Diagnostic Study of the National Health Information System

Of

BELIZE

Prepared Under the Direction
Of the Epidemiology and Surveillance Unit,
Ministry of Health
By
Vanguard Consulting

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ACKNOWLEDGEMENTS

The development of a properly functioning national HIS in Belize is key to our national development. Given our fiscal constraints it is imperative that a national HIS is in place to provide the information needed to make evidence based decisions that will result in desired health outcomes and leverage our scarce resources.

This assessment would not have been possible without the hard work and dedication of the members of the National Health Information Steering Committee. This is but the first milestone on a much longer journey in which their continued dedication and leadership will be required.

The team from the Ministry of Health's Epidemiology Unit deserves special mention. Despite their tremendous workload they invested of their personal time to be able to get this assessment done in a relatively short time frame.

We must thank the HMN Secretariat in Geneva for providing the catalytic funding required to conduct this assessment and for creating a framework that countries can use to guide the development of its national health information systems. We look forward to continued collaboration and partnership as we strive to strengthen our national HIS and fully implement the Belize Health Information System software.

As usual to our colleagues in the PAHO country office, thanks for the unwavering support throughout this process and for major contributions made over the years to strengthen the HIS. We are now within reach of our goal of having a modern and effective national HIS. Our challenge will be to ensure that we continue to develop an information culture that strives to always make evidenced based decisions.

Together We Move Forward.

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LIST OF ACRONYMS

BHIS	Belize Health Information Services
CEO	Chief Executive Officer
DHS	Director of Health Services
GPS	Global Positioning System
HIS	Health Information System
HoD	Heads of Departments
HMN	Health Metrics Network
HRH	Human Resources in Health
IADB	Inter American Development Bank
MIS	Management Information System
MOH	Ministry of Health
NHA	National Health Accounts
NHIS	National Health Information System
NHISC	National Health Information System Committee
PAHO	Pan American Health Organization
SIB	Statistical Institute of Belize
SIC	Social Investment Committee
SLA	Service Level Agreements
SSB	Social Security Board
VSU	Vital Statistics Unit
UB	University of Belize
UNICEF	United Nations Children Fund
UNDP	United Nations Development Fund
UNFPA	United Nations Population Fund

EXECUTIVE SUMMARY

In line with the goals of the current Health Sector Reform Programme (HSRP) and the MOH's general commitment to improve performance the MOH applied to the Health Metrics Network (HMN) to get the support necessary to undertake a comprehensive assessment of the national Health Information System (HIS). The genesis of the proposal was a result of officials from the MOH, PAHO, and Vital Statistics Unit (VSU) attending an HMN hosted meeting in Panama City, Panama in June of 2006.

A National Health Information System Committee (NHISC) was setup to oversee the implementation of the HMN funded national HIS assessment and strategic plan development. The committee is comprised of representatives from the following institutions which collectively they make up the main stakeholders of the national HIS:

- Ministry of Agriculture and Fisheries
- Ministry of Health
- Ministry of Economic Development, Commerce and Industry, and Consumer Protection
- Ministry of the Public Service, Governance Improvement and Elections & Boundaries
- Ministry of Natural Resources and the Environment
- Pan American Health Organization
- Social Security Board (SSB)
- Statistical Institute of Belize (SIB)
- United Nations Children Fund (UNICEF)
- United Nations Development Fund (UNDP)
- United Nations Population Fund (UNFPA)
- University of Belize
- Vital Statistics Unit

The first objective of the consultancy was to conduct an assessment of the National HIS in order to evaluate the current status, provide a baseline assessment and identify critical gaps. The second objective is to develop a strategic plan to address the gaps identified and chart the course for the long term evolution of Belize's national HIS. The superordinate goal is to foster a culture of evidenced based decision making at all levels of Belize's governance structure. Work on the strategic plan will take place subsequent to the finalization of this report.

The terms of reference for the National Assessment and Development of the Strategic Plan consultancy were as follows:

- To evaluate the current status of the health information system against specific criteria, utilizing a standardized questionnaire completed by country stakeholders
- To provide a baseline assessment and diagnosis of critical gaps in health information results, processes, context and resources:-
  (a) against which ongoing performance and achievements can be measured

      (b) To allow comparison of HIS performance with objective standards for health information
- To fulfill the requirement of a national assessment using the HMN tool, a condition for all countries receiving HMN support
- To develop a five year National Health Information System Strategic Plan using the HMN strategic planning tool.

Methodology

The National HIS Assessment was carried out during a series of four working sessions. In each session two working groups used the tool to assess the indicators as specified by the group builder tool. After the four working sessions, a national workshop was held to share the findings with all stakeholders who participated in the assessment. The objective of the national workshop was to share the findings of the assessment with all key participants to get their buy-in and support for the process and findings.

The assessment focused on the following six areas of the HIS: Resources, Indicators, Data Sources, Data Management, Information Products and Dissemination & Use. The scores are reported in quartiles ranging from Not Adequate At All, Present But Not Adequate, Adequate to Highly Adequate. HIS is defined as "the people, finances and processes in place that collect, produce and use health information to make strategic decisions".

The assessment scores ranged from a high of 74% or Highly Adequate (Indicators) to a low of 29% or Present But Not Adequate (Data Management). Information Products was assessed as Adequate with a score of 66% while Resources, Data Sources and Dissemination & Use were all assessed as present but not adequate with scores of 45%, 54% and 41%, respectively.

The next step of the process is to use this assessment as the basis for the development of a strategic plan that will guide the development of Belize's national HIS. The strategic plan will form part of an application for resources to strengthen the HIS that will be sent to various funding sources. It will also be used to obtain additional support from HMN. HMN has signalled to the MOH its interest in upgrading Belize to wave one country status which makes Belize eligible for more direct support from HMN. This has been made possible in large part due to the work that MOH has done in developing its Belize Health Information System software.

1.0   BACKROUND

Demographics of Belize

Belize is located in Central America; the borders are shared with Mexico at the north, Guatemala to the south and west, and with the Caribbean Sea to the east. It is 274 km long and 109 km wide. The total land area (mainland and keys) is 22,700 km2, with a population density (2005) of approximately 12 inhabitants per km2. The Belize's district capital city is Belmopan.
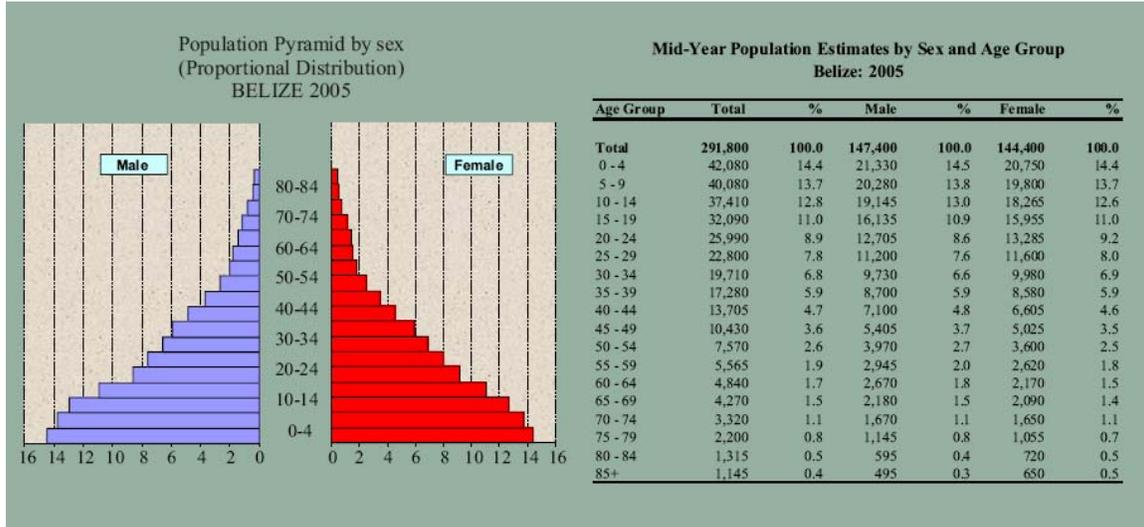
Figure 1: Map of Belize

In 2005, the mid-year population estimate of Belize was 291,800, comprised of 144,400 (49.5%) females and 147,400 (50.5%) males. The population is more than doubled recorded since 1980, when it was 144,000, while the female-male distribution remains unchanged. In 2005, 50.2% lived in urban areas and 49.8% in rural areas, compared between 49% and 51%, respect to 2000.

Belize has six districts: Corozal, Orange Walk, Belize, Cayo, Stann Creek and Toledo. The mid-year population in 2005 showed that Belize District keeps the highest population proportion (29.8%), while Toledo District keeps the lowest proportion (9.5%). On the period of 2001 to 2005 the population density averaged 12 per km2.

The demographic population profile is of a young population. In 2005, 50% of the population was under 15 years of age, while 48% was 20 years and older. The elderly (60 years and older) represents the 4.2% of the total population. Women of child-bearing age (15–49 years) represent the 49.2% of the total female population. The dependency ratio was 69.6% in 2005.

Figure 2: Population structure by age and sex.

Population Pyramid by sex
(Proportional Distribution)
BELIZE 2005

Male

Female

80-84
70-74
60-64
50-54
40-44
30-34
20-24
10-14
0-4

16 14 12 10 8 6 4 2 0   0 2 4 6 8 10 12 14 16

Mid-Year Population Estimates by Sex and Age Group
Belize: 2005

Age Group	Total	%	Male	%	Female	%
Total	291,800	100.0	147,400	100.0	144,400	100.0
0 - 4	42,080	14.4	21,330	14.5	20,750	14.4
5 - 9	40,080	13.7	20,280	13.8	19,800	13.7
10 - 14	37,410	12.8	19,145	13.0	18,265	12.6
15 - 19	32,090	11.0	16,135	10.9	15,955	11.0
20 - 24	25,990	8.9	12,705	8.6	13,285	9.2
25 - 29	22,800	7.8	11,200	7.6	11,600	8.0
30 - 34	19,710	6.8	9,730	6.6	9,980	6.9
35 - 39	17,280	5.9	8,700	5.9	8,580	5.9
40 - 44	13,705	4.7	7,100	4.8	6,605	4.6
45 - 49	10,430	3.6	5,405	3.7	5,025	3.5
50 - 54	7,570	2.6	3,970	2.7	3,600	2.5
55 - 59	5,565	1.9	2,945	2.0	2,620	1.8
60 - 64	4,840	1.7	2,670	1.8	2,170	1.5
65 - 69	4,270	1.5	2,180	1.5	2,090	1.4
70 - 74	3,320	1.1	1,670	1.1	1,650	1.1
75 - 79	2,200	0.8	1,145	0.8	1,055	0.7
80 - 84	1,315	0.5	595	0.4	720	0.5
85+	1,145	0.4	495	0.3	650	0.5

Source: Health indicators 2006.

The Health indicators for 2006 show that in 2002 the 33.5% of the population living in poverty, 23.7% in urban an 44.2% in rural areas.

The health data analysis for the period 2001–2005 indicates that no communicable diseases were among the leading causes of morbidity and mortality in Belize. Diseases such as diabetes mellitus and hypertension continue to be the major contributors to mortality and morbidity. During the period 2001–2004, the incidence of HIV reported infections has increased in 15.6%, but in the period 2004–2005 it has decreased in 5.0%. The Ministry of Health reported that the average HIV adult prevalence for the 2001–2005 period was 216 per 100,000 population.

The total fertility rate in 2003 was 3.4 children per woman; it was 3.6 in 2004 and 3.0 in 2005. The infant mortality rate ranged from as high as 21.2 per 1,000 live births in 2000 to as low as 14.3 in 2004. It was 18.4 in 2005. During the 2001–2005 period, the mortality rate in children under 5 due to diarrhea was reduced from 164 per 100,000 children to 23. Life expectancy at birth in 2005 was 71.8 (69.5 for males and 74.2 for females). The crude birth rate in 2005 was 25.7 births per 1,000 population. Teenage pregnancy, as reflected by births to the under-20 population, was 18.5% in 1998 and 17.1% in 2002. The crude mortality rate from 2001 to 2005 was 4.9, 4.8, 4.7, 4.6, and 5.2 deaths per every 1,000 population per year, respectively. There were 5 maternal deaths in 2000, 7 in 2002, 3 in 2003, 5 in 2004, and 10 in 2005. In 2005 the estimated underregistration of deaths was 12.8%, while for 2004 it was 6.7%. There were 6,489 deaths during the period 2001–2005, of which 7.8% (504) were from hypertension. Of these, 50.2% (253) occurred among females. Diabetes mellitus ranked among the first 10 leading causes of mortality in the period 2001–2005, accounting for 398 (6.1%). Of these, 228 (57.3%) occurred among females. In 2005, diabetes accounted for 94 (6.9%) deaths. There were 386

(5.9%) deaths from land transport accidents during this same period, with this cause ranking fourth during 2005. Of these deaths, males accounted for 303 (78.5%).

There were 372 (5.7%) deaths related to acute respiratory infections between 2001 and 2005. Of these, 199 (53.5%) occurred among males. Acute respiratory infections ranked sixth in 2005.

The leading causes of death from defined causes for all ages in Belize in 2005 were diabetes mellitus, ischemic heart diseases, land transport accidents, and HIV/AIDS. For males, the five leading causes of deaths in 2005 were land transport accidents, HIV/AIDS, injuries, ischemic heart diseases, and diabetes mellitus.

In 2005, for females, the five leading causes were hypertensive diseases, diabetes mellitus, ischemic heart diseases, cerebrovascular diseases, and acute respiratory infections.

HEALTH OF POPULATION GROUPS

Children under 5 Years Old

In 2001–2005, the leading cause of infant mortality was conditions originating in the perinatal period (62.0%). Of all deaths among neonates due to this disease group, slow fetal growth, fetal malnutrition, and immaturity accounted for 149 deaths (19.0%); hypoxia, birth asphyxia, and other respiratory conditions for 87 deaths (11.1%); other conditions originating in the perinatal period for 35 deaths (4.5%); congenital anomalies for 89 deaths (11.4%); acute respiratory infections for 65 deaths (8.3%); nutritional
deficiencies and anemias for 28 deaths (3.6%); and septicemia for 29 deaths (3.7%). Diarrheal diseases and acute respiratory infections were among the leading causes of death in the under-5 population. From 1998 to 2003, cases of diarrhea in children under 5 were reduced from 1,645 to 227. In 2005, the five leading causes of death were slow fetal growth, fetal malnutrition, and immaturity; hypoxia, birth asphyxia, and other respiratory
conditions; congenital anomalies; intestinal infectious diseases; and acute respiratory infections.

Between 2001 and 2004, the prevalence of low birthweight (less than 2,500 g) fluctuated from 3.6% to 4.4%; it peaked at 6.9% in 2005.

The highest proportion of deaths in the 1–4 age group was due to external causes of injury for the period 2001–2005. Of these deaths, land transport accidents accounted for 18 (11.5%) and accidental drowning for 13 (8.3%). The second leading cause of death for this age group was communicable diseases, accounting for 44 (43.6%) of all deaths. Of these, acute respiratory infections accounted for 13 (12.9%) of total deaths, and septicemia accounted for 11 (10.9%). In 2005, the five leading causes of death were transport accidents, accidental drowning, acute respiratory infections, septicemia, and intestinal infectious diseases.

Children 5–9 Years Old

The mortality rate for this age group stood at 32 per 100,000 in 2003 and increased to 50 in 2005, with 79 deaths for the 2001–2005 period. External causes accounted for 40.5% of all deaths, transport accidents for 24.1%, and accidental drowning and submersion for 13.9%. Communicable diseases, including acute respiratory infections (12.7%), septicemia (3.8%), and HIV/AIDS (2.5%), together accounted for 19.0% of deaths in this
age group. In 2005, the five leading causes of death were accidental drowning and submersion, acute respiratory infection, transport accidents, nutritional deficiency and anemia, and diseases of pulmonary circulation and other forms of heart diseases.

Adolescents 10–14 and 15–19 Years Old

The mortality rate for adolescents 10–14 years old ranged from 36 per 100,000 population in 2001 to 40 in 2005. External causes of injury were the leading cause of death (40.6%).Most notable were transport accidents, which made up 14.1% of total deaths. Communicable diseases accounted for 12.5% of all deaths, mostly due to respiratory infections. In 2005, the five leading causes of death were accidental drowning and submersion, malignant neoplasms of lymphatic and hemopoietic tissue, transport accidents, acute respiratory infections, and diseases of the nervous system other than meningitis. For the fiveyear period, adolescents in the 10–14 age group accounted for 2,643 (2.8%) of the 92,813 hospital discharges. Leading causes of hospitalization included injury,poisoning, and certain other consequences of external causes (19.6%); complications due to pregnancy (11.8%); and appendicitis, hernia, and intestinal obstruction (11.2%).

Adults 20–59 Years Old
This age group comprised approximately 42.2% of the total population in 2005 and accounted for 35.0% of deaths for that year. In the period 2001–2005, there were 2,147 deaths in this age group, or 33.1% of all deaths (6,489). The leading cause of death for adults was external causes, 762 deaths or 35.5% of all deaths in this age group; 252 of these deaths were due to land transport accidents. In 2003 and 2004, the leading cause of death among those ages 20–59 was land transport accidents, and for 2005 it was injuries. In the 30–39-year-old age group, the leading cause of death in 2004 was land transport accidents, and in 2005 it was HIV/AIDS.

Maternal deaths registered between 2001 and 2005 ranged between 3 and 10 per year. In 2003, 14% of pregnant women accessed prenatal care during their first trimester; 85% obtained prenatal care at some stage of their pregnancy; an estimated 20% who tested their hemoglobin level during pregnancy were found to be anemic; and only 62% took folic acid, iron, and vitamin A supplements before or during pregnancy.
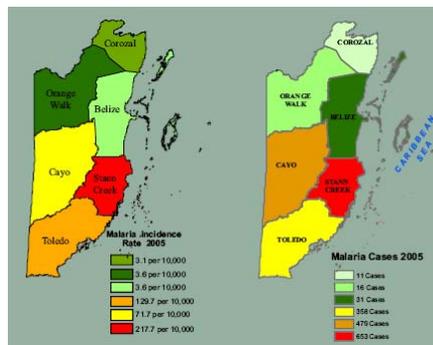
Older Adults 60 Years Old and Older

Belize has a relatively low proportion of older persons (4.2% in 2005); the absolute number of elderly persons is increasing and is projected to double by 2025. Income security in 2000 and 2001 was a key welfare issue; many older persons had only a very small income or none at all. The mortality rate during 2001–2005 for this age group was 48.3 per 1,000 population. There were 2,780 deaths (42.8% of total deaths), with males making up 56.1% and females 43.9%.

Diseases of the circulatory system accounted for 1,146 (43%) deaths among those 65 years of age and older. In 2005, the five leading causes of death were hypertensive diseases, diabetes mellitus, ischemic heart diseases, cerebrovascular diseases, and pulmonary heart disease and diseases of pulmonary circulation.

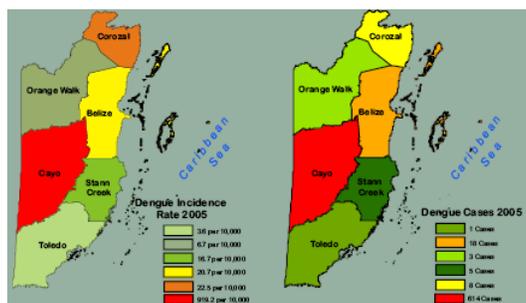## HEALTH CONDITIONS AND PROBLEMS

Vector-borne Diseases

Source: Health indicators 2006.

The two main vector-borne diseases affecting the country are malaria and dengue. The principal species causing malaria in Belize is the *Plasmodium vivax* parasite, although *P. falciparum* remains an important and dangerous threat in parts of the country.

Malaria cases fluctuated from 1,441 cases in 2000 to 1,066 in 2004 and 1,549 in 2005, of which 653 cases (42%) were from the southern Stann Creek District, 479 cases were from Cayo, 358 in Toledo, 31 in Belize, 16 in Orange Walk and 11 in Corozal. Malaria will continue to represent an important public health concern in Belize, especially in rural areas of the southern districts, given that there is an active migrant population that works in the citrus and banana industries, and frequent population movements and substandard housing have provided favorable environmental conditions for mosquito breeding.

The Malaria Incidence Rate was 53.1 per 10,000 pop, 61.0 for Males and 45.0 for Females. The mayor rate was found in Stann Creek with 217.7 for the total and 129.7 for Toledo.

Source: Health indicators 2006.

Dengue is also endemic in Belize. While the number of cases had been relatively low (under 5 annually), outbreaks were experienced in 2002 (42 cases) and 2005 (652 cases). Of the latter cases, 614 (94%) were from Cayo District, 18 were in Belize, 8 in Corozal, 5 in Stann Creek, and 3 in Orange Walk. The first confirmed case of dengue hemorrhagic fever (DHF) in Belize occurred in 2005. Serotypes 2, 3, and 4 have been identified in Belize; therefore, the population remains vulnerable to a DHF outbreak.

Vaccine-preventable Diseases

There have been no reported cases of measles since 1991 or poliomyelitis since 1987. The last case of neonatal tetanus was reported from Stann Creek District in 1997, and the last case of non-neonatal tetanus was in a 3-year-old from Orange Walk District in 1998. The last case of congenital rubella syndrome was reported in 1997. No cases of diphtheria or pertussis were reported for 2001–2005.

In 2002, two new vaccines, hepatitis B and *Haemophilius influenzae* type b, were introduced into the national infant immunization schedule.The vaccines were constituents of the pentavalent combination vaccine DPT/HepB/Hib.Although rubella elimination
activities with vaccination of adults were started in 1997, following introduction of the measles-mumps-rubella (MMR) vaccine the previous year,MMR vaccination of males was carried out in 2004; the effort targeted 66,800 males aged 5 to 35 years and resulted in 96% coverage.

	Immunization Coverage %			
	BCG Total	DPT Total	OPV Total	MMR Total
	2005			
COUNTRY	96.1	95.9	96.2	95.3
Corozal	99.6	98.3	98.3	97.7
Orange Walk	94.2	90.6	90.3	89.3
Belize	98.0	98.8	99.3	98.9
Cayo	94.0	94.5	94.6	94.6
Stann Creek	94.9	97.1	97.6	99.5
Toledo	95.9	95.7	96.4	86.6

Source: Health indicators 2006.

Vaccination coverage of all antigens (diphtheria, BCG, tetanus, pertussis, polio,Hib, hepatitis B,MMR) steadily increased during the 2001–2005 period. During the 2001–2005 period, vaccination coverage for BCG was 96% or higher, and that for 3 doses of
polio was 93% or higher in infants. For 2005, vaccination coverage for MMR (children 12–23 months) was 95.3%, Stann Creek 99.5%, Belize, 98.9% and Toledo 86.6%; coverage of infants (less than 12 months) for BCG was 96.1%; and that for third doses of the DPT/HepB/Hib pentavalent combination vaccine and OPV-3 was 95.9%, in Belize 98.8 and Stann Creek was 97.1.

Metabolic and Nutritional Diseases

		Newborn with Low Birthweight (< 2.5 kg)			Exclusive Breast-feeding at 1 Month		Exclusive Breast-feeding at 4 Months		Exclusive Breast-feeding at 6 Months		
		T	M	F	T	%	T	%	T	%	
		2005			2005		2005		2005		
	COUNTRY	638	290	348	2,284	79.1	1,851	24.8	1,420	17.6	
DISTRICTS	Corozal	79	37	42	356	39.4	410	45.4	350	38.7	
	Orange Walk	109	50	59	229	17.8	154	12.0	54	4.2	
	Belize	169	79	90	743	37.4	491	24.7	293	14.7	
	Cayo	142	63	79	308	18.5	230	13.8	316	12.5	
	Stann Creek	70	30	40	275	33.4	259	31.4	179	21.7	
	Toledo	69	31	38	373	46.8	307	38.5	228	28.6	

Source: Health indicators 2006.

The newborn with low birthweight was 638, the most of the cases were from Belize (169), Cayo (142) and Orange Walk (109).

		Obesity < 1 yr					Obesity 1 - 4 yrs				
		T	Urban	Rural	M	F	T	Urban	Rural	M	F
		2005					2005				
	COUNTRY	796	359	437	398	398	1,004	381	623	528	476
DISTRICTS	Corozal	38	20	18	25	13	41	17	24	21	20
	Orange Walk	59	18	46	30	29	99	16	83	50	49
	Belize	256	167	89	128	128	396	215	181	217	179
	Cayo	151	72	79	80	71	204	100	104	107	97
	Stann Creek	57	7	50	29	28	43	6	37	23	20
	Toledo	235	80	155	106	129	221	27	194	110	111

Source: Health indicators 2006.

The obesity in children less than one year old, was found in 769, the most of the cases were from Belize (256) and Toledo (235).

In 2005, obesity was found in 2.8% of children under 5 years of age who were seen in health clinics. Belize District had the highest percentage (36.4%) and Corozal District the lowest (4.4%). In rural areas, the severity of malnutrition was higher for females than for males, while in the urban areas, it was approximately the same.

Organization of the Health System

The role of the Ministry of Health headquarters is to provide policy advice to the Minister of Health. It holds responsibility for national health planning, public health protection, regulation, research, quality and standards, international and regional collaboration, and monitoring of the overall performance of the national health system. There are two key divisions in the Ministry of Health: the administrative arm, headed by the Chief Executive Officer, and the technical arm, headed by the Director of Health Services. The Director of Health Services is constitutionally responsible for the health of the nation.

Background of Health Information System (HIS)

In 1998 the Ministry of Health with the support of the Inter American Development Bank (IADB) completed a Health Policy Reform Diagnosis that served as the basis for the current Health Sector Reform Programme. One component of the diagnosis was the assessment of the Ministry's health information system (HIS). The management information system (MIS) component of the diagnosis highlighted weaknesses in data gathering, quality, lack of use at regional levels, timeliness and dissemination and use.

> In response to the weaknesses indentified in the assessment the Ministry of Health (MOH) took steps to strengthen the health information system. In collaboration with the Pan American Health Organization (PAHO) the MOH developed the National Health Information System (NHIS) software and invested in modernizing its IT infrastructure.

By 2001 the MOH began experiencing problems with the NHIS. The software did not support networking and the databases were unable to handle the growing amount of the data. In response to this problem the MOH commissioned a joint application design as an initial step to reengineer the NHIS. At the same time the MOH was working to improve its capacity to make evidenced based decisions and interventions.

Concurrently, as part of a wider public service modernization efforts in Belize considerable focus was being paid to performance management and measuring results. At the programmatic level the MOH has collaborated with different agencies to improve the performance of the Health Information System (HIS).

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HIS Stakeholder Agencies

The MOH is main the generator and user of data that feeds into the HIS. The MOH collects health facility based data and uses this data to inform health intervention decisions. The use of this information varies in the various health regions and programs.

Private health providers report on communicable diseases, birth and mortality. The reports are submitted to the health information units in the regions. The data is entered in to the BHIS where it becomes available to the epidemiology and surveillance unit at the MOH. The unit carries out periodic meetings with the private providers. In the view of the unit the private providers are reporting consistently.

The National Health Insurance (NHI) arm of the Social Security Board (SSB) purchases primary care services from selected public and private Primary Care Providers (PCP) in the two health regions where the NHI is in place. The NHI agency collects information on patient encounters, health services provided and the use of pharmaceuticals, laboratory and diagnostic studies. The information system used by the   NHI can be networked to the BHIS software that the MOH has developed.

The Statistical Institute of Belize (SIB) collects population, education, vital statistics, agriculture, health and public order information. The SIB coordinates and conducts the national census, the household expenditure survey, the family health survey and other surveys that may be required

from time to time. The SIB also measures the economic indicators such as the labour force statistics, trade, the gross domestic product (GDP) and inflation.

The Vital Statistics Unit is responsible for the registration of births, deaths and marriages. The unit works very closely with health officials to validate the registration of births and deaths. The MOH personnel visit villages and rural areas to capture and record unreported births or deaths and share this information with VSU.

Development Partners

Several agencies have provided technical and monetary support to the development of the national HIS. PAHO has funded the development of the NHIS and sponsored training in several areas including ICD 10 (International Classification of Diseases) decision tables of selecting underlying cause of mortality, WinSig software, intro to epidemiology, into to biostatistics analysis and EpiInfo software.
The Caribbean Health and Research Center provided training for MOH counterpart in the use of EpiInfo and the Statistical Package for Social Sciences (SPSS) softwares for monitoring and evaluation. CARICOM and UNFPA have supported the SIB's census activities.

Of recent the HMN is supporting this National HIS assessment and the subsequent development of a HIS strategic plan. At time of writing, the MOH and HMN have agreed in principle to the joint signing of a memorandum of understanding that will give Belize wave one country status and access to additional direct support from HMN.

2.0 STRATEGY FOR CARRYING OUT THE ASSESSMENT

The first objective of the consultancy was to conduct an assessment of the National HIS in order to evaluate the current status, provide a baseline assessment and identify critical gaps. The second objective is to develop a strategic plan to address the gaps identified and chart the course for the long term evolution of Belize's national HIS. The superordinate goal is to foster a culture of evidenced based decision making at all levels of Belize's governance structure. Work on the strategic plan will take place subsequent to the finalization of this report.

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Coordination and Preparation for Assessment Workshops

The Epidemiology Unit organized the national HIS assessment. The National Health Information System Committee reviewed the draft assessment plan. The schedule for the assessment was approved by the DHS. The Office of the DHS was instrumental in facilitating the full participation of the relevant MOH professionals.

The National HIS Assessment was carried out during a series of four working sessions. In each session two working groups used the tool to assess the indicators as specified by the group builder tool. The group builder tool is used to assign participants into groups and decide the areas each group will assess.

Each working group elected a group leader to guide the proceedings. The members of the group discussed each item to reach a consensus score for the group. The comments of members of the groups were also recorded. There were no instances where groups could not reach a consensus on a particular item. However, there were many instances where group members' initial reactions were to assign a score of "3" or highly adequate only to revise the score down after group discussions. Please see Annex One for a listing of participants for each working session.

After the four working sessions a national workshop was held to share the findings with all stakeholders who participated in the assessment. The objective of the national workshop was to share the findings of the assessment with all key participants to get their buy-in and support for the process and findings. The group discussed the various scores and comments and provided corrections and clarifications where necessary.

3.0   RESULTS

3.1   Resources

Categories	Result
Policy and Planning	Present but not adeq 38% (7.9 / 21)
HIS institutions, human resources and financing	Present but not adeq 43% (16.9 / 39)
HIS Infrastructure	Adequate 59% (8.9 / 15)
Overall	Present but not adeq 45% (33.7 / 75)

Policy and Planning

These scores validate the general view held by stakeholders. Policy and planning is weak, the system is under resourced and the HIS infrastructure is marginally adequate.

Belize does not have an up-to-date legal framework that covers health information in the areas of vital registration, notifiable diseases, and private sector data including social insurance, confidentiality and fundamental principles of statistics. Currently, the private sector reports voluntarily to the MOH except for the certain communicable diseases which are reportable by law. Consequently, there is large gap between what happens in the private sector and what is reported to the MOH.

The SSB administers the purchasing function for the National Health Insurance (NHI) and collects a significant amount of health services data. The Board of the SSB is reluctant at times to share this information with the MOH despite the legal remit of the MOH to safeguard the health of the population and steward the health system. Collaboration between the stakeholder agencies that generate or use the HIS data is based on informal or voluntary arrangements among these agencies and not on a legal requirement to report. Consequently, there are no ramifications for lack of reporting.

As with the legal framework, regulations and procedures for turning the fundamental principles of official statistics into good practices are weak and outdated. While practices exist to ensure the professional, objective, transparent and ethical collection, processing and dissemination of health data such practices and procedures are not always found in writing.

Planning is also weak. There is no HIS strategic plan. However, this national HIS assessment will culminate with the development of a national HIS strategic plan. Among the stakeholder agencies there exist some institutional plans at various levels but these need to be harmonized under the aegis of a national HIS strategic plan.

As part of the application to obtain support from HMN, the Epidemiology Unit of the MOH in collaboration with VSU and PAHO created a National Health Information System Committee (NHISC). The committee's central focus at this time is to guide the national HIS assessment and the development of the strategic plan. There are no written policies to empower the committee and like the reporting relationships that underpin the national HIS, the NHISC relies on the goodwill of member organizations to support the ongoing work. The assessment revealed that not all stakeholders were aware of the role and functions of the committee. There is an opportunity for the committee to improve communications with all stakeholder organizations.

HIS Institutions, Human Resources and Financing

The MOH has partially adequate capacity in the core health information sciences. The MOH's main issue is understaffing. The MOH has a small cadre of qualified professionals in epidemiology, statistics, information and ICT. However the work load for these individuals prevents them from providing the full level of support required for the health system at the national level. There exists a gap in demography.

The situation at the Statistical Institute of Belize is similar to that of the MOH. The SIB has a small cadre of well trained staff in the areas of demography, statistics and ICT. The small staff has a difficult time keeping up with the mandate of the SIB. As an example the special studies for the 1991 census were completed in 1996. The SIB has a staffing constraint and does not have a budget to retain consultants on an "as-need" basis to analyze data and prepare special reports. This may very well be a contributing factor to the system not being resourced as the policy makers do not benefit from receiving timely reports as in the case of the example cited. Given the budget spent on conducting a census it is not good economics to not spend the additional incremental amounts required to generate the special reports.

The MOH has one statistical clerk officer posted in each region. Health officers have received training in the collection of patient data to support the ongoing implementation of the Belize Health Information System (BHIS) software. Over the past year, the officers as well as other professionals in the ministry benefited from training in epidemiology, performance based management, and the use of EpiInfo and SPSS statistical software packages.

The MOH ICT unit, the BHIS Unit, has the capability to develop databases and write software. Members of the team were instrumental in the development of the BHIS software. The unit provides support services to the health regions but as previously mentioned the staffing complement is too small to provide the level of service necessary to oversee the implementation of the BHIS software and maintain the current functionality of the network in an efficient and effective way – prevention is better than fixing.

Resources exist within the budget of the various stakeholder organizations to support data collection and management. Typically institutional budgets are insufficient to adequately provide for a functioning statistics system for all data sources in the national statistics offices, the SIB.

HIS Infrastructure

Recording forms, paper, pencils and other supplies that are needed for recording health services and disease information are adequate. Participants reported occasions where forms were not available at the point of service. This was attributed to a lapse in the requisition for the forms and not to a lack of funding to print the forms. The VSU did report shortages of forms, paper, pencils and other supplies which affect the recording of required information.

The basic ICT infrastructure is in place at all levels to support the HIS. Weaknesses exist in getting support for equipment maintenance at the sub-national levels.

3.2   Indicators

Categories	Result
Indicators	Adequate 74% (11.1 / 15)

A minimum set of core indicators are identified at the national and sub-national levels but they do not cover all categories. In the case of HIV/AIDS and the reporting requirements to the Global Fund some indicators used by the fund cannot be used in Belize because the information required to build the indicators are not being generated by the HIS.

Core indicators are defined in collaboration between the relevant ministries and the SIB but more external participation would be desirable. The Social Indicators Committee (SIC) is the body that coordinates the work on core indicators. The SIC is chaired by the SIB but of late the committee is not functioning.

There is reporting of the minimum set of core indicators on a regular basis however analysis of the indicators and use in planning and interventions vary across health regions and programmatic areas. The MOH has implemented the use of Service Level Agreements (SLAs) between the MOH and public sector health regions.

3.3   Data Sources

Data Source	Contents	Capacity & Practices	Dissemination	Integration and use	Total
Census	Highly adequate 100% (3.0 / 3)	Highly adequate 78% (7.0 / 9)	Adequate 71% (8.5 / 12)	Present but not adeq 33% (1.0 / 3)	Adequate 70%
Vital statistics	Highly adequate 83% (7.5 / 9)	Present but not adeq 29% (7.0 / 24)	Not adequate at all 0% (0.0 / 3)	Highly adequate 100% (3.0 / 3)	Adequate 53%
Population-based surveys	Adequate 69% (6.2 / 9)	Highly adequate 92% (11.0 / 12)	Adequate 50% (3.0 / 6)	Not adequate at all 6% (0.3 / 6)	Adequate 54%

Health and disease records (incl. surveillance)	Adequate 63% (5.7 / 9)	Adequate 65% (13.7 / 21)	Present but not adeq 33% (1.0 / 3)	Adequate 68% (4.1 / 6)	Adequate 57%
Health service records	Present but not adeq 36% (2.2 / 6)	Adequate 59% (7.1 / 12)	Highly adequate 83% (5.0 / 6)	Adequate 59% (5.3 / 9)	Adequate 59%
Resource records	Present but not adeq 28% (6.7 / 24)	Present but not adeq 43% (14.2 / 33)	Present but not adeq 44% (2.7 / 6)	Not adequate at all 15% (1.8 / 12)	Present but not adeq 33%
Overall					Adequate 54%

Census – the weak dimension was integration and use. Participants indicated that population projections are not used for health planning. In doing the analysis it was noted that program managers and senior planners did not respond to this indicator. Validation of the data revealed that Program Managers, Regional Managers and Senior Planners do use population estimates. Estimates are used to determine the size of health facilities and plan for health service delivery. Most recently in planning for the role out of the NHI, population data was used in conjunction enumeration districts to map out geographic zones and to determine the structure of the health services delivery system.

Vital Statistics – the VSU does not publish its data. However, the data is provided to the SIB and is published by the SIB. The VSU captures the ICD 10 cause of death information provided by MOH but is unable to use the actual ICD 10 code because the software used by VSU does not support the use of the code.

Population Based Surveys – the country has the capacity to design and conduct the surveys but lack the resources to analyze the data and generate special reports in a timely fashion. There is need for greater collaboration between the MOH and SIB on survey design, implementation and data analysis and use. Given the existing resource constraints best use must be made of all survey opportunities to gather data.

Health and Disease Records including Surveillance – weaknesses exist in four areas: mapping of specific at-risk populations, lack of ability of primary care workers to correctly cite case definitions of the majority of notifiable diseases, lack of laboratory confirmation of investigated public health outbreaks and epi-bulletins are produced but not circulated to health regions.

The MOH has GIS capacity and uses it for vector control. Mapping in rural areas is not possible as shape files are not available for the rural areas at this time. The GIS unit in the Ministry of Natural Resources estimates that about one third of the country is yet to be mapped.

During the assessment public health officials stated that the national laboratory lacks the capacity to provide confirmation tests for several types of micro-biology related outbreaks and to meet the laboratory confirmation criteria for routine reporting in surveillance.

Health Service Records – content is the weak dimension in this area. The weakness exists because private data is covered only for reportable communicable diseases and mortality. The

existing legal framework does not mandate the private providers to report to the MOH other health services production data.

However, the private providers operating in the NHI scheme are contractually obligated to report and are paid based on the reports received. The SSB receives this information and shares some of it with the MOH. The MOH often complains that the policies of the Board of the SSB impede the sharing of these service records.

The MOH has installed its BHIS in a private hospital and this has facilitated the voluntary reporting by the hospital. The MOH is willing to provide the BHIS to private providers free of cost in exchange for reporting. The BHIS is a comprehensive software package that can be used to manage all aspects of the health service and for surveillance purposes.

There is information on quality of health services but only from a convenience sample of health facilities. Participants reported that quality is assessed differently across the regions.

Resource Records – currently the MOH does not have a complete roster and database of public and private health facilities. Some regions have full data on private health facilities and some have incomplete data but the data is not kept in a special database. However, at the national and regional levels the MOH has a complete roster of public health facilities but it is not maintained in a database. Despite having GIS capabilities the MOH does not have Global Positioning System (GPS) coordinates for its facilities.

There is no database that includes an updated listing of human resources and equipment at all facilities. At time of writing, the MOH, with the support of PAHO, is creating a national database of Human Resources in Health (HRH) in both the public and private sectors.

In terms of reporting on financial resources in the health sector only information on the MOH budget is readily available. Despite support from PAHO the MOH has been unable to develop a National Health Accounts (NHA).

The MOH has just installed the inventory module of the BHIS software. This will allow for the timely reporting of the status of inventory, supplies and equipment. Reports on physical infrastructure are done when a problem exists. There is no evidence that Managers at the national or regional levels try to reconcile the use of commodities with the data on cases of disease reported.

3.4   Data Management

Categories	Result
Data management	Present but not adeq 29% (4.4 / 15)

This component received the lowest score in the overall HIS assessment and thus needs much attention. Some written procedures exist for data management but do not fully address all the components of data management – data collection, storage, cleaning, quality control, analysis and presentation for target audiences. The limited procedures that exist are not uniformly implemented across the country.

There is a data warehouse at the national level with a user friendly reporting utility. However the warehouse is not accessible to all relevant stakeholders and it does not contain all population-based and institution-based data sources. No data warehouse exists at the sub-national level.

A meta dictionary does not exist but PAHO has provided definitions that are used to calculate core indicators. Unique identifier codes are used in different databases and work is required to harmonize these across databases or create a relational table to allow these to merge.

3.5   Information Products

Categories	Overall
Information Products	Adequate 66% (108.6 / 165)

Weaknesses were identified in terms of representativeness, disaggregation and adjustment methods. Health expenditure data is only readily available from the MOH at national and sub-national levels and it is not representative of the general public sector health expenditure.

The International Standard Classification of Occupations (ISCO) is not used to categorize health workers. However, the HRH database that is being populated will allow for the disaggregation of data by gender, urban/rural, public/private and administrative/geographical areas.

The SIB currently does not use adjustment methods. It was agreed by participants that the use of adjustment methods will improve the accuracy of the data.

3.6   Dissemination and Use

Categories	Result
Analysis and use of information	Present but not adeq 38% (3.4 / 9)
Information use for policy and advocacy	Highly adequate 75% (2.3 / 3)
Information use for planning and priority setting	Present but not adeq 44% (1.3 / 3)
Information use for resource allocation	Present but not adeq 42% (2.5 / 6)
Information use for implementation and action	Present but not adeq 28% (1.7 / 6)
Overall	Present but not adeq 41% (11.2 / 27)

Analysis and Use of Information – few targets/budget proposals are justified using HIS information. In general, HIS information is used in a selective and ad hoc basis.

Information Use for Policy and Advocacy – it is interesting to note that whereas participants reported that the analysis and use of information was present but not adequate, they reported that information use for policy and advocacy is highly adequate.

Information Use for Planning and Priority Setting – health information is used occasionally in planning and priority setting. In the Maternal and Child Health (MCH) programme information is used. However, this does not apply equally to all programs and varies at the sub-national levels.

Information Use for Resource Allocation – Budgets are usually modifications of old budgets and for the most part do not incorporate the use of HIS information.

Information and Use for Implementation and Action – information is used selectively by managers at both the national and sub-national levels. Care providers on a whole do not use health information for service delivery management, and continuous monitoring or periodic monitoring**.**

4.0 SUMMARY OF RESULTS: Strengths and Weaknesses

Resources	45%
Policy and planning	38%
Institutions, human resources & financing	43%
Infrastructure	59%
Indicators	**74%**

Data sources	54%
Census	70%
Vital statistics	53%
Population-based surveys	54%
Health & diseases records	57%
Health service records	59%
Resource records	33%
Data management	**29%**
Information products	**66%**
Health status indicators	77%
Mortality	76%
Morbidity	79%
th system indicators	62%
factor indicators	67%
Data-collection method	73%
Timeliness	77%
Periodicity	66%
Consistency	65%
Representativeness	55%
Disaggregation	68%
Estimation method	33%
Dissemination & use	**41%**
Analysis and us of information	38%
Policy & advocacy	75%
Planning & priority setting	44%
Resource allocation	42%
Implementation & action	28%

5.0   WAY FORWARD

5.1   Strategy for Priority Settings and Development of Strategic Planning

As per HMN guidelines, the NHISC will use the results of the national HIS assessment to develop a strategic plan for the development of the HIS. The first step in the process is to define a draft mission and vision for the HIS. This will be done during an executive strategy session with the NHISC.

The second step is an intense three day strategic planning session that will include senior executives from all the relevant stakeholders. The national HIS assessment along with a survey of the IT capabilities and information systems plans of stakeholder organizations will form the foundation for the strategic planning session.

The following areas will require attention during the strategic planning session:

HIS Resources

- Update Legal Framework
- National HIS Committee needs to improve communication with stakeholders
- Develop and implement sustained HIS training program for users at all levels
- Develop, finance and implement a long term IT infrastructure plan for HIS across member organizations
- Increase IT support to MOH health regions – scale up or outsource
- Strengthen MOH supply chain – protocols, reconcile patient flow with inventory

Indicators

- Examine core data set and develop protocols that spells out criteria for each indicator
- Revive Social Indicators Committee

Data Sources

- Prioritize the development of Human Resource in Health
- Increase investment and training in Human Resources at all stakeholder organizations – e.g. health information officers, SIB census/VSU
- Vital Statistics – update IT system to use ICD 10 classification
- MOH – improve use of GIS/strengthen lab capacity to diagnose public health conditions
- Improve collaboration between stakeholder agencies to improve survey results
- Rationalize reporting forms
- Improve storage areas for hard copies
- Reduce public – private reporting gap (legal framework)
- Implement continuous quality assurance program

- Improve internal controls – MOH inventory

HIS Information Products

- Develop protocol that outlines criteria for each indicator – standards for data collection and documentation of procedures
- Disaggregate data by socio-economic status and education (at least)
- Review current policy of not using adjustment methods
- Improve collection of data on private health expenditure – increase frequency of survey and implement national health accounts

HIS Dissemination and Use

- Major culture change required – training at levels on how to use information to improve evidence based decision making
- Budgets must be tied to performance – move away from global budgets
- Utilize Service Level Agreements for planning, budgeting, resource allocation, M&E and reporting purposes
- Performance evaluation must measure manager's use of information in planning, implementation and M&E
- Resource allocation must be evidence based and reflect policy – e.g. if primary care is priority it should be reflected in budget allocation vs. hospital care
- Advocacy plan to target – Cabinet, CEOs, HoDs, Donors and Public – sold as improved governance

5.2   Next Steps

After the completion of the strategic plan the NHISC through the office of the Chief Executive Officer of the Ministry of Health will implement an advocacy process to get the buy-in of government of officials at the highest levels and fiscal support for the strategic plan.

Similarly the MOH will collaborate with HMN in areas where HMN can support the continued role of out the BHIS and the implementation of the plan. The same will be done with PAHO and other key donor agencies.

The NHISC will take on the function of evaluating and monitoring the implementation of the strategic plan. The committee will provide feedback to relevant executives and policy makers and in so doing advocate for the continued implementation of the plan by all stakeholder organizations. The committee will also improve communication with stakeholder organizations and the wider public sector and public as well.

6.0   RECOMMENDATIONS FOR A SUCCESSFUL ASSESSMENT

Please see Annex Two.

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ANNEX ONE – Participants

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ANNEX TWO – HMN Survey

The aim of this questionnaire is to document country experience and lessons learnt and to improve the assessment tool.

1. Problems faced and opportunities favoured for preparing and conducting the assessment, and following up the results.

    The main problem faced was getting full participation from all stakeholder organizations. Where members could not attend the working sessions the tool was sent to four members for them to provide feedback. The list of items to be assessed was sent along with the tool.

    Except for the SIB feedback was received from all stakeholder institutions which could not attend the working sessions. To complement the assessment and in preparation for the strategic plan development the consultants develop a short survey for stakeholder organizations and requested copies of institutional plans that addressed HIS development. The purpose of the survey was to get a picture of the IT infrastructure and human resources capabilities resident in each stakeholder organization. At time of writing only one the SIB has responded to the survey.

    It is best to have stakeholders work in groups to achieve consensus ratings for the items being assessed. This process provides an opportunity to get a holistic understanding of the challenges and capabilities of each organization. It also builds buy-in through commitment for the assessment. This buy-in should translate over to the strategic planning sessions.

2. Adaptation of the assessment tool

    2a. Modifications made to the assessment tool (list if any)

    1) Spreadsheets that were originally locked and/or hidden in the HMN assessment tools were unlock and/or unhide in order to make use of the statistical data compiled in the respective spreadsheets.

    2) Numerical response to data collected during the assessment interviews from different groups were imported into one summary spreadsheet.

    3) Qualitative data (comments) from participants were imported into one summary sheet to better provide a collective synopsis of all the participants' comments.

    4) Additional graphs were produced to reflect statistical data that originally had no graphs.

2b. Items omitted from the assessment (list if any)

2c. Items that were not well understood (list if any)

2d. Any comments and suggestions for improvement of the tool?

1) The consultants discovered very useful hidden spreadsheets when performing analysis of the data collected. The consultants should have been told about such hidden spreadsheets rather than having to discover them.

3. Any further comments, suggestions or recommendations to HMN?

No further comments.