Nutritional Status of Children Under Five Years
Maternal & Child Health Services, Ministry of Health
With Funding from UNICEF
Belmopan City, Belize

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"young girls who grow poorly become stunted women and are more likely to give birth to low birth weight babies. If those infants are girls, they are likely to continue the cycle by being stunted in adulthood and so on..." (UNICEF 1998)
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Executive Summary

The Living Standard Measurement Survey (LSMS) conducted in Belize in 1995 and 2002 provide information on factors contributing to poverty in Belize. Database of both LSMS reports were used to generate a nutrition report on children less than five who participated in the LSMS. The LSMS are comprehensive reports consisting of information on demographics, poverty estimates, characteristics of the poor, and inform us on coping strategies and social assistance programs used by communities. Profiles of housing conditions, factors impacting on education and health, poverty assessment initiatives and other issues with implication for policy are included in what is generally known as the Poverty Assessment Report.

Within the LSMS Report (2002), discussions on use of healthcare facilities were done in general terms with limited reference to children under five years. However, the Report revealed that they were the group with the highest number of reported illnesses, and that they were (along with the elderly), more likely to seek health care when compared to other groups. Child health is specifically addressed under the two categories of immunizations and nutritional status.

The nutritional status of children less than five years was assessed by anthropometric measurements of weight for age, weight for height, and height for age. Of the 1006 children who were measured, 7.3% were under nourished, 17.9% were stunted and 11.3% were overweight. Contrasting patterns of nutrition status were seen in the Belize and Toledo Districts. In Belize District more children showed signs of being over nourished with fewer children exhibiting signs of under nutrition. Children in Toledo had the highest levels of under nutrition manifested by stunting or low height for age. Reported also is the tendency of children in the urban area to be taller and overweight than those in rural areas. Additionally children in the highest two consumption quintiles were taller and more overweight when compared to their counterparts in the lowest three quintiles. Although there were no significant differences among ethnic groups, more Maya children were stunted than in other ethnic groups.

There was evidence that stunting increases with age, but also revealed was the prevalence of wasting, (low weight for height) among children less than 24 months.

The LSMS Report (2002) informs us that childhood malnutrition exists in Belize and is expressed as stunting, wasting and the newer form of obesity. The primary source of information on children’s nutrition status is the Ministry of Health. However, there are inconsistencies in the way data are collected and recorded which limits the ability to use the information for policy formation and programmatic planning. The LSMS was conducted with scientific rigor and is assumed to be reliable and fairly accurate.

Decisions were made to further analyze the data to develop an in-depth profile and realistic conceptual framework of the nutritional status of children who are less than five years old. Additionally, information on specific age groups and their problems would
be identified and inform health care providers on priority areas and age group/s of children that should be targeted for attention.

A total of 1006 children 0-4 years were studied in the LSMS (2002). Of that number anthropometric data were obtained from 997 children. Children zero to four years old in the LSMS (2002) were further disaggregated into <1, 1, 2, 3, 4 years group by urban and rural areas, gender, ethnicity, and quintile. The distribution of children by age group and by gender was similar, with 494 males (49.1%) and females 508 (50.9%), Ethnicity distribution parallels national distribution with Mestizos (49.8%) as the largest ethnic group followed by Creoles (26.8%), Garifuna (3.1%), Maya (14.1%), and others (6.2%).

Of the 1006 children, 269 (26.7%) are in the first quintile which is the poorest quintile, 208 (20.7%) are in the second quintile, 200 (19.9%) in the third quintile, 183 (18.2%) in the fourth and 146 (14.5%) children in the fifth quintile which is the richest quintile.

Data on stunting, (Low height for age), shows Belize District with the lowest numbers (9.4%) of children with stunting. Cayo, Corozal, Stann Creek and Orange Walk had 12.8%, 13.5%, 18.2% and 18.9% respectively; Toledo had a high percentage (43.7%) of children with stunting (Table 6). The poorest group (quintile one) has the highest prevalence rate of stunting which decreases as the quintile increases. According to the World Health Organization, the finding of 17.9% of children 0-4 years with low height for age is interpreted as low prevalence (less than 20%). When disaggregating data by District, all are considered low except Toledo which has a very high prevalence rate (> 40%).

The prevalence rates of wasting by quintile ranges from 0.0 to 2.1% and has the same trend as stunting, the prevalence of wasting decreases with the increase of the quintile (Table C). Children less than two years have the highest rates with 2.8% in the group 0-11 months and 2.4% in children 12-23 months. On the other hand, one out of every nine children 0-4 years is overweight country wide, with an average of 11.3% within a range of 6.0 to 22.4% prevalence rate of obesity.

Other variables highlighted in the LSMS for all children (1006) are percentages of households with mother (956), father (744) or both parents (736) living in the households with the children which suggests that in one out of every three households the father is absent. Of interest is the educational level of parents in households with mother and father being mostly at the primary and secondary level. Countrywide, one out every three children reported illness in the last 30 days prior to data collection.

In all quintiles, almost one of every three children was reported to be ill within the last 30 days with a downward trend of reported illnesses as children got older. Interviewees expressed equal satisfaction with services received at local private facilities and local public facilities which requires further probing to determine reasons why private facilities are utilized despite higher direct costs for services.

Analysis of data from the LSMS 2002 provides a deeper understanding of nutritional problems being experienced by children less than five years old. Public health initiatives are urgently needed to sensitize the community on strategies to reduce stunting and obesity. Recommendations and strategies to improve the nutritional status of children are reflected in the Plans of Action formulated by the Maternal and Child Health
Program, Ministry of Health and National Committee for Families and Children, Ministry of Human Development.

**Overview**

Belize is signatory to the Convention on the Rights of the Child (CRC), adopted by General Assembly of the United Nations on November 20, 1989. Article 24 addresses the right of children to health and healthcare services:

States parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health.

States Parties shall strive to ensure that no child is deprived of his or her right of access to such health care services; to combat disease and malnutrition within the framework of primary health care; to develop preventive health care, guidance for parents;

States Parties shall take all effective and appropriate measures with a view to abolishing traditional practices prejudicial to the health of children.

The Ministry of Health in the *Action Plan to address Maternal and Child Nutrition in Belize (2006-2007)*, posits that:

*The Millennium Development Goals (MDGs) and the Convention on the Rights of the Child*, emphasize the importance of nutrition to meet governmental commitments. The entire MDG’s are directly or indirectly related to the nutritional status of the most vulnerable population.

The goals of the MDGs include the following: (1) eradicate poverty and hunger; (2) achieve universal primary education; (3) promote gender equality and empower women; (4) reduce child mortality; (5) improve maternal health; (6) combat HIV/AIDS, malaria and other major diseases; (7) ensure environmental sustainability; (8) develop a global partnership for development. To achieve the objectives of the Millennium Development Goals of reducing child mortality and improving maternal health, the health sector monitors pregnant women as well as the growth and development of children. Particular attention is directed to wellness practices, and to the nutritional status and feeding patterns of children. A reliable Surveillance System is in place and is used by health facilities in public and private sectors where Maternal and Child Health services are offered.

The importance of nutrition is well documented in the scientific literature on nutrition, with nutrition being acknowledged as the single most important influence on growth and development. Good nutrition consists of foods that provide essential nutrients necessary for physiological needs. Between conception and three years the rapid growth of the brain is unmatched by any other developmental period. Hence, the body’s demand for protein and caloric requirements are greatest during childhood to sustain rapid increase in height and weight.
Malnutrition and under nutrition are terms that are used interchangeably and describe diets that lack sufficient nutritive value and/or inadequate caloric intake or excesses in food relative to need. Prakash (2002), describes malnutrition in similar terms and further states that malnutrition “encompasses specific deficiencies or excesses of essential nutrients such as vitamins and minerals.” For example, inadequate intake of iodine, vitamin C iron and vitamin A are directly related to goiter, scurvy, anemia and xerophthalmia. In definitive terms undernourishment occurs when food intake is insufficient to meet energy needs and under nutrition is the result or outcome of under nourishment.

Undernourished women are at a higher risk for preterm deliveries resulting in morbidity and mortality. Maternal under nutrition is linked to delivery of low birth weight babies who are also at risk for neurological and cognitive impairments. Poor nutrition affects behavioral and neurological function because of the negative impact it has on myelination processes. Even the mildest form of malnutrition can result in brain impairments as it interferes with the development of the fatty protective covering of nerve fibers which is responsible for rapid transmission of neurological impulses (Tanner, 2002).

Although obesity is the result of excesses (over nutrition) rather than inadequate amounts food, it is a form of poor nutrition. Obesity was identified in the Belize LSMS Survey (2002), among children in higher socio-economic groups along with overwhelming evidence of chronic under nutrition in other groups. This phenomenon of over nutrition is described as being “symptomatic of a country in epidemiological transition,” with implications for development of chronic diseases resulting in high healthcare costs, morbidity and mortality.

Factors that contribute to malnutrition are disease, especially severe and repetitive infections, excessive physical activity or lack of sleep, disturbed interpersonal relationships, and other environmental influences (Wong, 1995), all of which creates a vicious cycle that impacts negatively on the growth of children. Young children are totally dependent on others for their care and are most vulnerable to poor caretaking. Older children can make their needs known more easily and are better able to take the initiative to procure food. Because of high nutritional requirements and limited gastric capacity, energy and nutrient dense foods are required to complement breast milk during weaning, yet caretakers in developing countries often serve foods that are too bulky and nutritionally deficient.

Malnutrition is also linked to socio-economic conditions affecting standard of living, the ability to meet basic food needs, access to potable water, good housing, environmental sanitation and access to health care (Prakash, 2002). The UNICEF conceptual framework (Figure I) offers a comprehensive view of the layers of factors that contribute to development of malnutrition.
The creation of the malnutrition cycle begins with deficiencies at the societal level, where political, social and economic factors influence the availability of resources at the family and household levels. Malnutrition, death, or disability can occur as a result of the immediate causes of inadequate dietary intake, disease and inadequate healthcare services. The Model demonstrates that the fight against malnutrition, requires multisectoral responses at the community, district and national levels.

The Ministry of Health provides iron syrup for infants as prophylaxis and treatment of anemia. Vitamin A is provided to children every six months starting at two months of age up to five years. For the control of parasitic infections, mebendazole tablets are recommended and prescribed on a six monthly basis for children one year and over. Both micronutrients and anti-parasitic tablets are provided to the community at health centers and during mobile clinics.

Within the Expanded Program for Immunization (EPI) the Ministry of Health provides four vaccines containing ten antigens to protect children against preventable diseases. These vaccines are available at health centers, private institutions and administered to children during mobile clinics in remote and rural areas. A register of
vaccines for all areas is maintained in order to monitor vaccines coverage. The last case of poliomyelitis was diagnosed in 1981, measles in 1991, congenital rubella syndrome and neonatal tetanus in 1997 and rubella in 2001. Strategies have been adapted to control and eradicate preventable diseases which can be achieved with minimum vaccine coverage of 95% of the total target population. All expenditure incurred for vaccine procurement, and other expenses in relation to the EPI are absorbed by the Government of Belize.

Further analysis of the LSMS (2002) by the Ministry of Health supports healthcare initiatives of providing services based on the best available evidence. This analysis makes good use of data collected during a costly survey and falls within the realm of research utilization. Titler et. al. (1994) describes research utilization as an exercise that “encompasses dissemination of new scientific knowledge, applying that knowledge in practice, and evaluating research based practice with respect to staff, patients, cost and utilization of services.”

**Objectives:**
- Document nutritional studies in children less than five years and make reference of major findings.
- Report data on morbidity and mortality of children less than five years caused by nutrition disorders.
- Prepare tables with nutrition information utilizing variables from LSMS and comparing data collected in 1995 and 2002.
- Report vaccination coverage stated in both LSMS and official reports form the Ministry of Health.
- Report finding of morbidity and mortality from both Surveys, caused by under nutrition in children less than five years and analyze results.
- Make recommendations with evidence based interventions to improve the nutritional and immunization status of children.

**Methodology:**
The Project Director and consultant identified variables that could provide information on factors influencing the nutritional status of children less than five years old. Requests were directed to the expert Statistician at the Central Statistics Offices who played a key role in providing data for the analysis and report. Anthropometrics and other data from the LSMS 2002 were manipulated to generate tables necessary for the analysis.

**Limitations:**
Operational Definitions:

- Poverty as used in the LSMS Report is defined by the World Bank (1990) as the inability to maintain a minimum standard of living.
- Consumption Quintiles are measurements of relative poverty that are used mainly for comparison of the poorest 20% or the first quintile of the population with others and were developed based on the share of total expenditure (CSO, 2002). Quintiles one to five are used to categorize poverty levels in the LSMS Report. For example, children in quintile one are very poor, those in quintile two are poor, quintile three are less poor, quintile four are rich and quintile five are the richest children.

Theoretical Framework

Nutritional anthropometry is defined as “measurements of the variations of the physical dimensions and the gross composition of the human body at different age levels and degrees of nutrition (Prakash, 2002). In children three indices used to assess nutrition status are height-for-age, weight-for-height, and weight-for-age.

A WHO Working Group (1986) proposed that in a child, height-for-age reflects linear growth and can identify long-term growth interruptions or stunting. The worldwide prevalence rate of height-for-age shows considerable variation, ranging from 5% to 65% among less developed countries. Children who are two and three years old, with low height-for-age reflects a continuing process of “failing to grow” or “stunting. In older children, low height-for-age reflects a state of “having failed to grow” or “being stunted.”

Weight-for-height measurements are sensitive to acute growth disturbances like wasting or thinness, and indicate recent, severe processes of weight loss associated with acute starvation and/or severe disease. Wasting may also be the result of a chronic unfavorable condition. Persons exhibiting excessive weight for height are considered overweight which is used as an indicator of obesity although in the strictness of terms obesity requires measurements of skinfold thickness.

Weight-for-age incorporates both linear and body proportions and identifies children who are underweight.

Growth indices are compared to WHO Classification System in which cut-off points are used to convert individual measures into prevalence rates. The commonly used cut-off with Z-scores is -2 standard deviations, which is indicative of moderate or severe malnutrition. Prevalence of overweight children is measured by weight for height above +2 Z scores (Cogill, 2003).

On the severity index scale, prevalences of 30-39% are considered high for those with low height for age (stunting). Rates of 20-29% are serious for the measure of weight-for-age (underweight) and weight for height measures (wasting) of 10-14% are regarded as serious (Table A).
Table A: Malnutrition Severity Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Severity of malnutrition by prevalence ranges (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td>Stunting</td>
<td>&lt;20</td>
</tr>
<tr>
<td>Underweight</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Wasting</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

Nutritional Studies and Initiatives in Belize: Major Findings

A number of reports and research initiatives have addressed issues affecting the nutritional status of children in Belize (Table B.), during the period 1992-2004. The major findings of those reports can be found in Appendix I.

Table B: Nutrition Reports

<table>
<thead>
<tr>
<th>No.</th>
<th>Organization/Author</th>
<th>Year</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Crooks, DL</td>
<td>1994</td>
<td>Growth status of school-age Mayan children Belize, Central America</td>
</tr>
<tr>
<td>7.</td>
<td>Makdani D. et. al.</td>
<td>1996</td>
<td>Comparison of methods of assessing vitamin A status in children</td>
</tr>
<tr>
<td>8.</td>
<td>Smith J. et.al.</td>
<td>1999</td>
<td>Vitamin A and Zinc Supplementation of Preschool children</td>
</tr>
<tr>
<td>9.</td>
<td>Government of Belize</td>
<td>1997</td>
<td>The Children of Toledo: A Food and Nutrition Perspective</td>
</tr>
<tr>
<td>11.</td>
<td>INCAP; PAHO</td>
<td>2004</td>
<td>Food and Nutrition Security at the Local Level</td>
</tr>
</tbody>
</table>

Results of the 2002 Living Standards Measurement Survey (LSMS)

A total of 1006 children 0-4 years were studied in the LSMS (2002). Of that number anthropometric data were obtained from 997 children. Children zero to four years old in the LSMS (2002) were further disaggregated into <1, 1, 2, 3, 4 years group (Table 1), urban and rural areas, gender, ethnicity, and quintile.
Among the 997 children who gave anthropometric data, 489 (49.1%) were from the urban and 508 (50.9%) from the rural areas (Appendix, Table 2). The distribution of children by age group and by gender was similar, with 494 males (49.1%) and females 508 (50.9%), (Appendix, Table 3). Ethnicity distribution parallels national distribution with Mestizos (49.8%) as the largest ethnic group followed by Creoles (26.8%), Garifuna (3.1%), Maya (14.1%), and others (6.2%), (Appendix Table No. 4).

Of the 1006 children, 269 (26.7%) are in the first quintile which is the poorest quintile, 208 (20.7%) are in the second quintile, 200 (19.9%) in the third quintile, 183 (18.2%) in the fourth and 146 (14.5%) children in the fifth quintile which is the richest quintile (Table 5).

The 1995 distribution of children under five by quintile showed that of the 656 children in that survey, 46.9 % were in the first quintile, 39.9 % in the second quintile 38.6% in the third, 32.8 in the fourth and 15.8 in the fifth quintile. While this data presents alarming percentages of children at or below the poverty line, the methodology
used to estimate the minimum food requirements were different in the 1995 and 2002; this prevents direct comparisons of poverty estimates (CSO, 2002).

Analysis of nutritional status (stunting etc. wasting etc.) refers to 714 of 1006 children who provided anthropometric data. Analysis on stunting etc. refers to this group only. Data indicative of stunting, (Low height for age), shows Belize District with the lowest numbers (9.4%) of children with stunting. Cayo, Corozal, Stann Creek and Orange Walk had 12.8%, 13.5%, 18.2 % and 18.9% respectively; Toledo had a high percentage (43.7%) of children with stunting (Table 6).

According to the World Health Organization, the finding of 17.9% of children 0-4 years with low height for age is interpreted as low prevalence (less than 20%). When disaggregating data by District, all are considered low except Toledo which has a very high prevalence rate (>40%). Toledo is the District with the highest poverty index and consists of a predominantly Maya population. Children in the rural areas are more likely (1.6 times more) to experience stunting (Table 7). In rural areas the prevalence of stunting is considered medium prevalence (20-29%).

<table>
<thead>
<tr>
<th>District</th>
<th>Children with anthropometric data</th>
<th>% stunted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>80</td>
<td>13.5</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>115</td>
<td>18.9</td>
</tr>
<tr>
<td>Belize</td>
<td>171</td>
<td>9.4</td>
</tr>
<tr>
<td>Cayo</td>
<td>175</td>
<td>12.8</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>66</td>
<td>18.2</td>
</tr>
<tr>
<td>Toledo</td>
<td>107</td>
<td>43.7</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>714</strong></td>
<td><strong>17.9</strong></td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

<table>
<thead>
<tr>
<th>Areas</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>322</td>
<td>13.6</td>
</tr>
<tr>
<td>Rural</td>
<td>392</td>
<td>21.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>714</strong></td>
<td><strong>35.3</strong></td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

When disaggregating the data of stunting by ethnicity, the Maya population has the highest prevalence rate (39.8%) considered high (30-39%) on the severity scale. The rest of ethnic groups present values within the range considered low (<20%), with the lowest rate among Creole children( 8.9%), (Table 9).
Table No. 9
Distribution of children 0-4 years with Stunting (-LH/A-) by Ethnicity
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>158</td>
<td>8.9</td>
</tr>
<tr>
<td>Garifuna</td>
<td>19</td>
<td>15.2</td>
</tr>
<tr>
<td>Maya</td>
<td>113</td>
<td>39.8</td>
</tr>
<tr>
<td>Mestizo</td>
<td>382</td>
<td>16.7</td>
</tr>
<tr>
<td>Others</td>
<td>42</td>
<td>9.9</td>
</tr>
<tr>
<td>Total</td>
<td>714</td>
<td>90.5</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

**Stunting** in children and access to food and other factors necessary for development is clearly shown when disaggregating the **data by quintile** (Table C). The poorest group (quintile one) has the highest prevalence rate of stunting which decreases as the quintile increases. The quintile one group has a prevalence rate of 32.2%, which is considered to be high prevalence (30-39%) (Appendix, Table 10). The difference between girls and boys was insignificant with prevalence rates of 17.9 to 17.8 % respectively, which are considered low prevalence of stunting in both groups (Appendix, Table 11). By **age group** it is evident that the prevalence rate is less than 20% except for children 48-59 months with 23.2% which is considered to be a medium prevalence. (Appendix, Table 12)

**Wasting** was exhibited at a prevalence rate of 1.3% country-wide (range of 0.0 to 2.6% at the district level). According to WHO’s severity of malnutrition by prevalence range, this is considered to be low (<5%). Data on wasting was disaggregated by selected characteristics. All six districts have values considered to be low prevalence rate of wasting. Cayo and Stann Creek Districts resulted in zero prevalence rates. Orange Walk is the district with the highest rate (2.6%) (Appendix, Table 13). Both urban and rural areas resulted in a low prevalence rate 1.6 times higher in urban than rural areas (Appendix, Table 14). The prevalence rate of **wasting by ethnicity** ranges from 0.0 to 1.7%, with the highest rate among the Maya children and the lowest among Garifuna children.

The prevalence rates of **wasting by quintile** ranges from 0.0 to 2.1% and has the same trend as stunting, the prevalence of wasting decreases with the increase of the quintile (Table C). Of interest is the quintile one group which has a lower rate (1.4%) than quintile two with the highest rate of wasting in this category of 2.1% (Appendix, Table 16). Boys are affected 1.5 times more than girls (Appendix, Table 17). The results on wasting were disaggregated by age group, the prevalence rate ranges from 0.0 to 2.8%, are considered low prevalence (<5%). Children less than two years have the highest rates with 2.8% in the group 0-11 months and 2.4% in children 12-23 months. (Appendix, Table 18)

One out of every nine children 0-4 years is **overweight** country wide, with an average of 11.3% within a range of 6.0 to 22.4% prevalence rate of obesity (Table E). The district with the highest rate is Belize district (22.4%) followed by Toledo (14.1%) and Orange Walk (10.5%), (Appendix, Table No. 19). Overweight is two times more a
problem of urban (15.5%) than rural communities (7.5%), (Appendix, Table 20). By ethnicity the prevalence rate of overweight children ranges from 8.4% to 18.6%, with the Creole population mostly affected, which is 1.6 times more than the national average (Table No. 21).

Table: C

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>208</td>
<td>7.6</td>
</tr>
<tr>
<td>2</td>
<td>157</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>13.3</td>
</tr>
<tr>
<td>4</td>
<td>131</td>
<td>15.0</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>19.8</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Of interest is the trend showing that being an overweight child directly increased as quintiles increased with values ranging from 5.9% in quintile two to 19.8%, in the wealthiest group. Overweight children in quintile five are 1.7 times more than the national average of 11.3% (Table 22). Girls are 1.9 times more overweight than boys (Table D), (Appendix, Table 23). The overweight prevalence rate by age group is higher in the 0-11 months (15.9%) and 48-59 months (14.3%) or in the first and fourth year of life. In the age group 1 to 3 years the prevalence rate of overweight decreases to a range of 8.9% to 9.5%, (Appendix, Table 24).
Table: D

<table>
<thead>
<tr>
<th></th>
<th>Stunting</th>
<th>Wasting</th>
<th>Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17.8</td>
<td>1.5</td>
<td>7.6</td>
</tr>
<tr>
<td>Female</td>
<td>17.9</td>
<td>1.0</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Table E:

<table>
<thead>
<tr>
<th></th>
<th>Stunting</th>
<th>Wasting</th>
<th>Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>13.6</td>
<td>45.3</td>
<td>15.4</td>
</tr>
<tr>
<td>Rural</td>
<td>21.7</td>
<td>2.1</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Vaccination coverage** by age group of those children who were able to present vaccination cards was below the minimum average of 95%. In children one year old, only BCG had 95% coverage or more; the rest of vaccines ranged from 65.3% in OPV to 86.4% in MMR. In two year olds, all vaccines are less than 95% coverage ranging from 76.2% in OPV and 92.8% in BCG. In three year olds, there is 100% coverage by BCG, 88.6%, for the Pentavalents and 94.3% for MMR vaccines. In four year olds, none of the vaccines coverage are equal to or above 95%, ranging from 80.5% in OPV and Pentavalent to 92.2% in MMR coverage.

This result is in sharp contrast to high vaccine coverage reported by the Ministry of Health. For period 2003-2004, monthly reports from Maternal and Child Health Services show achievements of over 95% coverage by BCG, OPV, Pentavalent and MMR vaccines. One explanation of lower results could be related to CSO’s report that a significant percentage of mothers (34%) did not have their children’s vaccination records and therefore could not provide information; a smaller percent with cards had incomplete records. Data on coverage of immunization in 1995, were restricted to tetanus, BCG over 95% coverage and Measles with a lower coverage of 74% (Table 31).
Table 31
Vaccination coverage of children 1-4 years by Age
2002 LSMS

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>1y</th>
<th>2y</th>
<th>3y</th>
<th>4y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage receiving 3 or more doses of OPV</td>
<td>65.3</td>
<td>76.2</td>
<td>90.9</td>
<td>80.5</td>
</tr>
<tr>
<td>Percentage receiving 3 or more doses of DPT</td>
<td>71.9</td>
<td>77.2</td>
<td>88.6</td>
<td>80.5</td>
</tr>
<tr>
<td>Percentage receiving BCG</td>
<td>96.2</td>
<td>92.8</td>
<td>100</td>
<td>91.6</td>
</tr>
<tr>
<td>Percentage vaccinated against Measles</td>
<td>86.4</td>
<td>83.4</td>
<td>94.3</td>
<td>92.2</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Other variables highlighted in the LSMS for all children (1006) are percentages of households with mother (956), father (744) or both parents (736) living in the households with the children suggesting that in one out of every three households the father is absent. The Stann Creek District demonstrated the highest percentage of mothers living in households (98.7%) and the lowest is Cayo (90.8%). Fathers living in the households have lower percentages than mothers, the highest is Toledo (83.1%) and the lowest is Belize District (67.8%). Households with both parents range from 66.9% to 82.3%. Toledo District shows the highest percentage (82.3%) and Belize District the lowest percentage (66.9%). Disaggregating the data of Mother, Father or both parents living in the households by quintile, the poorest families have the highest percentage of mother, father or both parents living in the households, with 27.4%, 26.6% and 26.5% respectively (Table 33). In rural settings, there is an increase of one percent to seven point six percent of mothers, father or both parents living in the households when compared with urban communities.

Table 33
Percentage of children 0-4 whose mother, father, both lives in the household by Quintile, 2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Mother n=956</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27.4</td>
<td>26.6</td>
<td>26.5</td>
</tr>
<tr>
<td>2</td>
<td>20.4</td>
<td>21.4</td>
<td>21.2</td>
</tr>
<tr>
<td>3</td>
<td>20.5</td>
<td>19.2</td>
<td>19.4</td>
</tr>
<tr>
<td>4</td>
<td>17.2</td>
<td>17.9</td>
<td>17.9</td>
</tr>
<tr>
<td>5</td>
<td>14.5</td>
<td>14.9</td>
<td>14.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Results show that mothers’ educational level in households with mother and both parents is mostly at the primary and secondary level with 60.9% and 19.5% respectively (Table 34). Similarly, the father’s educational level is mostly at primary and secondary levels, with 61.3% and 19.3% respectively (Table 35).
Countrywide, one out every three children **reported illness** in the last 30 days prior to data collection. There was a downward trend of reported illnesses as children got older. The highest percentages (above the national average of 31.3%) are concentrated in children less than two years. In children less than one year of age, four of six districts have prevalence rates above the national average, namely Cayo with 33.3%, Toledo 40%, and 50% in Stann Creek District.

In children 12 to 23 months only one district has values below the national average. Corozal had the highest rates with 60% followed by Stann Creek, 53.6% and Toledo 44.4%. In children 24 to 35 months, three districts had values below the national average, Corozal, Orange Walk and Belize District. Higher rates were seen in Cayo, Stann Creek and Toledo with 36.2%, 50%, and 37% respectively.

In the age group 36 to 47 months three districts have lower rates than the national average Orange Walk, Cayo and Toledo with higher rates in Stann Creek, Corozal and Belize. Among children who were 48 to 59 months old, only Stann Creek District had rates (46.2%) higher than the national average (Table 38).
Table 38
Percentage of children with reported morbidity in the last 30 days by District by Age
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Percentage of Children total and by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>Corozal</td>
<td>34</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>35</td>
</tr>
<tr>
<td>Belize</td>
<td>96</td>
</tr>
<tr>
<td>Cayo</td>
<td>62</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>40</td>
</tr>
<tr>
<td>Toledo</td>
<td>48</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>315</strong></td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

When comparing the prevalence rate of children reported to be ill in the last 30 days in urban or rural areas, country wide and for age specific groups, the prevalence rates are higher in urban areas. Less girls than boys were reported to be ill in the last 30 days country wide and in age specific groups except the 4 year olds where the percentage in girls was 1.9 times higher. Among children who reported being ill in the last 30 days, Garifuna, Maya, and Creole children had the higher percentages of illness with 48.4%, 42.3% and 31.5% respectively. Mestizo children had the lowest percentage of reported illness (27.3%). In all quintiles, almost one of every three children was reported to be ill within the last 30 days.

**Services** provided at public and private facility have direct cost for parents/guardians (Table 43) who visit health facilities. It was reported that the mean cost at a local private facility was ($49.74) 15 times more costly than the local public facility (3.30) and almost the same cost when utilizing health facility abroad. These direct payments vary according to the age groups. Interviewees expressed equal satisfaction with services received at local private facilities (67.3%) and local public facilities (68.3%), (Table 44). Since parents are almost equally satisfied with services in the public and private sector, further probing is needed to determine reasons why private facilities are utilized despite higher direct costs.

Table 43
Mean Cost of visit by type of facility visited and age
2002 LSMS

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Private Facility</td>
<td>49.74</td>
<td>52.58</td>
<td>42.06</td>
<td>47.26</td>
<td>73.74</td>
<td>41.67</td>
</tr>
<tr>
<td>Local Public Facility</td>
<td>3.30</td>
<td>5.98</td>
<td>2.74</td>
<td>2.42</td>
<td>1.45</td>
<td>4.49</td>
</tr>
<tr>
<td>Health Facility Abroad</td>
<td>47.81</td>
<td>0.00</td>
<td>80.51</td>
<td>0.00</td>
<td>0.00</td>
<td>25.61</td>
</tr>
<tr>
<td>Traditional Healer</td>
<td>2.78</td>
<td>0.00</td>
<td>3.98</td>
<td>1.13</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table 44
Rating of Quality of Service to Children 0-4 years
2002 LSMS

<table>
<thead>
<tr>
<th>Type of Facility / satisfaction</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Private</td>
<td>205</td>
<td>100</td>
</tr>
<tr>
<td>Satisfied</td>
<td>138</td>
<td>67.3</td>
</tr>
<tr>
<td>Very Satisfied</td>
<td>57</td>
<td>27.8</td>
</tr>
<tr>
<td>Other</td>
<td>10</td>
<td>4.9</td>
</tr>
<tr>
<td>Local Public</td>
<td>540</td>
<td>100</td>
</tr>
<tr>
<td>Satisfied</td>
<td>369</td>
<td>68.3</td>
</tr>
<tr>
<td>Very Satisfied</td>
<td>125</td>
<td>23.1</td>
</tr>
<tr>
<td>Other</td>
<td>46</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Major Findings:

1. **Quintile:** Of the 1006 children, 269 (26.7%) are in the first quintile which is the poorest quintile, 208 (20.7%) are in the second quintile, 200 (19.9%) in the third quintile, 183 (18.2%) in the fourth and 146 (14.5%) children in the fifth quintile which is the richest quintile (Table 5). *Almost half (47.4%) of children in the Survey are in the lowest consumption quintiles one and two.*

2. **Stunting:** Data indicative of stunting, (Low height for age), shows Belize District with the lowest numbers (9.4%) of children with stunting. Cayo, Corozal, Stann Creek and Orange Walk had 12.8%, 13.5%, 18.2% and 18.9% respectively. *Children in Toledo had a high percentage (43.7%) of being stunting (low height for weight) with a high prevalence of ≥ 40%.*
   - Children in rural areas are more likely to present with stunting at a medium prevalence rate of 20-29%.
   - Maya children exhibited high prevalence of stunting at 30-39 % on the severity scale.
   - *Children 48-59 months* are considered to have medium prevalence of stunting which indicates that these children have *failed to grow.*
   - Children in quintile one exhibit medium prevalence of stunting.

3. **Wasting:** All six districts have values considered to be low prevalence rate of wasting. Cayo and Stann Creek Districts resulted in zero prevalence rates. Orange Walk is the district with the highest rate (2.6%) (Appendix, Table 13). *The prevalence rate of wasting by ethnicity ranges from 0.0 to 1.7%, with the highest rate among the Maya children and the lowest among Garifuna children.*
   - Children less than two years reflected the highest percentage of wasting. Children less than two years have the highest rates with 2.8% in the group 0-11 months and 2.4% in children 12-23 months. (Appendix, Table 18)

4. **Overweight:** One out of every nine children 0-4 years is overweight country wide, with an average of 11.3% within a range of 6.0 to 22.4% prevalence rate of obesity (Table E). The district with the highest rate is Belize district (22.4%) followed by Toledo (14.1%) and Orange Walk (10.5%), (Appendix, Table No. 19).
• Overweight is two times more a problem of urban (15.5%) than rural communities (7.5%), (Appendix, Table 20).
• By ethnicity the prevalence rate of overweight children ranges from 8.4% to 18.6%, with the Creole population mostly affected, which is 1.6 times more than the national average (Table No. 21).
• Overweight children in quintile five (the richest quintile) are 1.7 times more than the national average of 11.3% (Table 22).

5. Parents in Household: There were 956 households with mothers, 744 with fathers and 736 households with both parents, suggesting that fathers are absent in one out of every three households.
• The Stann Creek District demonstrated the highest percentage of mothers living in households (98.7%) and the lowest is in Cayo (90.8%).
• Fathers living in households have lower percentages than mothers; the highest is Toledo (83.1%) and the lowest is Belize District (67.8%).
• Toledo District shows the highest percentage of having both parents in household (82.3%) and Belize District the lowest percentage (66.9%).

6. Mother and father’s education at the primary and secondary levels were similar at 60.9% and 19.5% respectively (Table 34).

7. Countrywide, one of every three children reported being ill in last 30 days. The highest percentages (above the national average of 31.3%) were concentrated in children less than two years.

Discussions/Recommendations

A. Childhood Poverty is experienced by Belizean children at a significant level. The effects of poverty are well documented and are known to be harmful to the physical, socio-emotional and cognitive well-being of children and their families. Poor families tend to be more chaotic, and often experience higher levels of violence and separation from families. Data from the LSMS show that fathers are absent from every one in three households with implications for instability of income, resulting in poor access to sufficient nutritious food. Toledo, the district with the highest poverty index had the highest percentage (83%) of fathers living in households. Culture, economic and employment opportunities, geographical location and other factors impact on the ability of families to have food security. Food insecurity or the limited availability of nutritionally adequate and safe food is a direct cause of malnutrition.

Recommendations: A second phase of the Food and Nutrition Security Initiative that was conducted over 2000-2004 should be implemented to continue to promote back yard food production and food security.

B. Children in Belize are experiencing nutritional problems of under nutrition which is confirmed by stunting. Optimal growth depends on not only genes but requires an absence of disease, adequate nutrition and a nurturing environment. Experts agree that few ethnic differences in weight and growth of children would remain if all received the same optimal nutrition (Public Policy, 2004).
An important phenomenon that has been highlighted in the analysis of the LSMS is the prevalence of obesity among Belizean children (1:9). Pediatric obesity is a recognized global problem and like under nutrition is related to the quality and quantity of food that is eaten. Lifestyles of sedentarism, fast foods, lack of physical education in schools and other factors contribute to obesity. Chronic conditions seen in adults (e.g. high cholesterol) are now being seen in children.

Healthcare providers in Belize are challenged to change the model of health care delivery from the focus of Maternal and Child Health to one that is more standardized, integrated and geared to caring for the family in a holistic fashion taking into account the social and cultural issues that are impacting on the health of children.

Recommendations:

- **Training of community health** nurses needs urgent attention to alleviate nurse shortages that exist nationally and globally. Most public health nurses are nearing retirement age and service gaps will widen thereby impact negatively on services to the community. Community Health Nursing could be offered as a specialty course through the Faculty of Nursing, University of Belize.

- A national initiative to encourage vigorous physical exercise for children and their families at least twice weekly should be considered with the help of social partners.

- **Public information** on nutrition should be disseminated on the importance of exercise, and good nutrition to guide families towards healthy lifestyles. The messages should be constructed to meet the educational levels of mothers and fathers at the primary school level.

- Actively promote the benefits of breastfeeding. Reintroduce and support Baby Friendly Initiatives in public and private health facilities, and include breastfeeding education Health and Family Life Education in schools.

- Strengthen **Health and Family Life Education** in schools with the assistance of social partners.

- **Growth monitoring charts** are used as a standard component of assessment of pediatric patients. However these charts are not always used nor are they sufficiently analyzed. This results in loss of opportunity to provide anticipatory guidance on healthy feeding and eating patterns. Continuing education of nurses and physicians on the use of growth chart, comprehensive assessment of children, and nutrition issues could correct this anomaly.

- **Annual monitoring** of children should be implemented for school age children. This could be achieved by implementing school health programs with yearly visit to schools by the health team. This constitutes outreach to the children and exemplifies the practice of community health.

- A review of best practices in growth monitoring for children was conducted by a collaborative group of health professionals (Public Policy, 2004). It is recommended that in addition to growth monitoring chart, children two years old and over should be screened with **Body Mass Index** measurements to identify those who are at risk for body fat.

- Persons trained in dietetics are needed to guide health personnel and the community on food related issues. Discussions with the Faculty of Nursing, University of Belize
should be held to explore opportunities for training nutritionists at the certificate and baccalaureate level to fill this service gap.

C. Morbidity

In the 1995 LSMS, data on illnesses were collected although the information was not child specific. Diarrhea in children less than five years indicated that 15.2% of the Study population experienced diarrhea. Information on diarrhea and other specific childhood illness were not included in the 2002 LSMS.

The National Health Information and Surveillance Unit, Ministry of Health reports the following leading causes of hospitalization for Children less than five years for period 2000-2004: intestinal infections, respiratory illnesses, injuries and accidental falls, diseases of the digest system, appendicitis, hernia and intestinal obstructions. Of interest are the low percentages reported on nutritional deficiencies and anemias ranging from two point six percent in the year 2000 and 2001, two point eight in 2002, one point five percent in 2003 and two percent in 2004.

Death from nutritional deficiencies in this age group ranged from 5% in 2000, 3% in 2001, zero in 2002, 4.5% in 2003 and 8.5% in 2004. It should be noted that this data is from the public sector only. It is also possible that nutritional deficiencies are not being correctly recorded which impacts both on the accuracy of data and national strategies to alleviate nutritional deficiencies.

Recommendation:

Children in Belize are experiencing problems with under nutrition which makes children vulnerable to diarrhea and respiratory illnesses.
- The Information System needs to adapt strategies that will accurately capture nutritional deficiencies and comorbidities in both public and private health sectors.
- Efforts should be made to educate physicians on using relevant ICD codes to ensure that standardized recording of nutritional problems and accompanying problems are recorded.
- Data should be recorded by district or region, and by healthcare provider to facilitate identification in improvements or deterioration of nutritional status of children within their locale.

D. Model of Quality & Integrated Management of Childhood diseases

To achieve the desired outcome of child health service, attention to how healthcare is delivered must be compared with the impact of service on the health status of children. In other words, the process used in the delivery of care is critical to successful outcomes. Although delivery of quality health care is the goal of health systems, quality cannot be achieved unless services are organized with quality components that allows for measurement of achievements. Bodenheimer & Grumbach (2002) identify the components of high quality care as access to care, adequate scientific knowledge, competent health care providers, separation of financial and clinical
decisions, and organization of health care institutions to maximize quality. Health systems must be organized to ensure compliance with established standards of care.

The discussion on vertical versus horizontal policies is key to understanding and adapting a new model of community health. Solomons, (2005) proposes the following:

Vertical initiatives imply that resources and agenda are mobilized alone and delivered in specific context. Vitamin A capsules …is an example of a vertical one-issue initiative. Horizontal initiatives can be seen as constructing a public health crossword puzzle with a series of interlocking pieces reinforcing one another to construct the basis for optimal population health (p.208).

Horizontal policy initiatives that can address nutritional issues are those that are integrated, and conform to model of practice that is often referred to as eco-nutritional policies. This means that public health policies are designed to achieve broad and simultaneous goals of promoting community development through simultaneous programs of education, health, economic initiatives and environmental strategies (Solomons, 2005).

**Recommendation**

Adopt the Integrated Management of Childhood Illness as a new model to deliver quality, standardized child health services. This model is an integrated approach to child health that focuses on the well-being of the whole child and includes both preventive and curative elements that are implemented by families and communities as well as by health facilities.

In health facilities, the IMCI strategy promotes the accurate identification of childhood illnesses in outpatient settings, ensures appropriate combined treatment of all major illnesses, strengthens the counseling of caretakers, and speeds up the referral of severely ill children. In the home setting, it promotes appropriate care seeking behaviors, improved nutrition and preventive care, and the correct implementation of prescribed care. The strategy includes three main components:

- Improving case management skills of health-care staff
- Improving overall health systems
- Improving family and community health practices

The implementation of the IMCI strategy will allow health personnel the early identification of most common illnesses during childhood, the standardized education of parents / guardians on how to continue providing care at home and how to recognize and where and when to seek help in the case of alert and danger signs (IMCI, 1999).

- Adapt the Continuous Quality Improvement system to identify weaknesses in services, determine root causes and facilitate correction of problems. Patients benefit directly from corrections of defect in health delivery systems.
Final Recommendations:

The above recommendations are reflected in the Plans of Action formulated by the Maternal and Child Health Program, Ministry of Health and National Committee for Families and Children, Ministry of Human Development. To successfully address issues related to the nutritional status of children, collaborative efforts are needed to identify adequate resources to implement the strategies outlined in both Plans of Action.

A. Support the initiatives of the Maternal and Child Health Program (Ministry of Health 2006-2007) which is designed to increase the survival rates of women during pregnancy, childbirth and the puerperium period and survival rates of children. The purpose of the plan is to increase the effectiveness of nutrition related interventions that will increase the maternal and child survival in Belize. The expected outputs are as follows:

1. Reinstall the Baby Friendly Hospitals and Health Centers Initiative.
2. Install the Integrated Management of Childhood Illnesses Strategy.
3. Increase the number of women and children with or without risk of malnutrition that have access to multiple micronutrient supplements and deworming tablets.
4. Increase public awareness on the effect of malnutrition in maternal and child health and the need to practice healthy lifestyles including healthy eating.
5. Increase the management skills of health professionals providing nutrition related services.


1. Target #1: Reduce the under five mortality rate to 14.3/1000 live births
   - Strategy #1: Strengthen the institutional capacity of the Ministry of Health
- **Strategy #2**: Strengthen the institutional capacity of the health system to allow public health nurses to provide in-service training. Monitor and evaluate the performance of rural health nurses and traditional birth attendants.
- **Strategy #3**: Implement Safe Motherhood Initiative in all districts.
- **Strategy #4**: Improve the collection, compilation and dissemination of vital health statistics.

2. **Target #2**: Reduce the incidence of severe to moderate malnutrition in children under one year by 5% by 2009; one to four years by 10% and prevention of micronutrient deficiencies diseases.
   - **Strategy #1**: Strengthen the Institutional capacity of the Nutrition Unit to be able to effectively carry out its Research, Public Awareness and Monitoring functions.
   - **Strategy #2**: Increase awareness of the prevention of malnutrition and the importance of micronutrient supplementation.
   - **Strategy #3**: Develop, implement and strengthen Nutrition Policies and Programs
   - **Strategy #4**: Develop, implement and strengthen Nutrition Policies, Protocols for school aged children.

3. **Target #3**: Disabilities
   
   There are no definitive strategies stated to address the issue of care for children with disabilities. This has direct implications in fulfilling Belize’s responsibility to address weaknesses in the healthcare delivery services for children with disability. Recommendations from the UN Committee on the Rights of the Child in regards to the Government of Belize’s Report which was submitted in early 2005, states among other recommendations, the following:

   The Committee urges the state to allocate considerably more resources to children, in particular to the most vulnerable groups of children (children with disabilities, living in extreme poverty, abused and neglected, belonging to minorities and indigenous children),… the Committee recommends that the state party expedite this process as much as possible and ensure its’ effective implementation; identify the yearly budgetary amount and proportion spent on persons under 18 years of age.

4. **Target #5**: Increase the accessibility and affordability of comprehensive health care services targeting adolescents by 50% by 2009
   - **Strategy #1**: Develop and implement protocols for the implementation of the Sexual and Reproductive Health Policy (2002) in all Public and Private Hospitals, Health Centers and Mobile Clinics across the country.
   - **Strategy #5**: Implement and monitor compliance with standards for registering Hospitals and Health Centers as Baby Friendly Institutions.
   - **Strategy #6**: Expanded Program on Immunization implemented.
Strategy #7: Develop a public awareness campaign targeted at “Late Booking and Delinquent” Mothers.

Conclusion

Analysis of data from the LSMS 2002 provides a deeper understanding of nutritional problems being experienced by children less than five years old. Public health initiatives are urgently needed to sensitize the community on strategies to reduce stunting and obesity. Plans of Action require financial and human resources and expertise to implement, monitor and evaluate the outcome of initiatives. Key to this process are the necessary changes that must occur within health delivery systems that will not only create plans and strategies, but will also provide structures to support health personnel at all levels with the implementation process.

As suggested in the LSMS 2002, Belize seems to be experiencing a process of nutrition transition in which under nutrition is gradually being replaced by the development of obesity. The available Plans of Action supports the concept of a comprehensive, integrated approach to address the issues of poverty, health and nutrition. However, urgent attention to identifying resources is imperative so that public education campaigns can be launched to sensitize the general public on the emerging trend of childhood obesity. This nutrition problem has the potential to destroy a child’s self-esteem, impede play which is necessary to normal growth and development, and early development of chronic non-communicable diseases.

Achievement of the Millenium Development Goals as well as the Rights of children to adequate healthcare, require an integrated, collaborative approach. Creating a paradigm shift from Maternal and Child Health Services to a Family Healthcare delivery model will illuminate the complexity of addressing nutritional deficiencies in children. Healthcare providers will be able to conceptualize and understand the importance of poverty, the importance of early education to prepare young women for pregnancy and other health and social factors that can negatively or positively impact on the nutritional status of children.
References


United Nations Recommendations, CRC (Nov. 9, 2005) Presentation at the Biltmore Plaza Hotel, Belize City


Government of Belize (1996). National Height Census of School Children in Belize


National Plan of Action for Children and Adolescents, Implementation Plan: 2.5.2 Health.
APPENDIX I

Nutritional Studies & Initiatives in Belize: Major Findings

A number of reports and initiatives have addressed issues affecting the nutritional status of children in Belize (Table B.) during the period 1992-2004. The major findings of those reports are described below.

Table B: Nutrition Reports

<table>
<thead>
<tr>
<th>No.</th>
<th>Organization/Author</th>
<th>Year</th>
<th>Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Crooks, DL</td>
<td>1994</td>
<td>Growth status of school-age Mayan children in Belize, Central America</td>
</tr>
<tr>
<td>7.</td>
<td>Makdani D. et. al.</td>
<td>1996</td>
<td>Comparison of methods of assessing vitamin A status in children</td>
</tr>
<tr>
<td>8.</td>
<td>Smith J. et. al.</td>
<td>1999</td>
<td>Vitamin A and Zinc Supplementation of Preschool children</td>
</tr>
<tr>
<td>9.</td>
<td>Government of Belize</td>
<td>1997</td>
<td>The Children of Toledo: A Food and Nutrition Perspective</td>
</tr>
<tr>
<td>11.</td>
<td>INCAP; PAHO</td>
<td>2004</td>
<td>Food and Nutrition Security at the Local Level</td>
</tr>
</tbody>
</table>


- This Study was undertaken by the Government of Belize with support from INCAP, PAHO/WHO and CFNI. Nutritional problems were grouped into four categories, namely: under and over nutrition in children, low birth weight, specific micronutrient deficiencies and chronic diseases. The first three categories are relevant to nutrition in children and major findings for those categories will be presented. The Study was facilitated by retrospective review of child health clinic cards for 1992.

- Under and Over nutrition in children:
  Analysis of data collected showed that 60% of the study population was normal with 25% undernourished and 15% with some degree of obesity.
(a) **Weight for age** was used as an indicator of global nutritional status along with the WHO classification for malnutrition and a cut-off point of minus one standard deviation. In the normal weight for age category 59.2% of the children under study countrywide, were within this category. In those considered malnourished, 19.2% were mildly malnourished, 4.9% moderately and 1.3% severely malnourished. Reported also was data indicating the highest prevalence of malnutrition in Toledo with 45.3% of children with some degree of malnutrition, and 15.5% presenting with moderate and severe malnutrition.

(b) In the over nutrition category, 11% were in the low risk for obesity category, 3.3% were high risk and 1.0% considered obese.

- **Low Birth Weight**: Statistics indicated a 5.5% incidence of low birth weight for Belize which at that time was similar to two Caribbean countries (Trinidad and Tobago) and one in Central America (Costa Rica).

- **Micronutrient Deficiencies**:
  (a) Vitamin A: Normal levels of vitamin A were reported in 40% of children who participated in a 1989 Study. Of those studied 55% had marginal values and 5% had very low values.
  (b) Zinc: In the same study 40% of children were determined to have low Zinc serum levels. Lower serum levels of Vitamin A and Zinc were found in Garifuna, East Indian and Ketchi children in comparison to other ethnic groups.
  (c) Iron Deficiency: In children between three and eight years it was determined that anemia was not a serious problem. However values slightly below 11.0 g/dl were found in Garifuna and East Indian children.

2. **Growth Status of School-age Mayan Children in Belize**
   A sample of Mopan Maya school children in San Antonio participated in a Study conducted between November 1990 -1991, to determine their growth status.
   (a) While there was no evidence of wasting, researchers found that 66% of these children had growth patterns that were indicative of stunting which is linked to chronic undernutrition.
   (b) Data on Mopan Mayan children were compared to other Amerindian groups in Guatemala and Mexico. The Belizean children were deemed to be shorter and lighter than a group in semi-urban Guatemala, and taller and heavier than three groups in rural Guatemala and Mexico; Belizean children had the largest hand circumference. Findings have implication for discussion on the role of environment and genetics on growth patterns.

   The National Iodine Survey was undertaken to determine the prevalence of iodine deficiency in children seven to fourteen years, availability of iodized salt in homes, levels of iodine fortification of salt used in homes and to identify groups at risk for iodine deficiency. Results showed that no iodine deficiency was detected and that 97.5% of all salt consumed contained varying levels of iodine.
fortification. Higher levels of urinary iodine were found in Corozal and Orange Walk District.

4. **Serum Carotenoid Concentrations and their Reproducibility in Children in Belize (1996).**
   (a) Carotenoid concentrations were determined as part of a survey of vitamin A status of 493 children between 65 and 89 months of age countrywide. The researchers proposed that several studies on adults have been done to determine the levels of carotenoid concentrations because of “suggestions” that carotenoid foods are beneficial to health (eg. protection against cancer). Because of the paucity of similar studies in children, the researchers embarked on a Study to: (a) determine carotenoid concentrations and (b) obtain information on the reproducibility of the concentrations.
   (b) Results:
   - Concentration of $B$–carotene were at similar levels among children in Belize and the United States (U.S.).
   - Luthein/zeaxanthin was lower and $a$-carotene was higher in Belizian children when compared to data from the U.S.
   - Lycopene was lower in Belizian children and considerably higher in children in the U.S.
   - Concentrations of carotenoids showed no differences between boys and girls.
   - Data from this Study represented the largest known documented database on carotenoid concentration in children.

   (a) This Study was conducted to determine the prevalence of anemia in pregnant women attending clinics in 1994-1995, assess the availability and distribution of iron supplements in clinics and identify problems in management of maternal anemia.
   (b) Results showed an increase in the prevalence of iron deficiency anemia from 40.2% in 1988 to 51.7% during 1994-1995.

6. **National Height Census of School Children in Belize, 1996**
   (a) The main objective of this Study was to identify less developed communities based on the level of children’s growth retardation and their place of residence. Countrywide, 22,426 children six to nine years participated in the Study.
   (b) Data from this Study revealed that 48 communities had high levels of growth retardation. Most (81%) were located in the Toledo District and 13% in the Stann Creek District. Medium level status was assigned to 97 communities which included Cayo (41%), Corozal (15%) and Toledo (12%) Districts. Low level communities (106) were located mostly in the Belize District.

7. **Comparison of methods of assessing vitamin A status in children**
   (a) A study was conducted on children ages two to eight years old, who were not classified as severely malnourished. Researchers sought to determine what
Nutrition Status of Children 0-5

A proportion of them are at risk of having Vitamin A deficiency. Additionally, researchers compared the three methods of assessment that were used to determine whether each method would produce similar results.

(b) Results showed that varying levels of vitamin A deficiency. More importantly, the three indices of Vitamin A status did not identify the same persons or same percentage of those at risk for deficiencies.

8. **Vitamin A and Zinc Supplementation of Preschool Children**
   (a) Studies were undertaken to determine whether supplementation of vitamin A and/or zinc improved vitamin serum levels. Researchers also sought to determine whether supplementation improved height and weight gains in immigrant Mestizo preschool children 22-66 months, living in the Salvapan and Los Flores communities in the Cayo District.
   (b) Results show that children in the Study were experiencing low or marginal levels of vitamin A and to a lesser degree some zinc deficiencies. Height and weight were significantly increased in those who received weekly supplements (3030 RE) of vitamin A.

9. **The Children of Toledo: A Food and Nutrition Perspective**
   (a) In 1997 the Ministry of Health conducted a Study to identify factors contributing to food and nutrition insecurity in Toledo District. Four data sets were analyzed which included 1992 weight for age from preschool children attending clinic; a 1994 weight, height, and feeding patterns of preschool children, diet and socioeconomic family data from sample of households; 1996 height for age census of school children; examination results in math and English of Standard II children participating in the national height census.
   (b) Factors contributing to nutrition insecurity were related to poor feeding patterns, late introduction of nutritious foods to young children, and very young children with mothers who were already pregnant with another child. Other factors were lack of self sufficiency in food production, lack of animal food, and low educational status of heads of households. Environmental factors of crowded bedrooms, dirt floors and polluted air from firewood smoke were also evident. High incidence of acute respiratory infections and diarrheal diseases were also identified.

10. **Breastfeeding and Infant Feeding in Belize**
    (a) The Ministry of Health embarked on a Study (1997) to determine the knowledge, attitude, beliefs, perceptions and practices on breastfeeding and infant feeding in Belize.
    (b) Results show that most persons do not breastfeed because it is inconvenient, receive limited breastfeeding support from health officials and immediate family, lack information, and are influenced negatively by cultural and social beliefs.

    (a) Toledo was identified as the district that would be targeted to participate in the Central American Project on Food and Nutrition Security at the local level in order
to address issues of poverty, growth retardation and delayed development. Five communities were selected based on vulnerability in the height for age census. (b) The Report describes the methodology used for the main activities which included nutrition education, organic vegetable production, food preparation, fruit and vegetable drying and preservation. Women and children and other community members were active participants. It is believed that their involvement increased the likelihood of successful implementation and sustainability of the Project.

12. **Mother and Child’s Nutrition: Preliminary Assessment of the Situation in Belize**
   (a) A rapid assessment of mother and child nutrition was done to analyze the available information regarding the nutritional status of the Belizean population with a particular focus on mothers and children.
   (b) Preliminary results indicate that inconsistencies in available data prevent definitive conclusions. It is recommended that a rapid assessment on maternal nutrition and nutritional status of children under five years be conducted using a representative sample of the population.
### APPENDIX II

#### Table 1
Distribution of children 0-4 years by District
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Children total, by age</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corozal</td>
<td>89</td>
<td>8.8</td>
<td>17</td>
<td>20</td>
<td>20</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>139</td>
<td>13.8</td>
<td>21</td>
<td>33</td>
<td>26</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>Belize</td>
<td>332</td>
<td>33</td>
<td>78</td>
<td>63</td>
<td>65</td>
<td>55</td>
<td>71</td>
</tr>
<tr>
<td>Cayo</td>
<td>229</td>
<td>22.8</td>
<td>42</td>
<td>41</td>
<td>58</td>
<td>46</td>
<td>42</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>81</td>
<td>8.1</td>
<td>10</td>
<td>28</td>
<td>16</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Toledo</td>
<td>136</td>
<td>13.5</td>
<td>25</td>
<td>36</td>
<td>27</td>
<td>25</td>
<td>23</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>1006</strong></td>
<td><strong>100</strong></td>
<td>193</td>
<td>221</td>
<td>212</td>
<td>190</td>
<td>190</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

#### Table 2
Distribution of children 0-4 years by Urban Rural Areas by Age
2002 LSMS

<table>
<thead>
<tr>
<th>Areas</th>
<th>Children total, by age</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>489</td>
<td>49.1</td>
<td>95</td>
<td>109</td>
<td>104</td>
<td>93</td>
<td>97</td>
</tr>
<tr>
<td>Rural</td>
<td>508</td>
<td>50.9</td>
<td>98</td>
<td>112</td>
<td>108</td>
<td>97</td>
<td>93</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

#### Table 3
Distribution of children 0-4 years by Sex, by Age
2002 LSMS

<table>
<thead>
<tr>
<th>Sex</th>
<th>Children total, by age</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>494</td>
<td>49.1</td>
<td>98</td>
<td>111</td>
<td>103</td>
<td>90</td>
<td>92</td>
</tr>
<tr>
<td>Female</td>
<td>512</td>
<td>50.9</td>
<td>95</td>
<td>110</td>
<td>109</td>
<td>100</td>
<td>98</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 4
Distribution of children 0-4 years by Ethnicity, by age
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Children total, by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total No.</td>
</tr>
<tr>
<td>Creole</td>
<td>270</td>
</tr>
<tr>
<td>Garifuna</td>
<td>31</td>
</tr>
<tr>
<td>Maya</td>
<td>142</td>
</tr>
<tr>
<td>Mestizo</td>
<td>501</td>
</tr>
<tr>
<td>Others</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 5
Distribution of children 0-4 years by Quintile, by age
2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Children total, by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total No.</td>
</tr>
<tr>
<td>1</td>
<td>269</td>
</tr>
<tr>
<td>2</td>
<td>208</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>183</td>
</tr>
<tr>
<td>5</td>
<td>146</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 6
Distribution of children 0-4 years with STUNTING (Low Height for Age -LH/A-) by District
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>No. of children studied</th>
<th>% stunted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>80</td>
<td>13.5</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>115</td>
<td>18.9</td>
</tr>
<tr>
<td>Belize</td>
<td>171</td>
<td>9.4</td>
</tr>
<tr>
<td>Cayo</td>
<td>175</td>
<td>12.8</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>66</td>
<td>18.2</td>
</tr>
<tr>
<td>Toledo</td>
<td>107</td>
<td>43.7</td>
</tr>
<tr>
<td>Country</td>
<td>714</td>
<td>17.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table No. 7
Distribution of children 0-4 years with Stunting (-LH/A-) by Urban Rural Areas
2002 LSMS

<table>
<thead>
<tr>
<th>Areas</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>322</td>
<td>13.6</td>
</tr>
<tr>
<td>Rural</td>
<td>392</td>
<td>21.7</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 9
Distribution of children 0-4 years with Stunting (-LH/A-) by Ethnicity
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>158</td>
<td>8.9</td>
</tr>
<tr>
<td>Garifuna</td>
<td>19</td>
<td>15.2</td>
</tr>
<tr>
<td>Maya</td>
<td>113</td>
<td>39.8</td>
</tr>
<tr>
<td>Mestizo</td>
<td>382</td>
<td>16.7</td>
</tr>
<tr>
<td>Others</td>
<td>42</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 10
Distribution of children 0-4 years with Stunting (-LH/A-) by Quintile
2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>206</td>
<td>32.3</td>
</tr>
<tr>
<td>2</td>
<td>153</td>
<td>13.9</td>
</tr>
<tr>
<td>3</td>
<td>137</td>
<td>19.5</td>
</tr>
<tr>
<td>4</td>
<td>130</td>
<td>8.2</td>
</tr>
<tr>
<td>5</td>
<td>88</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 11
Distribution of children 0-4 years with Stunting (-LH/A-) by Sex
2002 LSMS

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>360</td>
<td>17.8</td>
</tr>
<tr>
<td>Female</td>
<td>354</td>
<td>17.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 12
Distribution of children 0-4 years with Stunting (LH/A-) by Age Group
2002 LSMS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>120</td>
<td>11.3</td>
</tr>
<tr>
<td>12-23 months</td>
<td>160</td>
<td>19.6</td>
</tr>
<tr>
<td>24-35 months</td>
<td>156</td>
<td>15.9</td>
</tr>
<tr>
<td>36-47 months</td>
<td>143</td>
<td>18.5</td>
</tr>
<tr>
<td>48-59 months</td>
<td>135</td>
<td>23.2</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 13
Distribution of children 0-4 years with Wasting (Low Weight for Height –LW/H) by District
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>80</td>
<td>2.4</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>115</td>
<td>2.6</td>
</tr>
<tr>
<td>Belize</td>
<td>169</td>
<td>1.4</td>
</tr>
<tr>
<td>Cayo</td>
<td>178</td>
<td>0.0</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>68</td>
<td>0.0</td>
</tr>
<tr>
<td>Toledo</td>
<td>111</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td>721</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 14
Distribution of children 0-4 years with Wasting (LW/H) by Urban Rural Areas
2002 LSMS

<table>
<thead>
<tr>
<th>Areas</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>327</td>
<td>1.6</td>
</tr>
<tr>
<td>Rural</td>
<td>394</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table No. 15
Distribution of children 0-4 years with Wasting (LW/H) by Ethnicity
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>157</td>
<td>1.5</td>
</tr>
<tr>
<td>Garifuna</td>
<td>23</td>
<td>0.0</td>
</tr>
<tr>
<td>Maya</td>
<td>114</td>
<td>1.7</td>
</tr>
<tr>
<td>Mestizo</td>
<td>383</td>
<td>1.3</td>
</tr>
<tr>
<td>Others</td>
<td>44</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 16
Distribution of children 0-4 years with Wasting (LW/H) by Quintile
2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>208</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>157</td>
<td>2.1</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>131</td>
<td>0.8</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 17
Distribution of children 0-4 years with Wasting (LW/H) by Sex
2002 LSMS

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>358</td>
<td>1.5</td>
</tr>
<tr>
<td>Female</td>
<td>363</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 18
Distribution of children 0-4 years with Wasting (LW/H) by Age Group
2002 LSMS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>119</td>
<td>2.8</td>
</tr>
<tr>
<td>12-23 months</td>
<td>159</td>
<td>2.4</td>
</tr>
<tr>
<td>24-35 months</td>
<td>159</td>
<td>0.6</td>
</tr>
<tr>
<td>36-47 months</td>
<td>145</td>
<td>0.7</td>
</tr>
<tr>
<td>48-59 months</td>
<td>139</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 19
Distribution of Overweight children 0-4 years (High Weight for Height) by District
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>80</td>
<td>8.8</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>115</td>
<td>10.5</td>
</tr>
<tr>
<td>Belize</td>
<td>169</td>
<td>22.4</td>
</tr>
<tr>
<td>Cayo</td>
<td>178</td>
<td>1.8</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>68</td>
<td>6.0</td>
</tr>
<tr>
<td>Toledo</td>
<td>111</td>
<td>14.1</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>721</strong></td>
<td><strong>11.3</strong></td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 20
Distribution of children Overweight children 0-4 years (High Weight for Height) by Urban Rural Areas
2002 LSMS

<table>
<thead>
<tr>
<th>Areas</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>327</td>
<td>15.4</td>
</tr>
<tr>
<td>Rural</td>
<td>394</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 21
Distribution of Overweight children 0-4 years (High Weight for Height) by Ethnicity
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>157</td>
<td>18.6</td>
</tr>
<tr>
<td>Garifuna</td>
<td>23</td>
<td>8.4</td>
</tr>
<tr>
<td>Maya</td>
<td>114</td>
<td>8.6</td>
</tr>
<tr>
<td>Mestizo</td>
<td>383</td>
<td>9.1</td>
</tr>
<tr>
<td>Others</td>
<td>44</td>
<td>9.7</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table No. 22
Distribution of Overweight children 0-4 years (High Weight for Height) by Quintile
2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>208</td>
<td>7.6</td>
</tr>
<tr>
<td>2</td>
<td>157</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>13.3</td>
</tr>
<tr>
<td>4</td>
<td>131</td>
<td>15.0</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>19.8</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 23
Distribution of Overweight children 0-4 years (High Weight for Height) by Sex
2002 LSMS

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>358</td>
<td>7.6</td>
</tr>
<tr>
<td>Female</td>
<td>363</td>
<td>14.8</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 24
Distribution of Overweight children 0-4 years (High Weight for Height) by Age Group
2002 LSMS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>119</td>
<td>15.9</td>
</tr>
<tr>
<td>12-23 months</td>
<td>159</td>
<td>9.0</td>
</tr>
<tr>
<td>24-35 months</td>
<td>159</td>
<td>8.9</td>
</tr>
<tr>
<td>36-47 months</td>
<td>145</td>
<td>9.5</td>
</tr>
<tr>
<td>48-59 months</td>
<td>139</td>
<td>14.3</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 25
Distribution of Underweight children 0-4 years (Low Weight for Age) by District
2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>80</td>
<td>3.4</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>115</td>
<td>7.8</td>
</tr>
<tr>
<td>Belize</td>
<td>169</td>
<td>6.1</td>
</tr>
<tr>
<td>Cayo</td>
<td>178</td>
<td>5.9</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>68</td>
<td>8.7</td>
</tr>
<tr>
<td>Toledo</td>
<td>111</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Country</strong></td>
<td><strong>721</strong></td>
<td><strong>7.3</strong></td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table No. 26
Distribution of children Underweight children 0-4 years (Low Weight for Age) by Urban Rural Areas
2002 LSMS

<table>
<thead>
<tr>
<th>Areas</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>327</td>
<td>5.5</td>
</tr>
<tr>
<td>Rural</td>
<td>394</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 27
Distribution of Underweight children 0-4 years (LW/A) by Ethnicity
2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>157</td>
<td>4.5</td>
</tr>
<tr>
<td>Garifuna</td>
<td>23</td>
<td>17.2</td>
</tr>
<tr>
<td>Maya</td>
<td>114</td>
<td>13.8</td>
</tr>
<tr>
<td>Mestizo</td>
<td>383</td>
<td>6.9</td>
</tr>
<tr>
<td>Others</td>
<td>44</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 28
Distribution of Underweight children 0-4 years (LW/A) by Quintile
2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>208</td>
<td>11.3</td>
</tr>
<tr>
<td>2</td>
<td>157</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>7.1</td>
</tr>
<tr>
<td>4</td>
<td>131</td>
<td>5.8</td>
</tr>
<tr>
<td>5</td>
<td>90</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 29
Distribution of Underweight children 0-4 years (LW/A) by Sex
2002 LSMS

<table>
<thead>
<tr>
<th>Sex</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>358</td>
<td>5.8</td>
</tr>
<tr>
<td>Female</td>
<td>363</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 30
Distribution of Underweight children 0-4 years (LW/A) by Age Group
2002 LSMS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>119</td>
<td>5.2</td>
</tr>
<tr>
<td>12-23 months</td>
<td>159</td>
<td>6.2</td>
</tr>
<tr>
<td>24-35 months</td>
<td>159</td>
<td>7.4</td>
</tr>
<tr>
<td>36-47 months</td>
<td>145</td>
<td>7.4</td>
</tr>
<tr>
<td>48-59 months</td>
<td>139</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 31
Vaccination coverage of children 1-4 years by Age Group
2002 LSMS

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>1y</th>
<th>2y</th>
<th>3y</th>
<th>4y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage receiving 3 or more doses of OPV</td>
<td>65.3</td>
<td>76.2</td>
<td>90.9</td>
<td>80.5</td>
</tr>
<tr>
<td>Percentage receiving 3 or more doses of DPT</td>
<td>71.9</td>
<td>77.2</td>
<td>88.6</td>
<td>80.5</td>
</tr>
<tr>
<td>Percentage receiving BCG</td>
<td>96.2</td>
<td>92.8</td>
<td>100</td>
<td>91.6</td>
</tr>
<tr>
<td>Percentage vaccinated against Measles</td>
<td>86.4</td>
<td>83.4</td>
<td>94.3</td>
<td>92.2</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 32
Percentage of children 0-4 whose mother, father, both lives in the household by District, 2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Mother n=956</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corozal</td>
<td>95.5</td>
<td>69.7</td>
<td>70.8</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>95.7</td>
<td>82.0</td>
<td>79.9</td>
</tr>
<tr>
<td>Belize</td>
<td>96.7</td>
<td>67.8</td>
<td>66.9</td>
</tr>
<tr>
<td>Cayo</td>
<td>90.8</td>
<td>74.2</td>
<td>73.8</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>98.7</td>
<td>74.0</td>
<td>72.8</td>
</tr>
<tr>
<td>Toledo</td>
<td>94.9</td>
<td>83.1</td>
<td>82.3</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 33
Percentage of children 0-4 whose mother, father, both lives in the household by Quintile, 2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Mother n=956</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27.4</td>
<td>26.6</td>
<td>26.5</td>
</tr>
<tr>
<td>2</td>
<td>20.4</td>
<td>21.4</td>
<td>21.2</td>
</tr>
<tr>
<td>3</td>
<td>20.5</td>
<td>19.2</td>
<td>19.4</td>
</tr>
<tr>
<td>4</td>
<td>17.2</td>
<td>17.9</td>
<td>17.9</td>
</tr>
<tr>
<td>5</td>
<td>14.5</td>
<td>14.9</td>
<td>14.9</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table 34
Percentage of children 0-4 whose mother, both parents lives in the household by Mother Education Level, 2002 LSMS

<table>
<thead>
<tr>
<th>Mother education level</th>
<th>Mother n=956</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>6.9</td>
<td>7.5</td>
</tr>
<tr>
<td>Primary</td>
<td>60.4</td>
<td>60.6</td>
</tr>
<tr>
<td>Secondary</td>
<td>22.2</td>
<td>21.9</td>
</tr>
<tr>
<td>Tertiary</td>
<td>8.3</td>
<td>7.3</td>
</tr>
<tr>
<td>University</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Other</td>
<td>1.0</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table 35
Percentage of children 0-4 whose father, both parents lives in the household by Father Education Level, 2002 LSMS

<table>
<thead>
<tr>
<th>Father education level</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>6.7</td>
<td>6.3</td>
</tr>
<tr>
<td>Primary</td>
<td>60.9</td>
<td>61.3</td>
</tr>
<tr>
<td>Secondary</td>
<td>19.5</td>
<td>19.3</td>
</tr>
<tr>
<td>Tertiary</td>
<td>8.3</td>
<td>8.4</td>
</tr>
<tr>
<td>University</td>
<td>3.8</td>
<td>3.8</td>
</tr>
<tr>
<td>Other</td>
<td>0.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 36
Percentage of children 0-4 whose mother, father, both lives in the household by Ethnicity, 2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Mother n=956</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creole</td>
<td>26.5</td>
<td>21.1</td>
<td>21.2</td>
</tr>
<tr>
<td>Garifuna</td>
<td>3.1</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Maya</td>
<td>14.2</td>
<td>16.4</td>
<td>16.4</td>
</tr>
<tr>
<td>Mestizo</td>
<td>49.7</td>
<td>53.4</td>
<td>53.0</td>
</tr>
<tr>
<td>Other</td>
<td>6.5</td>
<td>7.0</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
### Table No. 37

Percentage of children 0-4 whose mother, father, both lives in the household by Urban and Rural areas, 2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Mother n=956</th>
<th>Father n=744</th>
<th>Both Parents n=736</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>49.5</td>
<td>46.5</td>
<td>46.2</td>
</tr>
<tr>
<td>Rural</td>
<td>50.5</td>
<td>53.5</td>
<td>53.8</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 38

Percentage of children with reported morbidity in the last 30 days by District by Age, 2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Percentage of Children total and by age</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corozal</td>
<td>34</td>
<td>38.2</td>
<td>41.1</td>
<td>60</td>
<td>25.0</td>
<td>42.9</td>
<td>9.1</td>
</tr>
<tr>
<td>Orange Walk</td>
<td>35</td>
<td>25.2</td>
<td>28.6</td>
<td>36.4</td>
<td>30.8</td>
<td>13.8</td>
<td>16.7</td>
</tr>
<tr>
<td>Belize</td>
<td>96</td>
<td>28.9</td>
<td>25.6</td>
<td>31.7</td>
<td>24.6</td>
<td>34.5</td>
<td>29.6</td>
</tr>
<tr>
<td>Cayo</td>
<td>62</td>
<td>27.0</td>
<td>33.3</td>
<td>22.0</td>
<td>36.2</td>
<td>24.0</td>
<td>16.7</td>
</tr>
<tr>
<td>Stann Creek</td>
<td>40</td>
<td>49.4</td>
<td>50</td>
<td>53.6</td>
<td>50.00</td>
<td>42.9</td>
<td>46.2</td>
</tr>
<tr>
<td>Toledo</td>
<td>48</td>
<td>35.3</td>
<td>40</td>
<td>44.4</td>
<td>37.0</td>
<td>28.0</td>
<td>21.7</td>
</tr>
<tr>
<td>Country</td>
<td>315</td>
<td>31.3</td>
<td>32.1</td>
<td>38.0</td>
<td>32.1</td>
<td>29.5</td>
<td>23.7</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

### Table No. 39

Percentage of children with reported morbidity in the last 30 days by Urban-Rural areas by Age, 2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Percentage of Children total and by age</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>177</td>
<td>35.5</td>
<td>34.7</td>
<td>40.4</td>
<td>33.7</td>
<td>35.5</td>
<td>33.0</td>
</tr>
<tr>
<td>Rural</td>
<td>138</td>
<td>27.2</td>
<td>29.6</td>
<td>35.7</td>
<td>30.6</td>
<td>23.7</td>
<td>14.0</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 40
Percentage of children with reported morbidity in the last 30 days by Sex, by Age, 2002 LSMS

<table>
<thead>
<tr>
<th>District</th>
<th>Percentage of Children total and by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>Male</td>
<td>158</td>
</tr>
<tr>
<td>Female</td>
<td>157</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 41
Percentage of children with reported morbidity in the last 30 days by Ethnicity, by Age, 2002 LSMS

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Children total, by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>Creole</td>
<td>85</td>
</tr>
<tr>
<td>Garifuna</td>
<td>15</td>
</tr>
<tr>
<td>Maya</td>
<td>60</td>
</tr>
<tr>
<td>Mestizo</td>
<td>137</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 42
Percentage of children with reported morbidity in the last 30 days by Quintile, by Age 2002 LSMS

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Children total, by age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>No.</td>
</tr>
<tr>
<td>1</td>
<td>81</td>
</tr>
<tr>
<td>2</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>66</td>
</tr>
<tr>
<td>4</td>
<td>71</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize

Table No. 43
Mean Cost of visit by type of facility visited 2002 LSMS

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Total</th>
<th>&lt;1</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Private Facility</td>
<td>49.74</td>
<td>52.58</td>
<td>42.06</td>
<td>47.26</td>
<td>73.74</td>
<td>41.67</td>
</tr>
<tr>
<td>Local Public Facility</td>
<td>3.30</td>
<td>5.98</td>
<td>2.74</td>
<td>2.42</td>
<td>1.45</td>
<td>4.49</td>
</tr>
<tr>
<td>Health Facility Abroad</td>
<td>47.81</td>
<td>0.00</td>
<td>80.51</td>
<td>0.00</td>
<td>0.00</td>
<td>25.61</td>
</tr>
<tr>
<td>Traditional Healer</td>
<td>2.78</td>
<td>0.00</td>
<td>3.98</td>
<td>1.13</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize
Table No. 44
Rating of Quality of Service to Children 0-4 years
2002 LSMS

<table>
<thead>
<tr>
<th>Type of Facility / satisfaction</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local Private</strong></td>
<td></td>
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<tr>
<td>Satisfied</td>
<td>138</td>
<td>67.3</td>
</tr>
<tr>
<td>Very Satisfied</td>
<td>57</td>
<td>27.8</td>
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<tr>
<td>Other</td>
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<td>4.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>205</td>
<td>100</td>
</tr>
<tr>
<td><strong>Local Public</strong></td>
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<td></td>
</tr>
<tr>
<td>Satisfied</td>
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<td>68.3</td>
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<tr>
<td>Very Satisfied</td>
<td>125</td>
<td>23.1</td>
</tr>
<tr>
<td>Other</td>
<td>46</td>
<td>8.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>540</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Central Statistical Office, Belize