CHAPTER 9

INFANT FEEDING, CHILDHOOD AND MATERNAL NUTRITION

This chapter covers two related topics: infant feeding (including initiation of breastfeeding, patterns and duration of breastfeeding, and introduction of complementary weaning foods) and nutritional status of young children and their mothers. Height and weight measurements of the respondent’s children under the age of five years and those of the mother were taken to determine their nutritional status.

9.1 Breastfeeding and Supplementation

Infant feeding has an impact on both the child and the mother. Feeding practices are important determinants of children’s nutritional status, and many studies have shown the beneficial effects of breastfeeding on nutritional status, morbidity, and mortality of young infants. Exclusive breastfeeding (i.e., only breast milk) is recommended during the first 4-6 months of a child’s life because it limits exposure to disease agents as well as providing all of the nutrients a baby requires. Breastfeeding also has an indirect effect on the postpartum fecundity of mothers. In particular, more frequent breastfeeding is associated with longer periods of postpartum amenorrhea, which in turn are related to longer birth intervals, and thus lower fertility levels.

Prevalence of Breastfeeding

Table 9.1 shows the proportion of children born in the five years before the survey who were ever breastfed and the percentage who started breastfeeding within one hour and one day of birth. Almost all Bangladeshi children (97 percent) are breastfed for some period of time, regardless of background characteristics of the child or the mother. Previous research confirms the universality of breastfeeding in Bangladesh (Mitra et al., 1994:116).

An important dimension related to breastfeeding is the timing of its initiation. Early initiation of breastfeeding is beneficial for mothers and children. From the mother’s perspective, early suckling stimulates the release of a hormone that helps the uterus to contract. From the child’s perspective, the first breast milk (colostrum) is important, since it is rich in antibodies. In Bangladesh, although almost all babies are breastfed at some time, only 13 percent are put to the breast within one hour of birth and less than half (45 percent) of children are put to the breast within the first day of life. Infants born to urban mothers, those in Sylhet Division, those whose mothers have some secondary education, and those born in a health facility with medically trained assistance have a slightly greater chance of receiving breast milk within the first day of life.

Timing of Introduction of Supplementary Foods

The timing of introduction of complementary foods in addition to breast milk has important implications for the child and the mother. Breast milk is uncontaminated and contains all the nutrients needed by children in the first few months of life. In addition, it provides some immunity to disease through the mother’s antibodies. Early supplementation, especially under unhygienic conditions, can result in infection with foreign organisms and lower immunity to disease. The timing of introduction of food supplements also has an impact on the length of the mother’s postpartum amenorrhea. Early initiation of supplementation results in earlier resumption of the mother’s menstrual periods, since supplementation reduces infants’ dependence on breast milk and the frequency of suckling.
Table 9.1: Initial breastfeeding

Percentage of children born in the five years preceding the survey who were ever breastfed, and the percentage who started breastfeeding within one hour of birth and within one day of birth, by selected background characteristics, Bangladesh 1996-97

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Percentage who started breastfeeding:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage ever breastfed</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>95.8</td>
</tr>
<tr>
<td>Female</td>
<td>97.5</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>96.4</td>
</tr>
<tr>
<td>Rural</td>
<td>96.7</td>
</tr>
<tr>
<td>Division</td>
<td></td>
</tr>
<tr>
<td>Barisal</td>
<td>97.2</td>
</tr>
<tr>
<td>Chittagong</td>
<td>97.8</td>
</tr>
<tr>
<td>Dhaka</td>
<td>96.0</td>
</tr>
<tr>
<td>Khulna</td>
<td>96.4</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>96.1</td>
</tr>
<tr>
<td>Sylhet</td>
<td>96.5</td>
</tr>
<tr>
<td>Mother's education</td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>96.6</td>
</tr>
<tr>
<td>Primary incomplete</td>
<td>96.2</td>
</tr>
<tr>
<td>Primary complete</td>
<td>96.5</td>
</tr>
<tr>
<td>Secondary/Higher</td>
<td>97.3</td>
</tr>
<tr>
<td>Assistance at delivery</td>
<td></td>
</tr>
<tr>
<td>Health professional</td>
<td>94.5</td>
</tr>
<tr>
<td>Traditional midwife</td>
<td>96.9</td>
</tr>
<tr>
<td>Other or none</td>
<td>96.7</td>
</tr>
<tr>
<td>Place of delivery</td>
<td></td>
</tr>
<tr>
<td>Health facility</td>
<td>93.1</td>
</tr>
<tr>
<td>At home</td>
<td>96.8</td>
</tr>
<tr>
<td>All children</td>
<td>96.6</td>
</tr>
</tbody>
</table>

Note: Total includes 13 children for whom information on assistance at delivery is missing and 60 children for whom information on place of delivery is missing.

Mothers were asked about the current breastfeeding status of all children under age five and, if the child was being breastfed, whether various types of liquid or solid foods had been given to the child "yesterday" or "last night." Children who are exclusively breastfed are defined as receiving breast milk only, while full breastfeeding is defined as receiving breast milk and plain water only.

The results shown in Table 9.2 indicate that babies are breastfed for a long time; even among children 12-13 months old, 97 percent are still receiving breast milk. However, the data indicate that supplementation of breast milk with other liquids and foods begins early in Bangladesh. Among newborns less than two months of age, most are either exclusively breastfed (57 percent) or fully breastfed (12 percent); however, 30 percent of these very young babies are already receiving complementary foods or liquids. Among those age 2-3 months, one-third are being given supplements.
Table 9.2 Breastfeeding status
Percent distribution of living children by current breastfeeding status, according to child's current age in months, Bangladesh 1996-97

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Not breastfeeding</th>
<th>Exclusively breastfed</th>
<th>Plain water only</th>
<th>Supplements</th>
<th>Total</th>
<th>Number of living children</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>1.1</td>
<td>57.0</td>
<td>12.3</td>
<td>29.6</td>
<td>100.0</td>
<td>185</td>
</tr>
<tr>
<td>2-3</td>
<td>0.5</td>
<td>46.4</td>
<td>19.5</td>
<td>33.6</td>
<td>100.0</td>
<td>252</td>
</tr>
<tr>
<td>4-5</td>
<td>0.6</td>
<td>31.3</td>
<td>12.8</td>
<td>55.2</td>
<td>100.0</td>
<td>184</td>
</tr>
<tr>
<td>6-7</td>
<td>2.3</td>
<td>9.0</td>
<td>17.4</td>
<td>71.2</td>
<td>100.0</td>
<td>168</td>
</tr>
<tr>
<td>8-9</td>
<td>2.1</td>
<td>7.2</td>
<td>23.5</td>
<td>72.3</td>
<td>100.0</td>
<td>179</td>
</tr>
<tr>
<td>10-11</td>
<td>2.6</td>
<td>4.3</td>
<td>17.3</td>
<td>75.6</td>
<td>100.0</td>
<td>213</td>
</tr>
<tr>
<td>12-13</td>
<td>2.7</td>
<td>2.7</td>
<td>11.2</td>
<td>83.4</td>
<td>100.0</td>
<td>202</td>
</tr>
<tr>
<td>14-15</td>
<td>3.3</td>
<td>2.2</td>
<td>10.3</td>
<td>84.2</td>
<td>100.0</td>
<td>235</td>
</tr>
<tr>
<td>16-17</td>
<td>6.0</td>
<td>0.0</td>
<td>7.4</td>
<td>86.7</td>
<td>100.0</td>
<td>171</td>
</tr>
<tr>
<td>18-19</td>
<td>6.7</td>
<td>0.4</td>
<td>5.7</td>
<td>87.2</td>
<td>100.0</td>
<td>153</td>
</tr>
<tr>
<td>20-21</td>
<td>3.9</td>
<td>0.7</td>
<td>3.5</td>
<td>90.8</td>
<td>100.0</td>
<td>157</td>
</tr>
<tr>
<td>22-23</td>
<td>15.4</td>
<td>0.0</td>
<td>6.0</td>
<td>78.6</td>
<td>100.0</td>
<td>164</td>
</tr>
<tr>
<td>24-25</td>
<td>24.3</td>
<td>0.5</td>
<td>4.2</td>
<td>71.0</td>
<td>100.0</td>
<td>250</td>
</tr>
<tr>
<td>26-27</td>
<td>34.0</td>
<td>0.6</td>
<td>1.3</td>
<td>64.1</td>
<td>100.0</td>
<td>204</td>
</tr>
<tr>
<td>28-29</td>
<td>33.6</td>
<td>0.8</td>
<td>1.7</td>
<td>63.9</td>
<td>100.0</td>
<td>155</td>
</tr>
<tr>
<td>30-31</td>
<td>43.5</td>
<td>0.0</td>
<td>1.3</td>
<td>55.1</td>
<td>100.0</td>
<td>159</td>
</tr>
<tr>
<td>32-33</td>
<td>41.6</td>
<td>0.4</td>
<td>1.3</td>
<td>57.0</td>
<td>100.0</td>
<td>160</td>
</tr>
<tr>
<td>34-35</td>
<td>44.8</td>
<td>0.0</td>
<td>2.5</td>
<td>52.7</td>
<td>100.0</td>
<td>197</td>
</tr>
<tr>
<td>36-37</td>
<td>64.7</td>
<td>0.0</td>
<td>0.5</td>
<td>34.8</td>
<td>100.0</td>
<td>253</td>
</tr>
<tr>
<td>38-39</td>
<td>72.6</td>
<td>0.5</td>
<td>0.6</td>
<td>26.3</td>
<td>100.0</td>
<td>209</td>
</tr>
<tr>
<td>40-41</td>
<td>84.1</td>
<td>0.0</td>
<td>0.0</td>
<td>15.9</td>
<td>100.0</td>
<td>161</td>
</tr>
<tr>
<td>0-3 months</td>
<td>0.8</td>
<td>50.9</td>
<td>16.4</td>
<td>31.9</td>
<td>100.0</td>
<td>437</td>
</tr>
<tr>
<td>4-6 months</td>
<td>1.1</td>
<td>24.8</td>
<td>14.6</td>
<td>59.5</td>
<td>100.0</td>
<td>276</td>
</tr>
<tr>
<td>7-9 months</td>
<td>2.2</td>
<td>6.8</td>
<td>21.4</td>
<td>69.6</td>
<td>100.0</td>
<td>255</td>
</tr>
</tbody>
</table>

Note: Breastfeeding status refers to preceding 24 hours. Children classified as breastfeeding and plain water only receive no supplements.

Among older children, it is the lack of complementary feeding that is a problem. Among children age 10-11 months—when supplements other than breast milk are generally considered necessary for adequate nutrition—the data show that one-fifth of children are being given only breast milk or breast milk and water.

Duration of Breastfeeding

Data on the median duration and frequency of breastfeeding are presented in Table 9.3. The estimates of mean and median duration of breastfeeding are based on current status data, that is, the proportion of children born in the four years before the survey who were being breastfed at the time of the survey, as opposed to retrospective data on the length of breastfeeding of older children who are no longer breastfed. The prevalence/incidence mean is also provided for possible comparison with other data sources.

The median duration of breastfeeding in Bangladesh is 33 months, with no major variations by background characteristics (Figure 9.1). The only exception is that babies in Chittagong Division are breastfed for shorter durations (median of 25 months) than those in Khulna and Rajshahi Divisions (36 and 35 months, respectively).
Table 9.3 Median duration and frequency of breastfeeding

Median duration of any breastfeeding, exclusive breastfeeding, and full breastfeeding among children under four years of age, and the percentage of children under six months of age who were breastfed six or more times in the 24 hours preceding the interview, according to background characteristics, Bangladesh 1996-97

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Any breastfeeding</th>
<th>Exclusive breastfeeding</th>
<th>Full breastfeeding</th>
<th>Children under 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median duration in months</td>
<td>Number of children 6+ times in 24 hours</td>
<td>Number of children under 4 years of age</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>33.7</td>
<td>1.4</td>
<td>3.3</td>
<td>2,173</td>
</tr>
<tr>
<td>Female</td>
<td>31.7</td>
<td>1.6</td>
<td>4.3</td>
<td>2,204</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>32.8</td>
<td>1.5</td>
<td>3.5</td>
<td>387</td>
</tr>
<tr>
<td>Rural</td>
<td>32.8</td>
<td>1.5</td>
<td>3.8</td>
<td>3,990</td>
</tr>
<tr>
<td>Division</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barisal</td>
<td>29.6</td>
<td>0.7</td>
<td>1.7</td>
<td>286</td>
</tr>
<tr>
<td>Chittagong</td>
<td>24.6</td>
<td>2.8</td>
<td>5.1</td>
<td>1,080</td>
</tr>
<tr>
<td>Dhaka</td>
<td>33.0</td>
<td>0.7</td>
<td>3.0</td>
<td>1,351</td>
</tr>
<tr>
<td>Khulna</td>
<td>35.5</td>
<td>0.6</td>
<td>0.7</td>
<td>423</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>35.4</td>
<td>2.5</td>
<td>3.5</td>
<td>925</td>
</tr>
<tr>
<td>Sylhet</td>
<td>29.0</td>
<td>1.9</td>
<td>4.3</td>
<td>311</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>33.4</td>
<td>1.9</td>
<td>4.4</td>
<td>2,481</td>
</tr>
<tr>
<td>Primary incomplete</td>
<td>34.0</td>
<td>1.8</td>
<td>3.1</td>
<td>735</td>
</tr>
<tr>
<td>Primary complete</td>
<td>27.6</td>
<td>0.7</td>
<td>1.0</td>
<td>445</td>
</tr>
<tr>
<td>Secondary+</td>
<td>29.5</td>
<td>1.2</td>
<td>3.6</td>
<td>717</td>
</tr>
<tr>
<td>Assistance at delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health professional</td>
<td>31.1</td>
<td>0.5</td>
<td>0.6</td>
<td>364</td>
</tr>
<tr>
<td>Traditional midwife</td>
<td>32.5</td>
<td>1.7</td>
<td>3.7</td>
<td>2,831</td>
</tr>
<tr>
<td>Other or none</td>
<td>33.5</td>
<td>1.9</td>
<td>4.5</td>
<td>1,178</td>
</tr>
<tr>
<td>Total</td>
<td>32.8</td>
<td>1.5</td>
<td>3.7</td>
<td>4,377</td>
</tr>
<tr>
<td>Mean</td>
<td>29.9</td>
<td>3.7</td>
<td>6.6</td>
<td>-</td>
</tr>
<tr>
<td>Prevalence/Incidence³</td>
<td>24.9</td>
<td>2.7</td>
<td>5.3</td>
<td>-</td>
</tr>
</tbody>
</table>

1 Medians and means are based on current status
2 Either exclusive breastfeeding or breastfeeding and plain water only
3 Prevalence-incidence mean

There has been an apparent decline in the median duration of breastfeeding since 1993-94 when it was over 36 months (Mitra et al., 1994:120). It should be noted that although the medians are calculated from smoothed data, they are still dependent on the point at which the proportions breastfeeding dip below 50 percent and are therefore somewhat volatile. Thus, although some decline in breastfeeding duration is no doubt real, it may not be as rapid as it appears.

The early introduction of supplements is reflected in the short duration of exclusive breastfeeding (median duration of 2 months). Few children who are supplemented receive only plain water in addition to breast milk and thus, the median duration of full breastfeeding is also quite short (4 months).
The duration of postpartum amenorrhea is affected by both the length of time spent breastfeeding and the frequency of breastfeeding. The child's health and nutritional status are also affected by the frequency of breastfeeding. Almost all children under the age of six months (97 percent) were reported to have been breastfed at least six times in the 24 hours preceding the survey. Differences among subgroups are minor.

9.2 Children's Nutritional Status

In addition to questions about breastfeeding and weaning foods, the 1996-97 BDHS included an anthropometric component, in which all children under five and their mothers were both weighed and measured. Each interviewing team carried two scales and one measuring board. The scales were lightweight, bathroom-type scales with a digital screen designed and manufactured under the authority of UNICEF, which generously assisted the survey organizers with their importation into Bangladesh. The boards were manufactured in Dhaka with assistance from staff at the Dhaka office of Helen Keller International. Children younger than 24 months were measured lying down on the board (recumbent length), while standing height was measured for older children.

Evaluation of nutritional status is based on the rationale that in a well-nourished population, there is a statistically predictable distribution of children of a given age with respect to height and weight. In any large population, there is variation in height and weight; this variation approximates a normal distribution. Use of a standard reference population as a point of comparison facilitates the examination of differences in the anthropometric status of subgroups in a population and of changes in nutritional status over time. One of the most commonly used reference populations, and the one used in this report, is the U.S. National Center for Health Statistics (NCHS) standard, which is recommended for use by the World Health Organization (WHO).
Three standard indices of physical growth that describe the nutritional status of children are presented:

- Height-for-age (stunting)
- Weight-for-height (wasting)
- Weight-for-age (underweight)

Each of these indices gives different information about growth and body composition that can be used to assess nutritional status.

Height-for-age is a measure of linear growth. A child who is below minus two standard deviations (-2 SD) from the median of the NCHS reference population in terms of height-for-age is considered short for his/her age, or stunted, a condition reflecting the cumulative effect of chronic malnutrition. If the child is below minus three standard deviations (-3 SD) from the reference median, then the child is considered to be severely stunted. A child between -2 SD and -3 SD is considered to be moderately stunted. Stunting reflects failure to receive adequate nutrition over a long period of time and may also be caused by recurrent and chronic illness. Height-for-age, therefore, represents a measure of the long-term effects of malnutrition in a population and does not vary appreciably according to the season of data collection. Stunted children are not immediately obvious in a population; a stunted three-year-old child could look like a well-fed two-year-old.

Weight-for-height measures body mass in relation to body length and describes current nutritional status. A child who is below minus two standard deviations (-2 SD) from the reference median for weight-for-height is considered to be too thin for his/her height, or wasted, a condition reflecting acute malnutrition. Wasting represents the failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of inadequate food intake or recent episodes of illness causing loss of weight and the onset of malnutrition. As with stunting, wasting is considered severe if the child is more than three standard deviations below the reference mean. Severe wasting is closely linked to an elevated risk of mortality. Prevalence of wasting may vary considerably by season; data from Helen Keller International indicate that acute malnutrition is most pronounced in August-October in Bangladesh and least severe in December-February, just after the main harvest (HKI, n.d.).

Weight-for-age is a composite index of height-for-age and weight-for-height and, thus, does not distinguish between acute malnutrition (wasting) and chronic malnutrition (stunting). A child can be underweight for his age because he is stunted, wasted or both. Weight-for-age is a useful tool in clinical settings for continuous assessment of nutritional progress and growth. Children whose weight-for-age is below minus two standard deviations from the median of the reference population are classified as underweight. In the reference population, only 2.3 percent of children fall below minus two standard deviations (-2 SD) for each of these three indices.

In the survey, all surviving children born since April 1991 were eligible for height and weight measurement. Of the 5,654 children eligible for measurement (age 0-59 months at the time of the survey), 85 percent were weighed and measured. The reason most commonly reported for not measuring a child was that the child was not at home. Of the children who were both weighed and measured, 6 percent were considered to have implausibly low or high values for height-for-age or weight-for-height. The following analysis focuses on the 4,787 children age 0-59 months for whom complete and plausible anthropometric data were collected. Table 9.4 shows the percentage of children who are classified as malnourished according to height-for-age, weight-for-height, and weight-for-age indices, by the child’s age and selected background characteristics.
### Table 9.4: Nutritional status of children by demographic characteristics

Percentage of children under five years of age who are classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height, and weight-for-age, by demographic characteristics, Bangladesh 1996-97

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>Height-for-age (stunting)</th>
<th>Weight-for-height (wasting)</th>
<th>Weight-for-age (underweight)</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage below -3 SD</td>
<td>Percentage below -2 SD</td>
<td>Percentage below -3 SD</td>
<td>Percentage below -2 SD</td>
</tr>
<tr>
<td>Age of child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 6 months</td>
<td>2.6</td>
<td>14.0</td>
<td>4.7</td>
<td>11.7</td>
</tr>
<tr>
<td>6-11 months</td>
<td>8.0</td>
<td>30.9</td>
<td>6.3</td>
<td>20.7</td>
</tr>
<tr>
<td>12-23 months</td>
<td>31.8</td>
<td>60.6</td>
<td>6.1</td>
<td>29.4</td>
</tr>
<tr>
<td>24-35 months</td>
<td>34.4</td>
<td>60.2</td>
<td>3.3</td>
<td>15.9</td>
</tr>
<tr>
<td>36-47 months</td>
<td>34.3</td>
<td>65.3</td>
<td>2.2</td>
<td>13.3</td>
</tr>
<tr>
<td>48-59 months</td>
<td>34.7</td>
<td>64.9</td>
<td>1.4</td>
<td>14.0</td>
</tr>
<tr>
<td>Sex of child</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>26.7</td>
<td>54.3</td>
<td>3.9</td>
<td>18.6</td>
</tr>
<tr>
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<td>3.6</td>
<td>17.1</td>
</tr>
<tr>
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<td>53.7</td>
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</tr>
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<td>4-5</td>
<td>29.9</td>
<td>58.6</td>
<td>4.0</td>
<td>18.2</td>
</tr>
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<td>6+</td>
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<td>63.3</td>
<td>5.5</td>
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<td>Birth interval</td>
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</tr>
<tr>
<td>First birth</td>
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<td>17.1</td>
</tr>
<tr>
<td>&lt; 24 months</td>
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<td>62.0</td>
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<td>17.1</td>
</tr>
<tr>
<td>24-47</td>
<td>31.7</td>
<td>59.4</td>
<td>3.5</td>
<td>17.9</td>
</tr>
<tr>
<td>48+</td>
<td>23.4</td>
<td>49.5</td>
<td>4.2</td>
<td>18.6</td>
</tr>
<tr>
<td>All children</td>
<td>28.0</td>
<td>54.6</td>
<td>3.7</td>
<td>17.7</td>
</tr>
</tbody>
</table>

Note: Figures are for children born in the period 0-59 months preceding the survey. Each index is expressed in terms of the number of standard deviation (SD) units from the median of the NCHS/CDC/WHO international reference population. Children are classified as malnourished if their z-scores are below minus two or minus three standard deviations (-2 SD or -3 SD) from the median of the reference population.

*1 Includes children who are below -3 SD

Just over half (55 percent) of children under five are considered to be short for their age or stunted, while 28 percent are severely stunted (<-3 SD). The figures are high and suggest chronic food insecurity and/or repeated illnesses. Stunting is evident even among children under age 6 months (14 percent) (Figure 9.2). The prevalence of stunting increases as children get older, up to a high of 65 percent among three- and four-year-old children. Prevalence of stunting varies little by sex of the child; however, it rises with birth order. Stunting is also related to the length of the preceding birth interval; children born less than 24 months after a prior birth are considerably more likely to be stunted (62 percent) than those born after an interval of 48 months or more (50 percent).

Eighteen percent of children under five are underweight for their height, or wasted, and 4 percent are severely wasted. Wasting is highest for children age 12-23 months. Variations in the level of wasting by other demographic characteristics of the child are minimal.
Fifty-six percent of the children are considered to be underweight (low weight-for-age) and 21 percent are classified as severely underweight. As with the other two nutrition indicators, children under 6 months are least likely to be underweight, probably due to the positive effects of breastfeeding. After 6 months of age, the proportion of children who are underweight rises substantially to 65 percent among those 12-23 months and remains at 62 percent among older children. The likelihood of being underweight varies little by sex of the child, but rises with birth order and diminishes with length of the previous birth interval.

Data on these same three indicators are presented in Table 9.5 by background characteristics of the children. A much higher percentage of children in rural areas are stunted, wasted, and underweight than in urban areas. For example, 56 percent of rural children are stunted, compared with 39 percent of urban children (Figure 9.3). Differences by division show that children in Sylhet Division are somewhat more likely and those in Khulna Division somewhat less likely to be malnourished. As expected, children of more educated mothers are less likely to be either stunted or underweight; proportions wasted show little difference by education of mother.

Few other sources of nationally representative data on children's nutrition status exist in Bangladesh. Data from the 1992 Child Nutrition Survey show that 46 percent of children age 6-71 months are stunted and 7 percent are wasted; however, it is unclear what definitions were used (BBS, 1997b:22). Data from Helen Keller International’s Nutritional Surveillance Project—although not nationally representative—are collected routinely from some 16,000 rural children in 41 thanas. In 1996, they show average levels of stunting (i.e., < -2 SD) of 60 percent among rural children age 6-59 months (HKI, 1996). Although this is higher than the level of 56 percent for rural children found in the BDHS, the two sources would be closer if the surveillance data included children under 6 months, who are less likely to be stunted. The average wasting rate from the surveillance project was 11 percent in December 1996, lower than the BDHS level of 18 percent for rural children.
Table 9.5 Nutritional status of children by background characteristics

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Height-for-age (stunting)</th>
<th>Weight-for-height (wasting)</th>
<th>Weight-for-age (underweight)</th>
<th>Number of children</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percentage below -3 SD</td>
<td>Percentage below -2 SD¹</td>
<td>Percentage below -3 SD</td>
<td>Percentage below -2 SD¹</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>16.9</td>
<td>39.4</td>
<td>1.7</td>
<td>14.2</td>
</tr>
<tr>
<td>Rural</td>
<td>29.2</td>
<td>56.2</td>
<td>3.9</td>
<td>21.3</td>
</tr>
<tr>
<td>Division</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barisal</td>
<td>31.4</td>
<td>59.9</td>
<td>3.7</td>
<td>18.9</td>
</tr>
<tr>
<td>Chittagong</td>
<td>31.5</td>
<td>54.4</td>
<td>5.1</td>
<td>25.2</td>
</tr>
<tr>
<td>Dhaka</td>
<td>28.6</td>
<td>55.8</td>
<td>3.3</td>
<td>21.5</td>
</tr>
<tr>
<td>Khulna</td>
<td>19.4</td>
<td>46.5</td>
<td>2.3</td>
<td>15.7</td>
</tr>
<tr>
<td>Rajshahi</td>
<td>23.4</td>
<td>53.4</td>
<td>3.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Sylhet</td>
<td>37.8</td>
<td>61.4</td>
<td>4.7</td>
<td>24.1</td>
</tr>
<tr>
<td>Mother's education</td>
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<td></td>
</tr>
<tr>
<td>No education</td>
<td>33.2</td>
<td>60.8</td>
<td>3.9</td>
<td>25.0</td>
</tr>
<tr>
<td>Primary incomplete</td>
<td>28.2</td>
<td>58.7</td>
<td>3.9</td>
<td>19.4</td>
</tr>
<tr>
<td>Primary complete</td>
<td>24.5</td>
<td>52.5</td>
<td>3.7</td>
<td>16.6</td>
</tr>
<tr>
<td>Secondary+</td>
<td>12.7</td>
<td>30.9</td>
<td>2.9</td>
<td>9.9</td>
</tr>
<tr>
<td>Total</td>
<td>28.0</td>
<td>54.6</td>
<td>3.7</td>
<td>20.6</td>
</tr>
</tbody>
</table>

Note: Figures are for children born in the period 0-59 months preceding the survey. Each index is expressed in terms of the number of standard deviation (SD) units from the median of the NCHS/CDC/WHO international reference population. Children are classified as malnourished if their z-scores are below minus two or minus three standard deviations (-2 SD or -3 SD) from the median of the reference population.

1 Includes children who are below -3 SD

9.3 Nutritional Status of Mothers

All mothers of children born since April 1991 were also weighed and measured. The objective was to determine the nutritional status of women of reproductive age. However, since weighing and measuring all women would add considerably to the length and cost of the fieldwork, it was decided to limit the anthropometric section to women with young children who would be measured anyway. Women were weighed and measured using the same scales and measuring boards used for the children. The information was used to construct the following indicators of mothers' nutritional status:

- Mean height (in centimeters)
- Body mass index.

Women who were pregnant at the time of the survey and those who had delivered a baby in the two months before the interview were excluded from the tables on weight and body mass index.

1 Interviewers were instructed to weigh and measure all women who had a birth since April 1991, regardless of whether or not the child was living.
Height is used to identify mothers at nutritional risk. Height of women can be used to predict the risk of difficulty in delivering children, given the association between height and size of the pelvis. Also, the risk of giving birth to low-weight newborns is higher among women of small stature. Although the cut-off point at which the mother can be considered at risk varies between populations, it probably falls in the range of 140-150 centimeters.

Indices of body mass are used to assess thinness or obesity. The most commonly used index is the body mass index or BMI (also referred to as the Quetelet index), which is defined as weight in kilograms divided by the square of the height in meters (kg/m²). The main advantage of the BMI is that it does not require a reference table from a well-nourished population. For the BMI, a cut-off point of 18.5 has been recommended for defining thinness, or acute malnutrition. Obesity has not been defined clearly in terms of the scale, though a BMI of 25.0 or above is usually considered obese.

Table 9.6 presents the mean height, body mass index (BMI), and Z-score for mothers by background characteristics. For each indicator, the proportion falling below the cut-off points is also presented. The average height of mothers in Bangladesh, 150 centimeters, is above the cut-off point of 145 centimeters; however, 17 percent of mothers are shorter than the cut-off point. Over half (52 percent) of mothers are acutely malnourished (i.e., BMI < 18.5). There are few differences in these indicators by background characteristics, except that more educated mothers tend to be slightly taller and heavier than less educated mothers. Also, a higher proportion of rural than urban mothers fall below the 18.5 cut-off for BMI.

The fact that half of Bangladeshi mothers can be considered acutely malnourished and almost one-fifth are so short as to increase the risk of difficult childbirth is one of the most disturbing findings from the survey. These levels are far higher than comparable data from other countries (see Figure 9.4).
Table 9.6. Nutritional status of mothers by background characteristics

Among mothers of children under five years, mean height and percentage of women shorter than 145 centimeters, mean body mass index (BMI) and the percentage of women whose BMI is less than 18.5 (kg/m²), by selected background characteristics, Bangladesh 1996-97

<table>
<thead>
<tr>
<th>Background characteristic</th>
<th>Height Mean</th>
<th>Percent &lt;145 cm</th>
<th>Number of women</th>
<th>BMI Mean</th>
<th>Percent &lt;18.5</th>
<th>Number of women</th>
<th>Z-score Mean</th>
<th>Below -2 SD</th>
<th>Number of women</th>
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<td></td>
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<tr>
<td>15-19</td>
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<td>18.7</td>
<td>762</td>
<td>18.6</td>
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<td>-1.5</td>
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<td>1,079</td>
<td>-1.7</td>
<td>41.4</td>
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<td>682</td>
<td>-1.7</td>
<td>37.1</td>
<td>676</td>
</tr>
<tr>
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<td>18.9</td>
<td>51.4</td>
<td>413</td>
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</tr>
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<td>20.0</td>
<td>37.7</td>
<td>701</td>
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<td>698</td>
</tr>
<tr>
<td>Total</td>
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<td>18.8</td>
<td>52.0</td>
<td>3,921</td>
<td>-1.7</td>
<td>39.5</td>
<td>3,877</td>
</tr>
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Note: Table includes only women who had a birth in the five years preceding the survey. The BMI index excludes pregnant women and those who are less than two months postpartum.

Figure 9.4

Percentage of Mothers Shorter Than 145 cm or with Low Body Mass Index (BMI), Selected Countries