

While there has been progress in the achievement of the CCH III objectives, some targets have not been met.

5.4.6.2 Caribbean Pharmaceutical Policy Designed and Implemented

The target was set that by 2013, a Caribbean Pharmaceutical Policy would be approved and a workplan implemented. The Caribbean Pharmaceutical Policy (CPP) was approved by the COHSOD in April 2011. The COHSOD also approved the establishment of the Expanded Technical Advisory Committee on Pharmaceutical Policy.

The goal of the CPP is to guide Caribbean countries to ensure access to safe, effective medicines of good quality and that medicines would be used rationally. There are four main areas of focus identified in the policy namely:

1. Pharmacy policy scope
2. Regulatory Framework
3. Access, and
4. Rational use of medicines

Specific objectives were agreed for each of the four areas, and strategies to be executed both at regional and national levels set out. Among the objectives was the development of a sub-regional regulatory framework for medicines and strengthening collaboration among Caribbean countries to ensure performance of the essential components of the regulation of medicines. Included among the strategies was the strengthening of the Regional Drug Testing Laboratory and supporting its incorporation into CARPHA.

Strengthened regulation of medicines including legislation and medicines registration

The development of a sub-regional regulatory framework had also been targeted for completion by 2013. This has however, not been completed. A draft concept note and roadmap for the establishment of a sub-regional regulatory framework for medicines and health technologies has been created but it has not been finalised and approved. Key aspects of the concept note are the proposal of a structure for a Caribbean Regulatory System combining proposed functions to be performed at sub-regional and national levels, and the establishment of a Caribbean Regulatory Authority (CRA) within CARPHA, building on the existing Drug Testing Laboratory. It envisages that a collaborative approach between the CRA and NRAs would be the operational modality with the CRA responsible for coordination of the system. The main activities for implementation of the roadmap and the associated provisional timelines for their implementation were elaborated but these are behind schedule.

5.4.6.3 Harmonised Medicines Supply Systems and Sub-Regional Negotiation Mechanism

The Regional Network of Pharmaceutical Procurement and Supply Management Authorities of the Caribbean was created in November 2004. The mission of the network is “To promote the continuous availability of affordable pharmaceutical products meeting standards in safety, quality and efficacy for Caribbean public health programme and services through inter-country and regional cooperation.” The last reported meeting of the group was held in Belize in February 2008 at which time the network agreed on a standard list of procedures/documents which should be used by all members, and the commitment to Good Procurement Practices was endorsed. Reference was made in the meeting report to the targets established in the CCH III document and future tasks for the network which had been agreed. The network does not appear to be active at this time and there appears to have been little if any progress in implementing the CCH III indicators.

5.4.6.4 Caribbean Strategy for Rational Use of Medicines Approved and Implemented

The WHO definition of rational use of medicines states that “Patients receive medicines appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.” Estimates by the WHO suggest that more than 50% of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly. Among the possible consequences of incorrect use of medicines are the development of antimicrobial resistance, adverse drug reactions and medication errors, lost resources and eroded patient confidence.

In the recent publication by PAHO entitled Pharmaceutical Situation in the Caribbean, it was reported that twelve of thirteen countries had an Essential Medicines List (EML) or equivalent. Only six of the twelve countries had however updated the list within the past two years. Alignment of the EML with Standard Treatment Guidelines (STGs) was reported by four countries. Seven countries reported the existence of National STGs for most common illnesses and five of those countries reported that the STGs had been updated within the last two years.

The targeted development and implementation of a Caribbean strategy for rational use of medicines does not appear to have been achieved. No information on the establishment of therapeutic protocols for chronic diseases, (proposed to be have been completed by 2011) has been located at the time of writing.

5.4.7 Future Directions

Over the years, a significant amount of resources and effort have been invested in initiatives to improve aspects of the medicines regulatory framework in the Region. Nonetheless, regulatory performance remains relatively weak when compared with other regions in the Americas. It is obvious then that considerable work remains to be done both at national and regional levels. It is also apparent that some initiatives which were implemented in the past have not been sustained. Looking ahead, it is important to have a critical review of all these programmes to identify the factors which have contributed to the lack of continuity of effort at the regional level. The design and planning of new regional initiatives to improve medicines regulation in the Region must be done within the context of the best understanding of the challenges which have stalled initiatives in the past.

The Concept note and Roadmap for the proposed Caribbean Regulatory System (including a Caribbean Regulatory Authority within CARPHA) has been further elaborated and finalised and proposes a system which will rely heavily on active collaboration of regional partners to achieve success. Initial funding to implement the CRS has been secured from the Bill & Melinda Gates Foundation (BMGF).
The CRS when operationalized will increase access to essential medicines, decrease cost to families and governments and facilitate industry. Regional medicines regulatory systems of various types operate successfully in other regions of the world. The Caribbean region can draw on the experiences of others in developing an appropriate system to meet its own needs. The development of this system must be informed by a thorough understanding of the realities at the operational level in the region and planning effective and workable strategies relevant to the Caribbean situation.

The availability of regularly updated information on the regulatory situation in Caribbean countries will be essential to inform the development of interventions which meet the needs of these countries. An instrument to capture critical information on the regulatory situation in countries should be very useful in this regard. The instruments used in previous studies could be adapted to capture essential information which could be provided on an annual basis.

5.5 Research

5.5.1 Background

The Pan-American Health Organization/World Health Organization (PAHO/WHO) has defined eleven Essential Public Health Functions (EPHF) necessary to strengthen public health practice. In its report (2002), PAHO detailed an evaluation of these functions for the Region, in which the English-speaking Caribbean and the Netherland Antilles received a less than optimal score for the Research in Public Health function (38% of optimal score). The indicators assessed for this function were the development of a public health research agenda; institutional research capacity, and technical assistance and support at the subnational level. Of these three indicators, the Caribbean countries received the lowest score with regards to the development of a public health research agenda. Intermediate performance was noted for the other two indicators.

The Research in Public Health function is consistent with the attributes of an effective Health Research System (HRS). The latter is now promoted by the World Health Organization (WHO) and the Council on Health Research for Development (COHRED) to describe what is needed to ensure the oversight, conduct and uptake of research for health to inform policies, programmes and practices. WHO’s revised definition for an HRS states that it is “the people, institutions, and activities whose primary purpose in relation to research is to generate high-quality knowledge that can be used to promote, restore, and/or maintain the health status of populations. It should include the mechanisms adopted to encourage the utilization of research.”

The four functions of an effective HRS, Stewardship (Governance), Financing, Building and Maintain Resources and Producing and Using Research, are detailed in Table 5.6.
Table 5.6 Functions of Health Research Systems

<table>
<thead>
<tr>
<th>Functions</th>
<th>Operational Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stewardship</td>
<td>Define and articulate a vision for a national health research system</td>
</tr>
<tr>
<td></td>
<td>Identify appropriate health research priorities and coordinate adherence to them</td>
</tr>
<tr>
<td></td>
<td>Set and monitor ethical standards for health research and research partnerships</td>
</tr>
<tr>
<td></td>
<td>Monitor and evaluate the health research system</td>
</tr>
<tr>
<td>Financing</td>
<td>Secure research funds and allocate them accountably</td>
</tr>
<tr>
<td>Building and Maintaining Resources</td>
<td>Build, strengthen and sustain the human and physical capacity to conduct and absorb health research</td>
</tr>
<tr>
<td>Producing and Using Research</td>
<td>Produce scientifically validated research outputs</td>
</tr>
<tr>
<td></td>
<td>Translate and communicate research to inform health policy, health practice, and public opinion</td>
</tr>
<tr>
<td></td>
<td>Promote the use of research to develop drugs, vaccines, devices and other application to improve health</td>
</tr>
</tbody>
</table>

The PAHO report on the Essential Public Health functions was published more than 10 years ago so it would be useful to know if there have been any improvements in the Research in Public Health function and to focus on the status of HRS in the Caribbean. This report not only includes a review of national HRS, but the status at the regional and institutional levels.

5.5.2 National Health Research Systems

Only one comprehensive assessment of a National HRS was identified in the Caribbean. In 2006, the Essential National Health Research Council in Trinidad and Tobago conducted a qualitative assessment of the National HRS.

Key findings included:
- An awareness of the benefits of health research in the country.
- The national health research system was poorly coordinated.
- Little strategic direction in terms of national policy and priorities for research.
- Limited collaboration between producers and users of research.
- Monitoring and evaluation (M&E) of research production and use was sub-optimal.
- Research findings needed to be presented in a more user-friendly manner.

An important recommendation was that a national health research policy should be developed in line with regional efforts. The report also recommended the establishment of a formal priority-setting process for health research and capacity building in research utilisation within the Ministry of Health.

In 2007, two brief HRS assessments were conducted to guide the development of the Health Research Policy for the Caribbean:
1. The Caribbean Health Research Council (CHRC) conducted a multi-country HRS assessment, selecting five countries which represented the range of situations in the Caribbean. The assessment comprised a mapping exercise, a desk review, a structured questionnaire for country-level stakeholders, and an interview of regional stakeholders.
2. COHRED conducted an independent assessment of health research policies and priority setting mechanisms. The survey targeted the Ministries of Health in 18 English-speaking Caribbean countries. Responses were received from ten (10).

Table 5.7 Findings of Two Studies to Assess HRS in the Caribbean

<table>
<thead>
<tr>
<th>CHRC multi-country HRS assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of Findings</td>
</tr>
<tr>
<td>• Most countries had no entity for coordinating research for health</td>
</tr>
<tr>
<td>• Research Ethics Committees existed in only a few countries</td>
</tr>
<tr>
<td>• Pockets of research expertise at academic institutions but limited linkage with other agencies</td>
</tr>
<tr>
<td>• Limited efforts at capacity building</td>
</tr>
<tr>
<td>• Little clarity on budget allocation at national level</td>
</tr>
<tr>
<td>• Researchers depend on international funding opportunities</td>
</tr>
<tr>
<td>• No national processes in place for identifying and reviewing evidence from local, regional or international sources</td>
</tr>
<tr>
<td>• Sub-optimal packaging of research findings</td>
</tr>
<tr>
<td>• Paucity of policy relevant research in the Caribbean</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COHRED Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of Findings</td>
</tr>
<tr>
<td>• 9 of 10 countries had health priorities</td>
</tr>
<tr>
<td>• 9 of 10 countries had health policies in place</td>
</tr>
<tr>
<td>• 3 make explicit reference to research</td>
</tr>
<tr>
<td>• 1 of 10 countries had health research priorities but the Agenda was not formally adopted by the Ministry of Health</td>
</tr>
<tr>
<td>• No country had a health research policy</td>
</tr>
<tr>
<td>• 3 were under development</td>
</tr>
</tbody>
</table>

5.5.3 Current Status of Regional Health Research Systems

Stewardship/Governance

The key indicators of stewardship examined in this report include the presence of:
- a Health Research Policy
- a Health Research Agenda
- Research Ethics Committees and a coordinating mechanism.

5.5.3.1 Health Research Policy

In 2009, CHRC developed the Health Research Policy for the Caribbean. The goal of the policy was to guide the strengthening of systems to facilitate the development of evidence-based policies, programmes and practices, through increased production, access and use of quality health research. The policy provided a blue print that can be adapted or adopted by CARICOM countries to facilitate the strengthening of national HRS. It outlines key strategies for strengthening HRS within each function. The policy has been endorsed by the CARICOM’s Council on Human and Social Development (COHSDO) and shared with Member States. However, it is unclear as to how many countries have formally adopted or adapted the policy.

5.5.3.2 Health Research Agenda for the Caribbean

The Health Research Policy of the Caribbean identified setting a regional agenda, which can also be adapted or adopted by Member States, as a critical step towards strengthening HRS in the Caribbean.

In 2011, CHRC developed and disseminated the Health Research Agenda for the Caribbean. The Agenda was endorsed by COHSDO: it defines the health research priorities of the Caribbean and identifies critical gaps in research. It contains the research priorities for each of the eight programme areas of the latest iteration of the Caribbean Cooperation
The concept of ENHR was introduced in the Region 20 years ago to build local research capacity and to address national health challenges through research. In the mid-1990s, the CHRC (then known as the Commonwealth Caribbean Medical Research Council) developed and implemented a proposal for the establishment and implementation of a five year programme of ENHR at the national and regional levels. Research scientists based in Barbados, Jamaica and Trinidad and Tobago were to work closely with Ministries of Health to plan and implement national and regional research on priority problems.

Currently, there is one active ENHR Committee in the Caribbean. The Ministry of Health, Jamaica recently reinstituted and revived their ENHR Committee that was initially established in 2003. The Committee serves as the governing body for the coordination of research for health in Jamaica and provide leadership, expertise, direction and guidance in this area. In Barbados, there is an ENHR Scientist based at the University of the West Indies, Faculty of Medical Sciences. The incumbent consults with the Ministry of Health on matters related to research and works with university staff and students providing support for the conduct of research. Assistance has also been provided for other Eastern Caribbean countries such as Antigua and Barbuda. An ENHR Council was established in Trinidad and Tobago and was involved in a number of projects for over 10 years. Although the Council is currently dormant, there are plans to revive it to function as a key coordinating facility for the Ministry of Health.

CARPHA plans to begin an evaluation of the Agenda to determine its impact on the conduct of essential research and to guide the update of the priorities.

5.5.3.3 Essential National Health Research Councils/Committees

The Health Research Policy for the Caribbean has identified an Essential National Health Research (ENHR) Council/ Committee with multi-sectoral representation as an appropriate body that can be tasked with the responsibility of coordinating issues related to research for health in countries. The concept of ENHR was introduced in the Region 20 years ago to build local research capacity and to address national health challenges through research.

5.5.3.4 Research Ethics Committees (REC)

A survey to inform the status of RECs in the Caribbean was conducted in 2011, for presentation at the Fifth Bioethics Forum of the Bioethics Society of the English-speaking Caribbean. Of the 18 country representatives interviewed, 10 (56%) indicated that there was a properly constituted Research Ethics Committee hosted or co-hosted by the Ministry of Health. However, most countries (95%) had some mechanism in place to facilitate the ethical review of research proposals (See Table 5.8).

5.5.3.5 CARPHA’S Research Ethics Committees

CARPHA has successfully established its Research Ethics Committee (REC). Twelve members and four alternates from seven Caribbean countries were appointed by the Executive Director of CARPHA. The Committee provides ethical oversight for research involving human participants conducted under its auspices, that is, research conducted by staff or funded by CARPHA. The Committee also has a responsibility to provide technical assistance/advice on matters related to research ethics to Chief Medical Officers, Research Ethics Committees and other officials from Member States. This may include the conduct of reviews of research proposals for ethical acceptability, on request. It will also provide ethical oversight for multi-country Caribbean research studies. The Chief Medical Officers and Executives of Regional Institutions of CARPHA Member States have been invited to submit for ethics review, any proposed research that involves human participants.

Summary

The development of a Regional Health Research Policy and a Research Agenda that can be adopted or adapted by Caribbean countries are two significant steps towards strengthening the stewardship function of HRS in the Region. Another important development is the establishment of CARPHA’s REC that can serve as a proxy for countries without a mechanism in place for the ethical oversight of research for health. However, greater effort must be made to identify, establish and implement a coordinating mechanism or entity to manage and coordinate issues related to research for health at the national level. Countries must decide whether Ministries of Health should be mandated to fulfil this function and/or if there is a need to establish or revive ENHR Councils/Committees.
5.5.4 Financing Research

Included in the Health Research Policy, as a key strategy for strengthening HRS, is COHRED's recommendation that 2% of national health budgets should be allocated for research. Anecdotal evidence suggests that Ministries of Health in the Region have not fully adopted this recommendation and there is usually no line item allocated for research in the budget. However, funding for the research units and projects is allocated under various budget components.

5.5.4.1 CARPHA’s Research Grants Programme

CARPHA’s Research Grants Programme is an important mechanism for funding research in the Region and facilitating the implementation of the Health Research Agenda for the Caribbean. From 2011, it was decided that only research topics identified in the Agenda would be eligible for funding under the Programme. Funding is also reserved for projects to be conducted by emerging researchers often in collaboration with experienced mentors as a means of building capacity. Table 5.9 provides a breakdown of the Programme for the period 2009 - 2013. Over past five years, 30 grants totalling over USD$240,000 were approved for funding. It should be noted that the annual budget was USD $100, 000, but in some years budgetary constraints restricted the amount of funding disbursed. In one year, CHRC collaborated with PAHO to disburse special grants in the area of Health System Strengthening.

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Total Grant Funding Received (USD) (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Epidemiology Centre, 2012</td>
<td>*</td>
</tr>
<tr>
<td>Caribbean Food and Nutrition Institute, 2012</td>
<td>$247,792</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Trinidad and Tobago, 2011/2012</td>
<td>$13,000</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Barbados, 2011/2012</td>
<td>$855, 490</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Jamaica (Includes TMRI) 2011/2012</td>
<td>$7,164,438</td>
</tr>
<tr>
<td>School of Medicine and Clinical Research, Bahamas, 2012</td>
<td>$250,000</td>
</tr>
<tr>
<td>Windward Island Research &amp; Education Foundation, 2012</td>
<td>$650,000</td>
</tr>
</tbody>
</table>

*value of the grant funding received was not indicated in the report.

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Total Grant Funding Received (USD) (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Epidemiology Centre, 2012</td>
<td>*</td>
</tr>
<tr>
<td>Caribbean Food and Nutrition Institute, 2012</td>
<td>$247,792</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Trinidad and Tobago, 2011/2012</td>
<td>$13,000</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Barbados, 2011/2012</td>
<td>$855, 490</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, Jamaica (Includes TMRI) 2011/2012</td>
<td>$7,164,438</td>
</tr>
<tr>
<td>School of Medicine and Clinical Research, Bahamas, 2012</td>
<td>$250,000</td>
</tr>
<tr>
<td>Windward Island Research &amp; Education Foundation, 2012</td>
<td>$650,000</td>
</tr>
</tbody>
</table>

5.5.5 Creating And Sustaining Resources

This attribute highlights the need to strengthen the capacity to conduct, analyse, disseminate and translate the findings of research for health

5.5.5.1 Health Training Programmes

The curricula of many of the academic institutions in the Caribbean at the undergraduate and post graduate levels includes the completion of a research project for advancement and graduation for health programmes (medicine, nursing, pharmacy, nutrition). Notably, students at the Faculty of Medical Sciences, St. Augustine are mandated to present the findings of such projects at the Annual Student’s Research Day. The better quality papers are usually accepted for oral or poster presentations at CARPHA Annual Health Research Conference. In 2014, 15 papers were accepted for presentation from students from this faculty.

Similar Annual Research Days are hosted at the Faculty of Medical Sciences, Mona and the School of Clinical Medicine and Research, Bahamas. In addition, the Faculty of Medical Sciences, Barbados also hosts an Annual Research Symposium to encourage medical students, junior doctors from different specialties, physicians at the polyclinics, the nursing community and other paramedical specialties to present original research papers.

5.5.5.2 CARPHA’s Capacity Building

CARPHA plays an important role in health research capacity development within the Region by hosting several training workshops:

- Basic Research Skills
- Grant Proposal Writing
- Advanced Research Skills/Data Management and Analysis
- Research Ethics
- Basic and Advanced Monitoring and Evaluation.

Participants include health professionals from organizations such as the Ministries of Health, other Government Ministries and Programmes, Universities, Regional Health Institutions and Non-Government Organizations. Over the past 5 years, CARPHA has trained over 1000 professionals in various aspects of research skills (see Table 5.11).

<table>
<thead>
<tr>
<th>Training Workshops</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Research Skills</td>
<td>2</td>
</tr>
<tr>
<td>Advanced Research Skills</td>
<td>3</td>
</tr>
<tr>
<td>Data Management and Analysis</td>
<td>-</td>
</tr>
<tr>
<td>Grant proposal Writing</td>
<td>-</td>
</tr>
<tr>
<td>Research Ethics</td>
<td>-</td>
</tr>
<tr>
<td>Qualitative Research Skills</td>
<td>2</td>
</tr>
<tr>
<td>Basic Monitoring and Evaluation</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL NO. OF WORKSHOPS</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NO. PERSONS TRAINED</th>
<th>NO. OF COUNTRIES THAT BENEFITED</th>
</tr>
</thead>
<tbody>
<tr>
<td>170</td>
<td>300</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
</tbody>
</table>
5.5.5.3 Tropical Medicine Research Institute (TMRI)

The Tropical Medicine Research Institute is also involved in building capacity for research for Health. One of the Institute's objectives is to increase the number of trained research scientists working in health. The Epidemiology Research Unit of TMRI hosts annual Basic and Advanced Research Skills training workshops for health professionals in Jamaica. In addition to the many postgraduate programmes delivered, the institute also offers an MSc, MPhil and PhD Degrees in Epidemiology providing training in clinical epidemiology.

Summary

Building health research capacity including the ability of health professionals to conceptualize, conduct, analyse, disseminate and translate research is crucial to a strong regional HRS. While there are programmes in place to build capacity in the conduct of research, there is a need for a critical review of the skills required including strengthening areas such as data analysis, knowledge translation and uptake.

5.5.6 Producing and Using Research

This includes the production, translation and application of research evidence. The key players for this function include Regional research and academic institutions. The key regional programmes in this area include the CARPHA Health Research Conference, the Caribbean Cochrane Collaboration, the Evidence Informed Policy Network and the development of the Caribbean Clinical Guidelines.

5.5.6.1 CARPHA Annual Health Research Conference

In 1956 the former Standing Advisory Committee (SAC) for Medical Research hosted its first Annual Scientific Meeting in Jamaica, providing a forum for sharing research findings in the Caribbean. Since then, the conference has been hosted every year by the institutions that evolved from the SAC (i.e. the Commonwealth Caribbean Research Council, Caribbean Health Research Council and now the Caribbean Public Health Agency). This Annual Health Research Conference is the largest in the English-speaking Caribbean with over 175 delegates in attendance. These include researchers, policy makers, students and health care providers. The conference provides a forum for sharing research findings and facilitating collaboration between researchers and policy makers. The abstracts of the papers are published in a supplement of the West Indian Medical Journal. Table 5.12 provides a breakdown of the number of oral and poster presentations delivered at CARPHA’s Annual Health Conference over the last five years.

Table 5.12 Oral and Poster Presentation Delivered at CARPHA’S Annual Health Research Conference over the Past Five Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Oral Presentations</th>
<th>Poster Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>45</td>
<td>54</td>
</tr>
<tr>
<td>2011</td>
<td>45</td>
<td>54</td>
</tr>
<tr>
<td>2012</td>
<td>42</td>
<td>48</td>
</tr>
<tr>
<td>2013</td>
<td>69</td>
<td>78</td>
</tr>
<tr>
<td>2014</td>
<td>67</td>
<td>62</td>
</tr>
</tbody>
</table>

5.5.6.2 Research Outputs of Regional and Academic Research Institutions

A large proportion of the research outputs of the Region are produced by academic and research institutions (see Table 5.13).

Table 5.13 Snapshot of the Research Outputs (publications and presentations) of Research and Academic Institutions extracted from 2012 Annual Reports

<table>
<thead>
<tr>
<th>Institutions</th>
<th>Research Publications (Peer-Reviewed)</th>
<th>Conference Presentations / Posters / Abstracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caribbean Epidemiology Centre, 2012</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>Faculty of Medical Sciences, UWI, Trinidad and Tobago,</td>
<td>93</td>
<td>47</td>
</tr>
<tr>
<td>2011/2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty of Medical Sciences, UWI, Barbados, 2011/2012</td>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>School of Medicine and Clinical Research,</td>
<td>271</td>
<td>285</td>
</tr>
<tr>
<td>UWI, Bahamas, 2011/2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windward Island Research &amp; Education Foundation, SGU,</td>
<td>3</td>
<td>46</td>
</tr>
<tr>
<td>Grenada, 2012</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GHESKIO (Haitian Study Group on Kaposi Sarcoma and</td>
<td>85</td>
<td>65</td>
</tr>
<tr>
<td>Opportunistic Infections), 2012</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.5.6.3 Caribbean Cochrane Collaboration

In 2013, the Caribbean Branch of the United States (US) Cochrane Centre was launched at an inaugural symposium entitled “Translating Research for Policy Impact and Practice: An Evidence–based Approach”. This is a significant development in the effort to provide expertise to support evidence-based healthcare and evidence-informed policy making for the Caribbean Community. The Caribbean Branch is based at the Tropical Medicine Research Institute, UWI, Jamaica.

5.5.6.4 Evidence-Informed Policy Network (EVIPNet)

Trinidad and Tobago is the only Caribbean country to date to participate in PAHO’s EVIPNet Americas, a flagship knowledge translation effort that uses a systems approach to strengthen national health research systems and to enhance people’s health by bridging health policy and research evidence. It is designed to promote the systematic use of high quality health research in policymaking in low and middle income countries. A national task force was assembled in Trinidad and Tobago under the leadership of the Ministry of Health with technical support by PAHO.

To date, the progress in the Trinidad and Tobago EVIPNet programme includes:

- Training via national and international workshops for the formulation of Policy Briefs under the EVIPNet Americas initiative
- Completion of a Policy Brief on Injuries and Violence, specifically on the topic of sexually abused children
- Completion of Policy Dialogue: “The Management and Rehabilitation Services for Sexually Abused Persons under 18 years of age in Trinidad”
5.5.6.5 Clinical Guidelines
Since 1995, CHRC has been producing clinical guidelines for the management of prevalent chronic conditions. CARPHA has assumed this mandate to facilitate evidenced-based practice through development and promotion of clinical care guidelines. These guidelines are disseminated to Ministries of Health and health care providers in the Caribbean. They are also periodically revised to ensure that they are informed by the most current research findings and best practices.

Guidelines developed by CHRC/CARPHA include:
- Managing Hypertension in Primary Care in the Caribbean, 2007 (currently under revision)
- Managing Diabetes in Primary Care in the Caribbean, 2009 (currently under revision)
- Managing Asthma in the Caribbean, 2009
- Pocket edition, 2012
- Managing Depression in the Caribbean, 2010
- Managing Depression in the Caribbean, 2010
- Neonatal Care – Currently being developed

Summary
The CARPHA Annual Health Research Conference, is a flagship activity for the Region that continues to be relevant. Supported by other initiatives such as the Cochrane Caribbean and EVIPNet, there is potential to enable the sharing of research evidence with policymakers and facilitate its uptake. The development and uptake of the Clinical Guidelines developed specifically for the Caribbean has and continues to play an important role in evidence-based practice. However, CARPHA and other stakeholders such as Ministries of Health need to place greater emphasis in promoting their use by care providers.

Conclusion
This review of HRS in the Caribbean has clearly indicated that many of the key attributes of a functional system has been established. This is the result of collaborative effort of the key stakeholders led by CHRC/CARPHA and with significant contribution from partners at the national (Ministries of Health), regional (PAHO, Universities etc.) and international (COHRED) levels. There is, however, a definite need to strengthen those attributes that exist and urgently address gaps. This requires the inputs of all stakeholders with continued leadership/coordination by CARPHA. The process should be guided by the Health Research Policy of the Caribbean. Special attention has to be paid to strengthening national HRS, especially in smaller CARPHA Member States.

5.6 Health Communication
The US Centres for Disease Control and Prevention (CDC) defines health communication as “the study and use of communication strategies to inform and influence individual decisions that enhance health.”

According to the United States Department of Health and Human Services “health communication is seen to have relevance for virtually every aspect of health and well-being, including disease prevention, health promotion, health care policy and the business of health care, as well as enhancement of the quality of life and health of individuals within the community.”

Senior lecturer in Communication Studies, UWI, Trinidad and Tobago, Dr. Godfrey A. Steele, states that health communication is used in diverse settings and points to three contexts for communicating health:
- Between the health provider and patients
- Among health professionals
- Between health professionals and the population

It has therefore become evident that a preventive approach to the problem of chronic disease and the protection of health is required. The CARICOM Secretariat proposed that health promotion is the approach that best achieves this goal. It further states that in its widest perspective, health promotion treats health as a primary resource in human and economic development, focusing on public policies conducive to prevention of disease and promotion of well-being and productivity. It suggests that on an individual and community level, dynamic health education in an intersectoral approach enables people to originate initiatives to seek to control and modify personal practices and everyday living conditions that foster their health.

In the first half of the 1900s, infections such as pneumonia, tuberculosis and gastrointestinal illnesses (mostly typhoid) were the most common causes of death. During this time, prevention of illness came significantly from the work of sanitary engineers with safe water and effective sewerage systems. In addition, vaccines were being developed against some of the more serious infections.

However, today, the leading causes of death globally and in the Caribbean region are chronic diseases such as heart disease, stroke, cancer, diabetes and chronic respiratory diseases, and violence and injuries. The epidemic of chronic non-communicable diseases (CNCDs) is being driven by population aging, along with risk factors such as tobacco use, poor diet, physical inactivity and harmful use of alcohol. All of which are behaviours that are modifiable. Threats of infectious diseases also continue for example Chikungunya and Dengue.

Closer examination of the manner in which health problems have changed over time indicate that a commensurate change in communication strategies may be required.
5.6.2 Investments in Health Communications and/or Health Promotion in the Region

An assessment of the investments requires information in the following key areas:

- Identification of Caribbean states that have posts dedicated to health communication and/or health promotion at the Ministries of Health
- Number of personnel and their role
- Number of Caribbean states in which there is a clearly defined strategy (part of the strategic planning process) for health communications which is budgeted and/or funded
- Health communications as part of the University curricula in the Region
- Existence of scholarships, grants as a stimulus for research in health communications, health promotion interventions and monitoring and evaluation components

Data was not readily available to make an informed assessment of investments in health communication and/or health promotion in the Region for this reporting period.

5.6.2.1 Key Achievements and Successes

The Heads of State and Government of CARICOM made history in 2007 when they convened a summit in Port of Spain, Trinidad and Tobago, to dedicate attention to the epidemic of NCDs in the Region. Subsequently, the annual Caribbean Wellness Day (CWD) on the second Saturday of September was established.

In 2009, the CARICOM Heads called for the issue to be elevated to the agenda of the Commonwealth Heads of Government Meeting (CHOGM). CHOGM agreed to work towards reducing the incidence of NCDs by fostering a multi-sectoral policies and community-based initiatives and called for the convening of a United Nations (UN) summit on the prevention and control of NCDs. This led to the historic UN High Level Meeting on NCDs in September 2011, and the subsequent inclusion of NCDs in the Sustainable Development Goals.

5.6.2.2 Challenges facing the Region

While several policies and programmes have been developed to address NCDs in the Caribbean region, Research Scientist, Dr. Dan Rambeth identifies some of the challenges that prevent CARICOM States from achieving better health outcomes:

- Lack of resources
- Unrealistic policies
- Poor implementation strategies
- Lack of community and engagement of implementers
- Lack of multi-sectoral collaboration
- Lack of political will

Additionally, the ability to utilize communication strategies that influence changes in behaviour presents yet another challenge for effective health communication.

5.6.2.3 The Way Forward

Dr. Steele believes that research and public policy are integral to effective health communication. In this regard, he recommends:

- Stimulating research on health communication through scholarships and grants
- Using social media especially in crisis and/or disaster management
- Building partnership and alliances with key stakeholders
- Technology transfer – seek out best practices/models that have worked

Discussions with Tony Deyal and Jones P. Madeira, two former health communication advisors who currently work as journalists, emphasized the need to develop synergies between the health professional and/or institution and the media. Mr. Madeira believes that it is imperative that scientists make public health a more attractive topic by simplifying the issues in a manner that is more palatable and easily understood by all. He stated that this will go a long way in bridging the gap between scientists and the media.

Other recommendations included providing communication workshops within countries to help develop capacity in health communication as well as using Caribbean Media Awards as a sustainable mechanism for improving relations between the media and the Ministries of Health, with CAPRHA as the facilitator.

5.7 Human Resources for Health

5.7.1 Introduction

The Caribbean Region has many challenges in establishing and maintaining its Human Resources for Health (HRH). HRH speaks to the need for sufficient numbers and appropriate mix of efficient, responsive, and competent workers, fairly distributed to achieve the best health outcomes possible given available resources and circumstances. Across the Region, with the support of PAHO and in the recent past PEPFAR, priority has been placed on boosting the HRH management systems. Specific attention has been placed on developing the leadership capacity of countries through the establishment of HR management departments within Ministries of Health (as opposed to Personnel departments).

Additionally, a number of Ministries are working on manpower plans for the Human Resources for Health at country level. These plans are meant to objectively provide approaches to addressing the HRH challenges, as well as service improvements. These HR planning and development activities are needed to identify and recommend solutions to the numbers, competence, skills-mix, responsiveness, distribution and efficiency gaps across the health sector.

HRH planning and management survey results pointed to the following as the biggest challenges in the Region:

- HRH database
- HRH Unit
- Redefine roles & skills mix
- Capacity & resources
- Staff burnout
- Inability to implement plans
- Rural shortages
- Inter-Ministry HRH Management
- Recruitment & retention schemes
- Identify training needs
- Program evaluation
- Link HRH to Health plan
- Chronic vacancies
- Salaries & working conditions

These were then seen to point to the need for appropriate incentives to be identified and implemented, as well as working conditions that enhance workers’ productivity, quality and responsiveness.

The Caribbean Cooperation in Health Phase III (CCH III), Regional Health Framework 2010 – 2015 “Investing in Health for Sustainable Development” identified Human Resource Development as one of eight priority areas. The Human Resource Development sub-priority areas are:

- Movement of health professionals
- Regional Health Human Resource policy and action plans
- Strengthening the regional primary care workforce
- Strengthening regional training institutions
- Building a public health workforce to promote health and development for CARICOM Member States

Annual monitoring of these sub-priority areas has not been done to date, but evaluation is expected in 2015.
Most countries were above the recommended ratio of the major public sector HRH (25 per 10,000 population), the minimum level recommended for the optimal delivery of health services and all countries met the Caribbean baseline HRH indicator of 1:1 ratio of qualified nurses to physicians (see Table 5.15). The ratio of Nurses to Doctors in Australia and Ireland are 4:1 and 5:1 respectively. Although countries were above the standard, of equal importance (and not necessarily evident) are issues of availability, accessibility, skills mix, capacity, motivation and productivity. Most assessments of HRH prioritise and treat first with the professions of Medical doctors and nursing personnel. However, other technical health workers (numbers and skills mix) are critical to the effective and efficient delivery of health services.

Table 5.14 Major Public-Sector HRH Workers per 10,000 Population

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Anguilla</th>
<th>Barbados</th>
<th>Belize</th>
<th>Dominica</th>
<th>Grenada</th>
<th>Jamaica</th>
<th>Montserrat</th>
<th>St Lucia</th>
<th>St Vincent &amp; Grenadines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical doctors</td>
<td>8.5</td>
<td>13.1</td>
<td>7.5</td>
<td>17.1</td>
<td>7.6</td>
<td>4.1</td>
<td>9.8</td>
<td>7.5</td>
<td>5.8</td>
</tr>
<tr>
<td>Nurses &amp; midwives</td>
<td>24.2</td>
<td>39.7</td>
<td>33.7</td>
<td>60.3</td>
<td>43.9</td>
<td>16.6</td>
<td>67.5</td>
<td>21.4</td>
<td>44.8</td>
</tr>
<tr>
<td>Physicians, Nurses &amp; Midwives</td>
<td>33</td>
<td>18.8</td>
<td>19.7</td>
<td>26.5</td>
<td>31.1</td>
<td>31.6</td>
<td>25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


In spite of countries meeting the recommended ratio of HRH per 10,000 population and the qualified nurses to physician ratio, this was not appropriately represented in primary health care. It should be noted that the percentage of primary care physicians was below expected levels and there was only one country with primary health care teams. This is consistent with the view that the HRH challenges in the Region are more significant in the areas of Primary care and public health. The situation is made worse with no clinical sciences schools willing to reorient their programmes to primary health care or community health needs, as stated in the PAHO Human resources for health in the Caribbean report. Other concerns were related to job insecurity, and paucity of policy and planning to ensure self-sufficiency. On the positive side all the countries have mechanisms for the recognition of foreign trained professionals, and the schools of clinical health sciences and public health are accredited.

Table 5.15 Ratio of Qualified Nurses to Physicians

<table>
<thead>
<tr>
<th>Country</th>
<th>Ratio of nurses to doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguilla</td>
<td>3:1</td>
</tr>
<tr>
<td>Barbados</td>
<td>1:2:7:1</td>
</tr>
<tr>
<td>Belize</td>
<td>1:4:1</td>
</tr>
<tr>
<td>Dominica</td>
<td>3:1</td>
</tr>
<tr>
<td>Grenada</td>
<td>6:1</td>
</tr>
<tr>
<td>Jamaica</td>
<td>2:3:1</td>
</tr>
<tr>
<td>Montserrat</td>
<td>8:2:1</td>
</tr>
<tr>
<td>St Lucia</td>
<td>2:3:1</td>
</tr>
<tr>
<td>St Vincent &amp; Grenadines*</td>
<td>4:1</td>
</tr>
<tr>
<td>Trinidad and Tobago</td>
<td>3:4:1</td>
</tr>
</tbody>
</table>


Table 5.16 Major Public-Sector HRH Workers per 10,000 Population

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Anguilla</th>
<th>Barbados</th>
<th>Belize</th>
<th>Dominica</th>
<th>Grenada</th>
<th>Jamaica</th>
<th>Montserrat</th>
<th>St Lucia</th>
<th>St Vincent &amp; Grenadines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentists &amp; allied</td>
<td>0.0</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td>0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Pharmacists &amp; allied</td>
<td>2.0</td>
<td>2.7</td>
<td>2.5</td>
<td>2.3</td>
<td>2.1</td>
<td>0.6</td>
<td>0.4</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>All health workers</td>
<td>79.9</td>
<td>86.0</td>
<td>59.2</td>
<td>113.4</td>
<td>107.3</td>
<td>29.0</td>
<td>na</td>
<td>85.8</td>
<td>86.87</td>
</tr>
</tbody>
</table>

The PAHO reports also provided data on the sex, and age profile of the workers in the health sector in the countries covered in the reports. Doctors were either equal in numbers between the sexes or represented by more males than females. Overall women outnumbered men in the sector, and were always significantly larger in numbers for the nursing professions. The age profile of the workforce was quite variable across countries, with a number of countries having an ageing workforce with planning needed to address the inevitable replacement challenge. Highest emigration rates for doctors and nurses were reported for Jamaica and Grenada, and the lowest rates for Saint Lucia.

None of the countries had plans to ensure self-sufficiency of their HRH, but all countries had some level of training in country for nursing personnel. Scholarships/funding through governments, are available to nationals to pursue health professional training locally (where it is available), regionally, as well as internationally. Given that most of the countries provide services without charge (or minimal charge) to their population at the point of care, all governments have legislation and policies which govern the operations of their public health service institutions, and in this way are able to monitor service provision and performance of their HRH.

At the regional level, PAHO led a process that enabled representatives from Ministries of Health and tertiary academic institutions to discuss a Human Resources for Health (HRH) development strategy for the Caribbean. The outcomes of which is the five year framework, Road Map for Strengthening the Caribbean Health Workforce, 2012-2017. The Road Map addresses governance and education approaches to improving the management and training of health professionals in both the short and medium term. The focus is on broadening primary health care access across the Region and enhancing public health competencies. The following areas were identified as priorities for the 2013-2017 period:

- Managerial Skills (HRH)
- Health Information Systems (HIS) Training
- Policy Development/Governance
- Staff Management
- Provider Competence

The outcomes and impacts expected include:

- Stable Health Workforce
- Efficient Service Delivery
- More Effective Health Systems
- Quality Health Outcomes

These milestones are in large part specific to HRH personnel.

Specific to technical HRH, PAHO convened meetings in Latin America and the Caribbean in 2011 to address the issue of competence of the Region’s Public Health workforce. Recommendations were made for a competency framework for the Region, The Regional Core Competency Framework for Public Health (RCCFPH) which speaks to “essential knowledge, skills and attitudes necessary for groups, domains and levels within the public health workforce.” The framework is intended to complement other key PAHO/WHO and United Nations (UN) strategies (including the Essential Public Health Functions and Millennium Development Goals). The six Domains are:

**Domain 1:** Health Situation Analysis
**Domain 2:** Surveillance and Control of Risks and Threats
**Domain 3:** Health Promotion and Social Participation
**Domain 4:** Policy, Planning, Regulation and Control
**Domain 5:** Equitable Access to Quality Health Services
**Domain 6:** International and Global Health

Minimum competences in each domain have been recommended.

Human resources development and training in public health is the 8th Essential Public Health Function defined by PAHO/WHO in 2002. The Essential Public Health Functions (EPHF) articulate 11 essential functions necessary to strengthen public health practice. The EPHF are described as the fundamental set of actions that should be performed in order to achieve public health’s central objective – improving the health of populations. This function includes:

- The identification of human resource profiles in public health that are adequate to the provision of public health services.
- The education, training, and evaluation of public health personnel in order to identify public health services needs, effectively face pressing public health issues, and adequately evaluate actions in these matters.
- The definition of accreditation requirements for general health professionals and the adoption of continuous quality improvement programmes for public health services.
- The construction of active partnerships with professional development programmes that expose participants to relevant experiences in public health, as well as continuing human resources education for management and leadership development in the area of public health.
- The development of capacities for interdisciplinarity and multicultural work in public health.
- Ethical training for public health personnel, with special attention to the values of solidarity, equality, and respect for the human dignity.

**Indicators:**

1. Characterization of the public health work force.
2. Improvement of the workforce quality.
3. Continuing public health education through training and postgraduate programmes.
4. Improvement of human resources to focus on the delivery of socially and culturally appropriate services for the public.
5. Advisory services and technical support for the sub-national entities in human resources development.

Although a methodology was developed that allows countries to evaluate their public health capacity, little work was documented specific to the Caribbean. Evaluations completed in Latin America and the Caribbean showed low performance in this function, with most countries at low or intermediate performance and a few performing better.

![Image](image_url)
5.7.2 Plans/Planned activities

Given the existing arrangements with HRH in the Region, there is the need for a more coordinated approach for the continued development of the HRH. Regional bodies have considered the challenges of HRH from different perspectives. What is now needed is a holistic approach that is coordinated with inputs from the various stakeholders PAHO, CARPHA, Academic institutions (regional and national) and Ministries of Health. Having already considered the Region’s HRH and their role/priorities, the stakeholders need to be brought together and agreement reached on the Region’s needs and priorities and the role(s) that each agency can and will assume in addressing these priorities. National agencies (Ministries of Health and training institutions) need to develop and implement complementary strategies and plans, with political will and funding for implementation, Monitoring and Evaluation and review. These plans need to reflect the health, social and demographic profiles of their populations, and at the same time address the HRH skills mix, distribution and productivity/accountability.

CARPHA has acknowledged the need to contribute towards the development of a competent workforce and ensuring sustainable capacity building in Public Health within the Region. This function can only be achieved by first ensuring CARPHA’s staff are themselves competent to effectively address this responsibility. To this end the organisation’s Human Resource Department’s Staff Development agenda/programme is being synchronised to work closely with the organisation’s training priorities. CARPHA has assumed its responsibility in support of its role in addressing the HRH challenge, specifically in the area of Training. The organisation sees itself as having a complementary role in building Public Health workforce in the workforce within the Region. It is recognised that the training provided by CARPHA needs to be carefully considered to ensure effectiveness and optimal efficiency as it facilitates the strengthening of the public health systems of its Member States. In this regard, CARPHA’s long-term Strategic Outcome for training is that Member States possess strong capacity to deliver public health services and to address current and emerging public health issues with minimal reliance on CARPHA. This speaks to capacity building and sustainability of the Region’s health systems in the area of Public Health.

Within the context of the Caribbean HRH Roadmap, The Regional Core Competency Framework for Public Health and its functions as defined in the IGA, CARPHA has been developed in collaboration with PAHO, bringing opportunity to establish a niche for applied public health training, within its mandate as the Region’s public health agency. This training is distinct from both HRH manpower development and conventional health workforce technical/professional training. It is also complementary to tertiary level public health training programmes and non-academic institution HRH training in the Region. The emphasis will be on health systems strengthening through training (internal and external to the organisation). An effective Training programme at CARPHA will reduce Health Systems challenges/barriers in:

- Health workforce – prioritised pre-service and in-service education for public health workers
- Service delivery – Policies, Strategies and Plans
- Information – in particular Health Statistics and Research
- Governance – Policy, Planning and M&E

Table 5.18 Caribbean Regional Field Epidemiology and Laboratory Training Programme

<table>
<thead>
<tr>
<th>Description</th>
<th>Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>The goal of the Caribbean Regional Field Epidemiology and Laboratory Training Programme (CR-FELTP) is to build epidemiology and laboratory capacity, through practical training that addresses current and future public health needs in the Caribbean.</td>
<td>US Centers for Disease Control and Prevention (CDC); Pan American Health Organization (PAHO); University of the West Indies (UWI); PEPFAR Caribbean Regional Partnership Countries [Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Jamaica, St. Kitts and Nevis, St. Lucia, St. Vincent, Suriname, and Trinidad and Tobago]</td>
</tr>
<tr>
<td>This applied training will contribute to the professional development of individuals, but more importantly, will strengthen public health systems and infrastructure in the Caribbean.</td>
<td></td>
</tr>
<tr>
<td>The CR-FELTP will contribute to building human resources and surveillance capacity to implement the revised International Health Regulations, and improve the use of evidence in public health decision-making in the region.</td>
<td></td>
</tr>
<tr>
<td>The FELTP will train public health practitioners at different levels, using face-to-face and distance education, and via applied projects to support ‘learning by doing’.</td>
<td></td>
</tr>
<tr>
<td>Field Epidemiology Training Programmes (“FETPs”) are development programmes for public health professionals, based on service and on-the-job learning in applied epidemiology. The Epidemic Intelligence Service (EIS) was the first FETP, established by the U.S. Centers for Disease Control in 1951 to address a shortage of skilled epidemiologists in the public health workforce. There are now more than 50 national and regional FETPs around the world.</td>
<td></td>
</tr>
<tr>
<td>The incorporation of epidemiology and laboratory content makes the Caribbean Regional programme a “FELTP”.</td>
<td></td>
</tr>
<tr>
<td>In project year 2 (2013-2014), partners collaborated to develop learning objectives and curriculum content for Level I of the CR-FELTP. CARPHA also hosted a programme orientation and training workshop for Caribbean stakeholders who will take on the roles of Country Coordinators and programme Mentors.</td>
<td></td>
</tr>
<tr>
<td>In consultation with partners, capacity needs and training structure were determined in the first year of the project (2012-2013).</td>
<td></td>
</tr>
<tr>
<td>Level I and II will be implemented in several partner countries in 2014 and 2015. Content and Trainee projects will address priority public health issues of the Region – communicable and non-communicable diseases, emergency response and laboratory surveillance.</td>
<td></td>
</tr>
</tbody>
</table>
5.8 Health Financing in the Caribbean

5.8.1 Introduction

Health financing derives its significance from the presumed functions of the health system. This system is meant to answer at least four questions:

1. What services should be made available to the population?
2. How should health services be delivered to the population? Specifically what should be the role of the state in the delivery of health services?
3. How will an adequate quality of services be established and maintained?
4. How should health services be financed?

The character of any health system is determined by how it proceeds to answer these four questions. What is interesting is that the four questions are not independent of each other. What is of particular importance is the fact that the link between service availability, service delivery, service quality and health financing is the access to health services. This link matters because it is this access which determines both the quality of life of the population and the productivity of the labour force.

If the health system is to realise its potential for making a significant contribution to the human development of the Region it would be important to have the health financing subsystem configured in a way which makes effective access the norm in health systems of the Region.

5.8.2 Health, Development and Political Commitment to Universal Health Coverage (UHC)

Conceptually and empirically, there is general recognition that health - and by extension, access to health services - plays a critical role in fostering individual, community and national development. The pathways of influence in terms of the health-development linkages are shown in Table 5.19. Given the close causal relationship between health and development, it would seem to make sense in each country to foster a national commitment to creating and sustaining healthy communities and to make appropriate investment in programmes to promote health, reduce the burden of disease and disability in the population and give attention to related health-inducing measures in areas such as nutrition, sanitation and education.

### Table 5.19: How Health Influences Socio-economic Development

<table>
<thead>
<tr>
<th>Levels</th>
<th>Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>* Physical, psychological and cognitive development.</td>
</tr>
<tr>
<td></td>
<td>* Healthy life expectancy—capacity (more years and ability) to learn, earn and lead long fulfilling life.</td>
</tr>
<tr>
<td>Family-Household</td>
<td>* Higher child survival rates, so less children. (Estimates show families with 75% child survival rates have about 6 children; those with 95% survival rates have 1.9 children —[1])</td>
</tr>
<tr>
<td></td>
<td>* More resources for spending on education, nutrition and other welfare/inter-generational enhancing goods rather than on illness;</td>
</tr>
<tr>
<td></td>
<td>* Higher savings and improved quality of life due to less expenses on catastrophic ill-health and disability;</td>
</tr>
<tr>
<td></td>
<td>* Escape from poverty trap and poverty-related diseases/impairments.</td>
</tr>
<tr>
<td>Population</td>
<td>* Lower birth, death and fertility rates (RE: sustainable population benefits);</td>
</tr>
<tr>
<td></td>
<td>* Lower dependency ratio (RE: demographic dividend with more adults to work and support children and elderly).</td>
</tr>
<tr>
<td>Economy</td>
<td>* More human capital (Estimates show countries with low infant mortality rates grew faster than those with high rates; a 10% rise in life expectancy is associated with a rise in economic growth of about 0.4%, cet. par.—[1]; 1 year increase in life expectancy due to improved health and nutrition could lead to increasing GDP per cap by 4% per year—[2]; 5 year advantage in life expectancy between countries could lead to 0.3-0.5% advantage in growth of per capita income—[3];</td>
</tr>
<tr>
<td></td>
<td>* Less turnover of workers;</td>
</tr>
<tr>
<td></td>
<td>* Higher productivity (less days off for sickness and more alert workers);</td>
</tr>
<tr>
<td></td>
<td>* Reduction in poverty and social exclusion so more productive contributions by all persons;</td>
</tr>
<tr>
<td></td>
<td>* Encouragement to investors in tourism and other sectors.</td>
</tr>
</tbody>
</table>

Source: Lalta et.al (2005)

In seeking to take targeted and collaborative action to protect and enhance the health of the population, CARPHA States, individually and collectively, have generally adopted and accepted major international agreements and resolutions pertaining to advancing health and development.

These include:

- ‘health for all’ in the WHO’s Alma Ata Declaration on Primary Health Care in 1978
- ‘health priorities’ in the UN’s Millennium Development Goals in 2000.

In addition, a subset of CARPHA States, particularly those members of the Caribbean Community (CARICOM), has repeatedly confirmed at the highest levels (CARICOM Heads of Government Conferences and CARICOM Council on Health and Social Development) the commitment to enhancing health opportunities for all. This is manifest in:
• the Nassau Declaration (2001), with the mantra ‘the health of the Region is the wealth of the Region’;
• the Port of Spain Charter on Health Promotion (2003);
• their adoption of the Report of the Caribbean Commission on Health and Development (2005) which pointed to the ‘epidemic’ of non-communicable diseases in the Region;
• the Port of Spain Declaration (2007) on ‘uniting to halt the epidemic of CNCDs’;

More recently, recognising that there are specific and persistent gaps in their health systems which have contributed to deficiencies in meeting the goals of health for all at a reasonable cost, CARPHA countries have endorsed, and are in the process of implementing, various aspects of Universal Health Coverage (UHC) as reflected in:

• WHA Resolution 58.33 (2005)
• WHA Resolution 64.9 (2011)
• UNGA Resolution 67.123 (2012)

The UHC approach seeks ‘to ensure all persons have access to necessary health services (preventive, promotion, curative, rehabilitative and palliative care) with sufficient quality to be effective without exposing individuals to financial hardship’.

Figure 5.1 provides a visual picture of the scope of UHC which may be characterized by its three (3) core features:

1. Barrier-free access to health services by all persons;
2. Health benefit package containing necessary services of sufficient quality which responds to the burden of disease of the country;
3. Adequate and sustainable financing for the benefits package with financial protection to members to avoid catastrophic health spending.

As political indicators, ‘health for all’, ‘health priorities’ and ‘UHC’ manifest the commitment of governments in CARPHA States to play the role of major providers and financiers of health services. This is demonstrated in public networks of health facilities offering varying levels of care staffed by teams of salaried and/or contract health workers funded through annual budgetary allocations for health. In most countries also, there are competing or complementary private health facilities funded through a mix of private insurance, out of pocket payments and public monies in cases where private care is purchased for public patients.

5.8.3 Patterns and Magnitudes of Health Financing in the Caribbean

Health financing involves three (3) inter-related functions (which may be manifest as separate sub-systems in some countries):

1. Revenue generation and collection
2. Pooling of funds
3. Purchasing health goods/services and reimbursing providers.

From reviews of health expenditure data in CARPHA Member States, responsibilities for these functions are generally shared in varying proportions among public agencies (tax authorities and Ministries of Health); social security organisations, private insurers and some non-governmental groups including external support agencies. In addition, direct purchasing of health services by individuals/households is quite common in all countries through out of pocket payments. Using 50% of total health expenditure as the benchmark, Table 5.20 summarises data from PAHO and World Bank sources showing the pattern of health financing responsibilities in select CARPHA States. It is noted that public financing of health services is more dominant in 13 countries; social security financing in seven and private financing in three.
Table 5.20 Health Financing Responsibilities/Systems in CARPHA Countries (PAHO and World Bank databases)

Public (Tax funds, MOH Dominant) Private (Health insurance and Out of Pocket) Social Security (earmarked funds)

Anguilla Bahamas Aruba Antigua and Barbuda Grenada Bermuda Barbados Haiti Cayman Islands Belize Curacao Dominica Sint Maarten Guyana Turks and Caicos Islands Jamaica Bonaire-St Eustatius-Saba St Kitts and Nevis Saint Lucia St Vincent and the Grenadines Suriname Trinidad and Tobago Virgin Island Using a subset of countries in the previous Table, Table 5.21 provides data from estimates for the year 2000, 2005, 2010 and 2012 on:

i) total health expenditure (THE) as a percentage of gross domestic product (GDP), as well as:

ii) the relative contributions of the components of THE, i.e.

- government health expenditure (GHE);
- private health expenditure (PHE);
- social security health expenditure (SSHE);
- direct out of pocket expenditure (OOP) by patients and
- private prepaid plans/health insurance (PPP).

Table 5.21 Health Expenditure Data for CARPHA Member States (2000, 2005, 2010 and 2012)

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>THE as a % of GDP</th>
<th>GHE as a % of THE</th>
<th>PHE as a % of THE</th>
<th>SSHE as a % of THE</th>
<th>THE as a % of GDP</th>
<th>GHE as a % of THE</th>
<th>PHE as a % of THE</th>
<th>SSHE as a % of THE</th>
<th>OOP Expenditure as a % of GDP</th>
<th>Private Prepaid Plans as a % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td>2010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2005</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td>2012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2015</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2016</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2016</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2017</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2018</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2019</td>
<td></td>
</tr>
</tbody>
</table>


Source: WHO (2008 and 2013) and World Bank (2014)
Four (4) key observations can be made in comparing the data on health expenditure magnitudes in the four (4) time periods:

a) There has been a slow but noticeable increase in THE as a percentage of GDP from 5.4% in 2000 to 6.2% in 2012. This increase is evident in most countries except Barbados, Grenada and Suriname.

b) There has been relative stability over the period in the percentage shares of government and private spending on health at around 58% and 41% respectively. The main noticeable shifts seem to have been a larger government share in Antigua, Belize and Trinidad and Tobago while a smaller share was observed in Grenada, Guyana and St Kitts and Nevis.

c) Averaging about 11%, there has been relative stability in the share of GHE to Total Government Expenditure (TGE).

d) Hovering around 79%, OOP as a proportion of PHE has remained consistently high;

e) The share of private expenditure (PHE) was largest in Haiti (77%);

f) If a PHE of 30% is the potentially catastrophic threshold, it noted that eleven (11) countries are already beyond this level.

It should be noted that, though not indicated in Table 5.21, external concessionary resources (grants, aid) also contributed to some extent to funds available to and spent in the health sector. This was more evident in the case of Haiti but was much smaller in other countries. (In most Caribbean countries because of their ‘middle income’ and ‘high income’ status, external concessionary resources are not generally accessible for health purposes and are targeted primarily to HIV-AIDS programmes. However, some external funds are received in the health sector largely through loans acquired by governments).

More intensive focus on the health spending magnitudes shown for 2010 given its more complete dataset reveals the following (See Table 5.22):

i) THE % GDP—range 4.7% in St Kitts and Nevis and St Vincent to 7.7% in Saint Lucia; 9 countries below the mean of 6% with 5 countries above;

ii) GHE % THE—range 40% in Haiti to 82.1% in St Vincent; 8 countries below mean of 59.8% with 6 countries above;

iii) GHE % Total Government Expenditure (TGE)—range 6.8% in Jamaica and St Kitts and Nevis to 18.7% in Antigua; 7 countries below mean of 11.4% with 7 above;

iv) SSHE % GHE—range 0% in Haiti, Jamaica, St Vincent and Trinidad and Tobago to 41.7% in Suriname; 11 countries below mean of 11.4% with 7 above;

v) GHE % TGE—range 17.9% in Saint Vincent to 53.2% in Bahamas; 6 countries below mean of 40.2% with 8 countries above;

vi) OOP % PHE—range 23.5% in Suriname to 100% in St Vincent; 5 countries below mean of 76.4% with 9 above;

vii) PPP % PHE—range 0.3% in Guyana to 45.1% in Bahamas; 4 countries below mean of 12.3% with 7 above and no data for 3 countries;

viii) THE per capita—range US$122 in Guyana to US$1481 in Bahamas; 6 countries below mean of US$400 with 8 above. (THE per capita was calculated using the mix of population and GDP data from IMF sources and the THE percentage of GDP from the WHO data)

Based on the analysis of the 2010 data on health spending in select CARPHA Member States, four (4) major inferences can be drawn:

a) Government mainly through taxes continues to be the primary source of funds for the health sector;

b) Out of pocket spending is relatively high in most countries averaging about 30% of THE. This is indicative of the likely burden faced by patients especially those with low incomes in meeting the cost of health care despite fairly high levels of government health spending. This also has implications for ‘equity’ in access to care and perhaps ‘catastrophic’ spending by some on health services;

c) Related to the above, there seems to be limited pooling/insurance coverage in most countries particularly in relation to accessible private and social health insurance plans. (In practice, social health insurance programmes are more common in the Dutch-speaking CWs such as Suriname, Aruba, Curacao and Sint Maarten. Among English-speaking countries, such programmes are evident only in Antigua, Cayman Islands and Turks and Caicos Islands);

d) With THE averaging 6% GDP and THE per capita averaging US$400, CMS are well below THE levels of 9% and THE per capita of more than US$2000 in more developed countries. At the same time, CARPHA countries have epidemiological profiles which are fairly similar to these more developed states. The obvious implication is that CMS have to treat, manage and contain health burdens with significantly less resources. This has implications both for additional revenue generation as well as innovative measures to be more efficient in spending available resources or investments in creating more healthy communities. It also reiterates the CCHD call for health systems in the Region to become prevention oriented.

### 5.8.4 Health Spending by Programmes

In terms of the functional distribution of health spending, the data available from the public health sector (i.e. health budgets) suggest that expenditures are generally organised in three (3) major categories:

- **Executive administration i.e. direction, coordination, purchasing, and regulation of programmes and activities** which are usually centred at the Head Offices of Ministries/Departments of Health;
- **Primary Care Services** usually delivered in health centres/clinics located in various urban and rural communities;
- **Secondary and Tertiary Care Services** delivered in hospitals located generally in urban centres.

Noticeably absent is a public health spending category. In reality such spending is subsumed under each of the three categories mentioned. Reviews of public health expenditure data in select countries suggest that, on average, budgeted funds are generally allocated/spent on the above categories as follows:

- **Executive Administration**—10%
- **Primary Care**—20%
- **Secondary and Tertiary Care**—70%.
In terms of ‘line items’, allocations for compensation of health workers (salaries and allowances) accounted for 60%-70% of budgeted funds across programmes while the remaining 30%-40% was spent on purchasing health goods (supplies, equipment, disposables) and services; paying utility, rental and related bills and subscriptions to regional/ international health agencies.

It would certainly be of interest to public health policy if the national spending on prevention was known. Prevention covers a spectrum of activities from ‘public health or population-based’ programmes such as disease surveillance, vector control, water sanitation and food safety to ‘primary care’ such as immunisation, antenatal care, certain disease screening activities to ‘secondary’ care such as medication for managing diseases and diagnostic tests. There are also some aspects of ‘tertiary care’ which may be described as preventive. From a cost or resource estimation perspective, not all prevention activities are readily indicated in national health budgets. As such, calculations of allocations to prevention activities will vary according to the definition of these activities.

Using data from Trinidad and Tobago (as a proxy for other CMS, estimates of resources allocated for ‘prevention’ activities are drawn from:

a) spending on/commitments to the following ‘Vertical Services’ (managed by Ministry of Health Head Office):
   - Disease surveillance
   - Insect vector control
   - Public health inspectorate
   - Expanded programme of immunisation
   - Health education
   - Drug inspectorate
   - School health
   - Hansen disease control unit
   - Nutrition and Metabolism
   - Queen’s Park Counselling Centre and Clinic
   - Chemistry, Foods and Drugs
   - Chronic Disease Assistance Programme (CDAP).

This list excludes non-health items like water sanitation and agriculture.

In 2013/14, resources for all Vertical Programmes amounted to TT$765m (or 19% of the national health budget). The above activities represent a subset of all Vertical Services and received an estimated TT$130m (or 3% of national health budget).

b) Spending on/commitments to primary care health centres (managed by Regional Health Authorities) which amounted to approximately 10% of the national health budget. If it is assumed that 25% of this was on ‘prevention’ activities, then estimated ‘primary prevention’ spending would be approximately 2.5% of the national budget.

c) The sum of (a) and (b) above suggest that prevention activities received about 6% of budgeted funds in 2013/14.

Because of disaggregation issues, the figure suggested would be an underestimate. This is because the above estimate does not take into account spending on prevention activities in secondary care facilities and some spending by local and central government authorities which also have some functions in relation to vector control, water sanitation, food safety and other public health related activities. It should also be noted that this estimate excludes spending on prevention activities (mostly out of pocket) in private health facilities.

5.8.5 Challenges facing Health Financing Systems in the Caribbean

From reviews of the above health expenditure data as well as of various reports, articles and presentations on health financing in CMS, the following inferences can be made on the nature and likely consequences of their health financing challenges (as graphically summarised in Figure 5.2):

a) despite variations in magnitude, all countries exhibit a growing resource gap between the cost of and demand for health funds on the one hand and the availability of funds for providing the range of health services to meet the demand on the other;

b) closing the resource gap would require simultaneous and sustained actions on:
   - managing demand for health services;
   - securing greater efficiencies in spending and slowing down the growth of costs;
   - finding new or additional sources of financing.

The main drivers of costs and demand (depicted by the upper arm in Figure 5.2) are:

- demographic (aging and urbanisation of the population);
- epidemiological (triple burden of ongoing infectious diseases, dominance of chronic diseases and increasing requirements to manage effects of violence and accidents);
- technological (in pharmaceuticals, diagnostics and surgery, rehabilitative and restorative medicine, ICT);
- operational (inefficiencies in resource allocation and service delivery as well as meeting routine demands for better compensation and other arrangements for health workers);
- growing incomes and health expectations (increased buying power of a more knowledgeable population; attention to ‘health and human rights’).

Actions to address these drivers of demand and costs means paying attention to:

- curtailing the epidemiological burden re: infectious diseases; CNCDs and trauma;
- balancing focus between high cost, hospital-based, curative services and preventive, early detection and timely treatment options;
- defining the package of health services to be made available by and accessible to all including considerations of portability of benefits given contingent rights in CSME jurisdictions;
- securing efficiencies in all operations including human resources deployment and compensation packages (i.e. payment systems). See Box 5.1 for likely efficiency measures
- developing health promotion and screening programmes targeted at the pre-elderly cohorts of the population.
In terms of resource availability (depicted in the lower arm of Figure 5.2), the key constraints are:

- the difficult macroeconomic and fiscal environmental in most countries exhibited by slow or declining economic growth, stable or marginal growth in fiscal revenues with consequent fiscal deficits, high external and local debt and debt repayment obligations (as shown in Figure 5.3 with burdens exceeding the 65% international thresholds in some countries and as high as 155% in St Kitts and 140% in Jamaica) and declining creditworthiness of some countries in terms of international capital markets;
- the competition for priority access to fiscal resources with governments increasingly called upon to ‘do more’ simultaneously for education, social services and national security along with health;
- the declining accessibility of external concessionary funds due to the ‘graduation’ of most CARPHA States in the categorisation of international lending agencies based on income per capita levels. (Most countries are now seen as ‘lower middle income’ (e.g. Guyana, Belize); ‘upper middle income’ (e.g. Grenada, Jamaica, St Vincent) or ‘high income’ (e.g. Aruba; Bahamas, Barbados, Trinidad and Tobago). Only Haiti is treated as a ‘low income’ country among CARPHA Member States.

Addressing the resource constraints issues and generating more resources for health would require closer collaboration with:

- Ministries of Finance on fiscal space and tax matters such as reallocations in budgets; expanding or becoming more efficient in collecting existing taxes; introducing new taxes. See Box 2 for likely additional funding options.
- Social Security organisations on opportunities for additional payroll deductions (which already average about 10% in most countries and are as high as 21% in Barbados) in social health insurance plans where they do not currently exist or for support funds from their surpluses for specific health activities bearing in mind their direct interest in worker productivity (which may be negatively affected by ‘sick’ populations) and the need to pay closer attention to the health needs of pensioners;
- the private sector especially in relation to health insurance options as well as more efficiencies in complementary vs competing service provision, overseas care management and ICT solutions;
- communities on cost sharing in health.
Box 5.2: Likely Additional Funding Options

1. Strengthened tax collection systems and mechanisms to reduce non-compliance.
2. Higher or new taxes on some under-taxed goods/services such as telecommunications devices and services (cable, cell phones; other portable devices); banking transactions; remittances; international travel; property and sin taxes such as on alcohol, tobacco, gambling, ‘fast foods.’
3. Possible debt-health swaps by highly-indebted countries e.g. Jamaica, St Kitts, Grenada; Antigua, Belize (as done for the environment in countries such as Guyana and Jamaica);
4. Possible diaspora bonds for health for purchase by diasporic groups and ‘friends’;
5. Selective user fees/co-payments at hospitals both to generate revenue as well as deter unwarranted use of services with the fees retained for use by the collecting facility. This should be developed alongside explicit mechanisms for exempting the poor.
6. More attention to fees (and penalties for non-compliance) for publicly-provided health services (such as public health inspections, ‘food badges’; licences and certificates for health professionals and facilities).

Since the above financing and expenditure objectives and corrective measures would require support (and incur likely opposition) from key stakeholders and the community at large, plans and actions should be developed and implemented within a coherent, universalistic, politically acceptable framework perhaps best articulated in the UHC approach.

5.8.6 Health Financing for the Caribbean– The Vision and the Philosophy

5.8.6.1 Sources and Context of Health Financing

The main point here is that if the access to health services matters to the socioeconomic welfare of the population, the way in which these services are financed would be important. We readily acknowledge four possible sources of health financing:

1. general revenues
2. social insurance
3. private insurance
4. out-of-pocket payments.

We also admit that each health system is characterized by the significance of the role played by these different types of health financing.

In a context where human development is the main objective, the desiderata of the health financing system will certainly include Efficiency, Equity and Sustainability. In other words, the system must be geared to avoid waste, it must ensure access to care by all who need it and it must find a way to make services available under varying economic circumstances. This is no doubt a very tall order and the situation is compounded by the challenges of a new commitment to

a) Universal Health Coverage,
b) The growing epidemic of chronic non-communicable diseases,
c) The demographic shift towards an elderly population and
d) The emergence of new infectious diseases.

5.8.6.2 The Caribbean Environment

In the Caribbean, the key pillar of the health financing system has been general revenues, with private insurance and out of pocket payments growing in significance over the past few decades. Partly because of the drive to health sector reform in the Region, the health financing issue has been widely discussed, with the need for a greater role for the social insurance pillar taking centre stage. For a while now there has been a general acceptance of the need for the pooling of resources to maximize population access to health services. However, for various reasons, implementation of social insurance type financing systems has been very slow.

The financing discussion is usually initiated by the identification of a basket of services which will be made available to the population, a basket which would come with the guarantee of ready access and with a guarantee of acceptable quality. In some cases, the population is expected to contribute to the financing pool by means of employer and employee premia. In other cases, the government may choose to underwrite the entire basket of services on behalf of the population.

These two modes of financing are not mutually exclusive, not only because the two can coexist with respect of different types of health services, but it is possible for any one of the two to smoothly evolve into the other in response to changes in the income distribution or in response to increasing costs.

5.8.6.3 Philosophy of Health Financing

The UWI Health Economic Unit (HEU) has always been fully supportive of the move to introduce a social insurance pillar into the health financing mix. The fact that not all health services will be included in the basket covered means that private insurance and out of pocket payments will continue to have a role in the financing subsystem. What matters is the fact that based on the epidemiological realities and the economic capacity of the country a decision will be made on the services to which all citizens and residents must have ready access.

Further, we note that while the health system straddles the social, political and economic dimensions of the society, health financing issues point to considerations which are mainly economic. This is because the health system depends on the economic system for its financing and the economic system, in turn, depends on the health system – and therefore health financing – for its income generation. This close relationship between the health system, health financing and the economic system is illustrated in Figure 5.4.

Figure 5.4 Disease and the Economic System Linkage Mechanisms
At the heart of the model is the economic system which generates the wheels of motion of activity in all sectors of the economy. We have already pointed to the fact that the health financing system is assumed to be comprised of four elements:

1. General tax revenues
2. Social insurance
3. Private insurance
4. Out of pocket payments

However, the model shows that regardless of the type of financing, the fundamental source of all health financing is the national income.

Our assumption is that the basic objective of the health system is to bring about the best possible fit between health services and health needs. The health system therefore provides the platform upon which the gap between health needs, and the production or supply of health services is bridged. Income is the means through which individuals negotiate a fit between their health needs and available health services. Income will influence the quantity and quality of services consumed as well as the choice of health care provider or institution. Prices and cost on the other hand, act as direct barriers or constraints to accessing health services.

Left to themselves therefore, economic institutions – the factor market and the final goods market - can lead to unacceptable outcomes, with persons and groups with the greatest needs having the most limited access to services. Given that health financing is a sub-component of the economic system, it follows that health care financing can be used to negotiate successful health outcomes in the face of an existing configuration of incomes, prices and costs which would, by themselves, make such outcomes impossible.

If we define medical poverty as a state in which individuals do not have adequate access to health services based upon their needs, if the financing instrument is not tailored appropriately, the health system itself can contribute to increased levels of medical poverty by facilitating a continued mismatch between needs and services. For example, there is ample evidence that if the health system is financed largely on an out-of-pocket basis, health care consumption will be based on individuals’ ability to pay and will simply be a reflection of the prevailing distribution of incomes in the society, not a reflection of the distribution of the society’s health needs. Apart from mitigating the impact of the existing distribution of incomes, the health financing system can itself become a tool of income redistribution. Such is the case, for example, where health financing may be organised using solidarity principles, such as under regimes of contributory or non-contributory social insurance. In such situations there is cross subsidisation from individuals with more resources to those less fortunate and from those with a lower incidence of illness to those who require care more frequently.

In a context, such as that in many Caribbean territories, where the distribution of income is known to be inequitable, the health financing system has the potential to be an important mechanism of redistribution, beginning with an appropriate fit between health needs and health services utilisation. It will be important to be able to monitor whether the financing system is making its potential contribution to human development through social equity.

Conclusion

It would seem that as the Region strives for a health financing system that works in the best interest of the population, it must move to adopt a system that has a few distinctive features. It must be:

- A prepaid system
- A system with ready access to good services by all
- A system with prevention and delivery characteristics that would systematically minimize waste.

It is within this context that countries of the region must be encouraged to incorporate Health Information Systems and embark on Social Health Accounts (SHA). Moving in this direction will facilitate continuous monitoring of both equity and efficiency outcomes of the health system while enhancing its sustainability.

Acknowledging the commitment to universality in the provision of services, the health financing system will need to be configured to incorporate a culture of efficiency both by keeping the demand for services as low as possible and by facilitating a delivery of services with as little waste as possible. In other words, health financing must involve steps to avoid moral hazard while facilitating access over the long haul. In this regard, collaboration with the social security institutions which have a history of treating with universality and with extended periods of providing services would be advisable.

Along the same lines, it would be appropriate for new approaches to health financing to recognize the opportunities presented by new technology – in particular, the opportunity for introducing health information systems throughout the entire Region.

On a final note it is important that all players in the health sector, and policymakers in particular, work with an understanding that the health financing system is not primarily a fiscal instrument. It is first and foremost one of the main instruments for getting the health system to function as we want it to, and, by implication, an instrument with the potential for influencing the quality of life of every citizen or resident of the Region.
5.9 Monitoring and Evaluation for Public Health in the Caribbean

In recent years, Monitoring and Evaluation (M&E) has gathered greater traction in ministries of health throughout the Region as public health professionals have come to understand the importance of demonstrating accountability for public health outcomes, improving data-informed decision making and promoting greater learning. Greater efforts are required to ensure improved capacity in M&E and the full utilisation of data generated M&E systems, as well as the institutionalisation of data-informed decision making.

The 12 Components of a Functional M&E System Model developed by the International Monitoring and Evaluation Reference Group forms the basis for capacity building efforts implemented by CARPHA throughout the Region (see Figure 5.4).

At a basic level, the 12 Components Model can be categorised into three main sections, which are reflected in the three rings of the 12 Component Model Diagram. The outer ring in the diagram links the six components representing People, Partnerships and Planning that support data production and use. The middle ring links the five components related to data management processes, including the Collection, Capture and Verification of routine data. The inner ring represents the primary outcome of the M&E system — Data Dissemination and Use which refers to the analysis of data to generate information which can be disseminated and utilised to inform decision-making and improve decision making.

Throughout the Region and within countries, health programmes vary considerably in their ability to implement functional M&E systems in accordance to the 12 Components Model. The following provides an overview of the current state of M&E systems in the Region in relation to each component of the 12 Components Model. It should be noted, however, that much of the M&E work undertaken to date has been through HIV funding which has allowed the organisation to leverage available funding to build broader health systems.

This sub-section of the report provides an overview of M&E practice and performance in the Caribbean. Its focus is the overall state of M&E practice in the Region and not the specific condition of M&E practice in individual Caribbean countries. Specifically, it seeks to identify common successes and challenges, to outline cross-cutting themes, and to recommend actions at both national and regional levels that will strengthen HIV M&E systems in the Region. It will inform future collaborative planning for upcoming project directions involving CARPHA and other key national, regional and international stakeholders.

5.9.1 Human Resources, Partnerships and Planning

5.9.1.1 Component 1: Organisational Structures with M&E Functions

Achievements/Sucesses
• A clear M&E mandate has been established for the Ministry of Health and National AIDS Programmes throughout the Caribbean. These mandates are being articulated in national M&E plans which demonstrate that the culture of M&E is strengthening and being integrated into health management and organisational structures.
• Technical assistance for M&E is widely available for all countries that request support from regional or international institutions seeking to establish M&E structures and functions (and other strategic information functions).
• CARPHA has secured funding from regional and international partners to develop M&E capacity throughout the Region offering a wide range of tailored services.
• CARPHA has adopted a lead role in M&E and is working to integrate M&E with other strategic information services to strengthen support for Member States and ensure efficiency.
• Several countries have dedicated M&E staff, or personnel with M&E responsibilities incorporated into their job descriptions.

Challenges/Limitations
• Most countries lack a comprehensive M&E framework in keeping with the 12-component structure.
• Most Ministries of Health do not have sufficient human resource structures for M&E. Many of the existing organisational structures in countries do not have adequate technical staff required to fulfil their M&E mandate as it relates to some of the 12 Components (for example, research and evaluation, supportive supervision and data auditing, surveys and surveillance and database management). Consequently, there is limited capacity to implement the M&E mandate.
• The financial situation in many countries means that there is a lengthy procedure involved in the establishment of M&E posts which compromises the ability of Ministries to appoint persons to carry out requisite M&E functions.
• M&E activities remain largely donor driven and not driven by country needs.
• The silo structures existent in many Ministries of Health means there is little collaboration and communication in terms of M&E and learning.

Recommendations
• CARPHA will continue to undertake 12 component assessments of country programmes
and national health systems and provide technical assistance to develop the appropriate organisational structures to facilitate effective and efficient M&E.

- CARPHA will continue to advocate for the development of organisational structures with M&E functions in Ministries of Health through the demonstration of the worth of M&E in terms of ensuring accountability and driving programme improvements.
- CARPHA will facilitate best practices and sharing within and among countries.

5.9.1.2 Component 2: Human Capacity for M&E

Achievements/Successes
- Basic and Advanced M&E Training curricula have been developed and are being used by CARPHA to train health care professionals throughout the Region. Some countries, most notably Jamaica, have used this training package to develop their own training, thus furthering the reach of persons trained. The training material is also available on DVD.
- M&E modules have been integrated into Master’s degree programmes at regional Universities.
- Countries have made efforts to train key staff in M&E through various training opportunities regionally and internationally and through participation in internship programmes.
- There is donor support for human resource capacity building in M&E.
- CARPHA has implemented an internship programme for M&E professionals.
- CARPHA provides coaching to M&E focal points throughout the Region.

Challenges/Limitations
- Many countries do not have a formal M&E human capacity building plan. In the absence of a plan, investments in human capacity building have been unstructured.

Recommendations
- CARPHA will advocate for the strengthening of human capacity in regional organisations to better support countries with building, strengthening and sustaining M&E practice.
- CARPHA will team national staff with staff from regional organisations to deliver in-country M&E training and undertake evaluations.
- CARPHA will work more closely with regional universities to standardise M&E curricula and develop a dedicated M&E programme.

5.9.1.3 Component 3: Partnerships to Plan, Coordinate and Manage the M&E System

Achievements/Successes
- The Caribbean Cooperation in Health (CCH III) provides a forum for high level coordination in health and M&E.
- The development of M&E Plans throughout the region is increasingly based on collaborations and cooperation between Ministries of Health, civil society, representative groups and other stakeholders, and is resulting in greater coordination of national programmes.
- A CARPHA M&E Technical Advisory Committee is being established to improve coordination and communication in M&E.
- CARPHA has established an M&E repository linked to the CARPHA website aimed at improving M&E communication and information sharing.

Challenges/Limitations
- Civil society capacity for M&E remains weak throughout the region and limits their contribution to M&E system development.
- Communication about public health M&E developments and outputs at the regional level requires strengthening.

Recommendations
- CARPHA to continue to expand the functionality and content of the M&E repository to increase usage and the sharing of M&E resources.
- CARPHA to work with countries to increase engagement more with civil society groups and the private sector to strengthen M&E.

5.9.1.4 Component 4: M&E Plan

Achievements/Successes
- Where they exist, National Health Sector M&E Plans are explicitly linked to strategic plans. Most M&E plans are current and fairly comprehensive, well developed and address many but not all of the 12 components required for a functional national M&E system.
- Most HIV Programmes have M&E Plans.

Challenges/Limitations
- Many countries do not have current Health Sector M&E plans or M&E plans for programmes outside of HIV.
- Many M&E plans do not fully describe the implementation of all 12 components of a national HIV M&E system, there is often no mention of a capacity building plan, and the plan does not provide guidelines for data auditing and supervision.
- Implementation of M&E plans is a challenge for many countries.
- The evaluation side of many M&E plans is under resourced.
- Articulating realistic, measurable and practical indicators remains a challenge for many countries.
- Most countries in the Region do not have National M&E Reference Working Groups.

Recommendations
- CARPHA will seek to expand its support to countries to develop M&E plans outside HIV.
- CARPHA will work to develop a stronger evaluation culture and cadre in the Caribbean.
- CARPHA will continue to work with countries to implement stronger M&E systems and quality indicators.
- National M&E Reference Groups (MERG) should be established or strengthened in each country. The main function of the Group will be to guide the development of M&E within each country including the implementation of the M&E plan. The MERG would identify the areas of focus for the M&E system and guide the implementation of selected activities. CARPHA could provide guidance to countries with the establishment or strengthening of these country working groups.

5.9.1.5 Component 5: Annual, Costed, National M&E Work Plan

Achievements/Successes
- Where M&E Units and MERGs have been established, annual work plans are often being implemented based on M&E plans.
- In some countries M&E budgets have been allocated.

Challenges/Limitations
- Most countries do not have a national multi-partner, multi-level M&E work plan that is costed. Activities are sometimes not well coordinated and this often leads to duplication of effort and failure to leverage resources.
- Funding to support the implementation of M&E work plans continue to be a challenge for most countries.

Recommendations
- Countries should develop a national costed annual/biennial M&E work plan with wide buy-in from all the sectors, and donors should be major stakeholders in its development. The plan should be based on the 12 Components of a Functional National M&E System; showing the critical step-by-step activities that will be conducted to strengthen each component; or, it can be based on any other country-specific format. CARPHA could provide countries with guidance in this area.

5.9.1.6 Component 6: Communication, Advocacy and Culture for M&E

Achievements/Successes
- M&E culture has firmly taken root, but is growing slowly.

Challenges/Limitations
- There are no clear national or regional high-level officials identified as M&E champions who actively endorse M&E actions.
- M&E materials are not yet readily available to stakeholders (e.g. other implementers, umbrella organisations, and national and sub-national level partners).
- Few opportunities exist for M&E professionals to share information and grow professionally.
Recommendations
Identify "M&E champions" - high level stakeholders – who are leaders and well recognized both technically and politically. The M&E champions would advocate for development of an M&E culture and evidence-based decision making with heads of ministries and their technical staff. They would advocate for the use of data for policymaking and decision making, and would communicate the importance of M&E at national and other high-level fora.
- CARPHA to develop an M&E network for professionals working in M&E throughout the region.

5.9.2 Data Collection, Verification and Analysis

5.9.2.1 Component 7: Routine Programme Monitoring

Achievements/Successes
- Most national M&E plans contain operational definitions of indicators for routine programme monitoring, reporting forms, and data flow charts for both non-health and health implementers.

Challenges/Limitations
- In countries, the harmonisation of M&E systems, especially indicators, data collection, and reporting tools and templates need to be improved across partners and service delivery areas.
- Unlinked databases make it difficult to manage data and undertake deeper analysis.
- Data quality guidelines are not available for programme monitoring.
- Reporting is still very poor among the private sector health facilities.

Recommendations
- CARPHA to work with countries to align data collection and reporting with the national M&E plan, including a review of current forms, and streamlining of data collection to support data needs for client management, indicator reporting, and generation of annual performance reports.
- CARPHA to strengthen existing skills in data management, analysis and report writing at the national level, through direct technical assistance and mentoring.

5.9.2.2 Component 8: Surveys and Surveillance

Achievements/Successes
- Several national M&E plans clearly stipulate the importance of surveillance, and identify all the key surveillance activities required to generate data for measuring the outcome and impact indicators to monitor national strategic plans.
- Several are undertaking health related surveys on a regular basis and feeding this information into the M&E system.

Challenges/Limitations
- Human capacity to design and analyse survey and surveillance data is limited.
- Formal inventories of surveys exist in only a few countries.
- Funding for large scale surveys remains limited.

Recommendations
- There is a need to develop national and regional level inventories on surveys and surveillance, which should be updated periodically.
- CARPHA will strengthen national capacity to conduct surveys through training, workshops and access to relevant literature.

5.9.2.3 Component 9: National and Sub-National Databases

Achievements/Successes
- Many countries in the region have implemented patient monitoring systems (e.g. OEDS, Belize) and have incorporated data from these into their M&E systems.

Challenges/Limitations
- Various departments maintain different databases at the national level that are not linked to each other leading to duplication of effort.
- The databases capture donor-specific information instead of capturing information pertaining to the national response.
- Human capacity to develop and manage databases at the national level requires strengthening.

Recommendations
- Countries are encouraged to work with a single, integrated database, which they constantly improve and update. Ministries can conduct a strengths, weaknesses, opportunities, and threats analysis of the available databases to inform its choice.
- Countries are encouraged to link databases particularly, surveillance and M&E databases which are programmatically linked.

5.9.2.4 Component 10: Supportive Supervision and Data Auditing

Achievements/Successes
- A small number of countries are implementing data quality checks and procedures.

Challenges/Limitations
- Many countries do not have supportive supervision or data auditing guidelines and where they exist, supportive supervision and data auditing is not scheduled regularly.
- Capacity to conduct supportive supervision and data auditing is weak.

Recommendations
- There is a need to develop guidelines for supportive supervision and data auditing of health programmes. This can be led by the MERGs and supported by regional technical support partners. This would improve the credibility and reliability of data and develop the capacity of implementers involved in this process. There is also need for training of supervisors in data auditing procedures such as:
  i) observation of data collection and reporting processes;
  ii) documentation review;
  iii) tracing and verification of data;
  iv) cross-checks;
  v) spot checks.

5.9.2.5 Component 11: Evaluation and Research Agenda

Achievements/Successes
- CARPHA has adopted the Health Research Agenda for the Caribbean, which includes research priorities for all the CCH III Programme Areas. is also recommended that this be adopted or adapted by its Member States

Challenges/Limitations
- There is no comprehensive inventory of health research and evaluation studies conducted in the Region; therefore, there is no clarity on investment made or any measure of the size of this investment in research and evaluation.
- Resources to conduct the required research and evaluation (human and financial) continues to present a challenge to progress in this area
- There is no clear structure for disseminating and using information generated from various research and evaluation studies carried out in the Caribbean. It is not clear how these results influence policy and programmes, if at all.

Recommendations
- It is recommended that the Ministry of Health or M&E Unit staff compile a listing of all health-related research and evaluation conducted in each country. These reports will serve as the basis for the M&E MERG to develop a research and evaluation agenda. Countries should also consider expanding this process to research and evaluation conducted across all areas of health.
- Countries and regional institutions should adopt, where appropriate, CARPHA’s Health Research Agenda and use this to develop national research agendas.
- A few countries (for e.g. Barbados and Dominica) have embarked on the development of a national research agenda.
- CARPHA has contributed significantly to the publication of health-related research papers through its annual Scientific Meeting.
- Increasing countries are seeking to undertake evaluations of national programmes, especially in HIV. A demand for evaluations in NCDs also appears to be growing.
5.9.3 Data Dissemination and Use

5.9.3.1 Component 12: Data Dissemination and Use

Achievements/Successes
- A few countries demonstrate clear evidence of M&E information use in the review and development of the national strategic framework.
- Use of evaluation findings has been increasing for CARPHA conducted evaluations

Challenges/Limitations
- Information products are available, but not disseminated to the data providers or users at the country level.
- The data collection, dissemination and use process are not driven by stakeholder needs but rather by external reporting requirements.

Recommendations
- CARPHA to provide countries with guidance on assessing national stakeholders’ information needs.
- CARPHA to assist countries with developing a data dissemination and use plan that is included in the national M&E plan. It should show the type of information, templates, and timelines for major information products.
- CARPHA to strengthen the capacity of personnel at the national level to translate evidence into recommendations for decision making and policy targeted actions.
- CARPHA should develop a cohesive communication and data dissemination plan for dissemination of M&E and other information products.

References
- A census of medical laboratories and public health laboratories in the Caribbean within the PAHO- CDC Joint Initiative on Strengthening Quality Management Systems for Medical Laboratories in a Step-Wise Approach toward Accreditation in the Caribbean
- Annual [Budget] Estimates of Expenditure in Dominica, St Kitts, Jamaica, Trinidad and Tobago, Virgin Islands (UK)... recent years.
- Cameron Rick. 2012. HRH planning & management survey PPT
- CAREC/PAHO Laboratory Capacity Survey for CAREC Member Countries 2011
- Caribbean Guidance on the Stepwise Improvement
- Caribbean Tourism Organization (CTO) www.onecaribbean.org


• PAHO. (2011). “Human resources for health in the Caribbean: a review of the workforce situation and the national baselines of the 20 goals for human resources for health 2011”


• PAHO. (2012). Road Map for Strengthening the Caribbean Health Workforce, 2012-2017

• Pan American Health Organization (2012). Health Conditions in the Americas, Volumes I and II.


• Process for Strengthening Laboratory Quality Management Systems towards Accreditation 2013


• Transforming the medical laboratory landscape. A generic Caribbean national laboratory policy framework. Caribbean Med Labs Foundation, April 2014

• United Nation World Tourism Organization (UNWTO). www.unwto.org


6.1 Tourism Migration

Travel and tourism is a principle economic activity in the Caribbean, and most of the Caribbean countries are tourism-dependent. However, tourism is vulnerable to health, safety and security and environmental challenges including foodborne and enteric diarrheal disease outbreaks; increasing violence, crime and injuries, declining natural resources, environmental degradation and serious deficiencies in environmental sanitation and safety. The high and increasing level of visitor arrivals / movement of people from international regions (e.g. Europe, Asia, the Americas, Africa and Middle East) to the Caribbean region, and intra-regional travel, increase the potential for visitors and locals transmitting or acquiring diseases from each other and threatens the integrity of our natural resource base. This has been typified by concern about SARS, Norovirus, and H1N1 and recently by Chikungunya in 2013.

The migration of people through travel and tourism has steadily recovered post September 11, 2001 (Figure 6.1). In 2013, tourism accounted for 25.0M stay-over arrivals and 21.8M cruise ship arrivals, showing an increase of 1.8% from 2012. The Caribbean was the third fastest growing Region with response to international tourism arrivals for 2012 but only outperformed the volatile Middle East in 2013 (WTO 2014). The tourist winter season extends from December 15th of one year until to March 15th of the following year but statistically, it is approximated by the months of January to April (Figure 6.2). Noting the travel trends of visitors to the Caribbean is important to reduce the risk of transmitting or acquiring diseases from each other illness.

Figure 6.1 International Stay Over and Cruise Ship Tourist Arrivals (million), Caribbean 2000 - 2013
6.1.1 Stay-Over (Air Travel) Arrivals

Most of tourism arrivals to the Caribbean are from the USA, Canada, Europe, South America and the Caribbean (intra and inter-regional travel) (Table 6.1). The United States is the most common supplier of tourists to the Region and its share of total arrivals averaged 50% over the last five years. About 12.3 million Americans visited the Region with most arriving in Bahamas, Jamaica, Dominican Republic and Puerto Rico. Canadian stay-over visitors to the region moved from 3.06 million in 2012 to 3.09 million, an increase of 0.7%. A large number of tourists from this market visit Cuba, Dominican Republic and Jamaica. The ongoing challenges in Europe resulted in a further reduction of tourists from the European countries in 2013. An estimated 4.7 million Europeans visited the region. Of the 11 destinations with 50,000 or more arrivals from this market, only Bahamas (0.5%) and Jamaica (5.5%) registered growth. Demand for Caribbean vacations is reduced in the United Kingdom in light of the Air Passenger Duty and low economic growth. While arrivals from the main source markets were teetering, tourists from South America were flocking to the Region. The numbers moved from an estimated 858.9 thousand in 2009 to in excess of 1.4 million at the end of 2013, almost 13.0% more than in 2012 and 70% more than in 2009. The main destinations to record positive results in 2013 were Aruba (26.1%), Jamaica (15.9%), Suriname (12.4%) and Curacao (9.5%) and Dominican Republic (4.6%).

Table 6.1 Tourist arrivals to the Caribbean by Main Market (‘000), 2009-2013

<table>
<thead>
<tr>
<th>MARKETS</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>%ch 13/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Arrivals</td>
<td>22,426.5</td>
<td>22,790.1</td>
<td>13,407.0</td>
<td>24,564.3</td>
<td>25,010.3</td>
<td>1.8</td>
</tr>
<tr>
<td>United States</td>
<td>11,278.1</td>
<td>11,305.4</td>
<td>11,404.2</td>
<td>11,975.9</td>
<td>12,323.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Canada</td>
<td>2,558.9</td>
<td>2,677.0</td>
<td>2,865.0</td>
<td>3,063.5</td>
<td>3,085.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Europe</td>
<td>4,916.2</td>
<td>4,857.0</td>
<td>4,962.8</td>
<td>4,916.5</td>
<td>4,734.3</td>
<td>3.7</td>
</tr>
<tr>
<td>Caribbean</td>
<td>1,457.9</td>
<td>1,487.0</td>
<td>1,584.4</td>
<td>1,562.8</td>
<td>1,595.2</td>
<td>2.1</td>
</tr>
<tr>
<td>South America</td>
<td>858.9</td>
<td>898.2</td>
<td>1,131.6</td>
<td>1,289.6</td>
<td>1,456.9</td>
<td>13.0</td>
</tr>
<tr>
<td>Other*</td>
<td>1,356.5</td>
<td>1,505.5</td>
<td>1,459.1</td>
<td>1,756.0</td>
<td>1,814.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Note: * The list of countries included in "other" varies from country to country. Imputed from data on international travel to member countries.

Source: CTO Member Countries and CTO estimates.

The most frequent visited countries in the Caribbean by international visitors include Dominican Republic, Cuba, Bahamas, Jamaica and Puerto Rico. However, countries like Montserrat, Haiti, Guyana and Aruba have shown double digits increase in the past two years. Visitors are now looking beyond the favorites and countries like Haiti and others are actually getting a chance at become tourist destinations.

Intra-Caribbean travel is also very popular. It is estimated that between 1.3-1.6 million Caribbean people travelled between islands for touristic purposes per year in the past five years (Table 6.2). Statistics for 2013 revealed that 2.1% more Caribbean residents visited neighbouring destinations than in 2012. Non-Commonwealth Caribbean countries dominated in numbers with an increase of 3.7%. The Commonwealth countries experienced a decrease in visits from Caribbean nationals of 0.5%. The OECS, which have significant intra-Caribbean tourism (accounting for 20-50% of total market share across countries), showed 3.4 % contraction in the arrivals.
Table 6.2 Intra-Caribbean Arrivals to the Caribbean by Sub Region, ('000), 2009-2013

<table>
<thead>
<tr>
<th>REGION</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>% Ch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commonwealth Countries</td>
<td>631.3</td>
<td>601.8</td>
<td>654.7</td>
<td>624.3</td>
<td>621.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>OECs Countries</td>
<td>298.9</td>
<td>284.9</td>
<td>284.6</td>
<td>283.6</td>
<td>273.9</td>
<td>-3.4</td>
</tr>
<tr>
<td>Other</td>
<td>332.3</td>
<td>316.9</td>
<td>370.1</td>
<td>340.6</td>
<td>347.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Commonwealth Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Caribbean</td>
<td>826.6</td>
<td>885.2</td>
<td>929.7</td>
<td>938.50</td>
<td>973.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Total Caribbean</td>
<td>1,457.9</td>
<td>1,487.0</td>
<td>1,584.4</td>
<td>1,562.8</td>
<td>1,595.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Of which</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CARICOM</td>
<td>573.0</td>
<td>541.8</td>
<td>575.2</td>
<td>575.4</td>
<td>579.9</td>
<td>0.8</td>
</tr>
</tbody>
</table>

6.1.2 Cruise Ship Arrivals

The Caribbean has been one of the leading cruise destination in the past five years by Cruise Lines International Association (CLIA), the world’s largest cruise industry trade association with representation in North and South America, Europe, Asia and Australia. In 2013, the Caribbean was the leading cruise destination by CLIA, accounting for 45.3% of global ship deployments. Cruise passengers to the Region totalled 21.8 million which represented a moderate pickup in cruise activity of 2.7% when compared to 2012. (Table 6.3). This total of cruise passenger arrivals represents the sum of arrivals at all destinations. However, because most cruise ships stop at more than one destination, this figure is considerably larger than the actual number of cruise passengers visiting the region. The fluctuations in cruise arrivals in individual destinations ranged from declines of 21.8% (Grenada) to increases of 45.1% in Curacao. Twice as many destinations (12), of the 23 destinations upon which the estimates are based, recorded increased cruise activity in 2013 over 2012. Summer months of 2013 were the best since 2010 for cruise in the Caribbean.

Table 6.3 Cruise Passenger Arrivals to the Caribbean ('000), 2009-2013

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>%Ch 13/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cruise Pax</td>
<td>19,452.4</td>
<td>21,125.4</td>
<td>21,544.2</td>
<td>21,313.1</td>
<td>21,884.8</td>
<td>2.7</td>
</tr>
</tbody>
</table>

NOTE: Imputed from data on Cruise Passenger travel to member countries
Source: CTO Member Countries and CTO estimates.

6.1.3 Suspected Spread of Chikungunya in 2013 Through Intra and Interregional Travel

The current Chikungunya epidemic in the Caribbean is suspected to have spread through intra and interregional travel. The first case was seen in December 2013 in French St Martin. This then migrated to Dutch Sint Maarten and the English-speaking Caribbean. The first case in the English-speaking Caribbean was seen in the British Virgin Islands in January 2014, then in Dominica where it escalated to large numbers. Chikungunya has now spread to 16 countries, including Haiti and the Dominican Republic, totalling 3,612 cases as of 1st May 2014.
References


Index

access to improved drinking water source, 45
access to improved sanitation facilities, 46
Acute Flaccid Paralysis, 93–94
Acute gastroenteritis, 73, 79
agriculture, 37
Aedes aegypti, 18, 65, 70, 115, 118
Aedes albopictus, 65
air quality management, 187–89
air travel arrivals. See tourism migration
alcohol consumption, 132
Bacillus Calmette-Guérin, 89
birth asphyxia, 55
birth rates, 31
birth trauma, 55
breast cancer, 55, 127
breastfeeding, 98, 147
Campylobacter, 72, 74, 78, 117
cardiovascular, 49, 55, 59, 77, 125, 135, 142, 149, 152, 157
Caribbean Cooperation in Health, 17, 73, 199, 212, 221,
Caribbean Public Health Laboratories Network, 200
Caribbean Regional Strategic Framework, 95
Caribbean Regulatory System, 24, 210, 212
Caribbean Sea Ecosystem Assessment, 180
death rates, 31
deaths among children, 55
debt service ratio, 40
dengue, 18, 65–68, 70, 71, 219
demographics, 27
diabetes, 17, 49, 55, 124, 125, 128, 135, 139, 140, 148,
diphtheria-tetanus-pertussis, 89, 90
Escherichia coli, 72, 74
expanded program on immunization, 89
expanded program on immunization, 89
Expanded Program on Immunization, 89
fear surveillance 91–93
farm to table, 73, 75, 77, 79
food safety, 72, 73, 120, 150
climate change
chemicals management, 186
coastal waters and environments, 181
dead sea salt, 106
debt service ratio, 40
dengue, 18, 65–68, 70, 71, 219
demographics, 27
diabetes, 17, 49, 55, 124, 125, 128, 135, 139, 140, 148,
diphtheria-tetanus-pertussis, 89, 90
diseases of endemic potential, 65
drowning, 22, 55, 162, 262
dengue, 18, 65–68, 70, 71, 219
demographics, 27
diabetes, 17, 49, 55, 124, 125, 128, 135, 139, 140, 148,
diphtheria-tetanus-pertussis, 89, 90
diseases of endemic potential, 65
drowning, 22, 55, 162, 262
dengue, 18, 65–68, 70, 71, 219
demographics, 27
diabetes, 17, 49, 55, 124, 125, 128, 135, 139, 140, 148,
diphtheria-tetanus-pertussis, 89, 90
diseases of endemic potential, 65
drowning, 22, 55, 162, 262

References
