# Chakaria Health and Demographic Surveillance System
## Focusing on the Poor and Vulnerable

## Demographic Events, Safe Motherhood and Infant Feeding Practices, and Care-seeking Behaviour for Malaria and Tuberculosis – 2010

Scientific Report No.116

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# CHAPTER 1

## Introduction

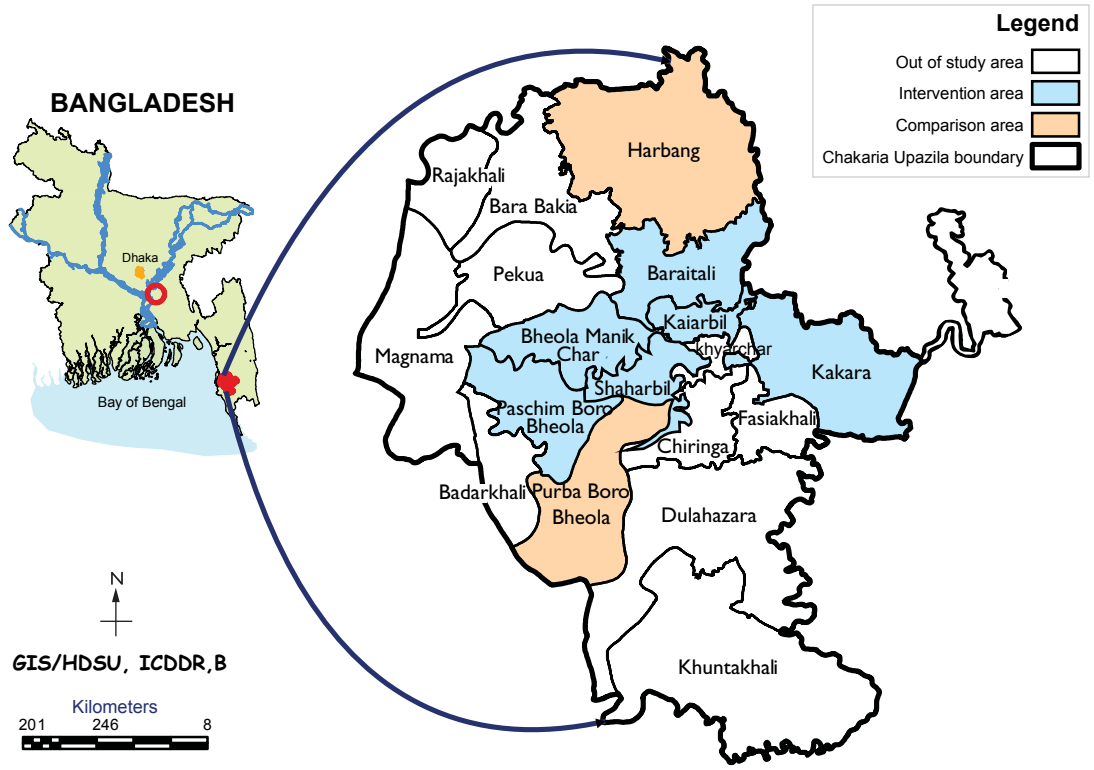
Chakaria is one of the 500 *upazilas* (sub-districts) in Bangladesh. It is located between latitudes 21°34′ and 21°55′ North and longitudes 91°54′ and 92°13′ East in the southeastern coast of the Bay of Bengal. Administratively, it is under Cox's Bazar district with an estimated population of 419,865 in 2010. The highway from Chittagong to Cox's Bazar passes through Chakaria. The east side of Chakaria is hilly, while on the west side towards the Bay of Bengal is lowland. A map showing the location of Chakaria is presented in Figure 1.

ICDDR,B started its activities in Chakaria in 1994. The focus of the activities has been to facilitate local initiatives for the improvement of health of the villagers in general and of children, women, and the poor in particular. Thus, the activities of the project have been participatory with emphasis on empowering the people by raising awareness about health, inducing positive preventive behaviour through health education, and providing technical assistance to any health initiatives taken by the village-based indigenous self-help organizations. Some major initiatives taken by the villagers included assessment of health needs, defining actions for health, implementing them, and monitoring their implementation and outputs. Among the health-related activities, identification of volunteers for health education, mobilizing local resources for the establishment of village health posts and their management, introduction of a pre-paid family health card, and establishment of health cooperatives have been the major ones. Details of the activities of the project and the outcomes have been reported elsewhere (1;2). Health services that are currently available in the intervention and comparison areas are presented in the box below. Collection of data from sample households on a quarterly basis, referred hitherto as Chakaria Health and Demographic Surveillance System (Chakaria HDSS), has been initiated in both the areas since 1999. The primary purpose of this surveillance system is to monitor the impact of interventions with equity focus and generate relevant health, demographic and socioeconomic information for policies and programmes, and further research. This report presents data collected through the Chakaria HDSS during 2010.

## Existing health services in the intervention and comparison areas, Chakaria Health and Demographic Surveillance System, 2010

| Intervention area (Six unions with 122,459 population) | | Comparison area (Two unions with 39,447 population) | |
|---|---|---|---|
| Healthcare facility/provider | No. | Healthcare facility/provider | No. |
| ICDDR,B facilitated and Community initiated | | ICDDR,B facilitated and Community initiated | |
| Village health post | 7 | Village health post | 0 |
| Trained midwife | 12 | Trained midwife | 0 |
| Qualified physician | 1 | Qualified physician | 0 |
| Male paramedic | 10 | Male paramedic | 0 |
| Government | | Government | |
| Union Health and Family Welfare Centre (UHFWC) | 6 | Union Health and Family Welfare Centre (UHFWC) | 1 |
| EPI centre | 216 | EPI centre | 38 |
| Rural dispensary | 0 | Rural dispensary | 1 |
| Family Welfare Visitor (FWV) | 6 | Family Welfare Visitor (FWV) | 2 |
| Sub-Assistant Community Medical Officer (SACMO)/Medical assistant | 3 | Sub-Assistant Community Medical Officer (SACMO)/Medical assistant | 2 |
| Family Welfare Assistant (skilled birth attendant) | 23 | Family Welfare Assistant (skilled birth attendant) | 1 |
| Private | | Private | |
| Village doctor (allopathic) | 186 | Village doctor (allopathic) | 54 |
| Village doctor (homeopathic) | 78 | Village doctor (homeopathic) | 24 |
| Allopathic pharmacy | 142 | Allopathic pharmacy | 35 |
| Homeopathic pharmacy | 13 | Homeopathic pharmacy | 2 |
| Diagnostic centre | 3 | Diagnostic centre | 0 |
| NGO | | NGO | |
| Health and development activities | 4 | Health and development activities | 4 |

## Fig. 1. Map of Chakaria showing intervention and comparison areas



# CHAPTER 2

## Methods and Materials

The Chakaria HDSS covered 8 unions[1], namely Baraitali, Kayerbil, Bheola Manik Char, Paschim Boro Bheola, Shaharbil, Kakara, Harbang, and Purba Boro Bheola. Of these, the last two unions formed the comparison area, and the first 6 formed the intervention area. In 1999, 106,320 people were living in 20,252 households in the intervention area and 34,418 people were living in 6,727 households in the comparison area (3). A household is defined as a unit comprising of a single individiual or a group of blood or otherwise related or unrelated individuals who live in the same compound and share food from the same kitchen. Individuals who live outside the household but spend at least one night every month at the household are also considered members of the household. A household member is considered migrated-out if s/he leaves the household and does not return or intend to return within six months from the day s/he leaves the household. An individual, previously not included as a household member, is considered migrated-in to household if s/he starts living in the household for at least one night every month for a minimum of six months from the day s/he joins the household.

Although Chakaria HDSS started in 1999 covering all the households in 8 unions, data collection was interrupted during 2001-2003. Since 2004, quarterly data collection has resumed, and data are being collected from 3,727 and 3,315 systematically randomly-chosen households in the intervention and comparison areas respectively. Twenty seven field-trained workers collected data during 2010. The data collectors were also provided with written instructions for specific questions that required added explanations.

Five supervisors supervised the data-collection process. To detect any anomalies, the supervisors re-visited 5% of the households, chosen randomly, within 2 days of data collection by the field workers. Later on, the supervisors and the relevant field workers together sorted out any inconsistencies in the collected data. All the filled-up questionnaires were manually checked for completeness and for any inconsistencies. Subsequently, computer-based data-editing procedures were applied to ensure the quality of data.

Asset quintiles based on ownership of various assets by any member of the households were used to examine differences in various health and demographic indicators. The list of assets included almirah, table/chair, van/rickshaw, *choki/khat*, radio, television, cycle, motorcycle, fridge, sofa, electric fan, sewing machine, telephone and electricity. The principal component analytical technique was used



[1] Government has restructured the existing 8 unions into 11 in 2005.

for calculating weights of the assets to derive household asset index scores (4). The major demographic indicators and safe motherhood practices have been tabulated for the various asset quintiles.

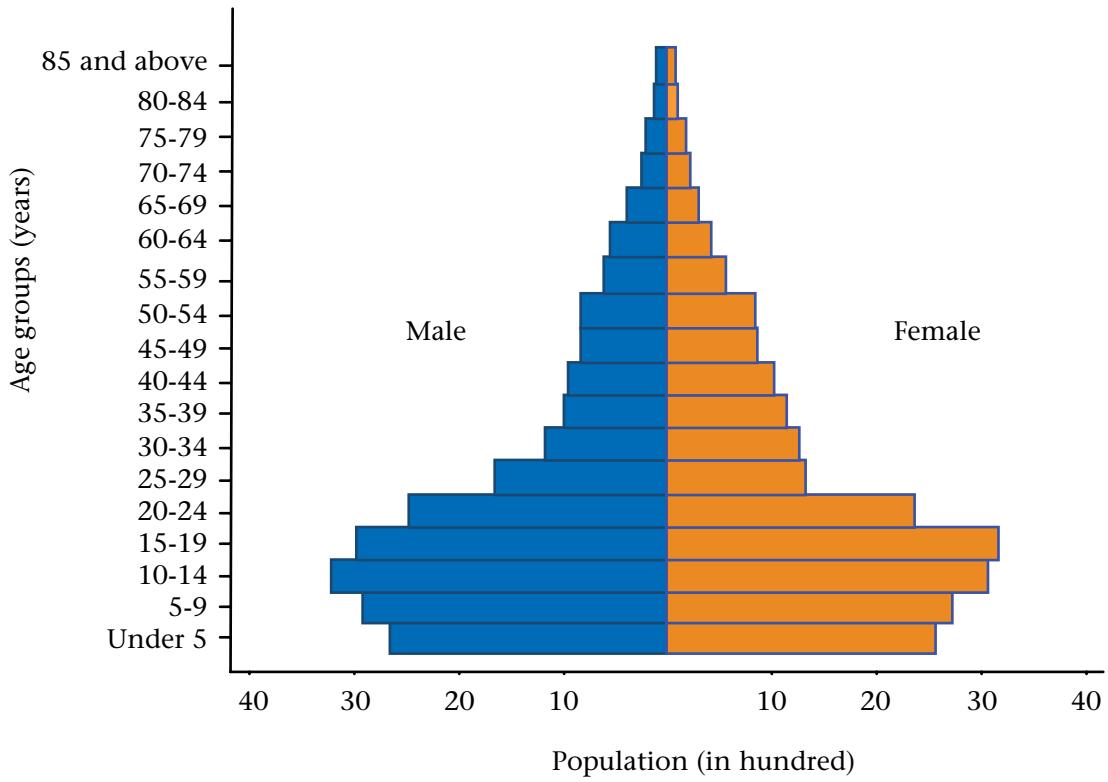
It should be mentioned that the number of observations in the tables presented in this report differ in some instances due to missing information for some variables.

# CHAPTER 3

## Population and Population Changes

The population pyramid based on the sample households is presented in Figure 2. The shape of the pyramid is typical of a developing country with declining mortality and fertility. The sex ratio (male per 100 females) was 103 in 2010. The age dependency ratio[2] was 74 in 2010 (see Appendix A).

**Fig. 2. Male and female population by age and sex, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

The major demographic and health indicators in the intervention and comparison areas during 1999, and 2004-2010 are presented in Table 1. A declining trend in the fertility indicators and natural rate of population increase has been observed during 1999-2010. Most of the rates in Chakaria HDSS area are much higher than those in the Matlab HDSS area, another rural field site of ICDDR,B (5). In 2010, the rate of natural increase and the annual population growth rate in the surveillance area was 1.7 % and 0.3% respectively (Table 1).



2 The age dependency ratio represents the ratio of the combined child population (under 15) and aged population (65 and over) to the population of intermediate age (15 to 64).

Fourteen percent of births in Chakaria were delivered at facilities (Hospital or Clinic) in 2010. The percentage of births at facilities increased from 12.0% in 2009 to 14.1% in 2010. Twenty eight percent of the births were attended by Skilled Birth Attendant (SBA). There has been an increase in deliveries by SBAs from 25.3% in 2009 to 28.1% in 2010 (Table 1).

The legal age of marriage is 18 years for female and 21 years for male in Bangladesh. In 2010, 36.4% of the women married before reaching their 18th birth day. The percentage of underage female marriage decreased to 36.4% in 2010 from 39.3% in 2009. Twenty five percent of the males were married before the age of 21 years in 2010. The proportion of male marriages before 21 years has remained similar between 2009 and 2010. The percentage of underage marriage for females remained higher than males during 2004 to 2010.

**Table 1. Demographic and health indicators, Chakaria HDSS, 1999-2010**

| Rates per 1,000 | Chakaria HDSS area | | | | | | | | Matlab HDSS area |
|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2009 |
| Crude birth rate | | | | | | | | | |
| Intervention area | 33.8 | 30.6 | 29.8 | 25.8 | 26 .9 | 24.7 | 23.7 | 22.6 | 21.6 |
| Comparison area | 33.9 | 28.8 | 27.4 | 25.3 | 27.2 | 26.5 | 21.9 | 22.8 | 20.5 |
| Both areas | 33.9 | 29.7 | 28.7 | 25.6 | 26.6 | 25.5 | 22.9 | 22.7 | 21.1 |
| Total fertility rate* | | | | | | | | | |
| Intervention area | 5.1 | 4.6 | 4.4 | 3.5 | 3.6 | 3.3 | 2.9 | 2.8 | 2.5 |
| Comparison area | 4.9 | 4.4 | 4.0 | 3.3 | 3.4 | 3.4 | 2.6 | 2.7 | 2.5 |
| Both areas | 5.1 | 4.5 | 4.2 | 3.4 | 3.5 | 3.3 | 2.8 | 2.7 | 2.5 |
| Neonatal mortality** | | | | | | | | | |
| Intervention area | 40.0 | 24.8 | 25.2 | 33.7 | 27.0 | 25.0 | 29.1 | 33.9 | 16.2 |
| Comparison area | 47.3 | 40.8 | 35.9 | 42.3 | 44.3 | 33.5 | 46.8 | 29.9 | 33.5 |
| Both areas | 41.7 | 31.9 | 31.5 | 37.6 | 34.8 | 29.0 | 36.8 | 32.1 | 24.4 |
| Post-neonatal mortality** | | | | | | | | | |
| Intervention area | 21.2 | 15.5 | 14.1 | 17.7 | 18.0 | 23.3 | 25.7 | 16.0 | 5.7 |
| Comparison area | 22.4 | 19.7 | 25.1 | 15.4 | 7.4 | 5.6 | 15.6 | 19.2 | 4.9 |
| Both areas | 21.4 | 17.4 | 17.4 | 16.6 | 13.3 | 14.9 | 21.3 | 17.5 | 5.3 |
| Infant mortality rate** | | | | | | | | | |
| Intervention area | 61.2 | 40.3 | 39.3 | 51.4 | 45.0 | 48.3 | 54.8 | 49.9 | 21.9 |
| Comparison area | 69.7 | 60.5 | 61.0 | 57.7 | 51.7 | 39.0 | 62.5 | 49.1 | 38.4 |
| Both areas | 63.2 | 49.3 | 48.9 | 54.2 | 48.0 | 43.9 | 58.1 | 49.6 | 29.8 |
| Child mortality rate (1-4 yrs) | | | | | | | | | |
| Intervention area | 9.0 | 8.1 | 7.5 | 6.2 | 4.7 | 3.6 | 5.2 | 5.0 | 1.7 |
| Comparison area | 10.6 | 5.5 | 5.3 | 2.4 | 4.4 | 6.2 | 4.1 | 3.8 | 2.1 |
| Both areas | 9.4 | 6.9 | 6.5 | 4.5 | 4.6 | 4.7 | 4.7 | 4.5 | 1.9 |

*Per woman; **Per 1,000 live births.

## Table 1. (Contd...)

| Rates per 1,000 | Chakaria HDSS area | | | | | | | | Matlab HDSS area 2009 |
|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | |
| Crude death rate | | | | | | | | | |
| Intervention area | 6.7 | 5.9 | 5.8 | 5.4 | 5.4 | 5.7 | 6.8 | 5.6 | 6.2 |
| Comparison area | 7.9 | 7.0 | 6.5 | 5.7 | 6.8 | 6.7 | 6.1 | 6.5 | 6.9 |
| Both areas | 7.0 | 6.3 | 6.1 | 5.6 | 6.1 | 6.5 | 6.5 | 6.0 | 6.5 |
| Rate of natural increase | | | | | | | | | |
| Intervention area | 27.1 | 24.7 | 24.0 | 20.4 | 21.7 | 19.4 | 16.9 | 17.2 | 15.4 |
| Comparison area | 26.0 | 21.8 | 20.8 | 19.6 | 19.2 | 21.0 | 15.8 | 16.4 | 13.7 |
| Both areas | 26.9 | 23.4 | 22.5 | 20.0 | 20.6 | 20.2 | 16.4 | 16.8 | 14.5 |
| In-migration rate | | | | | | | | | |
| Intervention area | - | 17.1 | 24.5 | 29.7 | 23.4 | 27.1 | 32.0 | 30.2 | - |
| Comparison area | - | 16.6 | 23.7 | 30.0 | 26.0 | 26.0 | 27.1 | 26.8 | - |
| Both areas | - | 16.9 | 24.1 | 29.9 | 24.6 | 26.6 | 29.8 | 28.7 | 54.1 |
| Out-migration rate | | | | | | | | | |
| Intervention area | - | 22.2 | 23.8 | 33.8 | 31.0 | 36.2 | 38.8 | 43.7 | - |
| Comparison area | - | 19.5 | 25.9 | 34.3 | 33.2 | 34.7 | 42.9 | 40.4 | - |
| Both areas | - | 21.0 | 24.8 | 34.0 | 32.0 | 35.5 | 40.6 | 42.2 | 58.0 |
| Growth rate (%) | | | | | | | | | |
| Intervention area | - | 2.0 | 2.5 | 1.6 | 1.4 | 1.0 | 1.0 | 0.4 | - |
| Comparison area | - | 1.9 | 2.0 | 1.5 | 1.3 | 1.2 | 0.4 | 0.3 | - |
| Both areas | - | 1.9 | 2.1 | 1.6 | 1.3 | 1.1 | 0.6 | 0.3 | 1.1 |
| Facility-based delivery (%) | | | | | | | | | |
| Intervention area | - | 6.8 | 6.4 | 6.2 | 3.8 | 18.3 | 14.3 | 12.3 | - |
| Comparison area | - | 4.4 | 3.8 | 4.5 | 6.8 | 9.5 | 9.2 | 16.2 | - |
| Both areas | - | 5.4 | 4.9 | 5.4 | 5.1 | 14.4 | 12.0 | 14.1 | - |
| Received assistance from SBA during delivery (%) | | | | | | | | | |
| Intervention area | - | 14.3 | 9.2 | 16.5 | 20.4 | 18.0 | 25.6 | 23.9 | - |
| Comparison area | - | 14.8 | 11.6 | 13.8 | 18.2 | 12.8 | 24.8 | 33.1 | - |
| Both areas | - | 14.5 | 10.3 | 15.3 | 19.1 | 16.2 | 25.3 | 28.1 | - |
| Male marriage at ages under 21 years (%) | | | | | | | | | |
| Intervention area | - | 23.4 | 25.6 | 26.3 | 25.2 | 25.6 | 21.8 | 24.2 | - |
| Comparison area | - | 23.3 | 23.8 | 29.7 | 26.0 | 23.8 | 28.1 | 26.2 | - |
| Both areas | - | 23.3 | 24.7 | 27.9 | 25.6 | 24.7 | 24.8 | 25.0 | - |
| Female marriage at ages under 18 years (%) | | | | | | | | | |
| Intervention area | - | 51.4 | 43.1 | 51.2 | 40.4 | 46.0 | 40.2 | 35.6 | - |
| Comparison area | - | 56.6 | 52.0 | 48.4 | 46.7 | 49.0 | 38.5 | 37.4 | - |
| Both areas | - | 53.6 | 47.3 | 49.8 | 43.2 | 47.7 | 39.3 | 36.4 | - |

'-' Data not available.

HDSS = Health and Demographic Surveillance System.

# CHAPTER 4

## Mortality

Age-specific mortality rates by area and sex are presented in Table 2. The crude death rate for the intervention and comparison areas in Chakaria, when considered together, was 6.0 per 1,000 population in 2010. The rate was slightly higher in the comparison area than in the intervention area. Infant mortality rate for all the villages in the intervention and comparison areas was 49.6 per 1,000 live births with a slightly lower rate in the comparison area than in the intervention area. Child mortality rate was 4.5 per 1,000 children aged 1-4 years in the intervention and comparison areas combined. The rate was higher in the intervention area than in the comparison area (Table 2).

Abridged Life Table for males and females are presented in Table 3. Life expectancy at birth was 68.9 years for males and 69.6 years for females. The rate of mortality of children aged less than 5 years (under-five mortality) was 67.1 per 1,000 live births in Chakaria in 2010 (Table 4). Figure 3 shows the probability of survival by sex during various age groups. The probability of survival of females remained same as males up to age 45 years, but after age 45 probability of survival oscillated.

**Table 2. Age-specific death rate (per 1,000 population) by sex, Chakaria HDSS, 2010**

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| <1* | 69.2 | 29.4 | 49.9 | 42.2 | 56.3 | 49.1 | 57.0 | 41.7 | 49.6 |
| 1-4 | 5.7 | 4.3 | 5.0 | 0.0 | 7.6 | 3.8 | 3.2 | 5.8 | 4.5 |
| 5-9 | 0.0 | 1.9 | 0.9 | 0.8 | 0.0 | 0.4 | 0.3 | 1.1 | 0.7 |
| 10-14 | 1.1 | 0.6 | 0.9 | 0.0 | 0.7 | 0.4 | 0.6 | 0.7 | 0.6 |
| 15-19 | 0.6 | 1.2 | 0.9 | 1.5 | 0.7 | 1.1 | 1.0 | 0.9 | 1.0 |
| 20-24 | 1.5 | 0.8 | 1.2 | 0.9 | 0.9 | 0.9 | 1.2 | 0.8 | 1.0 |
| 25-29 | 0.0 | 0.0 | 0.0 | 2.6 | 1.7 | 2.2 | 1.2 | 0.8 | 1.0 |
| 30-34 | 1.5 | 1.4 | 1.5 | 0.0 | 0.0 | 0.0 | 0.8 | 0.8 | 0.8 |
| 35-39 | 0.0 | 1.7 | 0.9 | 0.0 | 1.9 | 1.0 | 0.0 | 1.8 | 0.9 |
| 40-44 | 1.8 | 3.6 | 2.7 | 4.9 | 6.4 | 5.7 | 3.1 | 3.9 | 4.0 |
| 45-49 | 4.6 | 6.6 | 5.6 | 5.2 | 2.5 | 3.8 | 4.8 | 4.7 | 4.8 |
| 50-54 | 4.7 | 9.7 | 7.1 | 5.1 | 7.2 | 6.2 | 4.9 | 8.4 | 6.7 |
| 55-59 | 13.0 | 6.9 | 10.1 | 13.2 | 11.1 | 12.2 | 13.1 | 8.9 | 11.1 |
| 60-64 | 24.1 | 17.5 | 21.2 | 38.9 | 26.3 | 33.6 | 31.0 | 21.5 | 26.9 |
| 65-69 | 28.7 | 19.6 | 24.9 | 49.5 | 28.2 | 40.1 | 38.4 | 23.7 | 32.1 |
| 70-74 | 7.5 | 23.8 | 15.4 | 34.5 | 74.5 | 52.4 | 20.1 | 45.5 | 32.0 |
| 75-79 | 59.8 | 43.5 | 52.6 | 72.9 | 47.1 | 66.3 | 65.7 | 50.8 | 59.0 |
| 80-84 | 25.3 | 80.0 | 46.5 | 88.9 | 87.0 | 87.9 | 48.4 | 83.3 | 63.6 |
| 85+ | 250.0 | 177.8 | 217.8 | 155.6 | 153.8 | 154.8 | 207.9 | 166.7 | 189.2 |
| All | 6.3 | 4.9 | 5.6 | 6.5 | 6.5 | 6.5 | 6.4 | 5.6 | 6.0 |

*Per 1,000 live births; HDSS = Health and Demographic Surveillance System.

## Table 3. Abridged Life Table, Chakaria HDSS, 2010

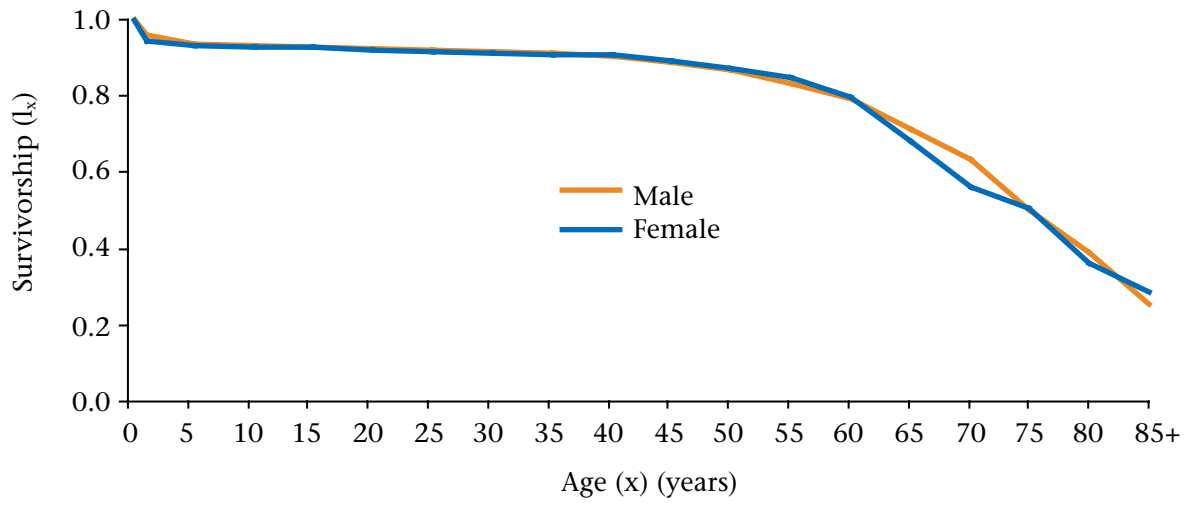
| Age (years) | Male | | | | | Female | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $_nm_x$ | $_nq_x$ | $l_x$ | $_nL_x$ | $e_x$ | $_nm_x$ | $_nq_x$ | $l_x$ | $_nL_x$ | $e_x$ |
| 0 | 0.0570 | 0.0570 | 100,000 | 95,437 | 68.9 | 0.0417 | 0.0417 | 100,000 | 96,660 | 69.6 |
| 1 | 0.0032 | 0.0128 | 94,297 | 374,912 | 72.1 | 0.0058 | 0.0229 | 95,825 | 379,171 | 71.6 |
| 5 | 0.0003 | 0.0017 | 93,086 | 465,060 | 69.0 | 0.0011 | 0.0055 | 93,630 | 466,963 | 69.3 |
| 10 | 0.0006 | 0.0031 | 92,926 | 463,965 | 64.1 | 0.0007 | 0.0033 | 93,115 | 464,875 | 64.6 |
| 15 | 0.0010 | 0.0050 | 92,637 | 462,111 | 59.3 | 0.0010 | 0.0048 | 92,811 | 463,037 | 59.8 |
| 20 | 0.0012 | 0.0061 | 92,170 | 459,566 | 54.6 | 0.0008 | 0.0042 | 92,369 | 460,945 | 55.1 |
| 25 | 0.0012 | 0.0060 | 91,612 | 456,785 | 49.9 | 0.0008 | 0.0038 | 91,979 | 459,093 | 50.3 |
| 30 | 0.0008 | 0.0042 | 91,059 | 454,404 | 45.2 | 0.0008 | 0.0040 | 91,631 | 457,319 | 45.5 |
| 35 | 0.0000 | 0.0000 | 90,673 | 453,438 | 40.3 | 0.0018 | 0.0088 | 91,268 | 454,485 | 40.7 |
| 40 | 0.0031 | 0.0156 | 90,673 | 450,100 | 35.3 | 0.0039 | 0.0194 | 90,463 | 448,270 | 36.0 |
| 45 | 0.0048 | 0.0239 | 89,259 | 441,353 | 30.9 | 0.0047 | 0.0231 | 88,712 | 438,825 | 31.7 |
| 50 | 0.0049 | 0.0241 | 87,122 | 430,750 | 26.5 | 0.0084 | 0.0414 | 86,664 | 425,004 | 27.4 |
| 55 | 0.0131 | 0.0636 | 85,020 | 412,500 | 22.1 | 0.0089 | 0.0438 | 83,079 | 406,950 | 23.4 |
| 60 | 0.0310 | 0.1445 | 79,611 | 370,827 | 18.5 | 0.0215 | 0.1022 | 79,439 | 378,136 | 19.4 |
| 65 | 0.0384 | 0.1758 | 68,107 | 312,021 | 16.1 | 0.0237 | 0.1124 | 71,317 | 337,740 | 16.3 |
| 70 | 0.0201 | 0.0959 | 56,137 | 268,066 | 14.0 | 0.0455 | 0.2049 | 63,303 | 285,420 | 13.0 |
| 75 | 0.0657 | 0.2832 | 50,754 | 218,708 | 10.2 | 0.0508 | 0.2265 | 50,329 | 224,196 | 10.7 |
| 80 | 0.0484 | 0.2167 | 36,379 | 162,948 | 8.2 | 0.0833 | 0.3454 | 38,930 | 161,358 | 8.1 |
| 85+ | 0.2079 | 1.0000 | 28,494 | 137,043 | 4.8 | 0.1667 | 1.0000 | 25,483 | 152,898 | 6.0 |

HDSS = Health and Demographic Surveillance System.

The Abridged life table is constructed applying the Greville's method illustrated in "The Methods and Materials of Demography", edited by Jacob S. Siegel and David A. Swanson, Second edition; Elsevier Academic Press, 2004: 301-40.

$_nm_x$ = Central mortality rate
$_nq_x$ = Probability of dying between the ages x and x+n;
$_nq_x$ = $_nm_x/[(1/n) + {}_nm_x\{1/2+n/12({}_nm_x-\log_e c)\}]$;
$\log_e c=.095$
$l_x$ = Survivors to exact age x
$_nL_x$ = Number of years lived by the total of the cohort of 100,000 births in the interval;
$L_0=.20l_0 +.80l_1$, $L_{85+}=l_{85+}/m_{85+}$
$e_x$ = Life expectancy at age x

**Fig. 3. Probability of survival by age and sex, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

Table 4 presents under-5 mortality rates by household asset quintiles. Under-5 mortality rate was inversely correlated with household asset scores. The mortality rate of children from the lowest quintile was nearly 2 times of children from the highest quintile.

**Table 4. Under-5 mortality rate per 1,000 live births by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | Number of birth | Number of under-5 deaths | Under-5 mortality rate |
|---|---|---|---|
| Lowest | 227 | 14 | 61.7 |
| Second | 182 | 15 | 82.4 |
| Middle | 255 | 24 | 94.1 |
| Fourth | 166 | 9 | 54.2 |
| Highest | 183 | 6 | 32.8 |
| All | 1,013 | 68 | 67.1 |

HDSS = Health and Demographic Surveillance System.

## *Causes of death*

Causes of death were recorded as reported by the informed household members. A physician classified the reported causes of death with medical synonyms. Table 5 presents the number of deaths from various causes in the year 2006-2010. Old age related complications, stroke, asthma, neoplasm, respiratory infections, neonatal, accident, diarrhoea, drowning, and cardiovascular were the 10 leading causes of death in Chakaria in 2010.

## Table 5. Causes of Death, Chakaria HDSS, 2006-2010

| Rank | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths |
| 1 | Stroke | 31 | Asthma/ Bronchitis | 30 | Stroke | 33 | Stroke | 42 | Old age related complications | 44 |
| 2 | Old age related complications | 28 | Neoplasm (Benign and Malignant) | 29 | Neoplasm (Benign and Malignant) | 33 | Old age related complications | 37 | Stroke | 41 |
| 3 | Asthma/ Bronchitis | 26 | Respiratory infections | 26 | Asthma/ Bronchitis | 26 | Asthma/ Bronchitis | 31 | Asthma/ Bronchitis | 27 |
| 4 | Respiratory infections | 26 | Old age related complications | 25 | Respiratory infections | 22 | Neoplasm (Benign and Malignant) | 29 | Neoplasm (Benign and Malignant) | 19 |
| 5 | Neoplasm (Benign and Malignant) | 21 | Stroke | 25 | Old age related complica-tions | 19 | Neonatal (Premature and LBW, Birth asphyxia, Bone trauma, Sepsis and infection) | 26 | Respiratory infections | 18 |
| 6 | Neonatal (Premature and LBW, Birth asphyxia, Birth trauma, Sepsis and infection) | 15 | Neonatal (Premature and LBW, Birth asphyxia, Birth trauma, Sepsis and infection) | 24 | Hepatitis | 13 | Respiratory infections | 22 | Neonatal (Premature and LBW, Birth asphyxia, Bone trauma, Sepsis and infection) | 16 |
| 7 | Drowning | 11 | Accident | 16 | Accident | 9 | Drowning | 14 | Accident | 16 |
| 8 | Hepatitis | 7 | Cardiovascular other than stroke and hypertension | 11 | Drowning | 9 | Hepatitis | 9 | Diarrhoea | 8 |

Table 5. (Contd…)

| Rank | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths |
| 9 | Accident | 6 | Diarrheal Diseases | 9 | Cardiovascular other than stroke and hypertension | 10 | Accident | 8 | Drowning | 8 |
| 10 | Diarrheal diseases | 6 | Hepatitis | 9 | Diarrheal diseases | 7 | Diabetes | 7 | Cardiovas-cular other than stroke and hypertension | 7 |
| 11 | Diabetes | 3 | Drowning | 8 | Hypertension | 7 | Diarrheal | 7 | Hepatic failure | 5 |
| 12 | Hypertension | 3 | Nutritional diseases | 5 | Maternal death | 5 | Cardiovascular other than stroke and hypertension | 5 | Suicide | 5 |
| 13 | Malaria | 3 | Diabetes | 3 | Diabetes | 4 | Suicide | 3 | Hepatitis | 4 |
| 14 | Cardiovascular other than stroke and hypertension | 3 | Hyper-tension | 3 | Digestive disease | 3 | Epilepsy | 2 | Tuberculosis | 4 |
| 15 | Urinary diseases | 3 | Urinary diseases | 3 | Neonatal (Premature and LBW, Birth asphyxia, Bone trauma, Sepsis and infection) | 13 | Hyper-tension | 2 | Congenital anomalies | 3 |

Table 5. (Contd...)

| Rank | 2006 | | 2007 | | 2008 | | 2009 | | 2010 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths | Cause | No. of deaths |
| 16 | Rabies | 3 | Epilepsy | 2 | Tuberculosis | 4 | Nutritional | 2 | Digestive disease | 3 |
| 17 | Tuberculosis | 3 | Malaria | 2 | Burn | 2 | Other urinary | 2 | Malaria | 2 |
| 18 | Burn | 2 | Maternal death | 2 | Other urinary | 2 | Burn | 1 | Maternal death | 1 |
| 19 | Digestive diseases | 2 | Suicide | 2 | Homicide | 1 | Digestive disease | 1 | Nutritional | 2 |
| 20 | Nutritional diseases | 2 | Tuberculosis | 2 | Nutritional | 1 | Disease of uterus | 1 | Other urinary | 2 |
| 21 | Congenital anomalies | 1 | Typhoid | 2 | Rabies | 1 | Dysentery | 1 | Measles | 1 |
| 22 | Leprosy | 1 | Dysentery | 1 | Snake bite | 1 | Epestaxis | 1 | Diabetes | 1 |
| 23 | Tetanus | 1 | Digestive disease | 1 | Suicide | 1 | Homicide | 1 | Dysentery | 1 |
| 24 | Unknown | 42 | Homicide | 1 | Typhoid | 1 | Malaria | 1 | Epestaxix | 1 |
| 25 | | | Rabies | 1 | Malaria | 1 | Maternal death | 1 | Homicide | 1 |
| 26 | | | Unknown | 32 | Unknown | 46 | Tuberculosis | 1 | Hypertension | 1 |
| 27 | | | | | | | Unknown | 35 | intestinal obstruction | 1 |
| 28 | | | | | | | | | Unknown | 29 |
| Total | | 249 | | 274 | | 274 | | 292 | | 271 |

HDSS = Health and Demographic Surveillance System.

# CHAPTER 5

## Fertility

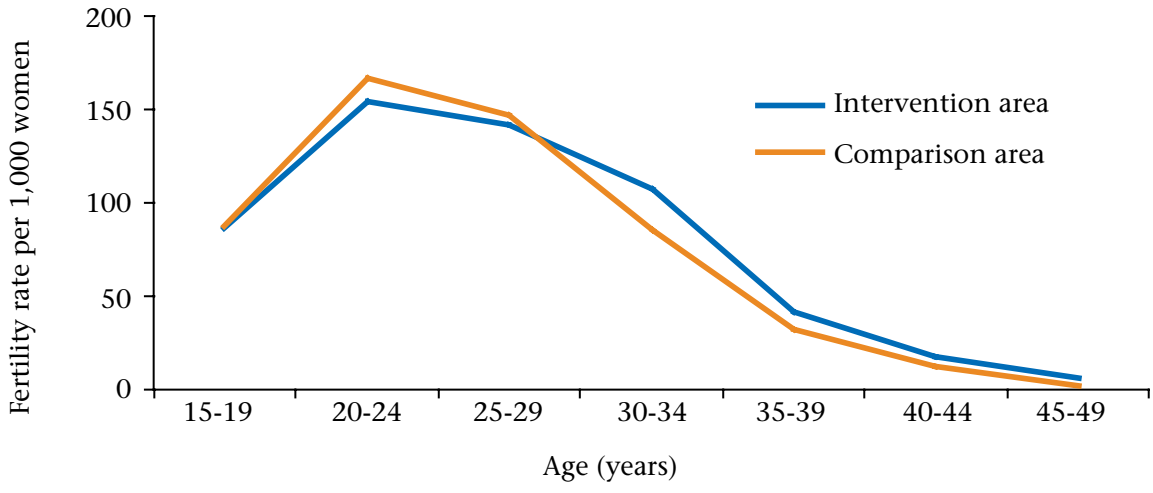
The crude birth rate in 2010 was 22.7 per 1,000 population, which was similar in 2009 (22.9 per 1,000 population) (Table 1). Total fertility rates per woman showed a downward trend during 1999-2010 with a value of 2.7 in 2010 (Table 1). The fertility rate was highest among women of age-group of 20-24 years (Fig. 4 and Table 6).

**Table 6. Age-specific fertility rate per 1,000 women aged 15-49 years, Chakaria HDSS, 2010**

| | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| Age (years) | No. of females | No. of births | Birth rate | No. of females | No. of births | Birth rate | No. of females | No. of births | Birth rate |
| 15-19 | 1,715 | 148 | 86.3 | 1,454 | 127 | 87.3 | 3,169 | 275 | 86.8 |
| 20-24 | 1,257 | 194 | 154.3 | 1,109 | 185 | 166.8 | 2,366 | 379 | 160.2 |
| 25-29 | 739 | 105 | 142.1 | 580 | 85 | 146.6 | 1,319 | 190 | 144.0 |
| 30-34 | 710 | 76 | 107.0 | 552 | 47 | 85.1 | 1,262 | 123 | 97.5 |
| 35-39 | 602 | 25 | 41.5 | 533 | 17 | 31.9 | 1,135 | 42 | 37.0 |
| 40-44 | 555 | 10 | 18.0 | 469 | 6 | 12.8 | 1,024 | 16 | 15.6 |
| 45-49 | 454 | 3 | 6.6 | 403 | 1 | 2.5 | 857 | 4 | 4.7 |
| Total | 6,032 | 561 | | 5,100 | 468 | | 11,132 | 1,029 | |
| TFR | | | 2,780 | | | 2,665 | | | 2,729 |

TFR = Total fertility rate per 1,000 women; HDSS = Health and Demographic Surveillance System.

**Fig. 4. Age-specific fertility rate, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

**Table 7. Crude birth rate per 1,000 population by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | Midyear population | Number of births | Birth rate |
|---|---|---|---|
| Lowest | 8,162 | 223 | 27.3 |
| Second | 8,252 | 186 | 22.5 |
| Middle | 11,603 | 255 | 22.0 |
| Fourth | 7,763 | 166 | 21.4 |
| Highest | 8,862 | 183 | 20.6 |
| All | 44,642 | 1,013 | 22.7 |

HDSS = Health and Demographic Surveillance System.

Table 7 presents the crude birth rates by household asset quintiles. The crude birth rate of the lowest quintile was 1.3 times higher than that of the lighest quintile.

Of the pregnancies in 2010, 9.4% of 1,239 were terminated prematurely and spontaneously, 4.4% were terminated through induction, and 3.1% resulted in stillbirths (Table 8).

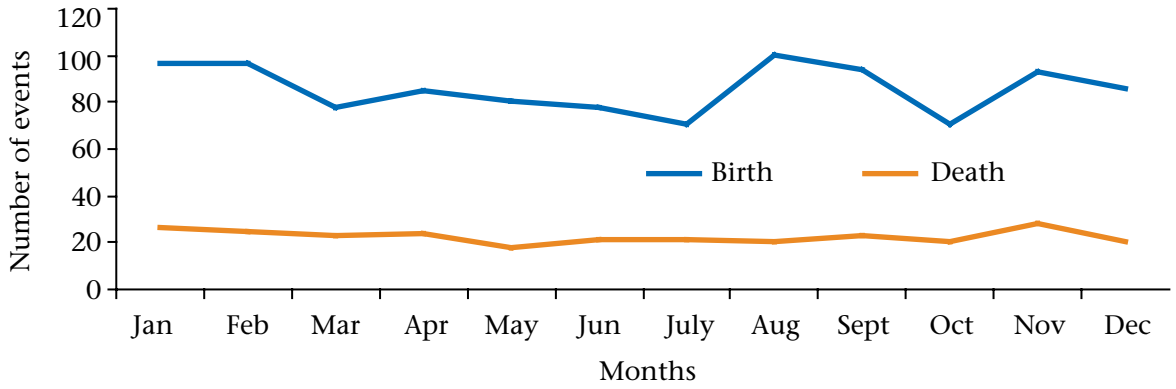
**Table 8. Pregnancy outcome, Chakaria HDSS, 2010**

| Pregnancy outcome | Intervention area | | Comparison area | | Both areas | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Spontaneous abortion | 59 | 8.8 | 58 | 10.2 | 117 | 9.4 |
| Induced abortion | 28 | 4.2 | 27 | 4.8 | 55 | 4.4 |
| Stillbirth | 24 | 3.6 | 14 | 2.5 | 38 | 3.1 |
| Live birth* | 561 | 83.5 | 468 | 82.5 | 1,029 | 83.1 |
| Total number of pregnancies | 672 | 100.0 | 567 | 100.0 | 1,239 | 100.0 |

*Multiple live births included
HDSS = Health and Demographic Surveillance System.

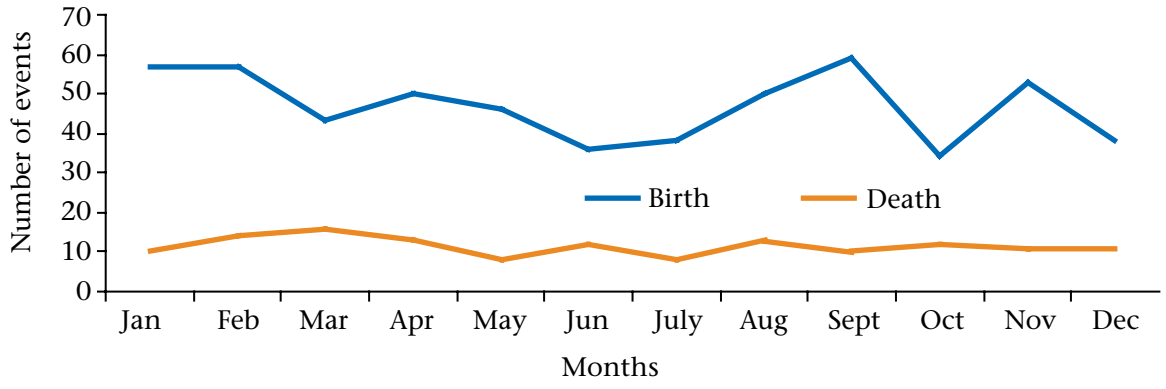
Distribution of births and deaths by month did not show any distinct seasonal pattern (Fig. 5). The seasonal patterns of birth and death were similar in the intervention and comparison areas (Fig. 6 and 7).

## Fig. 5. Number of births and deaths by month, Chakaria HDSS, 2010



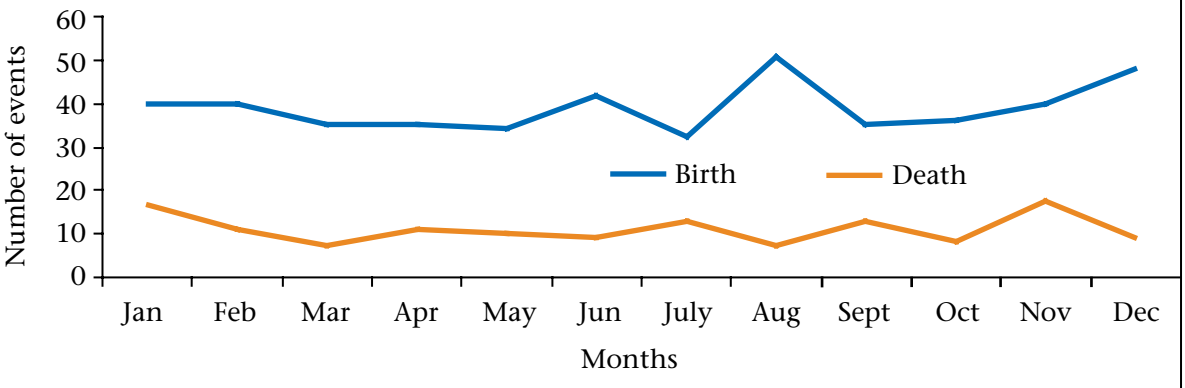

HDSS = Health and Demographic Surveillance System.

## Fig. 6. Number of births and deaths by month, Intervention area, Chakaria, HDSS, 2010




HDSS = Health and Demographic Surveillance System.

## Fig. 7. Number of births and deaths by month, Comparison area, Chakaria, HDSS, 2010




HDSS = Health and Demographic Surveillance System.

# CHAPTER 6

## Migration

In 2010, the rate of out-migration was higher at 42.0 per 1,000 population than that of in-migration at 28.5 per 1,000 population (Table 9). Monthly data on migration are presented in Tables 10, 11 and 12. Data showed that the number of in-migrants was lower than that of out-migrants during 2010 in both the areas. The sex differential in migration was also not prominent. The rates of in-migration among both males and females were highest in January. The rate of out-migration was highest among the males in January and females in July.

**Table 9. Migration rate per 1,000 population by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | Mid-year population | In-migration rate | Out-migration rate |
|---|---|---|---|
| Lowest | 8,162 | 21.2 | 27.7 |
| Second | 8,252 | 23.0 | 33.6 |
| Middle | 11,603 | 27.4 | 40.5 |
| Fourth | 7,763 | 32.2 | 50.9 |
| Highest | 8,862 | 38.7 | 57.4 |
| All | 44,642 | 28.5 | 42.0 |

HDSS = Health and Demographic Surveillance System.

**Table 10. Number of migrants by sex and month, Chakaria HDSS, 2010**

| Month | In-migration | | | Out-migration | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| January | 61 | 92 | 153 | 99 | 112 | 211 |
| February | 37 | 61 | 98 | 91 | 87 | 178 |
| March | 32 | 87 | 119 | 55 | 86 | 141 |
| April | 38 | 75 | 113 | 65 | 101 | 166 |
| May | 22 | 64 | 86 | 63 | 110 | 173 |
| June | 47 | 61 | 108 | 57 | 102 | 159 |
| July | 42 | 91 | 133 | 78 | 130 | 208 |
| August | 31 | 69 | 100 | 50 | 70 | 120 |
| September | 43 | 49 | 92 | 68 | 72 | 140 |
| October | 32 | 72 | 104 | 30 | 66 | 96 |
| November | 34 | 64 | 98 | 64 | 85 | 149 |
| December | 26 | 61 | 87 | 54 | 107 | 161 |
| All | 445 | 846 | 1,291 | 774 | 1,128 | 1,902 |

HDSS = Health and Demographic Surveillance System.

**Table 11. Number of migrants by sex and month, intervention area, Chakaria HDSS, 2010**

| Month | In-migration | | | Out-migration | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| January | 31 | 50 | 81 | 49 | 54 | 103 |
| February | 22 | 39 | 61 | 53 | 47 | 100 |
| March | 16 | 43 | 59 | 30 | 43 | 73 |
| April | 22 | 45 | 67 | 44 | 56 | 100 |
| May | 13 | 38 | 51 | 36 | 60 | 96 |
| June | 26 | 38 | 64 | 37 | 54 | 91 |
| July | 23 | 57 | 80 | 48 | 85 | 133 |
| August | 19 | 43 | 62 | 30 | 39 | 69 |
| September | 24 | 26 | 50 | 48 | 45 | 93 |
| October | 17 | 45 | 62 | 13 | 34 | 47 |
| November | 20 | 33 | 53 | 29 | 51 | 80 |
| December | 19 | 35 | 54 | 32 | 60 | 92 |
| All | 252 | 492 | 744 | 449 | 628 | 1,077 |

HDSS = Health and Demographic Surveillance System.

**Table 12. Number of migrants by sex and month, comparison area, Chakaria HDSS, 2010**

| Month | In-migration | | | Out-migration | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| January | 30 | 42 | 72 | 50 | 58 | 108 |
| February | 15 | 22 | 37 | 38 | 40 | 78 |
| March | 16 | 44 | 60 | 25 | 43 | 68 |
| April | 16 | 30 | 46 | 21 | 45 | 66 |
| May | 9 | 26 | 35 | 27 | 50 | 77 |
| June | 21 | 23 | 44 | 20 | 48 | 68 |
| July | 19 | 34 | 53 | 30 | 45 | 75 |
| August | 12 | 26 | 38 | 20 | 31 | 51 |
| September | 19 | 23 | 42 | 20 | 27 | 47 |
| October | 15 | 27 | 42 | 17 | 32 | 49 |
| November | 14 | 31 | 45 | 35 | 34 | 69 |
| December | 7 | 26 | 33 | 22 | 47 | 69 |
| All | 193 | 354 | 547 | 325 | 500 | 825 |

HDSS = Health and Demographic Surveillance System.

## *Origin and destination of migrants*

During 2010, 5.2% of 1,291 in-migrants moved into Chakaria HDSS households from outside of Bangladesh whereas 9.8% of 1,902 out-migrants moved out of Bangladesh from Chakaria HDSS area. The proportion of migrants that moved out of Bangladesh was higher than the proportion of migrants that moved into Bangladesh. Overall, the rates of movement of people to and from Chakaria were similar (Table 13).

**Table 13. Origin and destination of migrants by sex, Chakaria HDSS, 2010**

| Origin or destination | In-migration | | | Out-migration | | |
|---|---|---|---|---|---|---|
| | Male (%) | Female (%) | Both (%) | Male (%) | Female (%) | Both (%) |
| Inside Bangladesh | 85.2 | 99.9 | 94.8 | 77.8 | 98.8 | 90.2 |
| Outside Bangladesh | 14.8 | 0.1 | 5.2 | 22.2 | 1.2 | 9.8 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total number of migrants | 445 | 846 | 1,291 | 774 | 1,128 | 1,902 |
| Inside Chakaria | 63.1 | 67.3 | 66.0 | 65.8 | 66.2 | 66.0 |
| Outside Chakaria | 36.9 | 32.7 | 34.0 | 34.2 | 33.8 | 34.0 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total number of migrants | 379 | 845 | 1,224 | 602 | 1,115 | 1,717 |
| Inside HDSS area | 69.0 | 64.1 | 65.6 | 70.1 | 62.8 | 65.3 |
| Outside HDSS area | 31.0 | 35.9 | 34.4 | 29.9 | 37.2 | 34.7 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total number of migrants | 239 | 569 | 808 | 398 | 739 | 1,137 |

HDSS = Health and Demographic Surveillance System.

## *Reasons for migration*

Table 14 presents the reasons of migration by sex. Forty four percentage of the migrants moved out due to family-related issues - mostly marriage, followed by housing (28.6%), work (21.6%), and education (5.2%). Reasons for moving out for males were different from those of females. Forty percentage of male in-migrants moved due to work related issues whereas only 7.6% of the females moved due to that reason. On the other hand, 72.6% of female in-migrants moved due to family related issues - mostly marriage, while only 21.1% of males moved due to family related reasons (Table 14). The reasons of movement for out-migration were mostly similar to the reasons for in-migration.

**Table 14. Reasons for migration, Chakaria HDSS, 2010**

| Reasons for migration | In-migration | | | Out-migration | | |
|---|---|---|---|---|---|---|
| | Male (%) | Female (%) | Both (%) | Male (%) | Female (%) | Both (%) |
| Family-related | 21.1 | 72.6 | 54.8 | 14.6 | 64.5 | 44.2 |
| Work-related | 40.3 | 7.6 | 18.8 | 42.3 | 7.4 | 21.6 |
| Housing-related | 27.4 | 16.2 | 20.1 | 34.2 | 24.7 | 28.6 |
| Education | 11.2 | 3.5 | 6.2 | 8.4 | 3.0 | 5.2 |
| Other | 0.0 | 0.1 | 0.1 | 0.5 | 0.4 | 0.4 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total number of migrants | 445 | 846 | 1,291 | 774 | 1,228 | 1,902 |

HDSS = Health and Demographic Surveillance System.

# CHAPTER 7

## Marriage

In total 936 marriages took place in the surveillance households in Chakaria during 2010. The highest number of marriages took place in July and the lowest in February. There has been no strong seasonal pattern for marriages (Fig. 8).

Table 15 presents singulate mean age at marriage (SMAM) and median age at first marriage. The SMAM was 27 years for males and 20 years for females. The SMAM in 2010 remained same as of 2009 for males and females. The median age at first marriage for males and females were 27 and 19 years. Both the indicators for males and females were almost positively associated with household socioeconomic status.

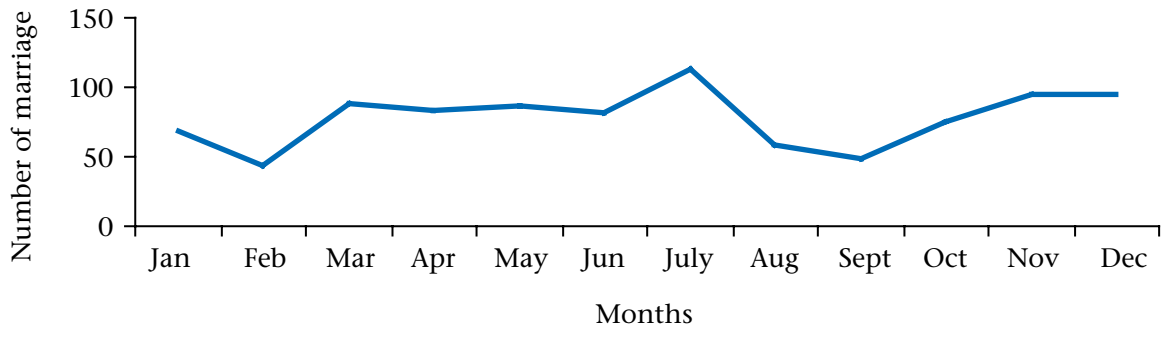
**Table 15. Age at marriage by sex, Chakaria HDSS, 2010**

| Asset quintile | Male | | Female | |
|---|---|---|---|---|
| | SMAM* | Median age at first marriage* | SMAM* | Median age at first marriage |
| Lowest | 23.4 | 23.0 | 18.7 | 18.0 |
| Second | 25.1 | 24.8 | 18.7 | 18.0 |
| Middle | 27.0 | 26.5 | 19.3 | 18.4 |
| Fourth | 28.0 | 28.2 | 19.8 | 18.6 |
| Highest | 29.5 | 29.7 | 20.4 | 19.6 |
| All | 27.1 | 27.1 | 19.6 | 18.7 |

HDSS = Health and Demographic Surveillance System.
SMAM = Singulate mean age at marriage

* The SMAM and median age at first marriage are calculated by applying indirect methods illustrated in "The Methods and Materials of Demography", edited by Jacob S. Siegel and David A. Swanson, Second edition; Elsevier Academic Press, 2004: 196-202.

**Fig. 8. Number of marriages by month, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

# CHAPTER 8

## Safe Motherhood Practices

The health-related activities of ICDDR,B in Chakaria included facilitation of provision of safe motherhood services (e.g. antenatal care, postnatal care, and delivery services) by the trained midwives who were based in the seven village health posts that had been established and managed by the villagers since the late nineties. The services provided by these midwives were not strictly restricted to the intervention area. The women from the comparison area also availed their services to some extent. Apart from this, the physicians employed by ICDDR,B with financial support from the community, also provided healthcare services once a week to the villagers from these village health posts during 1998 and 2005.

At present, the Upazila Health Complex of the government and four private hospitals provide healthcare services at the headquarters of Chakaria. At the union level, 6 Union Health and Family Welfare Centres (UHFWCs) of the government and 7 village health posts which were initiated by the community members provide healthcare services in the intervention area. At the same level, one UHFWC and one Rural Dispensary (RD) of the government provide health services in the comparison area. The Family Development Services and Research (FDSR), an NGO, also provides healthcare services both in intervention and comparison areas.

### *Use of antenatal care services*

During 2010, 62.2% of 1,013 pregnant women in Chakaria received at least one antenatal check-up (ANC). The percentage of women receiving at least one ANC was higher in the comparison area (65.6%) than in the intervention area (59.3%). The women in the intervention area received services from various sources. Among these sources, the nurses/doctors were dominant, followed by midwives and FDSR/CMH and then FWV. In the comparison area, the dominant source was FDSR/CMH followed by nurses/doctors and then midwives (Table 16).

The use of ANC was very inequitable in both the intervention and the comparison areas. Of the various sources, services from nurse and doctor has been the most inequitable (Table 16).

**Table 16. Antenatal care by type of sources and asset quintile, Chakaria HDSS, 2010**

| Area | Asset quintile | Received any ANC (%) | Midwife* (%) | FWV* (%) | Nurse/ doctor* (%) | FDSR/ CMH* (%) | None (%) | No. of women |
|---|---|---|---|---|---|---|---|---|
| Intervention area | Lowest | 51.9 | 23.3 | 15.5 | 9.3 | 19.4 | 48.1 | 129 |
| | Second | 61.2 | 17.3 | 16.3 | 16.3 | 27.6 | 38.8 | 98 |
| | Middle | 62.2 | 18.9 | 16.1 | 25.9 | 18.2 | 37.8 | 143 |
| | Fourth | 60.9 | 14.9 | 13.8 | 34.5 | 14.9 | 39.1 | 87 |
| | Highest | 61.7 | 8.5 | 11.7 | 52.1 | 3.2 | 38.3 | 94 |
| | Total | 59.3 | 17.2 | 14.9 | 26.1 | 17.1 | 40.7 | 551 |
| Comparison area | Lowest | 59.2 | 12.2 | 9.2 | 11.2 | 37.8 | 40.8 | 98 |
| | Second | 66.7 | 20.2 | 10.7 | 20.2 | 38.1 | 33.3 | 84 |
| | Middle | 63.4 | 17.0 | 12.5 | 30.4 | 25.9 | 36.6 | 112 |
| | Fourth | 68.4 | 8.9 | 7.6 | 38.0 | 31.6 | 31.6 | 79 |
| | Highest | 73.0 | 6.7 | 11.2 | 50.6 | 20.2 | 27.0 | 89 |
| | Total | 65.6 | 13.2 | 10.4 | 29.7 | 30.5 | 34.4 | 462 |
| Both areas | Lowest | 55.1 | 18.5 | 12.8 | 10.1 | 27.3 | 44.9 | 227 |
| | Second | 63.7 | 18.7 | 13.7 | 18.1 | 32.4 | 36.3 | 182 |
| | Middle | 62.7 | 18.0 | 14.5 | 27.8 | 21.6 | 37.3 | 255 |
| | Fourth | 64.5 | 12.0 | 10.8 | 36.1 | 22.9 | 35.5 | 166 |
| | Highest | 66.7 | 7.7 | 11.5 | 51.4 | 11.5 | 33.3 | 183 |
| | Total | 62.2 | 15.4 | 12.8 | 27.7 | 23.2 | 37.8 | 1,013 |

*Multiple responses recorded
ANC = Antenatal care
FWV = Family welfare visitor
FDSR = Family Development Services and Research
CMH = Christian Memorial Hospital
HDSS = Health and Demographic Surveillance System.

## *Use of postnatal care services*

It was observed that only 31.5% of the pregnant women received at least one postnatal care (PNC) during 2010. This percentage was higher in the comparison area (33.8%) than the intervention area (29.6%). The nurses, doctors and midwives were the dominant sources for PNC in both the areas, and the utilization of services was characterized by large inequities (Table 17).

**Table 17. Postnatal care by type of sources and asset quintile, Chakaria HDSS, 2010**

| Area | Asset quintile | Received any PNC (%) | Midwife* (%) | FWV* (%) | Nurse/ doctor* (%) | FDSR/ CMH* (%) | None (%) | No. of women |
|---|---|---|---|---|---|---|---|---|
| Intervention area | Lowest | 23.3 | 6.2 | 0.8 | 17.1 | 3.9 | 76.7 | 129 |
| | Second | 21.4 | 5.1 | 0.0 | 16.3 | 2.0 | 78.6 | 98 |
| | Middle | 28.0 | 7.0 | 2.1 | 18.2 | 3.5 | 72.0 | 143 |
| | Fourth | 31.0 | 8.0 | 2.3 | 23.0 | 1.1 | 69.0 | 87 |
| | Highest | 47.9 | 5.3 | 2.1 | 44.7 | 1.1 | 52.1 | 94 |
| | Total | 29.6 | 6.4 | 1.5 | 22.9 | 2.5 | 70.4 | 551 |
| Comparison area | Lowest | 23.5 | 10.2 | 1.0 | 10.2 | 3.1 | 76.5 | 98 |
| | Second | 25.0 | 4.8 | 0.0 | 17.9 | 3.6 | 75.0 | 84 |
| | Middle | 32.1 | 8.9 | 0.0 | 26.8 | 0.9 | 67.9 | 112 |
| | Fourth | 36.7 | 10.1 | 0.0 | 30.4 | 0.0 | 63.3 | 79 |
| | Highest | 52.8 | 5.6 | 2.2 | 47.2 | 2.2 | 47.2 | 89 |
| | Total | 33.8 | 8.0 | 0.6 | 26.2 | 1.9 | 66.2 | 462 |
| Both areas | Lowest | 23.3 | 7.9 | 0.9 | 14.1 | 3.5 | 76.7 | 227 |
| | Second | 23.1 | 4.9 | 0.0 | 17.0 | 2.7 | 76.9 | 182 |
| | Middle | 29.8 | 7.8 | 1.2 | 22.0 | 2.4 | 70.2 | 255 |
| | Fourth | 33.7 | 9.0 | 1.2 | 26.5 | 0.6 | 66.3 | 166 |
| | Highest | 50.3 | 5.5 | 2.2 | 45.9 | 1.6 | 49.7 | 183 |
| | Total | 31.5 | 7.1 | 1.1 | 24.4 | 2.3 | 68.5 | 1,013 |

*Multiple responses recorded
PNC = Postnatal care
FWV = Family welfare visitor
FDSR = Family Development Services and Research
CMH = Christian Memorial Hospital
HDSS = Health and Demographic Surveillance System.

## *Assistance during delivery*

In Chakaria, the traditional birth attendants (TBAs) were more popular than the skilled birth attendants (SBAs) for assisting deliveries. Seventy two percent of 1,013 deliveries in Chakaria were assisted by the TBAs as opposed to 28% of the deliveries assisted by the SBAs (e.g. nurses/doctors, FWVs, midwives). The percentage of deliveries assisted by the TBAs was slightly higher in the intervention area (76.2%) than the comparison area (66.9%) (Table 18).



Despite the fact that the services provided by the midwives of the Chakaria project were also available to comparison area, the use of these trained midwives became more popular in comparison area compared to intervention area (10.0%

vs 7.6%) (Table 18). At the same time, the overall use of SBAs that comprised nurses, doctors, FWVs, and midwives was higher in the comparison area (33.1%) than the intervention area (23.8%) (Table 18). The use rate of nurse/doctors by the women from the highest quintile was much higher than those by women from the lowest quintiles.

**Table 18. Assistance during delivery by asset quintile, Chakaria HDSS, 2010**

| Area | Asset quintile | Midwife (%) | FWV (%) | Nurse/ doctor (%) | TBA (%) | No. of women |
|---|---|---|---|---|---|---|
| Intervention area | Lowest | 7.7 | 1.6 | 3.9 | 86.8 | 129 |
| | Second | 4.1 | 1.0 | 7.1 | 87.8 | 98 |
| | Middle | 7.0 | 4.2 | 9.7 | 79.1 | 143 |
| | Fourth | 6.9 | 6.9 | 13.1 | 73.1 | 87 |
| | Highest | 12.8 | 3.2 | 36.2 | 47.8 | 94 |
| | Total | 7.6 | 3.3 | 12.9 | 76.2 | 551 |
| Comparison area | Lowest | 7.1 | 8.2 | 3.1 | 81.6 | 98 |
| | Second | 5.9 | 2.4 | 9.5 | 82.2 | 84 |
| | Middle | 13.4 | 5.4 | 13.4 | 67.8 | 112 |
| | Fourth | 16.5 | 2.5 | 19.0 | 62.0 | 79 |
| | Highest | 6.7 | 9.0 | 44.9 | 39.4 | 89 |
| | Total | 10.0 | 5.6 | 17.5 | 66.9 | 462 |
| Both areas | Lowest | 7.5 | 4.4 | 3.5 | 84.6 | 227 |
| | Second | 4.9 | 1.6 | 8.2 | 85.3 | 182 |
| | Middle | 9.8 | 4.7 | 11.4 | 74.1 | 255 |
| | Fourth | 11.5 | 4.8 | 15.7 | 68.0 | 166 |
| | Highest | 9.8 | 6.0 | 40.4 | 43.8 | 183 |
| | Total | 8.7 | 4.3 | 15.0 | 72.0 | 1,013 |

FWV = Family Welfare Visitor
HDSS = Health and Demographic Surveillance System.

## *Place of delivery*

Eighty six percent of the deliveries took place at home. Only 14.2% of 1,013 deliveries took place either at hospitals or at clinics. The percentage of deliveries taking place at the hospitals was higher in the comparison area (16.5%) compared to the intervention area (12.3%) (Table 19). The women from the households in the highest asset quintile had a much higher rate of facility based delivery (38.2%) than those from the lowest quintile (4.0%).

**Table 19. Place of delivery by asset quintile, Chakaria HDSS, 2010**

| Area | Asset quintile | Hospital/Clinic (%) | Home (%) | No. of women |
|---|---|---|---|---|
| Intervention area | Lowest | 3.9 | 96.1 | 129 |
| | Second | 6.1 | 93.9 | 98 |
| | Middle | 11.2 | 88.8 | 143 |
| | Fourth | 10.3 | 89.7 | 87 |
| | Highest | 34.0 | 66.0 | 94 |
| | Total | 12.3 | 87.7 | 551 |
| Comparison area | Lowest | 4.1 | 95.9 | 98 |
| | Second | 7.1 | 92.9 | 84 |
| | Middle | 13.4 | 86.6 | 112 |
| | Fourth | 16.5 | 83.5 | 79 |
| | Highest | 42.7 | 57.3 | 89 |
| | Total | 16.5 | 83.5 | 462 |
| Both areas | Lowest | 4.0 | 96.0 | 227 |
| | Second | 6.6 | 93.4 | 182 |
| | Middle | 12.2 | 87.8 | 255 |
| | Fourth | 13.3 | 86.7 | 166 |
| | Highest | 38.2 | 61.8 | 183 |
| | Total | 14.2 | 85.8 | 1,013 |

HDSS = Health and Demographic Surveillance System.

Table 20 shows caesarean-section delivery by household asset quintile in 2010. Caesarean-section delivery accounted for 4.9% of the deliveries in the Chakaria HDSS area in 2010. Although the number of caesarean section was small, the number of women with caesarean section exhibited huge discrepancies between highest and lowest quintile.

**Table 20. Proportion of caesarean-section delivery by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | No. of caesarean-section delivery | Caesarean-section delivery (%) | Total number of deliveries |
|---|---|---|---|
| Lowest | 1 | 0.4 | 227 |
| Second | 5 | 2.7 | 182 |
| Middle | 13 | 5.1 | 255 |
| Fourth | 7 | 4.2 | 166 |
| Highest | 24 | 13.1 | 183 |
| Total | 50 | 4.9 | 1,013 |

HDSS = Health and Demographic Surveillance System.

# CHAPTER 9

## Infant Feeding Practices

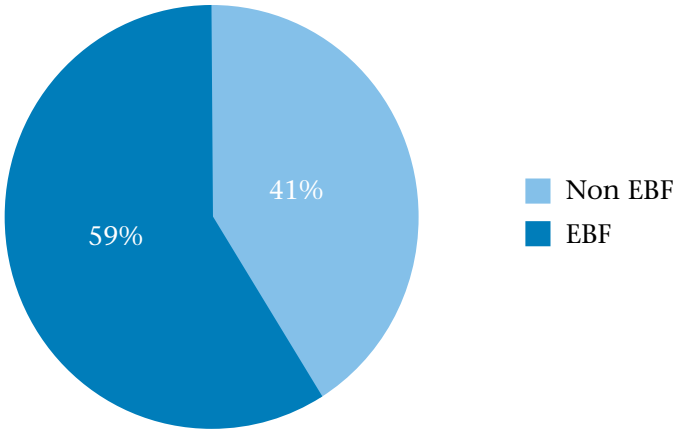
Bangladesh has one of the highest rate of malnourished under-5 children in the world (39.2%). That such a large portion of children does not have access to an essential amount of food, it is crucial to look at infants' feeding practice in Bangladesh. This current report presents the infant feeding practices in Chakaria.

Data on exclusive breastfeeding (EBF: not giving anything other than breast milk) and complementary feeding (CF: giving other foods in addition to breast milk) were collected from 776 children during February-April 2010.

### *Infants under 6 months*

Data showed that 59% of the infants were exclusively breastfed in the last 24 hours preceeding the day of the interview (Fig. 9). This figure is higher compared to Bangladesh Demographic and Health Survey (BDHS) data of 2007 (42.9%).

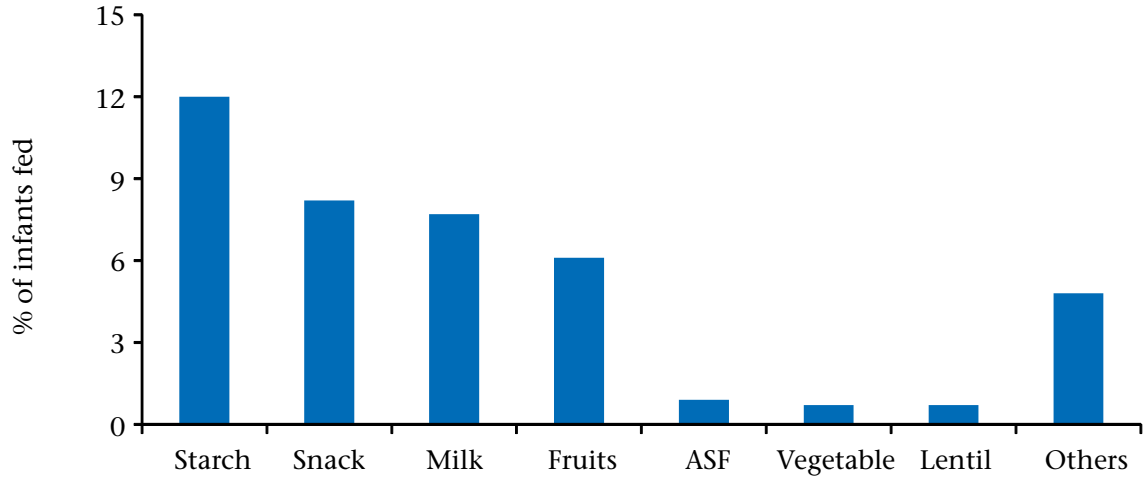
**Fig. 9. Proportion of infants (0-5 months) exclusively breastfed, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

Although only EBF is recommended for this age group, often additional foods are given to the infants. In Chakaria starch, milk and fruits were offered frequently (12%, 7.7% and 6.1%). Food such as animal-source food (ASF), vegetables and lentils were offered rarely (0.9%, 0.7% and 0.7%) to infants of this age group (Fig. 10).

**Fig. 10. Proportion of infants (0-5 months) fed other than breast milk, Chakaria HDSS, 2010**

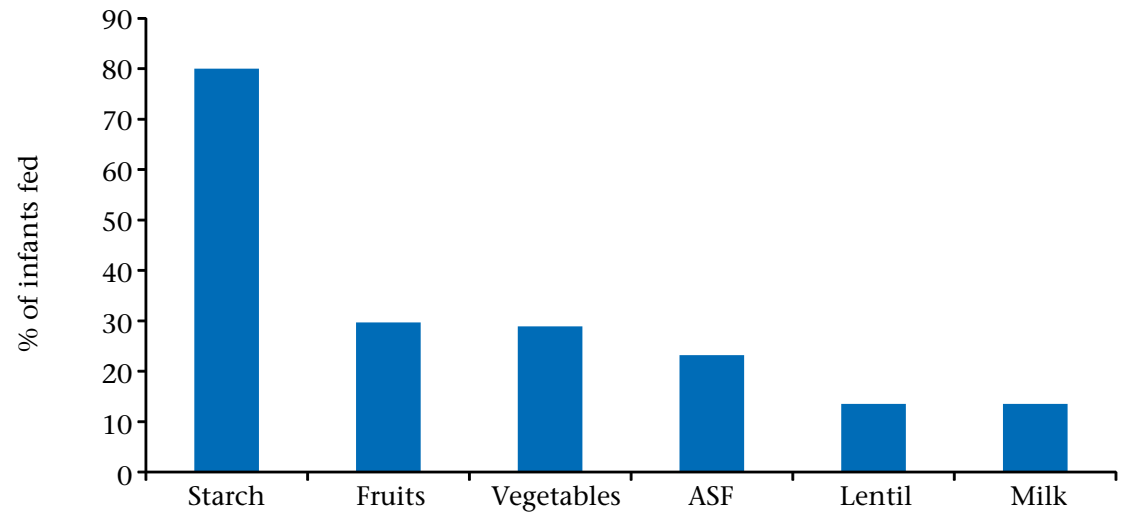



HDSS = Health and Demographic Surveillance System.

### *Infants aged 6-11 months*

Breastfeeding was universal for the infants aged 6-11 months. Among the food groups, starch (80%) was dominant, followed by fruits (30%), vegetable (29%), ASF (23%), lentil (13%) and milk (13%) (Fig. 11).

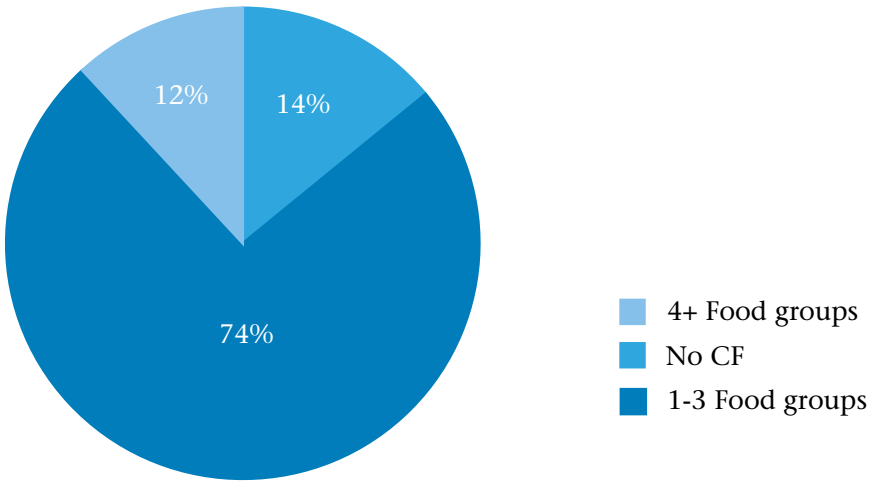
**Fig. 11. Proportion of infants (6-11 months) received complimentary food groups, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

According to the WHO feeding recommendation, infants at age 6-11 months advised to offer at least 4 different groups of food in a day (6). In Chakaria 14% of the 6-12 month old infants were not given any CF, 74% were offered food of 1-3 groups and only 12% were fed as recommended (Fig. 12).

**Fig. 12. Dietary diversity among 6-11 months old infants, Chakaria HDSS, 2010**




HDSS = Health and Demographic Surveillance System.

# CHAPTER 10

## Malaria and Care-Seeking Behaviour

Chakaria is a malaria endemic area. The HDSS collected data on prevalence of malaria during April-June, 2010. Each head of HDSS household were asked whether any of their household members were currently suffering from fever accompanied by shivering. Health seeking behaviour of those reporting fever with shivering was recorded. They were further enquired to find out whether any had gone through blood screening for malaria. The prevalence of fever with shivering (suspected cases of malaria) was 4.2% 1,000 population on the day of interview (Table 21) in the Chakaria HDSS area. The prevalence was highest among people belonging to the age-group of 20-49 years (Table 21). In 2007, a study conducted by ICDDR,B and BRAC revealed that 18% of people had fever with shivering in last 15 days in south-eastern region of Bangladesh (7).

**Table 21. Age and sex specific prevalence of fever with shivering, Chakaria HDSS, 2010**

| Age (years) | Number of individuals | | | Rate per 1,000 | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| Under-5 | 2,757 | 2,638 | 5,395 | 2.2 | 1.1 | 1.7 |
| 5-19 | 9,471 | 9,230 | 18,701 | 1.9 | 2.1 | 2.0 |
| 20-49 | 8,095 | 7,924 | 16,019 | 6.8 | 7.2 | 7.0 |
| 50 and above | 2,846 | 2,529 | 5,375 | 6.0 | 5.5 | 5.8 |
| Total | 23,169 | 22,321 | 45,490 | 4.1 | 4.2 | 4.2 |

HDSS = Health and Demographic Surveillance System.

Table 22 presents the prevalence of fever with shivering by household asset quintiles. The prevalence showed a declining trend with household socioeconomic status measured by asset quintile.

**Table 22. Prevalence of fever with shivering by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | Number of individuals | Rate per 1,000 |
|---|---|---|
| Lowest | 8,144 | 6.5 |
| Second | 8,118 | 5.7 |
| Middle | 11,514 | 4.5 |
| Fourth | 7,702 | 3.0 |
| Highest | 9,007 | 1.4 |
| Total | 44,533 | 4.2 |

HDSS = Health and Demographic Surveillance System.

About one-fifth of the people who had fever with shivering took the microscopic blood-test for malaria at Upazila Health Complex (UHC) or at private clinic. The number of people who examined their blood was higher for males than for females (Table 23).

**Table 23. Proportion of suspected cases who investigated for malaria, Chakaria HDSS, 2010**

| Tested for malaria? | Male (%) | Female (%) | Both (%) |
|---|---|---|---|
| Yes | 25.5 | 10.9 | 18.3 |
| No | 74.5 | 89.1 | 81.7 |
| Total number of individuals | 94 | 92 | 186 |

HDSS = Health and Demographic Surveillance System.

Table 24 presents the results of microscopic blood-tests. About two-thirds of the cases tested positive for malaria.

**Table 24. Results of microscopic blood-test for malaria, Chakaria HDSS, 2010**

| Results | Male (%) | Female (%) | Both (%) |
|---|---|---|---|
| Positive | 78.3 | 44.4 | 68.7 |
| Negative | 21.7 | 55.6 | 31.3 |
| Total number of individuals | 23 | 9 | 32 |

HDSS = Health and Demographic Surveillance System.

Table 25 shows the care seeking behaviour of people who had fever with shivering. About half of the people did not seek care for their health problems and of those who sought care, most contacted village doctors. Moreover, only a few people contacted the UHC for care. A sex-differential in care-seeking behavior exists for treatment of malaria.

**Table 25. Care-seeking behaviour for malaria, Chakaria HDSS, 2010**

| Sources of care | Number of individuals who had fever with shivering | | | Percentage of individuals sought care | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| Upazila Health Complex | 1 | 1 | 2 | 1.1 | 1.1 | 1.1 |
| Private Practitioners (MBBS) | 10 | 15 | 25 | 11.4 | 16.9 | 14.1 |
| SACMO | 5 | 2 | 7 | 5.7 | 2.2 | 4.0 |
| Homeopathy | 0 | 2 | 2 | 0.0 | 2.2 | 1.1 |
| Village Doctors | 43 | 22 | 65 | 48.8 | 24.7 | 36.7 |
| None | 29 | 47 | 76 | 33.0 | 52.9 | 43.0 |
| Total | 88 | 89 | 177 | 100.0 | 100.0 | 100.0 |

HDSS = Health and Demographic Surveillance System.

# CHAPTER 11

## Tuberculosis and Care-Seeking Behaviour

During April-June 2011, HDSS collected data on prevalence of tuberculosis (TB). The household heads were asked whether any of the household member currently had chronic cough for more than three weeks. Those reporting chronic cough was then asked whether they had taken any sputum specimen test for tuberculosis. The health seeking behaviour of members with chronic cough was also recorded. 2.5% of the household members reported having chronic cough on the day of the interview. Data shows prevalence of chronic cough increased with age in Chakaria (Table 26). Among the adults (15 years and above), the prevalence of chronic cough was 3.7% which was lower compared to the national figure (6.1%) (8).

**Table 26. Age and sex specific prevalence of chronic cough for more than three weeks, Chakaria HDSS, 2010**

| Age (Year) | Number of individuals | | | Rate per 100 | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| Under-5 | 2,757 | 2,640 | 5,397 | 0.9 | 0.6 | 0.7 |
| 5-14 | 6,416 | 6,057 | 12,473 | 0.7 | 0.7 | 0.7 |
| 15-24 | 5,456 | 5,436 | 10,892 | 0.7 | 0.8 | 0.8 |
| 25-34 | 2,749 | 2,623 | 5,372 | 1.4 | 1.6 | 1.5 |
| 35-44 | 2,010 | 2,152 | 4,162 | 3.5 | 3.5 | 3.5 |
| 45-54 | 1,634 | 1,665 | 3,299 | 7.2 | 7.2 | 7.2 |
| 55+ | 2,142 | 1,753 | 3,895 | 13.6 | 11.0 | 12.4 |
| Total | 23,164 | 22,326 | 45,490 | 2.7 | 2.4 | 2.5 |

HDSS = Health and Demographic Surveillance System.

Proportion of people with chronic cough by asset quintiles is presented in Table 27. The prevalence for the people from the lowest quintile was nearly double than the people from the highest quintile.

**Table 27. Prevalence of chronic cough for more than three weeks by asset quintile, Chakaria HDSS, 2010**

| Asset quintile | Number of individuals | Rate per 100 |
|---|---|---|
| Lowest | 8,143 | 2.9 |
| Second | 8,044 | 2.8 |
| Middle | 11,391 | 2.9 |
| Fourth | 7,702 | 2.5 |
| Highest | 9,007 | 1.5 |
| Total | 44,532 | 2.5 |

HDSS = Health and Demographic Surveillance System.

Table 28 presents data on sputum specimen test for TB. Only 10% of the people who had cough for more than three weeks took the sputum test for TB and males took the test more than females.

**Table 28. Proportion of people who took sputum specimen test for TB, Chakaria HDSS, 2010**

| Tested for TB? | Male (%) | Female (%) | Both (%) |
|---|---|---|---|
| Yes | 10.7 | 8.1 | 9.5 |
| No | 89.3 | 91.9 | 90.5 |
| Total number of individuals | 608 | 530 | 1,138 |

HDSS = Health and Demographic Surveillance System.

One-fourth of the sputum tests showed positive results for TB. The test results showed that TB cases were detected more in females than males (Table 29).

**Table 29. Results of sputum test for tuberculosis, Chakaria HDSS, 2010**

| Results | Male (%) | Female (%) | Both (%) |
|---|---|---|---|
| Positive | 22.4 | 27.5 | 24.5 |
| Negative | 77.6 | 72.5 | 75.5 |
| Total | 58 | 40 | 98 |

HDSS = Health and Demographic Surveillance System.

Data on health seeking behaviour revealed that about 70% of the people who had cough for more than 3 weeks sought healthcare. Among those who contacted a healthcare provider, majority went to a village doctor (Table 30). Only a few people visited the Upazila Health Complex (UHC) or BRAC for care seeking.

**Table 30. Care-seeking behaviour for tuberculosis, Chakaria HDSS, 2010**

| Sources of care | Number of individuals who had chronic cough for more than three weeks | | | Percentage of individuals sought care | | |
|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both |
| BRAC | 8 | 9 | 17 | 1.3 | 1.7 | 1.5 |
| Upazila Health Complex | 8 | 9 | 17 | 1.3 | 1.7 | 1.5 |
| Private practitioners (MBBS) | 110 | 90 | 200 | 18.1 | 17.1 | 17.6 |
| SACMO/Health assistant/Health inspector | 26 | 18 | 44 | 4.3 | 3.4 | 3.9 |
| Homeopathy | 15 | 13 | 28 | 2.5 | 2.5 | 2.5 |
| Village doctors | 272 | 216 | 488 | 44.6 | 41.2 | 43.0 |
| None | 170 | 170 | 340 | 27.9 | 32.4 | 30.0 |
| Total | 609 | 525 | 1,134 | 100.0 | 100.0 | 100.0 |

HDSS = Health and Demographic Surveillance System.

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# APPENDIX A

## Midyear population by age and sex in the intervention and comparison areas, Chakaria HDSS, 2010

| Age (yrs) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| <1 | 276 | 273 | 549 | 211 | 209 | 420 | 487 | 482 | 969 |
| 1-4 | 1,225 | 1,154 | 2,379 | 942 | 919 | 1,861 | 2,167 | 2,073 | 4,240 |
| 5-9 | 1,618 | 1,568 | 3,186 | 1,296 | 1,149 | 2,445 | 2,914 | 2,717 | 5,631 |
| 10-14 | 1,786 | 1,663 | 3,449 | 1,430 | 1,405 | 2,835 | 3,216 | 3,068 | 6,284 |
| 15-19 | 1,602 | 1,715 | 3,317 | 1,367 | 1,454 | 2,821 | 2,969 | 3,169 | 6,138 |
| 20-24 | 1,332 | 1,257 | 2,589 | 1,138 | 1,109 | 2,247 | 2,470 | 2,366 | 4,836 |
| 25-29 | 882 | 739 | 1,621 | 768 | 580 | 1,348 | 1,650 | 1,319 | 2,969 |
| 30-34 | 647 | 710 | 1,357 | 531 | 552 | 1,083 | 1,178 | 1,262 | 2,440 |
| 35-39 | 564 | 602 | 1,166 | 421 | 533 | 954 | 985 | 1,135 | 2,120 |
| 40-44 | 545 | 555 | 1,100 | 410 | 469 | 879 | 955 | 1,024 | 1,979 |
| 45-49 | 439 | 454 | 893 | 387 | 403 | 790 | 826 | 857 | 1,683 |
| 50-54 | 430 | 411 | 841 | 390 | 419 | 809 | 820 | 830 | 1,650 |
| 55-59 | 307 | 288 | 595 | 303 | 271 | 574 | 610 | 559 | 1,169 |
| 60-64 | 291 | 229 | 520 | 257 | 190 | 447 | 548 | 419 | 967 |
| 65-69 | 209 | 153 | 362 | 182 | 142 | 324 | 391 | 295 | 686 |
| 70-74 | 133 | 126 | 259 | 116 | 94 | 210 | 249 | 220 | 469 |
| 75-79 | 117 | 92 | 209 | 96 | 85 | 181 | 213 | 177 | 390 |
| 80-84 | 79 | 50 | 129 | 45 | 46 | 91 | 124 | 96 | 220 |
| 85+ | 56 | 45 | 101 | 45 | 39 | 84 | 101 | 84 | 185 |
| All | 12,538 | 12,084 | 24,622 | 10,335 | 10,068 | 20,403 | 22,873 | 22,152 | 45,025 |

# APPENDIX B

## Percentage distribution of midyear population by age and sex in the intervention and comparison areas, Chakaria HDSS, 2010

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| <1 | 2.2 | 2.3 | 2.2 | 2.0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 |
| 1-4 | 9.8 | 9.5 | 9.7 | 9.1 | 9.1 | 9.1 | 9.5 | 9.4 | 9.4 |
| 5-9 | 12.9 | 13.0 | 12.9 | 12.5 | 11.4 | 12.0 | 12.7 | 12.3 | 12.5 |
| 10-14 | 14.2 | 13.8 | 14.0 | 13.8 | 14.0 | 13.9 | 14.1 | 13.8 | 14.0 |
| 15-19 | 12.8 | 14.2 | 13.5 | 13.2 | 14.4 | 13.8 | 13.0 | 14.3 | 13.6 |
| 20-24 | 10.6 | 10.4 | 10.5 | 11.0 | 11.0 | 11.0 | 10.8 | 10.7 | 10.7 |
| 25-29 | 7.0 | 6.1 | 6.6 | 7.4 | 5.8 | 6.6 | 7.2 | 6.0 | 6.6 |
| 30-34 | 5.2 | 5.9 | 5.5 | 5.1 | 5.5 | 5.3 | 5.2 | 5.7 | 5.4 |
| 35-39 | 4.5 | 5.0 | 4.7 | 4.1 | 5.3 | 4.7 | 4.3 | 5.1 | 4.7 |
| 40-44 | 4.3 | 4.6 | 4.5 | 4.0 | 4.7 | 4.3 | 4.2 | 4.6 | 4.4 |
| 45-49 | 3.5 | 3.8 | 3.6 | 3.7 | 4.0 | 3.9 | 3.6 | 3.9 | 3.7 |
| 50-54 | 3.4 | 3.4 | 3.4 | 3.8 | 4.2 | 4.0 | 3.6 | 3.7 | 3.7 |
| 55-59 | 2.4 | 2.4 | 2.4 | 2.9 | 2.7 | 2.8 | 2.7 | 2.5 | 2.6 |
| 60-64 | 2.3 | 1.9 | 2.1 | 2.5 | 1.9 | 2.2 | 2.4 | 1.9 | 2.1 |
| 65-69 | 1.7 | 1.3 | 1.5 | 1.8 | 1.4 | 1.6 | 1.7 | 1.3 | 1.5 |
| 70-74 | 1.1 | 1.0 | 1.1 | 1.1 | 0.9 | 1.0 | 1.1 | 1.0 | 1.0 |
| 75-79 | 0.9 | 0.8 | 0.8 | 0.9 | 0.8 | 0.9 | 0.9 | 0.8 | 0.9 |
| 80-84 | 0.6 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 | 0.5 |
| 85+ | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| All | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

# APPENDIX C

## Number of births by age of mother, Chakaria HDSS, 2010

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| 10-14 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 2 |
| 15-19 | 77 | 69 | 146 | 69 | 57 | 126 | 146 | 126 | 272 |
| 20-24 | 96 | 98 | 194 | 88 | 98 | 186 | 184 | 196 | 380 |
| 25-29 | 61 | 44 | 105 | 38 | 47 | 85 | 99 | 91 | 190 |
| 30-34 | 40 | 36 | 76 | 28 | 19 | 47 | 68 | 55 | 123 |
| 35-39 | 9 | 16 | 25 | 9 | 8 | 17 | 18 | 24 | 42 |
| 40-44 | 3 | 7 | 10 | 4 | 2 | 6 | 7 | 9 | 16 |
| 45-49 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 |
| 50-54 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 2 |
| All | 289 | 272 | 561 | 237 | 231 | 468 | 526 | 503 | 1,029 |

# APPENDIX D

## Number of deaths by age and sex of decease, Chakaria HDSS, 2010

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| <1 | 20 | 8 | 28 | 10 | 13 | 23 | 30 | 21 | 51 |
| <1 month | 16 | 3 | 19 | 5 | 9 | 14 | 21 | 12 | 33 |
| 1-11 month | 4 | 5 | 9 | 5 | 4 | 9 | 9 | 9 | 18 |
| 1-4 | 7 | 5 | 12 | 0 | 7 | 7 | 7 | 12 | 19 |
| 5-9 | 0 | 3 | 3 | 1 | 0 | 1 | 1 | 3 | 4 |
| 10-14 | 2 | 1 | 3 | 0 | 1 | 1 | 2 | 2 | 4 |
| 15-19 | 1 | 2 | 3 | 2 | 1 | 3 | 3 | 3 | 6 |
| 20-24 | 2 | 1 | 3 | 1 | 1 | 2 | 3 | 2 | 5 |
| 25-29 | 0 | 0 | 0 | 2 | 1 | 3 | 2 | 1 | 3 |
| 30-34 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 1 | 2 |
| 35-39 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 2 | 2 |
| 40-44 | 1 | 2 | 3 | 2 | 3 | 5 | 3 | 5 | 8 |
| 45-49 | 2 | 3 | 5 | 2 | 1 | 3 | 4 | 4 | 8 |
| 50-54 | 2 | 4 | 6 | 2 | 3 | 5 | 4 | 7 | 11 |
| 55-59 | 4 | 2 | 6 | 4 | 3 | 7 | 8 | 5 | 13 |
| 60-64 | 7 | 4 | 11 | 10 | 5 | 15 | 17 | 9 | 26 |
| 65-69 | 6 | 3 | 9 | 9 | 4 | 13 | 15 | 7 | 22 |
| 70-74 | 1 | 3 | 4 | 4 | 7 | 11 | 5 | 10 | 15 |
| 75-79 | 7 | 4 | 11 | 7 | 5 | 12 | 14 | 9 | 23 |
| 80-84 | 2 | 4 | 6 | 4 | 4 | 8 | 6 | 8 | 14 |
| 85+ | 14 | 8 | 22 | 7 | 6 | 13 | 21 | 14 | 35 |
| All | 79 | 59 | 138 | 67 | 66 | 133 | 146 | 125 | 271 |

# APPENDIX E

## Causes of deaths by age and sex of decease, Chakaria HDSS, 2010

| Cause | All age | Age (years) | | | | | |
|---|---|---|---|---|---|---|---|
| | | <1 | 1-4 | 5-14 | 15-49 | 50-59 | 60+ |
| **Male** | | | | | | | |
| Communicable diseases | | | | | | | |
| Diarrheal | 2 | 1 | 1 | 0 | 0 | 0 | 0 |
| Tuberculosis | 3 | 0 | 0 | 0 | 0 | 0 | 3 |
| Hepatitis | 3 | 3 | 0 | 0 | 0 | 0 | 0 |
| Hepatic failure | 3 | 0 | 1 | 0 | 0 | 0 | 2 |
| Respiratory infections | 13 | 10 | 2 | 0 | 0 | 0 | 1 |
| Measles | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Malaria | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Maternal and neonatal conditions | | | | | | | |
| Neonatal | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Other neonatal | 4 | 4 | 0 | 0 | 0 | 0 | 0 |
| Non–communicable diseases | | | | | | | |
| Malignant neoplasm | 7 | 0 | 0 | 0 | 3 | 2 | 2 |
| Neoplasm | 5 | 0 | 0 | 0 | 1 | 1 | 3 |
| Diabetes | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Stroke | 22 | 0 | 0 | 0 | 3 | 3 | 16 |
| Other cardiovascular | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Asthma/Bronchitis | 14 | 0 | 0 | 0 | 0 | 2 | 12 |
| Digestive disease | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Old age related complications | 20 | 0 | 0 | 0 | 0 | 0 | 20 |
| Epistaxis | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Intestinal obstruction | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Nutritional | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Urinary | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Hypertension | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Congenital anomalies | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Injuries | | | | | | | |
| Accident | 14 | 0 | 0 | 3 | 7 | 1 | 3 |
| Drowning | 3 | 1 | 2 | 0 | 0 | 0 | 0 |
| Homicide | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Suicide | 2 | 0 | 0 | 0 | 1 | 1 | 0 |
| Unknown | 13 | 4 | 0 | 0 | 0 | 0 | 9 |
| All | 146 | 30 | 7 | 3 | 16 | 12 | 78 |

# Appendix E. (contd...)

| Cause | All age | Age (years) | | | | | |
|---|---|---|---|---|---|---|---|
| | | <1 | 1-4 | 5-14 | 15-49 | 50-59 | 60+ |
| **Female** | | | | | | | |
| Communicable diseases | | | | | | | |
| Diarrheal | 6 | 2 | 4 | 0 | 0 | 0 | 0 |
| Dysentery | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Tuberculosis | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Hepatitis | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Hepatic failure | 2 | 0 | 0 | 1 | 1 | 0 | 0 |
| Respiratory infections | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Malaria | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Maternal and neonatal conditions | | | | | | | |
| Neonatal | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Other neonatal | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Maternal death | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| Non–communicable diseases | | | | | | | |
| Malignant neoplasm | 3 | 0 | 0 | 0 | 1 | 1 | 1 |
| Neoplasm | 4 | 0 | 0 | 0 | 1 | 2 | 1 |
| Stroke | 19 | 0 | 0 | 0 | 5 | 2 | 12 |
| Other cardiovascular | 5 | 0 | 0 | 0 | 2 | 0 | 3 |
| Asthma/Bronchitis | 13 | 0 | 0 | 0 | 0 | 5 | 8 |
| Digestive disease | 2 | 0 | 0 | 0 | 0 | 1 | 1 |
| Old age related complications | 24 | 0 | 0 | 0 | 0 | 0 | 24 |
| Nutritional | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Urinary | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Congenital anomalies | 2 | 1 | 1 | 0 | 0 | 0 | 0 |
| Injuries | | | | | | | |
| Accident | 2 | 1 | 0 | 1 | 0 | 0 | 0 |
| Drowning | 5 | 1 | 3 | 1 | 0 | 0 | 0 |
| Suicide | 3 | 0 | 0 | 1 | 2 | 0 | 0 |
| Unknown | 16 | 2 | 4 | 1 | 3 | 0 | 6 |
| All | 125 | 21 | 13 | 5 | 17 | 12 | 57 |

# APPENDIX F

## Number of migrants by age and sex, Chakaria HDSS, 2010

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| **In-migrants** | | | | | | | | | |
| <1 | 12 | 7 | 19 | 8 | 10 | 18 | 20 | 17 | 37 |
| 1-4 | 29 | 23 | 52 | 20 | 20 | 40 | 49 | 43 | 92 |
| 5-9 | 26 | 32 | 58 | 18 | 19 | 37 | 44 | 51 | 95 |
| 10-14 | 52 | 35 | 87 | 29 | 24 | 53 | 81 | 59 | 140 |
| 15-19 | 31 | 236 | 267 | 17 | 160 | 177 | 48 | 396 | 444 |
| 20-24 | 35 | 83 | 118 | 26 | 78 | 104 | 61 | 161 | 222 |
| 25-29 | 28 | 37 | 65 | 29 | 16 | 45 | 57 | 53 | 110 |
| 30-34 | 12 | 6 | 18 | 14 | 2 | 16 | 26 | 8 | 34 |
| 35-39 | 5 | 3 | 8 | 7 | 0 | 7 | 12 | 3 | 15 |
| 40-44 | 5 | 1 | 6 | 6 | 1 | 7 | 11 | 2 | 13 |
| 45-49 | 2 | 1 | 3 | 4 | 4 | 8 | 6 | 5 | 11 |
| 50-54 | 3 | 4 | 7 | 0 | 2 | 2 | 3 | 6 | 9 |
| 55-59 | 2 | 1 | 3 | 1 | 2 | 3 | 3 | 3 | 6 |
| 60-64 | 1 | 2 | 3 | 5 | 4 | 9 | 6 | 6 | 12 |
| 65-69 | 2 | 7 | 9 | 2 | 3 | 5 | 4 | 10 | 14 |
| 70-74 | 2 | 4 | 6 | 0 | 4 | 4 | 2 | 8 | 10 |
| 75-79 | 2 | 3 | 5 | 3 | 2 | 5 | 5 | 5 | 10 |
| 80-84 | 0 | 3 | 3 | 1 | 2 | 3 | 1 | 5 | 6 |
| 85+ | 3 | 4 | 7 | 3 | 1 | 4 | 6 | 5 | 11 |
| All | 252 | 492 | 744 | 193 | 354 | 547 | 445 | 846 | 1,291 |
| **Out-migrants** | | | | | | | | | |
| <1 | 18 | 18 | 36 | 15 | 10 | 25 | 33 | 28 | 61 |
| 1-4 | 33 | 36 | 69 | 25 | 31 | 56 | 58 | 67 | 125 |
| 5-9 | 36 | 37 | 73 | 32 | 30 | 62 | 68 | 67 | 135 |
| 10-14 | 54 | 45 | 99 | 44 | 35 | 79 | 98 | 80 | 178 |
| 15-19 | 74 | 201 | 275 | 51 | 163 | 214 | 125 | 364 | 489 |
| 20-24 | 84 | 169 | 253 | 56 | 127 | 183 | 140 | 296 | 436 |
| 25-29 | 43 | 51 | 94 | 44 | 49 | 93 | 87 | 100 | 187 |
| 30-34 | 40 | 19 | 59 | 18 | 9 | 27 | 58 | 28 | 86 |
| 35-39 | 23 | 10 | 33 | 17 | 4 | 21 | 40 | 14 | 54 |
| 40-44 | 12 | 0 | 12 | 6 | 3 | 9 | 18 | 3 | 21 |
| 45-49 | 10 | 5 | 15 | 3 | 6 | 9 | 13 | 11 | 24 |
| 50-54 | 2 | 4 | 6 | 0 | 3 | 3 | 2 | 7 | 9 |
| 55-59 | 3 | 5 | 8 | 3 | 4 | 7 | 6 | 9 | 15 |
| 60-64 | 3 | 5 | 8 | 5 | 8 | 13 | 8 | 13 | 21 |
| 65-69 | 2 | 6 | 8 | 0 | 4 | 4 | 2 | 10 | 12 |
| 70-74 | 3 | 7 | 10 | 1 | 4 | 5 | 4 | 11 | 15 |
| 75-79 | 4 | 4 | 8 | 3 | 7 | 10 | 7 | 11 | 18 |
| 80-84 | 2 | 5 | 7 | 0 | 1 | 1 | 2 | 6 | 8 |
| 85+ | 3 | 1 | 4 | 2 | 2 | 4 | 5 | 3 | 8 |
| All | 449 | 628 | 1,077 | 325 | 500 | 825 | 774 | 1,128 | 1,902 |

# APPENDIX G

## Migration rate per 1,000 population by age and sex, Chakaria HDSS, 2010

| Age (years) | Intervention area | | | Comparison area | | | Both areas | | |
|---|---|---|---|---|---|---|---|---|---|
| | Male | Female | Both | Male | Female | Both | Male | Female | Both |
| **In-migration** | | | | | | | | | |
| <1 | 43.5 | 25.6 | 34.6 | 37.9 | 47.8 | 42.9 | 41.1 | 35.3 | 38.2 |
| 1-4 | 23.7 | 19.9 | 21.9 | 21.2 | 21.8 | 21.5 | 22.6 | 20.7 | 21.7 |
| 5-9 | 16.1 | 20.4 | 18.2 | 13.9 | 16.5 | 15.1 | 15.1 | 18.8 | 16.9 |
| 10-14 | 29.1 | 21.0 | 25.2 | 20.3 | 17.1 | 18.7 | 25.2 | 19.2 | 22.3 |
| 15-19 | 19.4 | 137.6 | 80.5 | 12.4 | 110.0 | 62.7 | 16.2 | 125.0 | 72.3 |
| 20-24 | 26.3 | 66.0 | 45.6 | 22.8 | 70.3 | 46.3 | 24.7 | 68.0 | 45.9 |
| 25-29 | 31.7 | 50.1 | 40.1 | 37.8 | 27.6 | 33.4 | 34.5 | 40.2 | 37.0 |
| 30-34 | 18.5 | 8.5 | 13.3 | 26.4 | 3.6 | 14.8 | 22.1 | 6.3 | 13.9 |
| 35-39 | 8.9 | 5.0 | 6.9 | 16.6 | 0.0 | 7.3 | 12.2 | 2.6 | 7.1 |
| 40-44 | 9.2 | 1.8 | 5.5 | 14.6 | 2.1 | 8.0 | 11.5 | 2.0 | 6.6 |
| 45-49 | 4.6 | 2.2 | 3.4 | 10.3 | 9.9 | 10.1 | 7.3 | 5.8 | 6.5 |
| 50-54 | 7.0 | 9.7 | 8.3 | 0.0 | 4.8 | 2.5 | 3.7 | 7.2 | 5.5 |
| 55-59 | 6.5 | 3.5 | 5.0 | 3.3 | 7.4 | 5.2 | 4.9 | 5.4 | 5.1 |
| 60-64 | 3.4 | 8.7 | 5.8 | 19.5 | 21.1 | 20.1 | 10.9 | 14.3 | 12.4 |
| 65-69 | 9.6 | 45.8 | 24.9 | 11.0 | 21.1 | 15.4 | 10.2 | 33.9 | 20.4 |
| 70-74 | 15.0 | 31.7 | 23.2 | 0.0 | 42.6 | 19.0 | 8.0 | 36.4 | 21.3 |
| 75-79 | 17.1 | 32.6 | 23.9 | 31.3 | 23.5 | 27.6 | 23.5 | 28.2 | 25.6 |
| 80-84 | 0.0 | 60.0 | 23.3 | 22.2 | 43.5 | 33.0 | 8.1 | 52.1 | 27.3 |
| 85+ | 53.6 | 88.9 | 69.3 | 66.7 | 25.6 | 47.6 | 59.4 | 59.5 | 59.5 |
| All | 20.1 | 40.7 | 30.2 | 18.7 | 35.2 | 26.8 | 19.5 | 38.2 | 28.7 |
| **Out-migration** | | | | | | | | | |
| <1 | 65.2 | 65.9 | 65.6 | 71.1 | 47.8 | 59.5 | 67.8 | 58.1 | 63.0 |
| 1-4 | 26.9 | 31.2 | 29.0 | 26.5 | 33.7 | 30.1 | 26.8 | 32.3 | 29.5 |
| 5-9 | 22.2 | 23.6 | 22.9 | 24.7 | 26.1 | 25.4 | 23.3 | 24.7 | 24.0 |
| 10-14 | 30.2 | 27.1 | 28.7 | 30.8 | 24.9 | 27.9 | 30.5 | 26.1 | 28.3 |
| 15-19 | 46.2 | 117.2 | 82.9 | 37.3 | 112.1 | 75.9 | 42.1 | 114.9 | 79.7 |
| 20-24 | 63.1 | 134.4 | 97.7 | 49.2 | 114.5 | 81.4 | 56.7 | 125.1 | 90.2 |
| 25-29 | 48.8 | 69.0 | 58.0 | 57.3 | 84.5 | 69.0 | 52.7 | 75.8 | 63.0 |
| 30-34 | 61.8 | 26.8 | 43.5 | 33.9 | 16.3 | 24.9 | 49.2 | 22.2 | 35.2 |
| 35-39 | 40.8 | 16.6 | 28.3 | 40.4 | 7.5 | 22.0 | 40.6 | 12.3 | 25.5 |
| 40-44 | 22.0 | 0.0 | 10.9 | 14.6 | 6.4 | 10.2 | 18.8 | 2.9 | 10.6 |
| 45-49 | 22.8 | 11.0 | 16.8 | 7.8 | 14.9 | 11.4 | 15.7 | 12.8 | 14.3 |
| 50-54 | 4.7 | 9.7 | 7.1 | 0.0 | 7.2 | 3.7 | 2.4 | 8.4 | 5.5 |
| 55-59 | 9.8 | 17.4 | 13.4 | 9.9 | 14.8 | 12.2 | 9.8 | 16.1 | 12.8 |
| 60-64 | 10.3 | 21.8 | 15.4 | 19.5 | 42.1 | 29.1 | 14.6 | 31.0 | 21.7 |
| 65-69 | 9.6 | 39.2 | 22.1 | 0.0 | 28.2 | 12.3 | 5.1 | 33.9 | 17.5 |
| 70-74 | 22.6 | 55.6 | 38.6 | 8.6 | 42.6 | 23.8 | 16.1 | 50.0 | 32.0 |
| 75-79 | 34.2 | 43.5 | 38.3 | 31.3 | 82.4 | 55.2 | 32.9 | 62.1 | 46.2 |
| 80-84 | 25.3 | 100.0 | 54.3 | 0.0 | 21.7 | 11.0 | 16.1 | 62.5 | 36.4 |
| 85+ | 53.6 | 22.2 | 39.6 | 44.4 | 51.3 | 47.6 | 49.5 | 35.7 | 43.2 |
| All | 35.8 | 52.0 | 43.7 | 31.4 | 49.7 | 40.4 | 33.8 | 50.9 | 42.2 |

# APPENDIX H

## Number of migrants by origin or destination, Chakaria HDSS, 2010

| Origin/ Destination | All age | Age (years) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | <5 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50+ |
| **In-migration** | | | | | | | | | | | | |
| Male | | | | | | | | | | | | |
| Inside Bangladesh | 379 | 69 | 44 | 80 | 47 | 46 | 38 | 14 | 3 | 8 | 3 | 27 |
| Outside Bangladesh | 66 | 0 | 0 | 1 | 1 | 15 | 19 | 12 | 9 | 3 | 3 | 3 |
| Inside Chakaria | 239 | 37 | 29 | 64 | 31 | 21 | 16 | 8 | 3 | 4 | 2 | 24 |
| Outside Chakaria | 140 | 32 | 15 | 16 | 16 | 25 | 22 | 6 | 0 | 4 | 1 | 3 |
| Inside HDSS area | 165 | 25 | 19 | 42 | 23 | 17 | 11 | 4 | 1 | 3 | 2 | 18 |
| Outside HDSS area | 74 | 12 | 10 | 22 | 8 | 4 | 5 | 4 | 2 | 1 | 0 | 6 |
| Female | | | | | | | | | | | | |
| Inside Bangladesh | 845 | 60 | 51 | 59 | 396 | 160 | 53 | 8 | 3 | 2 | 5 | 48 |
| Outside Bangladesh | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Inside Chakaria | 569 | 38 | 37 | 39 | 287 | 84 | 30 | 2 | 1 | 2 | 4 | 45 |
| Outside Chakaria | 276 | 22 | 14 | 20 | 109 | 76 | 23 | 6 | 2 | 0 | 1 | 3 |
| Inside HDSS area | 365 | 20 | 24 | 32 | 180 | 52 | 12 | 0 | 1 | 1 | 3 | 40 |
| Outside HDSS area | 204 | 18 | 13 | 7 | 107 | 32 | 18 | 2 | 0 | 1 | 1 | 5 |
| **Out-migration** | | | | | | | | | | | | |
| Male | | | | | | | | | | | | |
| Inside Bangladesh | 602 | 89 | 68 | 96 | 88 | 82 | 54 | 43 | 23 | 13 | 10 | 36 |
| Outside Bangladesh | 172 | 2 | 0 | 2 | 37 | 58 | 33 | 15 | 17 | 5 | 3 | 0 |
| Inside Chakaria | 396 | 60 | 42 | 80 | 65 | 46 | 30 | 25 | 9 | 7 | 4 | 28 |
| Outside Chakaria | 206 | 29 | 26 | 16 | 23 | 36 | 24 | 18 | 14 | 6 | 6 | 8 |
| Inside HDSS area | 278 | 44 | 25 | 55 | 48 | 32 | 26 | 16 | 6 | 3 | 1 | 22 |
| Outside HDSS area | 119 | 17 | 17 | 25 | 17 | 14 | 4 | 9 | 3 | 4 | 3 | 8 |
| Female | | | | | | | | | | | | |
| Inside Bangladesh | 1,114 | 95 | 67 | 78 | 358 | 293 | 99 | 28 | 14 | 3 | 10 | 69 |
| Outside Bangladesh | 14 | 0 | 0 | 2 | 6 | 3 | 1 | 0 | 0 | 0 | 1 | 1 |
| Inside Chakaria | 738 | 54 | 47 | 56 | 243 | 184 | 64 | 13 | 8 | 3 | 8 | 58 |
| Outside Chakaria | 377 | 41 | 20 | 22 | 116 | 109 | 35 | 15 | 6 | 0 | 2 | 11 |
| Inside HDSS area | 464 | 29 | 26 | 40 | 145 | 116 | 40 | 7 | 5 | 2 | 6 | 48 |
| Outside HDSS area | 275 | 25 | 21 | 16 | 98 | 69 | 24 | 6 | 3 | 1 | 2 | 10 |

# APPENDIX I

## Number of in-migrants by reasons for migration, Chakaria HDSS, 2010

| Reason for migration | All age | Age (years) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | <5 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50+ |
| **Male** | | | | | | | | | | | | |
| Family-related | | | | | | | | | | | | |
| To join spouse | 16 | 0 | 0 | 0 | 2 | 5 | 6 | 1 | 0 | 1 | 0 | 1 |
| Family friction/ breakdown | 21 | 5 | 1 | 0 | 2 | 4 | 1 | 3 | 1 | 0 | 0 | 4 |
| Others | 58 | 11 | 3 | 3 | 2 | 8 | 10 | 3 | 0 | 2 | 1 | 15 |
| Work-related | | | | | | | | | | | | |
| New job/job transfer | 67 | 1 | 0 | 1 | 0 | 15 | 18 | 13 | 9 | 4 | 3 | 3 |
| To look for work/lost job | 95 | 0 | 3 | 48 | 23 | 12 | 5 | 0 | 0 | 2 | 0 | 2 |
| others | 16 | 3 | 2 | 3 | 2 | 0 | 1 | 1 | 1 | 1 | 0 | 2 |
| Housing-related | | | | | | | | | | | | |
| Wanted to own home/ new house | 122 | 47 | 10 | 11 | 12 | 15 | 15 | 5 | 1 | 1 | 2 | 3 |
| Education | | | | | | | | | | | | |
| To acquire education | 50 | 2 | 25 | 15 | 5 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| All | 445 | 69 | 44 | 81 | 48 | 61 | 57 | 26 | 12 | 11 | 6 | 30 |
| **Female** | | | | | | | | | | | | |
| Family related | | | | | | | | | | | | |
| To join spouse | 461 | 0 | 1 | 17 | 325 | 96 | 19 | 1 | 0 | 0 | 1 | 1 |
| Family friction/ breakdown | 52 | 2 | 1 | 0 | 12 | 14 | 5 | 4 | 1 | 0 | 1 | 12 |
| Others | 101 | 9 | 9 | 5 | 18 | 12 | 14 | 2 | 0 | 2 | 0 | 30 |
| Work-related | | | | | | | | | | | | |
| New job/job transfer | 4 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| To look for work/lost job | 42 | 0 | 9 | 12 | 11 | 6 | 4 | 0 | 0 | 0 | 0 | 0 |
| Others | 19 | 2 | 3 | 4 | 1 | 3 | 1 | 0 | 1 | 0 | 0 | 4 |
| Housing-related | | | | | | | | | | | | |
| Wanted to own home/ new house | 137 | 46 | 10 | 15 | 22 | 28 | 10 | 1 | 1 | 0 | 3 | 1 |
| Education | | | | | | | | | | | | |
| To acquire education | 30 | 1 | 17 | 5 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| All | 846 | 60 | 51 | 59 | 396 | 161 | 53 | 8 | 3 | 2 | 5 | 48 |

# APPENDIX J

## Number of out-migrants by reasons for migration, Chakaria HDSS, 2010

| Reason for migration | All age | Age (years) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | <5 | 5-9 | 10-14 | 15-19 | 20-24 | 25-29 | 30-34 | 35-39 | 40-44 | 45-49 | 50+ |
| **Male** | | | | | | | | | | | | |
| Family-related | | | | | | | | | | | | |
| To Join spouse | 15 | 0 | 0 | 0 | 2 | 6 | 5 | 1 | 1 | 0 | 0 | 0 |
| Family friction/ breakdown | 38 | 4 | 2 | 2 | 3 | 9 | 5 | 5 | 1 | 1 | 0 | 6 |
| Others | 51 | 6 | 3 | 5 | 6 | 7 | 8 | 2 | 1 | 1 | 0 | 12 |
| Work-related | | | | | | | | | | | | |
| New job/job transfer | 185 | 1 | 0 | 0 | 38 | 62 | 39 | 17 | 17 | 6 | 4 | 1 |
| To look for work/ lost job | 120 | 1 | 3 | 20 | 27 | 20 | 11 | 18 | 7 | 2 | 6 | 5 |
| Others | 31 | 3 | 6 | 5 | 3 | 2 | 5 | 0 | 2 | 1 | 0 | 4 |
| Housing-related | | | | | | | | | | | | |
| Wanted to own home/new house | 265 | 75 | 43 | 44 | 30 | 23 | 13 | 13 | 10 | 5 | 2 | 7 |
| Education | | | | | | | | | | | | |
| To acquire education | 65 | 0 | 11 | 22 | 15 | 10 | 1 | 2 | 1 | 2 | 0 | 1 |
| Reasons not reported | 4 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| All | 774 | 91 | 68 | 98 | 125 | 140 | 87 | 58 | 40 | 18 | 13 | 36 |
| **Female** | | | | | | | | | | | | |
| Family-related | | | | | | | | | | | | |
| To Join spouse | 508 | 0 | 0 | 15 | 252 | 187 | 47 | 4 | 3 | 0 | 0 | 0 |
| Family friction/ breakdown | 83 | 2 | 2 | 3 | 16 | 28 | 12 | 2 | 2 | 1 | 3 | 12 |
| Others | 128 | 13 | 8 | 6 | 26 | 23 | 10 | 3 | 2 | 1 | 3 | 33 |
| Work-related | | | | | | | | | | | | |
| New job/job transfer | 9 | 0 | 0 | 0 | 4 | 2 | 1 | 0 | 0 | 0 | 1 | 1 |
| To look for work/lost job | 47 | 1 | 3 | 10 | 11 | 11 | 5 | 5 | 1 | 0 | 0 | 0 |
| Others | 36 | 3 | 3 | 3 | 8 | 3 | 0 | 4 | 0 | 0 | 1 | 11 |
| Housing-related | | | | | | | | | | | | |
| Wanted to own home/ new house | 279 | 75 | 41 | 30 | 39 | 41 | 22 | 10 | 6 | 1 | 2 | 12 |
| Education | | | | | | | | | | | | |
| To acquire education | 34 | 1 | 10 | 11 | 7 | 0 | 3 | 0 | 0 | 0 | 1 | 1 |
| Reasons not reported | 4 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| All | 1,128 | 95 | 67 | 80 | 364 | 296 | 100 | 28 | 14 | 3 | 11 | 70 |

# APPENDIX K

## Percentage of population by age and marital status, Chakaria HDSS, 2010

| Age (years) | Married | Divorced | Widower/ Widow | Never married | Population |
|---|---|---|---|---|---|
| **Male** | | | | | |
| 10-14 | 0.1 | 0.0 | 0.0 | 99.9 | 3,216 |
| 15-19 | 4.3 | 0.1 | 0.0 | 95.6 | 2,971 |
| 20-24 | 24.9 | 0.3 | 0.0 | 74.7 | 2,478 |
| 25-29 | 55.0 | 1.1 | 0.1 | 43.8 | 1,660 |
| 30-34 | 83.1 | 0.7 | 0.0 | 16.2 | 1,183 |
| 35-39 | 95.8 | 0.9 | 0.2 | 3.1 | 993 |
| 40-44 | 97.7 | 0.7 | 0.1 | 1.5 | 960 |
| 45-49 | 99.0 | 0.1 | 0.6 | 0.2 | 829 |
| 50-54 | 99.2 | 0.0 | 0.7 | 0.1 | 822 |
| 55-59 | 98.5 | 0.2 | 1.0 | 0.3 | 612 |
| 60-64 | 98.0 | 0.4 | 1.6 | 0.0 | 552 |
| 65-69 | 94.1 | 0.0 | 5.9 | 0.0 | 390 |
| 70-74 | 94.8 | 0.0 | 5.2 | 0.0 | 252 |
| 75-79 | 87.3 | 0.5 | 11.8 | 0.5 | 212 |
| 80-84 | 85.6 | 0.0 | 14.4 | 0.0 | 125 |
| 85+ | 68.6 | 2.9 | 28.4 | 0.0 | 102 |
| All | 47.7 | 0.4 | 0.8 | 51.1 | 17,357 |
| **Female** | | | | | |
| 10-14 | 1.3 | 0.0 | 0.0 | 98.6 | 3,064 |
| 15-19 | 31.4 | 0.5 | 0.0 | 68.1 | 3,176 |
| 20-24 | 70.2 | 1.6 | 0.4 | 27.8 | 2,376 |
| 25-29 | 88.0 | 1.0 | 1.9 | 9.1 | 1,319 |
| 30-34 | 93.6 | 1.9 | 2.3 | 2.2 | 1,267 |
| 35-39 | 93.2 | 1.5 | 5.3 | 0.0 | 1,136 |
| 40-44 | 90.2 | 1.4 | 8.0 | 0.4 | 1,022 |
| 45-49 | 82.9 | 1.1 | 15.6 | 0.4 | 859 |
| 50-54 | 76.0 | 1.0 | 23.0 | 0.1 | 828 |
| 55-59 | 62.0 | 1.6 | 36.2 | 0.2 | 561 |
| 60-64 | 54.7 | 0.0 | 44.9 | 0.5 | 419 |
| 65-69 | 43.2 | 0.3 | 56.5 | 0.0 | 294 |
| 70-74 | 33.3 | 0.5 | 66.2 | 0.0 | 219 |
| 75-79 | 15.6 | 0.6 | 83.8 | 0.0 | 179 |
| 80-84 | 8.3 | 0.0 | 90.6 | 1.0 | 96 |
| 85+ | 3.6 | 0.0 | 96.4 | 0.0 | 84 |
| All | 54.4 | 0.9 | 9.2 | 35.5 | 16,899 |

# APPENDIX L

## Percentage of population by age and marital status, intervention area, Chakaria HDSS, 2010

| Age (years) | Married | Divorced | Widower/ Widow | Never married | Population |
|---|---|---|---|---|---|
| **Male** | | | | | |
| 10-14 | 0.1 | 0.0 | 0.0 | 99.9 | 1,786 |
| 15-19 | 4.4 | 0.1 | 0.0 | 95.6 | 1,602 |
| 20-24 | 24.8 | 0.4 | 0.0 | 74.9 | 1,336 |
| 25-29 | 54.2 | 1.6 | 0.1 | 44.1 | 891 |
| 30-34 | 83.4 | 0.9 | 0.0 | 15.7 | 649 |
| 35-39 | 96.0 | 1.1 | 0.4 | 2.6 | 569 |
| 40-44 | 97.6 | 0.9 | 0.0 | 1.5 | 547 |
| 45-49 | 99.1 | 0.0 | 0.5 | 0.5 | 442 |
| 50-54 | 99.3 | 0.0 | 0.7 | 0.0 | 432 |
| 55-59 | 98.7 | 0.3 | 0.7 | 0.3 | 307 |
| 60-64 | 98.3 | 0.3 | 1.4 | 0.0 | 293 |
| 65-69 | 92.8 | 0.0 | 7.3 | 0.0 | 207 |
| 70-74 | 93.4 | 0.0 | 6.6 | 0.0 | 137 |
| 75-79 | 90.5 | 0.9 | 7.8 | 0.9 | 116 |
| 80-84 | 84.8 | 0.0 | 15.2 | 0.0 | 79 |
| 85+ | 70.2 | 1.8 | 28.1 | 0.0 | 57 |
| All | 47.6 | 0.4 | 0.8 | 51.2 | 9,450 |
| **Female** | | | | | |
| 10-14 | 1.2 | 0.0 | 0.0 | 98.9 | 1,659 |
| 15-19 | 31.5 | 0.6 | 0.1 | 67.9 | 1,723 |
| 20-24 | 71.1 | 1.9 | 0.5 | 26.6 | 1,261 |
| 25-29 | 87.7 | 0.4 | 2.0 | 9.9 | 738 |
| 30-34 | 94.1 | 1.8 | 2.1 | 2.0 | 714 |
| 35-39 | 93.7 | 1.7 | 4.6 | 0.0 | 603 |
| 40-44 | 91.7 | 1.3 | 6.7 | 0.4 | 554 |
| 45-49 | 85.1 | 1.1 | 13.9 | 0.0 | 455 |
| 50-54 | 76.8 | 1.0 | 22.3 | 0.0 | 409 |
| 55-59 | 58.3 | 2.4 | 39.0 | 0.3 | 290 |
| 60-64 | 59.4 | 0.0 | 40.2 | 0.4 | 229 |
| 65-69 | 47.7 | 0.7 | 51.6 | 0.0 | 153 |
| 70-74 | 33.1 | 0.8 | 66.1 | 0.0 | 124 |
| 75-79 | 12.8 | 1.1 | 86.2 | 0.0 | 94 |
| 80-84 | 10.0 | 0.0 | 90.0 | 0.0 | 50 |
| 85+ | 4.4 | 0.0 | 95.6 | 0.0 | 45 |
| All | 54.8 | 0.9 | 8.7 | 35.6 | 9,101 |

# APPENDIX M

## Percentage of population by age and marital status, comparison area, Chakaria HDSS, 2010

| Age (years) | Married | Divorced | Widower/ Widow | Never married | Population |
|---|---|---|---|---|---|
| **Male** | | | | | |
| 10-14 | 0.0 | 0.0 | 0.0 | 99.9 | 1,430 |
| 15-19 | 4.2 | 0.2 | 0.0 | 95.6 | 1,369 |
| 20-24 | 25.1 | 0.3 | 0.1 | 74.5 | 1,142 |
| 25-29 | 55.9 | 0.7 | 0.0 | 43.4 | 769 |
| 30-34 | 82.8 | 0.4 | 0.0 | 16.9 | 534 |
| 35-39 | 95.5 | 0.7 | 0.0 | 3.8 | 424 |
| 40-44 | 97.8 | 0.5 | 0.2 | 1.5 | 413 |
| 45-49 | 99.0 | 0.3 | 0.8 | 0.0 | 387 |
| 50-54 | 99.0 | 0.0 | 0.8 | 0.3 | 390 |
| 55-59 | 98.4 | 0.0 | 1.3 | 0.3 | 305 |
| 60-64 | 97.7 | 0.4 | 1.9 | 0.0 | 259 |
| 65-69 | 95.6 | 0.0 | 4.4 | 0.0 | 183 |
| 70-74 | 96.5 | 0.0 | 3.5 | 0.0 | 115 |
| 75-79 | 83.3 | 0.0 | 16.7 | 0.0 | 96 |
| 80-84 | 87.0 | 0.0 | 13.0 | 0.0 | 46 |
| 85+ | 66.7 | 4.4 | 28.9 | 0.0 | 45 |
| All | 47.8 | 0.3 | 0.8 | 51.1 | 7,907 |
| **Female** | | | | | |
| 10-14 | 1.5 | 0.1 | 0.1 | 98.4 | 1,405 |
| 15-19 | 31.3 | 0.3 | 0.0 | 68.4 | 1,453 |
| 20-24 | 69.3 | 1.3 | 0.3 | 29.2 | 1,115 |
| 25-29 | 88.5 | 1.7 | 1.7 | 8.1 | 581 |
| 30-34 | 93.0 | 2.0 | 2.5 | 2.5 | 553 |
| 35-39 | 92.7 | 1.3 | 6.0 | 0.0 | 533 |
| 40-44 | 88.5 | 1.5 | 9.6 | 0.4 | 468 |
| 45-49 | 80.5 | 1.0 | 17.6 | 0.7 | 404 |
| 50-54 | 75.2 | 1.0 | 23.6 | 0.2 | 419 |
| 55-59 | 66.1 | 0.7 | 33.2 | 0.0 | 271 |
| 60-64 | 49.0 | 0.0 | 50.5 | 0.5 | 190 |
| 65-69 | 38.3 | 0.0 | 61.7 | 0.0 | 141 |
| 70-74 | 33.7 | 0.0 | 66.3 | 0.0 | 95 |
| 75-79 | 18.8 | 0.0 | 81.2 | 0.0 | 85 |
| 80-84 | 6.5 | 0.0 | 91.3 | 2.2 | 46 |
| 85+ | 2.6 | 0.0 | 97.4 | 0.0 | 39 |
| All | 53.9 | 0.8 | 9.8 | 35.5 | 7,798 |

# APPENDIX N

## Chakaria HDSS project team, Chakaria HDSS, 2010

| Name of Staff | Designation |
|---|---|
| **Dhaka** | |
| Abbas Bhuiya | Project Director |
| Mohammad Iqbal | Senior Operations Researcher |
| SM Manzoor Ahmed Hanifi | Assistant Scientist |
| Rumesa R Aziz | Research Investigator |
| Tania Wahed | Senior Operations Researcher |
| Farhana Urni | Senior Statistical Officer |
| Md. Kashem Iqbal | Senior Administrative Officer |
| Ayesha Begum | Senior Data Management Assistant |
| **Chakaria** | |
| Shahidul Hoque | Senior Field Research Officer |
| Ariful Moula | Field Research Officer |
| Mijanur Rahaman | Field Research Officer |
| Ashish Paul | Senior Data Management Assistant |
| Md. Sharif Al-Hasan | Field Research Supervisor |
| Snehasish Dutta | Field Research Assistant |
| Md. Rehmat Ali | Senior Field Assistant |
| Afroza Yeasmin | Data Collector |
| Armanul Maowa | Data Collector |
| Aymun Nahar | Data Collector |
| Fatema Johura Surma | Data Collector |
| Fatema Zannat | Data Collector |
| Helena Khanom Happy | Data Collector |
| Hosaina Begum | Data Collector |
| Ismat Jahan Khuki | Data Collector |
| Kawsar Jannat | Data Collector |
| Kawsar Jannat Mukta | Data Collector |
| Kulsuma Aktar | Data Collector |
| Mina Dhar | Data Collector |
| Mobasseratul Zannat | Data Collector |
| Monuara Begum | Data Collector |
| Nazma Akter | Data Collector |
| Nigar Sultana | Data Collector |
| Noor Ayesha Begum | Data Collector |
| Rawnak Zahan | Data Collector |
| Riasmin Zannat | Data Collector |
| Rosan Ara | Data Collector |
| Sabina Yesmin | Data Collector |
| Setara Begum | Data Collector |
| Shamima Khanam | Data Collector |
| Tanjina Zannat Ara | Data Collector |
| Tanjimul Zannat | Data Collector |
| Zannatul Ferdous | Data Collector |
| Zosna Begum | Data Collector |

HDSS = Health and Demographic Surveillance System.

icddr,b

KNOWLEDGE FOR
GLOBAL LIFESAVING SOLUTIONS