

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

**Demographic Events, Safe Motherhood Practices, and
Childhood Immunization – 2011**

Scientific Report No. 122



icddr,b

KNOWLEDGE FOR
GLOBAL LIFESAVING SOLUTIONS

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Childhood Immunization – 2011

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All staff members of the Chakaria HDSS, Dhaka and Chakaria, have contributed to the preparation of this report.

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CHAPTER I

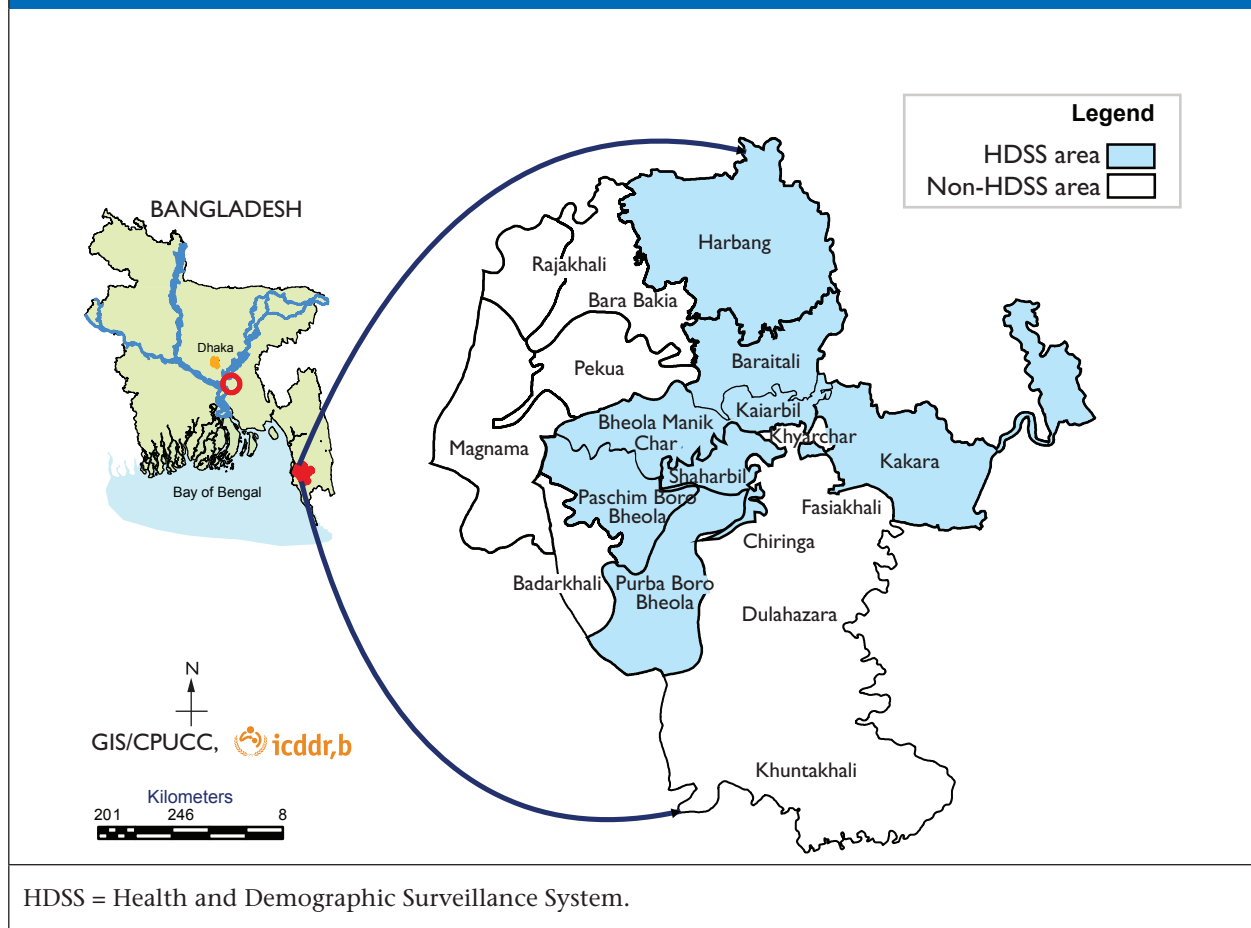
Introduction

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 491,242 in 2011. 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 surveillance area are presented in the box below. Collection of data from households on a quarterly basis, referred hitherto as Chakaria Health and Demographic Surveillance System (Chakaria HDSS), has been initiated in this 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 2011.

Existing health services in Chakaria HDSS area, 2011	
Healthcare facility/provider	No.
icddr,b facilitated and Community initiated	
Village health post	7
Trained midwife	12
Qualified physician	1
Male paramedic	10
Government	
Union Health and Family Welfare Centre (UHFWC)	10
EPI centre	254
Rural dispensary	1
Family Welfare Visitor (FWV)	8
Sub-Assistant Community Medical Officer (SACMO)/Medical assistant	4
Family Welfare Assistant (skilled birth attendant)	18
Community Clinics	23
Community Healthcare Provider	24
Private	
Village doctor (allopathic)	240
Village doctor (homeopathic)	102
Allopathic pharmacy	177
Homeopathic pharmacy	15
Diagnostic centre	3
NGO	
Health and development activities	8
HDSS = Health and Demographic Surveillance System.	

Fig. 1. Map of Chakaria showing Chakaria HDSS area



CHAPTER 2

Methods and Materials

The Chakaria HDSS covered 8 unions¹, namely Baraitali, Kayerbil, Bheola Manik Char, Paschim Boro Bheola, Shaharbil, Kakara, Harbang, and Purba Boro Bheola. In 1999, 166,405 people were living in 26,979 households. A household is defined as blood or otherwise related group of members and unrelated individuals living in the same compound at least once a month and sharing the food from the same kitchen. A household member is considered to have migrated out if s/he has left the household and does not intend to come back within six months of the time s/he left. A person is considered to have migrated in if s/he was not previously included in the list of household members and intends to live in the household for at least once in a month for the next six months.

Although Chakaria HDSS started in 1999, covering 183 villages of 166,405 individuals living in 26,979 households, data collection was interrupted during 2001–03. Since 2004, quarterly data collection has resumed, and data have been systematically collected from 7,042 households, randomly chosen from the total of 26,979 households. Data have been collected through quarterly visits by a team of surveillance workers (SWs) with supervision from a team of two supervisors. On a typical day, a SW would come to the office and take a list of households assigned by the supervisors, travel to respondents' households, update the events and return the collected data sheets to the office. Using this system, data collection and data management took a significant amount of time and money, involving daily travel to the households by SWs. The above system of data collection was modified in 2011. The modification involved choosing 49 villages randomly from a total of 183. The 49 villages were divided into 14 work areas and 14 SWs were recruited from the 14 work areas where they resided. Most of the households included in the system prior to this modification were also included in the new system. The modification of the system has resulted in the SWs visiting almost double the number of households in comparison with the previous system, saving time spent on travel in the earlier system. In addition, the modification allowed the possibility of estimating migration as the system includes complete villages. Currently, surveillance covers 79,635 individuals (14,649 households).

Two 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.

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

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 dependant variables. 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 for calculating weights of the assets to derive household asset index scores (3). The major demographic indicators and safe motherhood practices have been tabulated for the various asset quintiles.

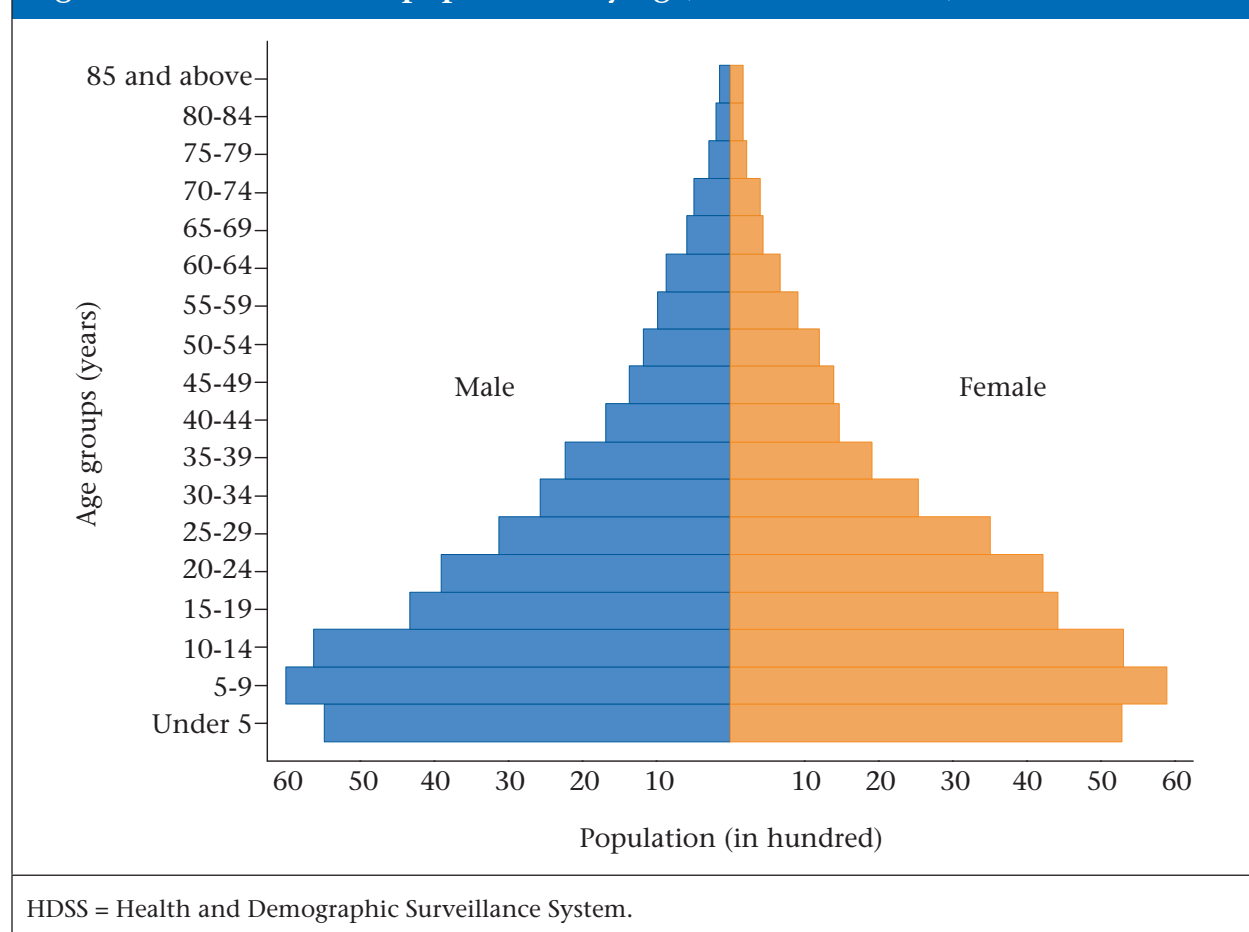
It should be mentioned that the number of observations in the tables presented in this report differ in some instances due to missing information for some variables.

CHAPTER 3

Population and Population Changes

The population pyramid based on the population 2011 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 102 in 2011. The age dependency ratio² was 83 in 2011 (see Appendix A).

Fig. 2. Male and female population by age, Chakaria HDSS, 2011



The major demographic and health indicators during 2007-11 are presented in Table 1. A declining trend in the fertility indicators and natural rate of population increase had been observed during 2007-10, but these rates increased in 2011. Most of the rates in Chakaria HDSS area are much higher than those in the Matlab government

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).

service area, another rural field site of icddr,b (4). In 2011, the rate of natural increase and the annual population growth rate in the surveillance area was 2.2 % and 1.9% respectively (Table 1).

14.0% of births in Chakaria were delivered at facilities (Hospital or Clinic) in 2011. The percentage of births at facilities in 2011 remained same to 2010. 25.7% of the births were attended by Skilled Birth Attendant (SBA). There has been a decrease in deliveries by SBAs from 28.1% in 2010 to 25.7% in 2011 (Table 1).

The legal age of marriage is 18 years for female and 21 years for male in Bangladesh. In 2011, 33.6% of the women married before reaching their 18th birthday. The percentage of underage female marriage decreased to 33.6% in 2011 from 36.4% in 2010. 22.8% of the males were married before the age of 21 years in 2011. The proportion of male marriages before 21 years has decreased between 2010 and 2011. The percentage of underage marriage for females remained higher than males during 2007 to 2011.

Table 1. Demographic and health indicators, Chakaria HDSS, 2007 – 2011

Rates per 1,000	Chakaria HDSS area					Matlab HDSS Govt. area 2011
	2007	2008	2009	2010	2011	
Crude birth rate	26.6	25.5	22.9	22.7	27.7	21.1
Total fertility rate*	3.5	3.3	2.8	2.7	3.3	2.5
Neonatal mortality**	34.8	29.0	36.8	32.1	38.1	25.5
Post-neonatal mortality**	13.3	14.9	21.3	17.5	14.5	6.9
Infant mortality rate**	48.0	43.9	58.1	49.6	52.6	32.4
Child mortality rate (1-4 yrs)	4.6	4.7	4.7	4.5	3.4	2.9
Crude death rate	6.1	6.1	6.5	6.0	5.7	6.4
Rate of natural increase	20.6	20.2	16.4	16.8	22.0	14.8
In-migration rate	24.6	26.6	29.8	28.7	36.8	41.5
Out-migration rate	32.0	35.5	40.6	42.2	39.7	57.6
Growth rate (%)	1.3	1.1	0.6	0.3	1.9	-0.1
Facility-based delivery (%)	5.1	14.4	12.0	14.1	14.0	-
Received assistance from SBA during delivery (%)	19.1	16.2	25.3	28.1	25.7	-
Male marriage at ages under 21 years (%)	25.6	24.7	24.8	25.0	22.8	-
Female marriage at ages under 18 years (%)	43.2	47.5	39.3	36.4	33.6	-

*Per woman; **Per 1,000 live births; '-' 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 was 5.7 per 1,000 population in 2011. Infant mortality rate was 52.6 per 1,000 live births. Child mortality rate was 3.4 per 1,000 children aged 1-4 years (Table 2).

Abridged Life Table for males and females are presented in Table 3. Life expectancy at birth was 71 years for males and 69 years for females. The rate of mortality of children aged less than 5 years (under-five mortality) was 62.6 per 1,000 live births in Chakaria in 2011 (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 65 years, but after age 65 probability of survival increased for males.

Table 2. Age-specific death rate per 1,000 population by sex, Chakaria HDSS, 2011

Age (years)	No. of death			Death rate		
	Male	Female	Both	Male	Female	Both
<1*	60	56	116	52.8	52.5	52.6
1-4	13	16	29	3.0	3.9	3.4
5-9	11	5	16	1.9	0.9	1.4
10-14	1	4	5	0.2	0.8	0.5
15-19	2	3	5	0.5	0.7	0.6
20-24	3	13	16	0.8	3.2	2.0
25-29	3	6	9	1.0	1.7	1.4
30-34	6	3	9	2.4	1.2	1.8
35-39	7	3	10	3.2	1.6	2.5
40-44	7	9	16	4.2	6.1	5.1
45-49	5	1	6	3.7	0.7	2.2
50-54	5	10	15	4.3	8.4	6.4
55-59	7	7	14	7.2	7.8	7.5
60-64	16	12	28	18.7	18.1	18.4
65-69	11	17	28	19.1	38.5	27.5
70-74	17	14	31	35.2	34.7	35.0
75-79	14	12	26	50.5	54.5	52.3
80-84	11	19	30	59.5	115.2	85.7
85+	23	24	47	160.8	144.6	152.1
All	222	234	456	5.5	5.9	5.7

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

Table 3. Abridged Life Table, Chakaria HDSS, 2011

Age (years)	Male					Female				
	${}_n m_x$	${}_n q_x$	l_x	${}_n L_x$	e_x	${}_n m_x$	${}_n q_x$	l_x	${}_n L_x$	e_x
0	0.0549	0.0523	100,000	95,292	70.8	0.0537	0.0512	100,000	95,391	68.6
1	0.0030	0.0121	94,769	376,782	73.7	0.0039	0.0153	94,878	376,613	71.3
5	0.0019	0.0093	93,622	465,936	70.6	0.0009	0.0043	93,428	466,134	68.4
10	0.0002	0.0009	92,753	463,553	66.2	0.0008	0.0038	93,026	464,235	63.6
15	0.0005	0.0023	92,669	462,801	61.3	0.0007	0.0035	92,669	462,535	58.9
20	0.0008	0.0039	92,452	461,351	56.4	0.0032	0.0158	92,345	458,078	54.1
25	0.0010	0.0049	92,088	459,309	51.6	0.0017	0.0087	90,886	452,454	49.9
30	0.0024	0.0119	91,635	455,446	46.9	0.0012	0.0060	90,096	449,129	45.3
35	0.0032	0.0159	90,543	449,112	42.4	0.0016	0.0079	89,556	446,015	40.6
40	0.0042	0.0208	89,101	440,864	38.1	0.0061	0.0302	88,850	437,548	35.9
45	0.0037	0.0184	87,244	432,209	33.8	0.0007	0.0036	86,169	430,070	31.9
50	0.0043	0.0215	85,639	423,602	29.4	0.0084	0.0412	85,859	420,454	27.0
55	0.0072	0.0353	83,802	411,607	25.0	0.0078	0.0382	82,323	403,745	23.1
60	0.0187	0.0893	80,841	386,159	20.8	0.0181	0.0865	79,175	378,765	18.9
65	0.0191	0.0910	73,623	351,368	17.6	0.0385	0.1758	72,330	329,862	15.5
70	0.0352	0.1618	66,924	307,559	14.1	0.0347	0.1598	59,615	274,254	13.2
75	0.0505	0.2244	56,099	249,030	11.4	0.0545	0.2400	50,087	220,383	10.3
80	0.0595	0.2588	43,513	189,409	9.0	0.1152	0.4471	38,066	147,786	7.7
85+	0.1608	1.0000	32,251	200,515	6.2	0.1446	1.0000	21,048	145,585	6.9

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.

${}_n m_x$ = Central mortality rate

${}_n q_x$ = Probability of dying between the ages x and x+n;

${}_n q_x = \frac{{}_n m_x}{\log_e c} \left[\frac{1}{1+n} + \frac{{}_n m_x}{2} \left(\frac{1}{1+n} + \frac{1}{2} \right) \right]$;

l_x = Survivors to exact age x

${}_n L_x$ = Numbers 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

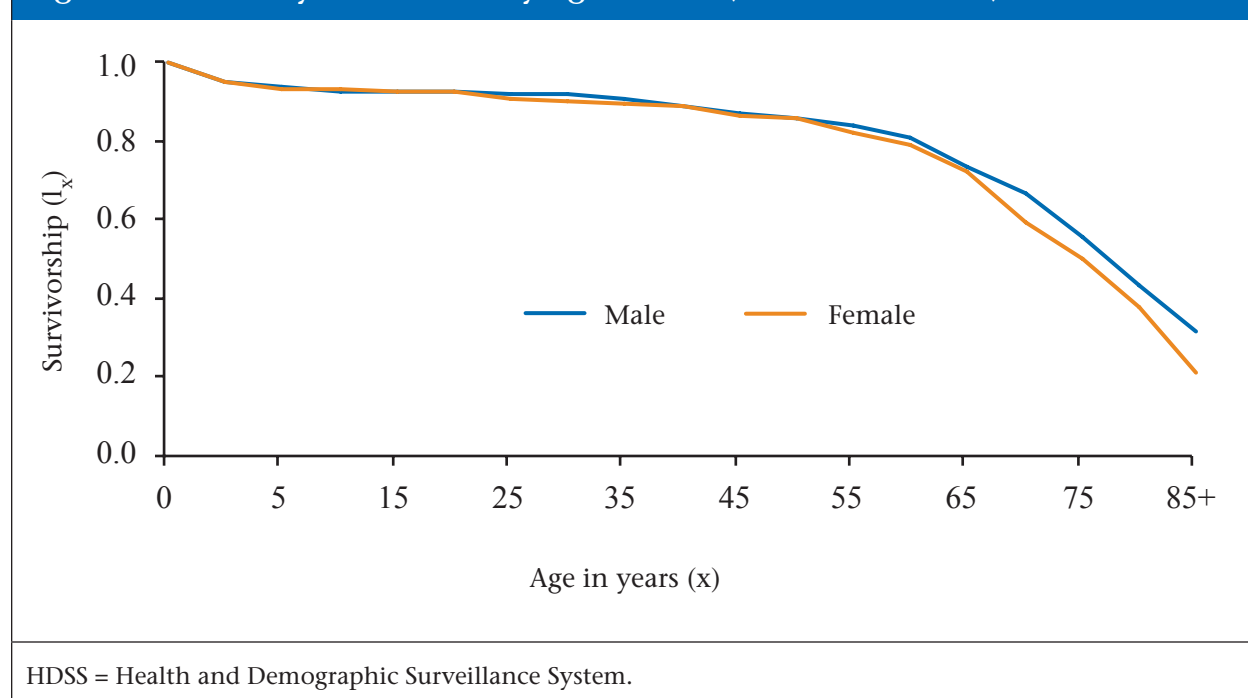
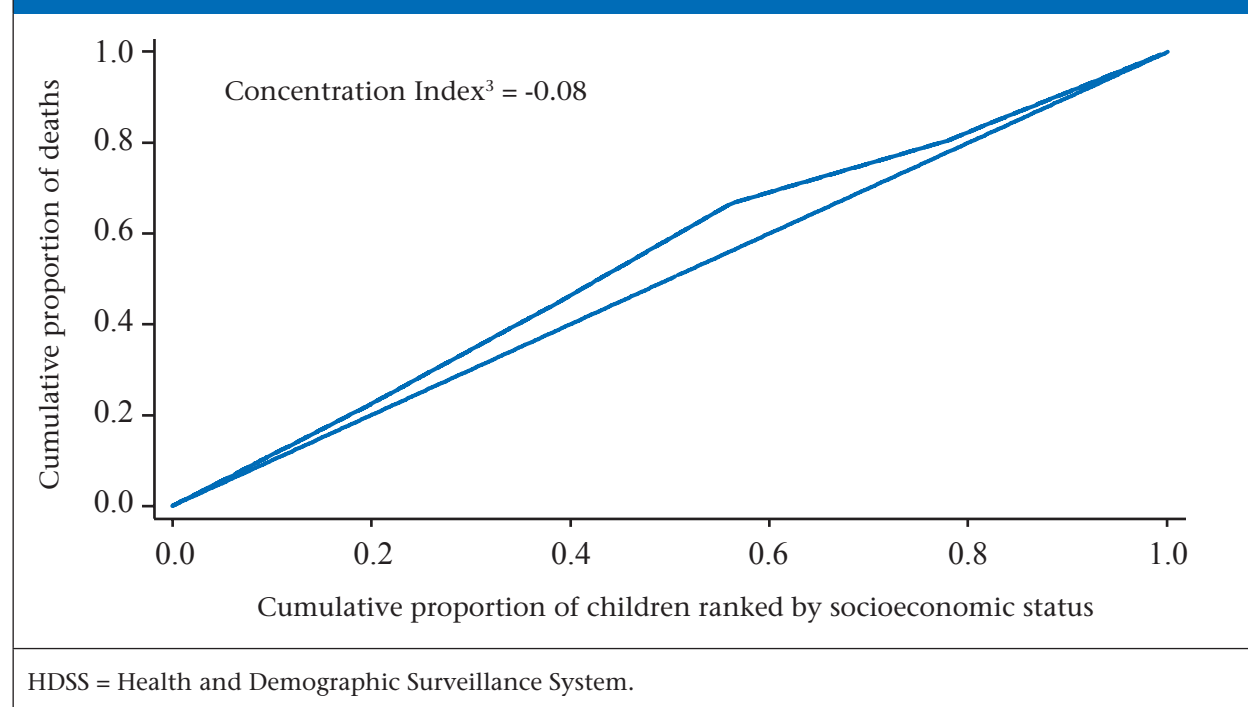
Fig. 3. Probability of survival by age and sex, Chakaria HDSS, 2011

Table 4 presents under-5 mortality rates by household asset quintile. Under-5 mortality rate was inversely correlated with household asset scores. The mortality rate of children from the lowest quintile was almost double of children from the highest quintile. Figure 4 also shows that under-5 deaths concentrated to the poorer segment of the population.

Table 4. Under-5 mortality rate per 1,000 live births by asset quintile, Chakaria HDSS, 2011

Asset quintile	Number of birth	Number of under-5 deaths	Under-5 mortality rate
Lowest	417	32	76.7
Second	418	31	74.2
Middle	375	28	74.7
Fourth	480	25	52.1
Highest	483	20	41.4
All	2,173	136	62.6

HDSS = Health and Demographic Surveillance System.

Fig. 4. Concentration curve for under-5 mortality, Chakaria HDSS, 2011

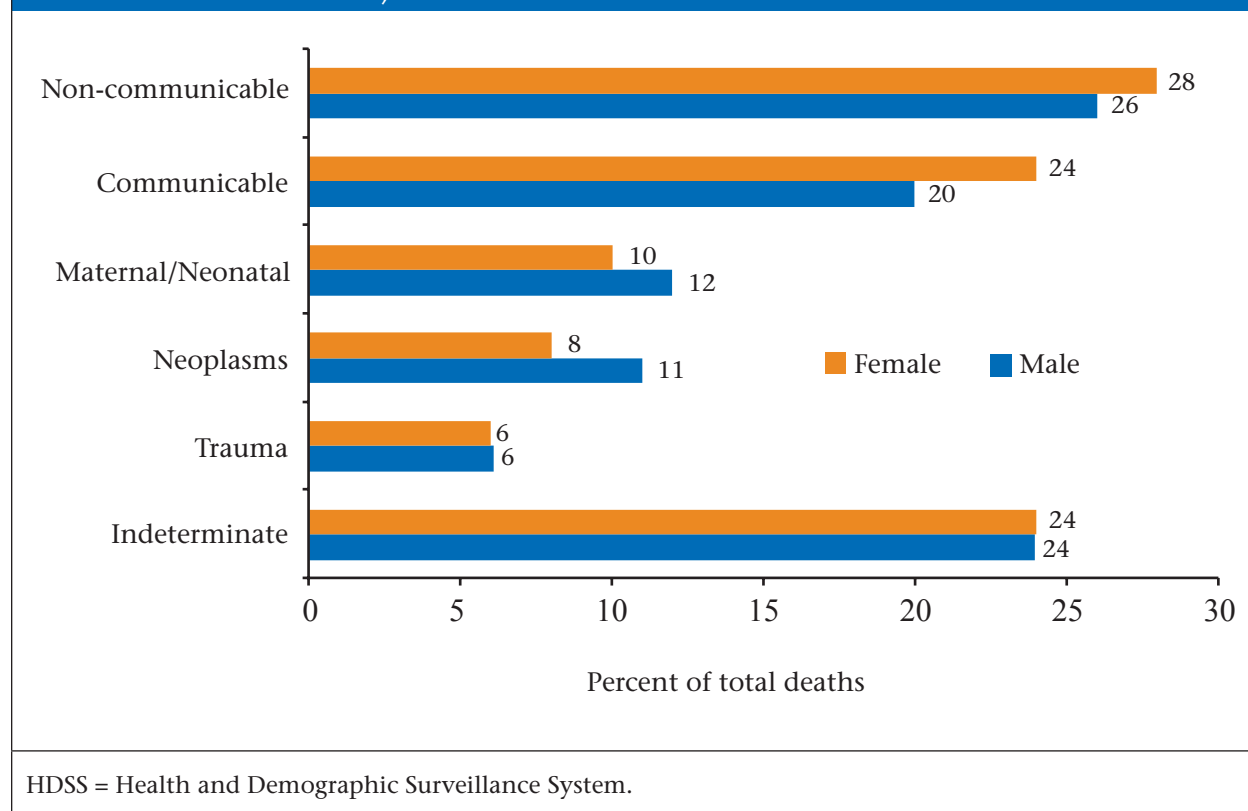
Causes of death

Verbal autopsy data on signs, symptoms and circumstances leading to death, and medical history of the deceased were collected during the quarterly household visits from an informed household member. A total of 456 deaths were registered in 2011. Data was analyzed using “InterVA-4.01” (5) to ascertain causes of death.

Broad pattern of cause of death

Non-communicable conditions (27%) and communicable diseases (22%) were the leading causes of death for both men and women. This was followed by maternal and neonatal condition (11%), neoplasms (10%), and trauma (6%). For both communicable and non-communicable diseases, proportion of deaths were higher for females than for males (Fig. 5). Maternal and neonatal conditions were the leading cause of death in children and accounts for one-third of child deaths. Non-communicable diseases were the leading cause of death for adult and elderly people (Table 5).

³ Concentration Index (CI) is a measure of the socioeconomic inequality of health based upon information on the socioeconomic ranks and the health levels of all individuals in the population. A positive value of CI indicates that health is distributed in favour of the rich, and a negative one that it is distributed in favour of the poor (6). A value of zero indicates no relation between health and socioeconomic status (7).

Fig. 5. Distribution of deaths by leading causes for males and females, Chakaria HDSS, 2011**Table 5. Distribution of causes of death, Chakaria HDSS, 2011**

Cause group	Children (%)	Adults (%)	Elderly (%)
01 Communicable	18.6	16.1	25.4
02 Neoplasms	0.4	16.5	13.4
03 Non-communicable	5.1	24.1	40.8
04 Maternal/Neonatal	34.6	0.9	0.0
05 Trauma	12.5	8.1	2.1
06 Indeterminate	28.9	34.3	18.3
Total	100.0	100.0	100.0

HDSS = Health and Demographic Surveillance System.

Pulmonary tuberculosis, acute respiratory infection (including pneumonia), stroke, diabetes mellitus, and chronic obstructive pulmonary diseases are the leading five causes of death for all ages. Table 6 presents the distribution of cause of death for males and females.

Table 6. Distribution of causes of death among males and females, Chakaria HDSS, 2011

Causes	Male	Female	Both
01.01 Sepsis (non-obstetric)	0.1	0.2	0.2
01.02 Acute respiratory infection, including pneumonia	6.0	7.5	6.7
01.03 HIV/AIDS related death	0.1	0.2	0.2
01.04 Diarrhoeal diseases	0.9	2.1	1.5
01.05 Malaria	0.0	0.6	0.3
01.06 Measles	0.0	0.4	0.2
01.07 Meningitis and encephalitis	0.4	1.5	0.9
01.09 Pulmonary tuberculosis	10.7	9.4	10.1
01.10 Pertussis	0.1	0.2	0.1
01.11 Haemorrhagic fever	0.0	0.0	0.0
01.99 Other and unspecified infectious diseases	1.9	1.8	1.8
02.01 Oral neoplasms	0.0	0.1	0.1
02.02 Digestive neoplasms	2.5	1.5	2.0
02.03 Respiratory neoplasms	4.1	2.7	3.4
02.04 Breast neoplasms	0.0	0.4	0.2
02.05 & 02.06 Reproductive neoplasms M, F	0.5	0.7	0.6
02.99 Other and unspecified neoplasms	4.2	2.8	3.5
03.01 Severe anaemia	0.4	0.5	0.4
03.02 Severe malnutrition	0.5	0.5	0.5
03.03 Diabetes mellitus	4.1	6.0	5.0
04.01 Acute cardiac disease	2.3	1.0	1.7
04.02 Stroke	5.4	5.6	5.5
04.99 Other and unspecified cardiac diseases	3.0	2.6	2.8
05.01 Chronic obstructive pulmonary disease	4.0	4.7	4.4
05.02 Asthma	1.2	1.2	1.2
06.01 Acute abdomen	1.4	2.1	1.7
06.02 Liver cirrhosis	1.6	0.8	1.2
07.01 Renal failure	1.4	2.2	1.8
08.01 Epilepsy	0.8	0.7	0.7
09.03 Pregnancy-induced hypertension	0.0	0.3	0.1
10.01 Prematurity	4.7	2.0	3.4
10.02 Birth asphyxia	3.2	3.6	3.4
10.03 Neonatal pneumonia	1.4	0.9	1.1
10.04 Neonatal sepsis	0.2	0.1	0.2
10.06 Congenital malformation	0.3	0.9	0.6
10.99 Other and unspecified neonatal causes of death	2.4	2.2	2.3

Table 6. (contd...)

Causes	Male	Female	Both
12.01 Road traffic accident	0.4	0.0	0.2
12.03 Accidental fall	0.9	0.3	0.6
12.04 Accidental drowning and submersion	3.6	3.3	3.4
12.05 Accidental exposure to smoke fire & flame	0.8	0.4	0.0
12.06 Contact with venomous plant/animal	0.1	0.0	0.1
12.07 Accidental poisoning & noxious substances	0.6	0.0	0.3
12.08 Intentional self-harm	0.3	0.9	0.6
12.09 Assault	0.3	0.1	0.2
12.99 Other and unspecified external causes of death	0.2	0.8	0.5
98 Other and unspecified non-communicable diseases	0.3	0.1	0.2
99 Indeterminate	19.3	19.4	19.4
XX VA not completed	4.6	4.5	4.5
All	100.0	100.0	100.0
HDSS = Health and Demographic Surveillance System.			

CHAPTER 5

Fertility

The crude birth rate in 2011 was 27.7 per 1,000 population, which was higher than the rate in 2010 (22.7 per 1,000 population) (Table 1). The fertility rate was highest among women of age-group of 20-24 years (Table 7).

Table 7. Age-specific fertility rate per 1,000 women aged 15-49 years, Chakaria HDSS, 2011

Age (years)	No. of females	No. of births			Birth rate
		Male	Female	Both	
15-19	4,295	155	159	314	73.1
20-24	4,080	461	417	878	215.2
25-29	3,435	303	284	587	170.9
30-34	2,497	159	127	286	114.5
35-39	1,895	38	57	95	50.1
40-44	1,469	18	19	37	25.2
45-49	1,386	3	4	7	5.1
Total	19,057	1,137	1,067	2,204	
TFR					3,270

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

Table 8. Crude birth rate per 1,000 population by asset quintile, Chakaria HDSS, 2011

Asset quintile	Midyear population	Number of births	Birthrate
Lowest	12,895	417	32.3
Second	15,010	418	27.8
Middle	17,030	375	22.0
Fourth	16,741	480	28.7
Highest	17,672	483	27.3
All	79,348	2,173	27.4

HDSS = Health and Demographic Surveillance System.

Table 8 presents the crude birth rates by household asset quintiles. The crude birth rate showed a 'U' shaped relationship with household socioeconomic status measured by asset quintiles.

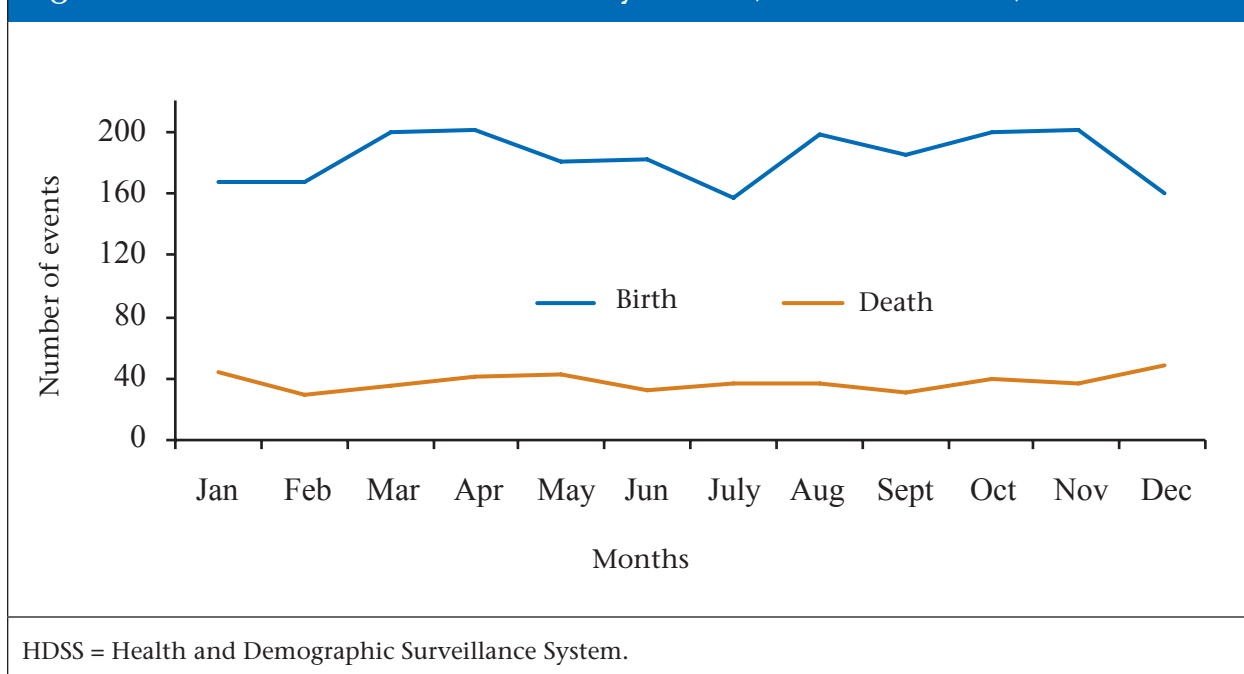
Of the pregnancies in 2011, 7.9% of 2,547 were terminated prematurely and spontaneously, 2.7% were terminated through induction, and 2.8% resulted in stillbirths (Table 9).

Table 9. Pregnancy outcome, Chakaria HDSS, 2011

Pregnancy outcome	No.	%
Spontaneous abortion	202	7.9
Induced abortion	69	2.7
Stillbirth	72	2.8
Live birth*	2,204	86.5
Total number of pregnancies	2,547	100.0

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

Fig. 6. Number of births and deaths by month, Chakaria HDSS, 2011



Distribution of births and deaths by month did not show any distinct seasonal pattern (Fig. 6).

CHAPTER 6

Migration

In 2011, the rate of out-migration was higher at 39.7 per 1,000 population than that of in-migration at 37.9 per 1,000 population (Table 10). Monthly data on migration are presented in Table 11. Data showed that the number of in-migrants was lower than that of out-migrants during 2011. The sex differential in migration was prominent. The rate of in-migration of females was highest in January and that for males was in February. The rate of out-migration was highest among the males in May and females were highest in February.

Table 10. Migration rate per 1,000 population by asset quintile, Chakaria HDSS, 2011

Asset quintile	Midyear population	In-migration rate	Out-migration rate
Lowest	12,895	53.4	33.4
Second	15,010	36.0	30.5
Middle	17,030	32.9	33.8
Fourth	16,741	33.0	42.6
Highest	17,672	37.6	55.1
All	79,348	37.9	39.7

HDSS = Health and Demographic Surveillance System.

Table 11. Number of migrants by sex and month, Chakaria HDSS, 2011

Month	In-migration			Out-migration		
	Male	Female	Both	Male	Female	Both
January	143	220	363	125	159	284
February	149	197	346	138	198	336
March	100	136	236	110	150	260
April	96	152	248	83	131	214
May	111	157	268	139	150	289
June	71	144	215	127	134	261
July	71	135	206	126	161	287
August	84	106	190	115	116	231
September	88	131	219	117	149	266
October	73	134	207	113	106	219
November	86	129	215	121	112	233
December	72	149	221	133	146	279
All	1,144	1,790	2,934	1,447	1,712	3,159

HDSS = Health and Demographic Surveillance System.

Origin and destination of migrants

During 2011, 3.3% of 2,934 in-migrants moved into Chakaria HDSS households from outside of Bangladesh whereas 13.8% of 3,159 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 12).

Origin or destination	In-migration			Out-migration		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Inside Bangladesh	92.1	99.6	96.7	70.6	99.4	86.2
Outside Bangladesh	8.0	0.4	3.3	29.4	0.6	13.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of migrants	1,144	1,790	2,934	1,447	1,712	3,159
Inside Chakaria	55.9	64.6	61.2	45.4	64.2	55.7
Outside Chakaria	44.1	35.5	38.8	54.6	35.8	44.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of migrants	1,111	1,766	2,877	1,398	1,672	3,070
Inside HDSS area	60.7	61.8	61.4	70.8	65.0	67.1
Outside HDSS area	39.3	38.2	38.6	29.2	35.0	32.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of migrants	782	1,408	2,190	750	1,279	2,029

HDSS = Health and Demographic Surveillance System.

Reasons for migration

Table 13 presents the reasons of migration by sex. 41.7% of the migrants moved out due to family-related issues - mostly marriage, followed by housing (25.6%), work (20.7%), and education (7.5%). Reasons for moving out for males were different from those of females. 37.9% of male in-migrants moved due to work related issues whereas only 19.2% of the females moved due to that reason. On the other hand, 60.4% of female in-migrants moved due to family related issues - mostly marriage, while 33.5% of males moved due to family related reasons (Table 13). The reasons of movement for out-migration were mostly similar to the reasons for in-migration.

Table 13. Reasons for migration, Chakaria HDSS, 2011

Reasons for migration	In-migration			Out-migration		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Family-related	33.5	60.4	49.9	22.8	57.7	41.7
Work-related	37.9	19.2	26.5	38.8	5.4	20.7
Housing-related	19.2	12.1	14.9	26.5	24.7	25.6
Education	5.6	5.1	5.3	8.4	6.8	7.5
Other	3.8	3.2	3.4	3.5	5.4	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of migrants	1,144	1,790	2,934	1,447	1,712	3,159

HDSS = Health and Demographic Surveillance System.

CHAPTER 7

Marriage

In total 1,243 marriages took place in the surveillance villages in Chakaria during 2011. The highest number of marriages took place in July and the lowest in August. The number of marriages showed a downward trend from July to August (Fig.7). Table 14 presents singulate mean age at marriage (SMAM) and median age at first marriage. The SMAM was 26.4 years for males and 19.8 years for females. The SMAM was decreased for males and it increased for females between 2010 and 2011. The median age at first marriage for males and females were 26.2 and 19.2 years. Both the indicators for males and females were almost positively associated with household socioeconomic status.

Table 14. Age at marriage by sex, Chakaria HDSS, 2011

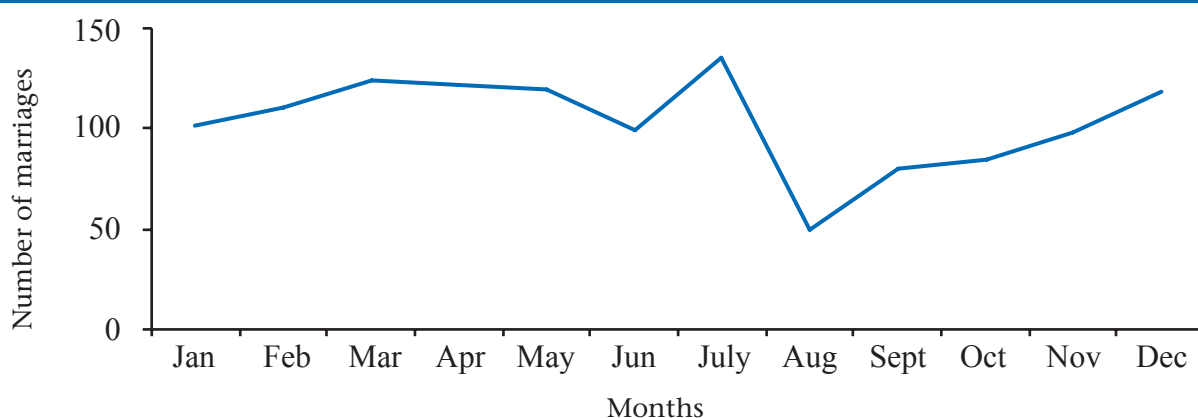
Asset quintile	Male		Female	
	SMAM*	Median age at first marriage*	SMAM*	Median age at first marriage*
Lowest	22.7	22.5	19.3	18.7
Second	24.7	24.6	19.3	18.7
Middle	26.5	26.3	19.5	19.2
Fourth	26.8	25.9	19.7	19.1
Highest	28.9	29.1	20.5	19.6
All	26.4	26.2	19.8	19.2

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. 7. Number of marriages by month, Chakaria HDSS, 2011



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. 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, 10 Union Health and Family Welfare Centres (UHFWCs) of the government, 7 village health posts which were initiated by the community members and one Rural Dispensary (RD) of the government provide health services. The Family Development Services and Research (FDSR), an NGO also provides healthcare services in Chakaria surveillance area.

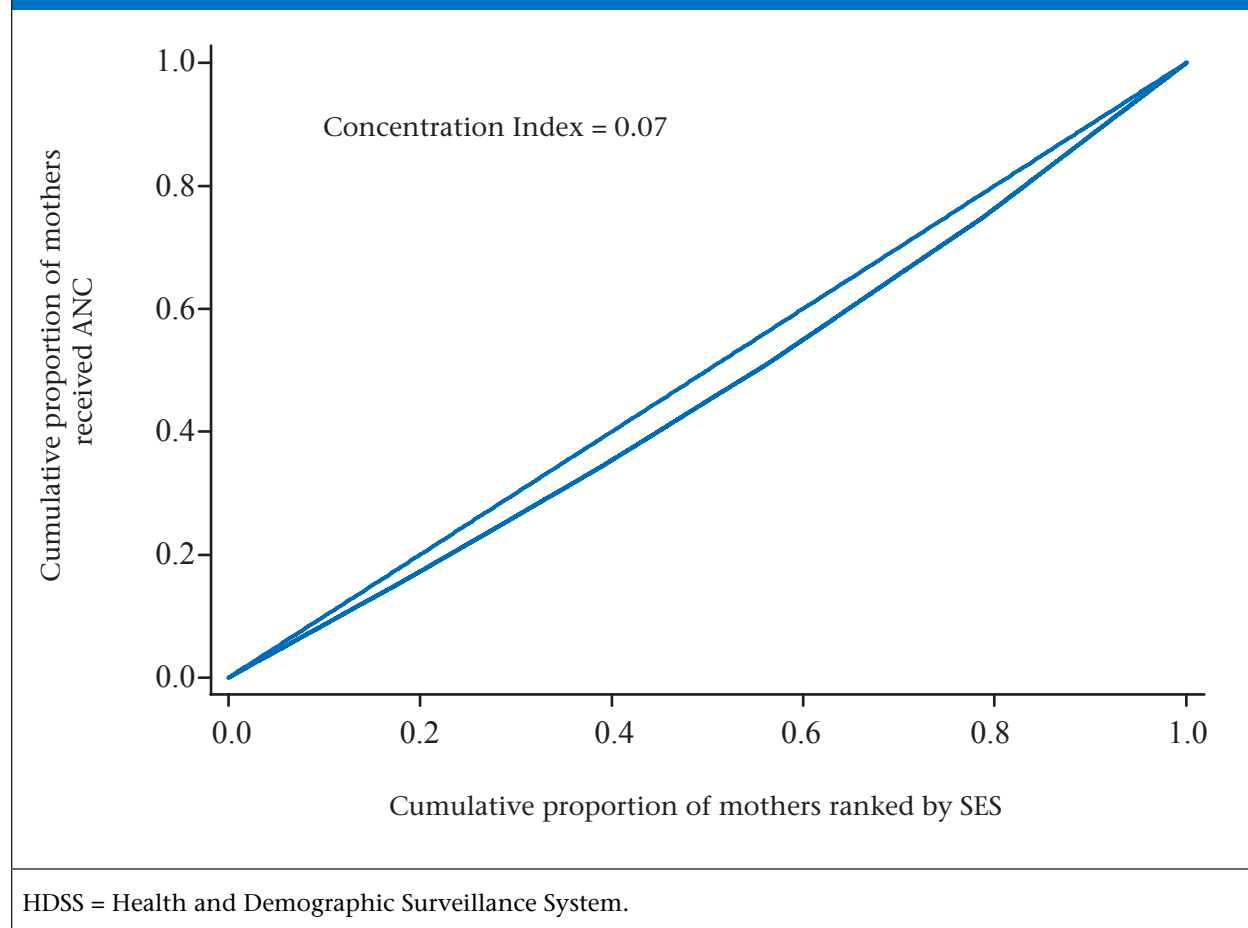
Use of antenatal care services

Table 15. Antenatal care by type of sources and asset quintile, Chakaria HDSS, 2011							
Asset quintile	Received any ANC (%)	Midwife*	FWV*	Nurse/doctor*	FDSR/CMH*	None (%)	No. of women
Lowest	59.2	17.3	20.1	17.7	19.2	40.8	417
Second	60.8	20.8	20.1	17.2	20.3	39.2	418
Middle	68.0	16.5	17.9	28.0	24.5	32.0	375
Fourth	70.2	18.5	16.3	36.0	16.5	29.8	480
Highest	79.1	8.1	11.2	64.6	10.6	20.9	483
Total	67.9	16.1	16.9	33.9	17.8	32.1	2,173
*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.							

During 2011, 67.9% of 2,173 pregnant women in Chakaria received at least one antenatal check-up (ANC). The women received services from various sources.

Among these sources, the nurses/doctors were dominant, followed by FDSR/CMH and FWV and then midwives (Table 15). Also Figure 8 indicated that the use of ANC services concentrated to richer segments of the population (Fig. 8).

Fig. 8. Concentration curve for receiving ANC, Chakaria HDSS, 2011



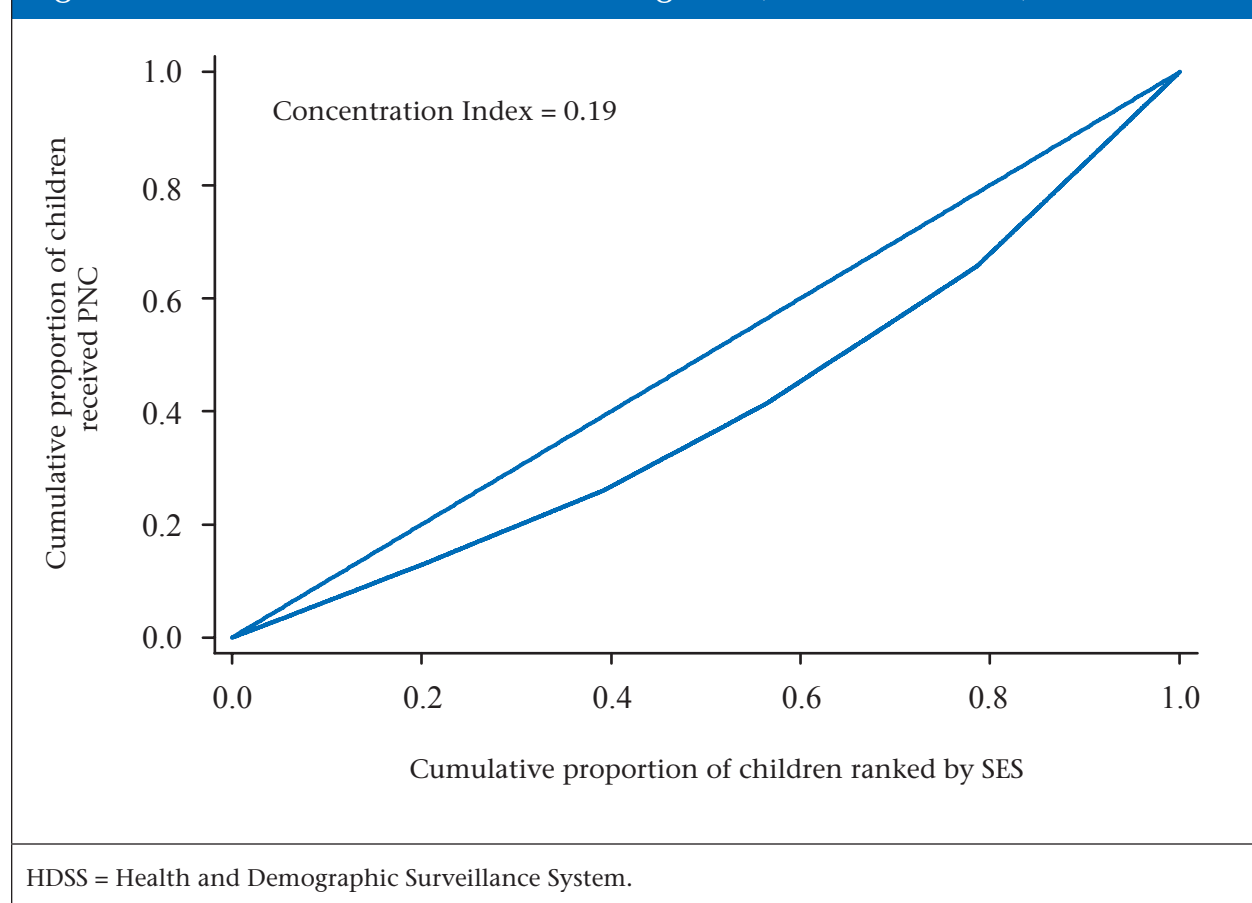
Use of postnatal care services

It was observed that only 34.9% of the pregnant women received at least one postnatal care (PNC) in 2011. The nurses, doctors and midwives were the dominant sources for PNC. The utilization of services was characterized by large inequities and the services concentrated to the richest segment of the society (Table 16 and Fig. 9).

Table 16. Postnatal care by type of sources and asset quintile, Chakaria HDSS, 2011

Asset quintile	Received any PNC (%)	Midwife* (%)	FWV* (%)	Nurse/doctor* (%)	FDSR/CMH* (%)	None (%)	No. of women
Lowest	22.5	3.6	1.2	17.7	0.7	77.5	417
Second	23.7	7.2	1.0	15.8	0.5	76.3	418
Middle	32.5	9.6	1.1	24.0	0.5	67.5	375
Fourth	37.3	9.6	2.3	28.8	0.4	62.7	480
Highest	54.9	6.6	2.9	47.4	2.7	45.1	483
Total	34.9	7.3	1.7	27.5	1.0	65.1	2,173

*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.

Fig. 9. Concentration curve for receiving PNC, Chakaria HDSS, 2011

Assistance during delivery

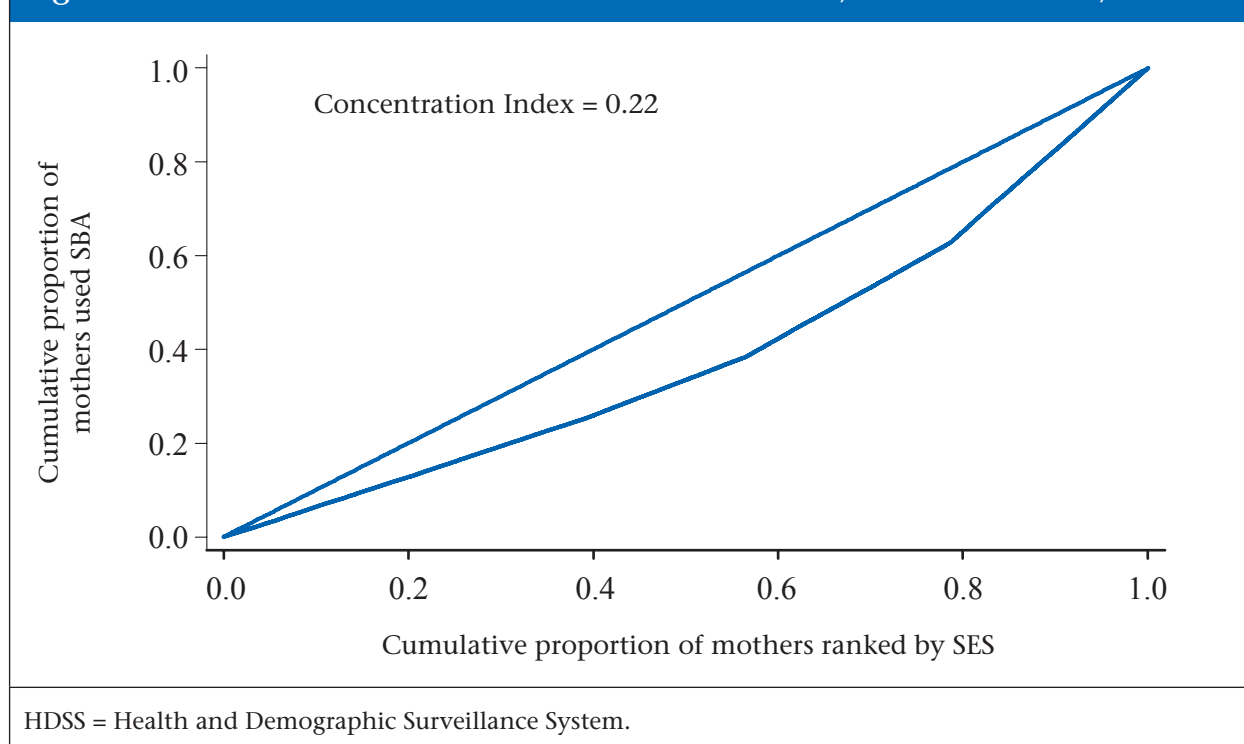
Table 17. Assistance during delivery by asset quintile, Chakaria HDSS, 2011

Asset quintile	Midwife (%)	FWV (%)	Nurse/ doctor (%)	TBA (%)	No. of women
Lowest	6.7	1.4	7.9	83.9	417
Second	7.9	2.4	4.5	85.2	418
Middle	9.1	1.1	7.7	82.1	375
Fourth	12.3	2.9	12.9	71.9	480
Highest	8.9	4.1	33.7	53.2	483
Total	9.1	2.5	14.1	74.3	2,173

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

In Chakaria, the traditional birth attendants (TBAs) were used more than the skilled birth attendants (SBAs) for assisting deliveries. 74.3% of 2,173 deliveries in Chakaria were assisted by the TBAs as opposed to 25.7% of the deliveries assisted by the SBAs (e.g. nurses/doctors, FWVs, midwives) (Table 17). The use rate of nurses/doctors by the women from the highest quintile was much higher than those by women from the lowest quintiles (Fig. 10).

Fig. 10. Concentration curve for use of SBA services, Chakaria HDSS, 2011



Place of delivery

Eighty six percent of the deliveries took place at home. Only 14.0% of 2,173 deliveries took place either at hospitals or at clinics (Table 18). The women from the households in the highest asset quintile had a much higher rate of facility based delivery than those from the lowest quintile (Fig. 11).

Table 18. Place of delivery by asset quintile, Chakaria HDSS, 2011

Asset quintile	Hospital/Clinic (%)	Home (%)	No. of women
Lowest	6.7	93.3	417
Second	5.3	94.7	418
Middle	8.5	91.5	375
Fourth	12.1	87.9	480
Highest	34.0	66.0	483
Total	14.0	86.0	2,173

HDSS = Health and Demographic Surveillance System.

Fig. 11. Concentration curve for facility-based delivery, Chakaria HDSS, 2011

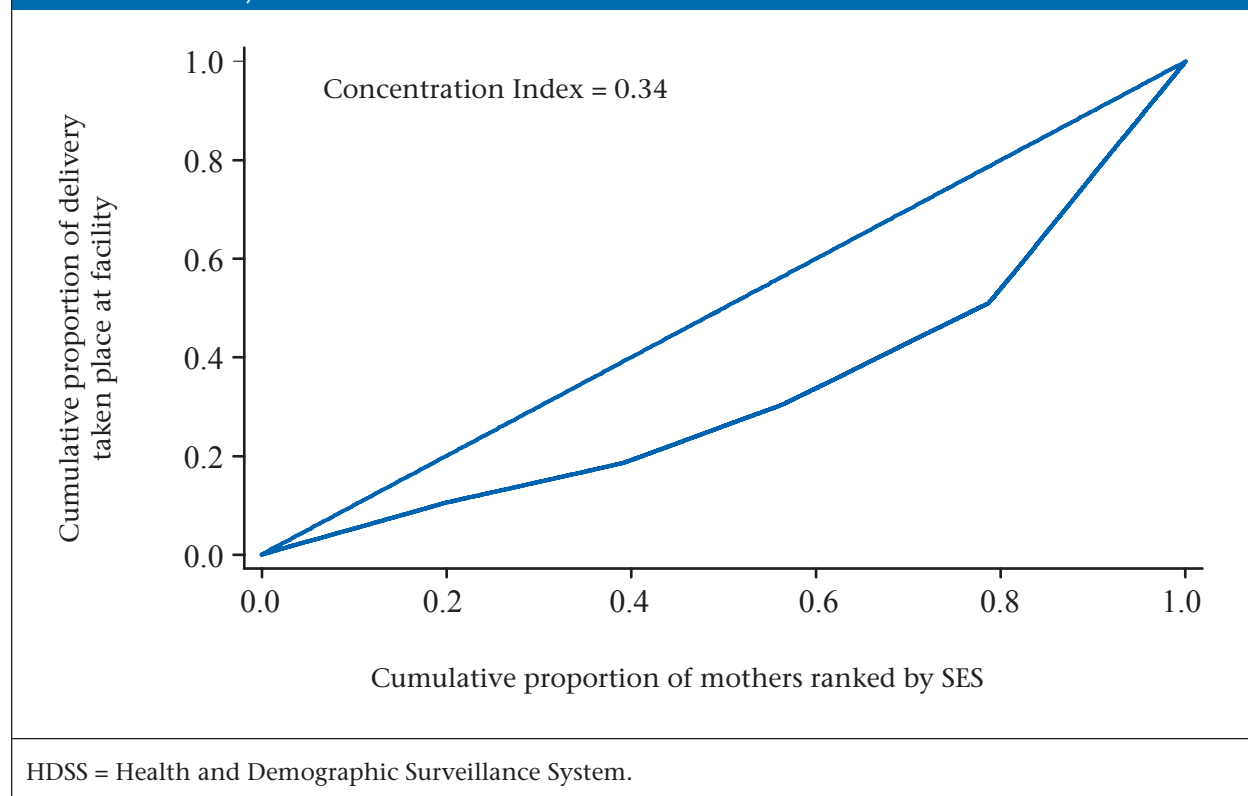


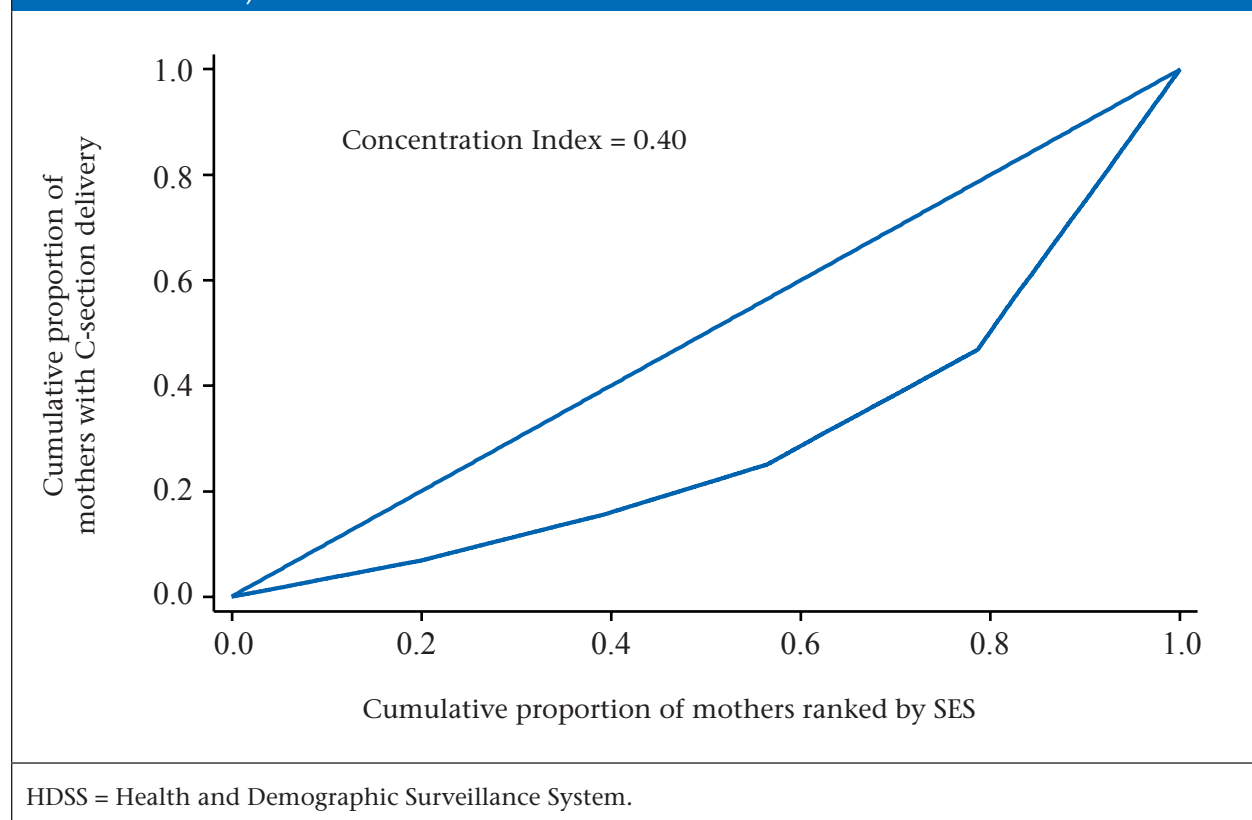
Table 19 shows caesarean-section delivery by household asset quintile in 2011. Caesarean-section delivery accounted for 4.6% of the deliveries in the Chakaria HDSS area in 2011. Although the number of caesarean sections was small, the number of women with caesarean sections exhibited huge discrepancies between highest and lowest quintile (Fig. 12 and Table 19).

Table 19. Proportion of caesarean-section delivery by asset quintile, Chakaria HDSS, 2011

Asset quintile	No. of caesarean-section delivery	Caesarean-section delivery (%)	Total number of deliveries
Lowest	7	1.7	417
Second	8	1.9	418
Middle	10	2.7	375
Fourth	19	4.0	480
Highest	55	11.4	483
Total	99	4.6	2,173

HDSS = Health and Demographic Surveillance System.

Fig. 12. Concentration curve for caesarean-section delivery, Chakaria HDSS, 2011



CHAPTER 9

Childhood Immunization

Immunization is now widely regarded as a cost-effective strategy to reduce the burden of morbidity and mortality caused by infectious diseases (8). The Expanded Program on Immunization (EPI) in Bangladesh follows the international guidelines recommended by the World Health Organization (WHO). The recommended vaccine schedule was as follows: BCG/oral polio vaccine (OPV) at birth, pentavalent vaccine (diphtheria, tetanus, pertussis, hepatitis B and Hib)/OPV at 6, 10, and 14 weeks of age, and measles and rubella vaccine (MR) at 9 months of age. Immunizations are routinely recorded on a vaccination card. For each child, mothers were asked whether they had the vaccination card and, if so, to show the card to the interviewer. If the mother was able to show the vaccination card, the dates of vaccinations were transferred from the card to the questionnaire. If vaccination card was not available, mothers were asked to recall whether the child had received each vaccine.

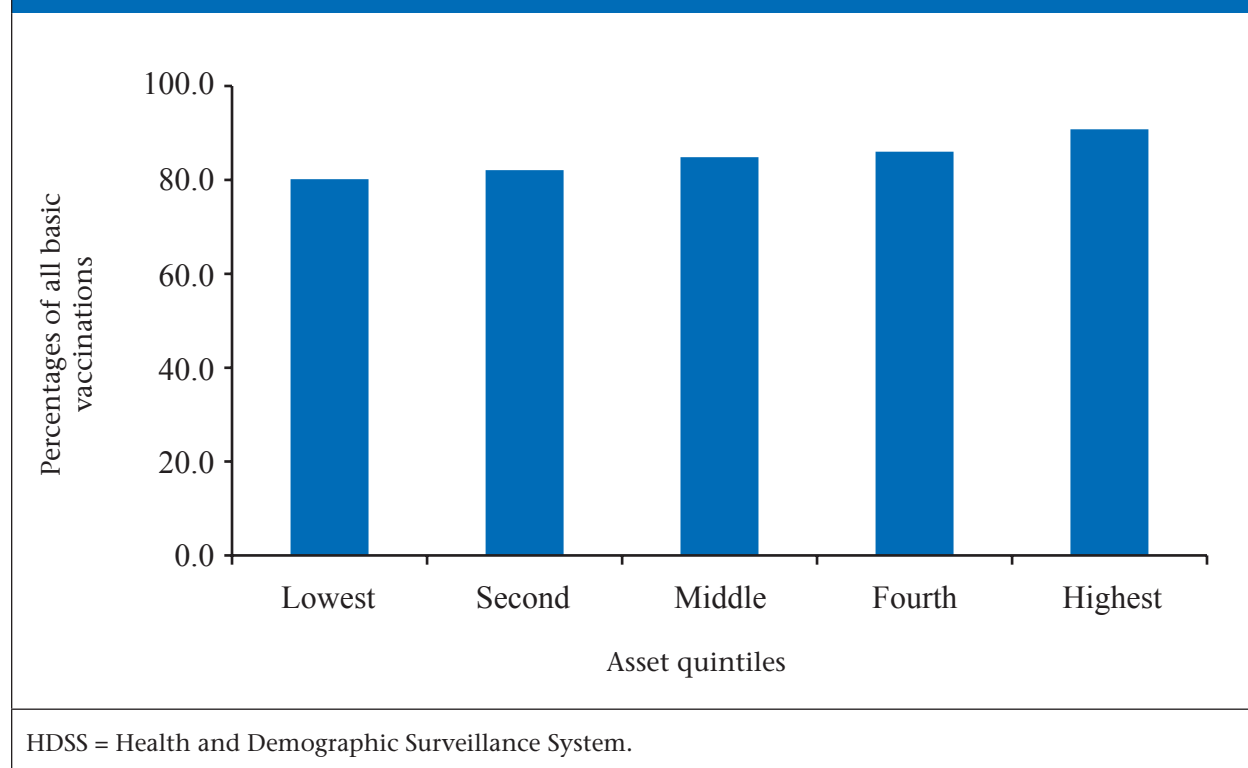
Table 20. Immunization coverage among children (1-3 years), Chakaria HDSS, 2011

Background factors	BCG	Pentavalent			MR	All basic vaccinations*	No vaccinations	No. of children
		1	2	3				
Sex								
Male	96.3	96.1	94.8	92.9	86.4	85.7	3.6	2,023
Female	95.8	95.7	94.5	91.6	85.5	84.5	3.9	1,940
Asset quintile								
Lowest	95.2	94.5	92.5	88.8	81.3	80.2	4.7	768
Second	96.5	96.4	95.0	91.5	82.9	82.2	3.4	717
Middle	95.7	95.7	93.8	92.0	86.2	84.9	4.2	675
Fourth	95.7	95.8	94.8	92.9	87.0	86.1	4.0	883
Highest	97.0	97.0	96.7	95.4	91.2	90.9	2.9	874
Mother's education (class passed)								
0	92.1	91.9	90.6	87.8	81.4	80.5	7.8	1,308
1-5	98.4	98.1	96.1	93.0	85.6	84.7	1.5	1,297
6+	97.7	97.9	97.2	96.0	90.8	90.2	2.0	1,321
Total	96.1	95.9	94.6	92.3	85.9	85.1	3.8	3,963

* BCG, MR and three doses of pentavalent
HDSS = Health and Demographic Surveillance System.

Table 20 presents the immunization coverage among children aged 1 to 3 years. Vaccination coverage was similar for boys and girls. Mother's education was positively associated with children's likelihood of being fully vaccinated: 90 percent of children whose mothers completed class six or higher education were fully vaccinated, compared with 81 percent of children whose mothers had no education. Also, vaccination status varied by asset quintile, children from households in the highest asset quintile were more likely to be fully vaccinated (91%) than children in the lowest quintile (80%) (Fig.13).

Fig. 13. Immunization coverage by asset quintile, Chakaria HDSS, 2011



In Chakaria, 93% of the children aged 1-3 years were reported having vaccination card. Majority (95%) of the mothers of children who had a vaccination card was able to show it to the interviewers.

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APPENDIX A

Midyear population by age and sex, Chakaria HDSS, 2011

Age (years)	Midyear population			Percentage distribution of midyear population		
	Male	Female	Both	Male	Female	Both
<1	1,093	1,043	2,136	2.7	2.6	2.7
1-4	4,270	4,155	8,425	10.6	10.5	10.6
5-9	5,896	5,791	11,687	14.7	14.7	14.7
10-14	5,531	5,200	10,731	13.7	13.2	13.5
15-19	4,266	4,295	8,561	10.6	10.9	10.8
20-24	3,809	4,080	7,889	9.5	10.4	9.9
25-29	3,040	3,435	6,475	7.6	8.7	8.1
30-34	2,503	2,497	5,000	6.2	6.3	6.3
35-39	2,180	1,895	4,075	5.4	4.8	5.1
40-44	1,662	1,469	3,131	4.1	3.7	3.9
45-49	1,346	1,386	2,732	3.3	3.5	3.4
50-54	1,153	1,189	2,342	2.9	3.0	2.9
55-59	973	898	1,871	2.4	2.3	2.3
60-64	856	664	1,520	2.1	1.7	1.9
65-69	577	441	1,018	1.4	1.1	1.3
70-74	483	403	886	1.2	1.0	1.1
75-79	277	220	497	0.7	0.6	0.6
80-84	185	165	350	0.5	0.4	0.4
85+	143	166	309	0.4	0.4	0.4
All	40,243	39,392	79,635	100.0	100.0	100.0

APPENDIX B

Distribution of causes of death by age and sex, Chakaria HDSS, 2011

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
Male							
01.01 Sepsis (non-obstetric)	0.0	1.6	0.0	0.0	0.0	0.0	0.1
01.02 Acute respiratory infection including pneumonia	0.0	19.0	19.9	7.8	1.8	6.0	6.1
01.03 HIV/AIDS related death	0.0	0.0	0.0	0.0	0.0	0.8	0.0
01.04 Diarrhoeal diseases	0.0	12.9	2.3	2.9	0.7	0.0	0.0
01.05 Malaria	0.0	0.0	0.0	0.0	0.0	0.0	0.1
01.06 Measles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01.07 Meningitis and encephalitis	0.0	2.9	2.2	0.0	1.1	0.0	0.0
01.09 Pulmonary tuberculosis	0.0	0.0	0.0	0.0	9.3	19.0	16.7
01.10 Pertussis	0.0	1.6	0.0	0.0	0.0	0.0	0.0
01.11 Haemorrhagic fever	0.0	0.0	0.0	0.7	0.0	0.0	0.0
01.99 Other and unspecified infectious diseases	0.0	0.0	3.3	6.3	1.5	0.5	2.7
02.01 Oral neoplasms	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02.02 Digestive neoplasms	0.0	0.0	0.0	0.0	5.6	3.7	2.9
02.03 Respiratory neoplasms	0.0	0.0	0.0	0.0	5.9	3.2	7.0
02.04 Breast neoplasms	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02.05 & 02.06 Reproductive neoplasms M, F	0.0	0.0	0.0	0.0	0.3	0.0	1.1
02.99 Other and unspecified neoplasms	0.0	0.0	0.0	2.9	9.3	8.0	4.0
03.01 Severe anaemia	0.0	0.0	0.0	0.0	0.0	0.0	1.0
03.02 Severe malnutrition	0.0	3.2	1.9	2.9	0.0	0.0	0.2
03.03 Diabetes mellitus	0.0	0.0	0.0	0.0	3.1	2.8	8.1
04.01 Acute cardiac disease	0.0	0.0	0.0	0.0	3.0	0.5	4.7
04.02 Stroke	0.0	0.0	0.0	0.0	5.5	9.8	8.0
04.99 Other and unspecified cardiac diseases	0.0	0.0	0.0	2.5	0.0	5.7	5.1
05.01 Chronic obstructive pulmonary disease	0.0	0.0	0.0	0.0	0.0	6.2	7.9
05.02 Asthma	0.0	0.0	0.0	0.0	0.0	3.6	1.7
06.01 Acute abdomen	0.6	0.0	0.0	3.7	2.6	0.0	1.8
06.02 Liver cirrhosis	0.0	0.0	0.0	1.4	3.5	3.6	1.2
07.01 Renal failure	0.0	0.0	2.1	0.0	1.9	1.4	2.0

Appendix B (contd...)

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
08.01 Epilepsy	0.0	5.7	1.5	2.5	0.5	0.0	0.6
09.03 Pregnancy-induced hypertension	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.01 Prematurity	28.5	0.0	0.0	0.0	0.0	0.0	0.0
10.02 Birth asphyxia	19.4	0.0	0.0	0.0	0.0	0.0	0.0
10.03 Neonatal pneumonia	8.3	0.0	0.0	0.0	0.0	0.0	0.0
10.04 Neonatal sepsis	1.2	0.0	0.0	0.0	0.0	0.0	0.0
10.06 Congenital malformation	0.0	7.0	0.0	0.0	0.0	0.0	0.0
10.99 Other and unspecified neonatal causes of death	14.7	0.0	0.0	0.0	0.0	0.0	0.0
12.01 Road traffic accident	0.0	0.0	0.0	1.5	1.0	1.2	0.0
12.03 Accidental fall	0.0	0.0	0.0	0.0	3.8	1.4	0.3
12.04 Accidental drowning and submersion	0.0	3.2	38.6	20.6	1.0	0.0	0.0
12.05 Accidental exposure to smoke fire & flame	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.06 Contact with venomous plant/ animal	0.0	0.0	0.0	0.0	0.0	0.0	0.3
12.07 Accidental poisoning & noxious substances	0.0	0.0	2.3	9.2	0.0	0.0	0.0
12.08 Intentional self-harm	0.0	0.0	0.0	2.4	0.0	0.8	0.3
12.09 Assault	0.0	0.0	0.0	0.0	1.9	0.0	0.0
12.99 Other and unspecified external causes of death	0.0	0.0	0.0	0.9	0.8	0.0	0.0
98 Other and unspecified non-communicable diseases	0.0	0.0	0.0	0.0	0.0	1.5	0.3
99 Indeterminate	25.7	26.8	10.1	23.1	29.1	15.7	14.7
XX VA not completed	1.7	16.1	15.9	8.8	6.8	4.7	1.4
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix B. (contd...)

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
Female							
01.01 Sepsis (non-obstetric)	0.0	0.8	1.9	0.0	0.0	0.0	0.0
01.02 Acute respiratory infection including pneumonia	0.0	22.0	19.4	0.0	3.2	4.5	8.4
01.03 HIV/AIDS related death	0.0	0.7	0.0	0.0	0.0	0.8	0.0
01.04 Diarrhoeal diseases	0.0	7.4	11.4	5.1	2.2	0.0	0.7
01.05 Malaria	0.0	0.8	2.9	7.4	0.0	0.0	0.0
01.06 Measles	0.0	3.6	0.0	1.4	0.0	0.0	0.0
01.07 Meningitis and encephalitis	1.4	6.0	3.7	1.6	3.6	0.0	0.0
01.09 Pulmonary tuberculosis	0.0	0.0	0.0	0.0	6.0	16.1	15.7
01.10 Pertussis	0.0	2.7	0.0	0.0	0.0	0.0	0.0
01.11 Haemorrhagic fever	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01.99 Other and unspecified infectious diseases	0.0	1.0	2.8	13.9	3.1	0.8	1.1
02.01 Oral neoplasms	0.0	0.0	0.0	0.0	0.0	0.0	0.3
02.02 Digestive neoplasms	0.0	0.0	0.0	0.0	1.0	3.8	2.0
02.03 Respiratory neoplasms	0.0	0.0	0.0	0.0	4.6	4.7	3.4
02.04 Breast neoplasms	0.0	0.0	0.0	0.0	1.1	0.0	0.5
02.05 & 02.06 Reproductive neoplasms M, F	0.0	0.0	0.0	0.0	1.1	0.0	1.5
02.99 Other and unspecified neoplasms	0.0	0.0	2.3	0.0	3.8	7.6	2.5
03.01 Severe anaemia	0.0	0.0	0.0	0.0	0.0	0.4	1.1
03.02 Severe malnutrition	0.0	1.8	0.0	0.0	1.1	0.0	0.6
03.03 Diabetes mellitus	0.0	0.0	0.0	7.0	5.6	6.0	10.4
04.01 Acute cardiac disease	0.0	0.0	0.0	0.0	0.0	1.6	2.0
04.02 Stroke	0.0	0.0	0.0	0.0	6.2	8.8	8.7
04.99 Other and unspecified cardiac diseases	0.0	0.0	0.0	0.0	2.8	3.5	4.3
05.01 Chronic obstructive pulmonary diseases	0.0	0.0	0.0	0.0	0.0	12.5	7.2
05.02 Asthma	0.0	0.0	0.0	0.0	0.4	4.4	1.4
06.01 Acute abdomen	0.5	2.4	0.0	14.6	3.1	3.1	0.9
06.02 Liver cirrhosis	0.0	0.0	0.0	0.0	3.2	2.6	0.0
07.01 Renal failure	0.0	0.0	2.1	0.0	6.1	2.8	2.1
08.01 Epilepsy	0.0	0.0	6.2	0.0	0.0	0.0	0.7
09.03 Pregnancy-induced hypertension	0.0	0.0	0.0	0.0	1.8	0.0	0.0
10.01 Prematurity	15.5	0.0	0.0	0.0	0.0	0.0	0.0

Appendix B. (contd...)

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
10.02 Birth asphyxia	27.4	0.0	0.0	0.0	0.0	0.0	0.0
10.03 Neonatal pneumonia	6.8	0.0	0.0	0.0	0.0	0.0	0.0
10.04 Neonatal sepsis	0.7	0.0	0.0	0.0	0.0	0.0	0.0
10.06 Congenital malformation	1.0	9.1	0.0	0.0	0.0	0.0	0.0
10.99 Other and unspecified neonatal causes of death	16.5	0.0	0.0	0.0	0.0	0.0	0.0
12.01 Road traffic accident	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.03 Accidental fall	0.0	1.8	0.0	0.0	0.0	0.0	0.4
12.04 Accidental drowning and submersion	0.0	3.6	23.3	29.2	1.0	0.0	0.3
12.05 Accidental exposure to smoke fire & flame	0.9	0.0	0.0	0.0	0.0	0.0	1.8
12.06 Contact with venomous plant/ animal	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.07 Accidental poisoning & noxious substances	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.08 Intentional self-harm	0.0	0.0	0.0	0.0	4.0	1.7	0.3
12.09 Assault	0.0	0.0	0.0	0.0	0.5	0.0	0.0
12.99 Other and unspecified external causes of death	0.0	0.0	3.4	4.1	2.2	0.5	0.0
98 Other and unspecified non-communicable diseases	0.0	0.0	0.0	0.0	0.0	0.0	0.3
99 Indeterminate	28.2	20.2	18.4	15.9	26.1	11.9	17.4
XX VA not completed	1.1	16.4	2.3	0.0	6.5	2.0	4.2
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX C

Migration rate per 1,000 population by age and sex, Chakaria HDSS, 2011

Age (years)	Number of migrants			Migration rate per 1,000 population		
	Male	Female	Both	Male	Female	Both
In-migration						
<1	60	55	115	54.9	52.7	53.8
1-4	181	156	337	42.4	37.5	40.0
5-9	148	184	332	25.1	31.8	28.4
10-14	122	122	244	22.1	23.5	22.7
15-19	78	518	596	18.3	120.6	69.6
20-24	105	310	415	27.6	76.0	52.6
25-29	139	172	311	45.7	50.1	48.0
30-34	118	80	198	47.1	32.0	39.6
35-39	72	37	109	33.0	19.5	26.7
40-44	33	13	46	19.9	8.8	14.7
45-49	31	29	60	23.0	20.9	22.0
50-54	14	20	34	12.1	16.8	14.5
55-59	11	14	25	11.3	15.6	13.4
60-64	7	15	22	8.2	22.6	14.5
65-69	6	19	25	10.4	43.1	24.6
70-74	9	17	26	18.6	42.2	29.3
75-79	5	10	15	18.1	45.5	30.2
80-84	3	10	13	16.2	60.6	37.1
85+	2	9	11	14.0	54.2	35.6
All	1,144	1,790	2,934	28.4	45.4	36.8
Out-migration						
<1	44	40	84	40.3	38.4	39.3
1-4	119	121	240	27.9	29.1	28.5
5-9	110	113	223	18.7	19.5	19.1
10-14	121	161	282	21.9	31.0	26.3
15-19	217	483	700	50.9	112.5	81.8
20-24	283	426	709	74.3	104.4	89.9
25-29	236	163	399	77.6	47.5	61.6
30-34	130	56	186	51.9	22.4	37.2
35-39	72	26	98	33.0	13.7	24.0
40-44	38	19	57	22.9	12.9	18.2
45-49	26	12	38	19.3	8.7	13.9
50-54	14	13	27	12.1	10.9	11.5
55-59	6	11	17	6.2	12.2	9.1
60-64	4	14	18	4.7	21.1	11.8
65-69	7	13	20	12.1	29.5	19.6
70-74	10	12	22	20.7	29.8	24.8
75-79	5	11	16	18.1	50.0	32.2
80-84	4	9	13	21.6	54.5	37.1
85+	1	9	10	7.0	54.2	32.4
All	1,447	1,712	3,159	36.0	43.5	39.7

APPENDIX D

Number of migrants by origin or destination, Chakaria HDSS, 2011

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	1,053	240	148	118	75	90	114	99	63	25	28	53
Outside Bangladesh	91	1	0	4	2	16	25	19	9	8	3	4
Inside Chakaria	621	137	90	83	52	52	65	48	34	11	12	37
Outside Chakaria	490	97	55	37	24	50	66	66	36	22	19	18
Inside HDSS area	475	106	62	69	40	39	46	33	29	10	8	33
Outside HDSS area	307	64	60	31	23	22	36	31	11	7	9	13
Female												
Inside Bangladesh	1,783	210	183	122	518	309	170	79	37	13	28	114
Outside Bangladesh	7	1	1	0	0	1	2	1	0	0	1	0
Inside Chakaria	1,140	117	105	75	362	191	96	54	19	8	21	92
Outside Chakaria	626	91	77	42	155	113	73	25	17	5	7	21
Inside HDSS area	870	85	80	59	288	133	61	44	15	4	18	83
Outside HDSS area	538	65	59	33	160	100	56	19	13	7	7	19
Out-migration												
Male												
Inside Bangladesh	1,022	163	110	117	136	133	141	90	42	26	18	46
Outside Bangladesh	425	0	0	4	81	150	95	40	30	12	8	5
Inside Chakaria	635	102	71	86	93	83	73	43	24	12	7	41
Outside Chakaria	763	55	33	32	120	192	156	81	44	25	17	8
Inside HDSS area	531	79	45	71	81	77	70	39	18	7	6	38
Outside HDSS area	219	36	38	28	29	21	18	16	16	6	6	5
Female												
Inside Bangladesh	1,701	161	113	161	482	425	158	55	26	17	12	91
Outside Bangladesh	11	0	0	0	1	1	5	1	0	2	0	1
Inside Chakaria	1,074	87	73	112	319	242	97	33	14	8	10	79
Outside Chakaria	598	66	39	43	156	179	59	21	12	9	2	12
Inside HDSS area	831	66	51	82	254	183	73	23	6	8	8	77
Outside HDSS area	448	44	32	46	130	117	38	18	9	4	2	8

APPENDIX E

Number of in-migrants by reasons for migration, Chakaria HDSS, 2011

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	83	0	0	0	24	22	17	12	4	1	2	1
Family friction/ breakdown	251	1	6	18	27	42	53	35	27	8	13	21
Others	49	11	5	9	7	0	2	5	1	1	1	7
Work-related												
New job/job transfer	169	1	2	12	5	59	26	29	9	11	10	5
To look for work/ lost job	235	0	71	28	89	44	0	2	0	1	0	0
Others	29	2	1	5	4	3	3	7	2	0	0	2
Housing-related												
Wanted to own home/new house	220	29	23	22	16	22	34	24	21	6	8	15
Education												
To acquire education	60	8	17	22	5	0	1	1	4	0	1	1
Reasons not reported	48	2	5	6	3	4	8	6	4	5	0	5
All	1,144	54	130	122	156	174	144	121	72	33	35	57
Female												
Family related												
To join spouse	607	0	0	11	403	148	23	14	6	0	0	2
Family friction/ breakdown	366	3	20	30	65	86	75	26	17	6	9	29
Others	106	3	6	5	12	8	8	3	0	0	4	57
Work-related												
New job/job transfer	98	0	6	5	3	67	10	3	2	1	1	0
To look for work/ lost job	231	0	75	30	87	9	18	8	0	0	1	3
Others	15	1	1	0	0	5	8	0	0	0	0	0
Housing-related												
Wanted to own home/new house	216	10	35	19	29	38	29	20	8	5	11	12
Education												
To acquire education	53	2	16	15	10	2	1	2	1	0	0	4
Reasons not reported	98	4	11	21	12	15	13	8	3	1	3	7
All	1,790	23	170	136	621	378	185	84	37	13	29	114

APPENDIX F

Number of out-migrants by reasons for migration, Chakaria HDSS, 2011

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	62	0	1	1	10	15	12	10	4	3	4	2
Family friction/ breakdown	139	0	12	22	34	30	11	11	6	2	5	6
Others	29	5	5	5	4	0	3	0	1	0	0	6
Work-related												
New job/job transfer	392	0	0	17	26	119	114	56	33	14	9	4
To look for work/ lost job	192	1	48	7	127	3	3	2	1	0	0	0
Others	89	0	0	2	26	25	16	7	6	5	0	2
Housing-related												
Wanted to own home/new house	261	15	14	7	99	51	37	13	7	7	5	6
Education												
To acquire education	93	3	17	30	16	12	7	4	2	1	0	1
Reasons not reported	190	7	5	14	22	39	40	31	9	6	3	14
All	1,447	31	102	105	364	294	243	134	69	38	26	41
Female												
Family-related												
To Join spouse	612	0	0	31	277	234	49	14	5	1	0	1
Family friction/ breakdown	307	8	29	54	66	69	32	12	6	1	4	26
Others	68	3	5	5	5	1	1	1	0	0	3	44
Work-related												
New job/job transfer	10	0	3	3	1	1	1	0	1	0	0	0
To look for work/ lost job	39	0	11	14	5	1	1	2	0	0	0	5
Others	2	0	0	0	0	1	1	0	0	0	0	0
Housing-related												
Wanted to own home/new house	350	11	55	81	84	50	36	13	3	11	2	4
Education												
To acquire education	77	0	0	2	22	22	16	5	4	5	0	1
Reasons not reported	247	16	11	33	83	47	26	9	7	1	3	11
All	1,712	38	114	223	543	426	163	56	26	19	12	92

APPENDIX G

Percentage of population by age and marital status, Chakaria HDSS, 2011

Age (years)	Married	Divorced	Widower/ Widow	Never married	Population
Male					
10-14	0.1	0.0	0.0	99.9	5,473
15-19	5.7	0.1	0.0	94.2	4,269
20-24	27.4	0.2	0.0	72.5	3,836
25-29	63.4	0.6	0.2	35.8	3,060
30-34	88.8	1.0	0.3	9.9	2,484
35-39	96.8	0.8	0.2	2.3	2,158
40-44	98.7	0.1	0.2	1.0	1,637
45-49	99.0	0.5	0.4	0.2	1,343
50-54	98.2	0.5	1.3	0.1	1,157
55-59	98.4	0.0	1.4	0.2	966
60-64	97.8	0.0	1.9	0.2	846
65-69	94.5	0.3	5.0	0.2	572
70-74	91.6	1.0	7.4	0.0	479
75-79	88.5	0.0	11.5	0.0	269
80-84	84.2	0.5	15.3	0.0	181
85+	68.1	1.8	30.1	0.0	144
All	51.4	0.3	0.8	47.5	28,874
Female					
10-14	2.3	0.0	0.0	97.7	5,147
15-19	39.7	0.4	0.0	59.9	4,364
20-24	80.4	1.2	0.3	18.1	4,069
25-29	92.6	1.7	1.2	4.4	3,382
30-34	94.8	1.2	2.9	1.2	2,468
35-39	91.5	1.7	6.1	0.7	1,875
40-44	89.4	1.1	9.0	0.5	1,459
45-49	82.9	1.3	15.2	0.6	1,370
50-54	74.1	1.2	24.5	0.3	1,174
55-59	67.6	1.0	31.1	0.3	875
60-64	52.3	0.7	47.0	0.0	652
65-69	40.4	0.2	59.2	0.2	433
70-74	23.5	0.2	76.3	0.0	399
75-79	19.4	0.4	80.2	0.0	218
80-84	7.9	0.0	92.1	0.0	162
85+	3.5	0.0	96.5	0.0	166
All	60.0	0.9	8.7	30.5	28,213

APPENDIX H

Chakaria HDSS project team, Chakaria HDSS, 2011

Name of Staff	Designation
Dhaka	
Abbas Bhuiya	Project Director
Mohammad Iqbal	Deputy Project Coordinator
SM Manzoor Ahmed Hanifi	Assistant Scientist
Sabrina Rasheed	Assistant Scientist
Farhana Urni	Senior Statistical Officer
Md. Kashem Iqbal	Office Manager
Chakaria	
Shahidul Hoque	Field Research Manager
Ariful Moula	Senior Field Research Officer
Mijanur Rahaman	Field Research Officer
Ashish Paul	Senior Data Management Assistant
Md. Sharif Al-Hasan	Field Research Supervisor
Md. Rehmat Ali	Senior Field Assistant
Afroza Yeasmin	Surveillance worker
Armanul Maowa	Surveillance worker
Fatema Johura Surma	Surveillance worker
Fatema Zannat	Surveillance worker
Fatema Nasrin	Surveillance worker
Helena Khanom Happy	Surveillance worker
Hosaina Begum	Surveillance worker
Ismat Jahan Khuki	Surveillance worker
Jesmin Jannat Rano	Surveillance worker
Jesmin Akter	Surveillance worker
Kawsar Jannat	Surveillance worker
Kulsuma Aktar	Surveillance worker
Mina Dhar	Surveillance worker
Mobasseratul Zannat	Surveillance worker
Monuara Begum	Surveillance worker
Nazma Akter	Surveillance worker
Rawnak Zahan	Surveillance worker
Riasmin Zannat	Surveillance worker
Rosan Ara	Surveillance worker
Setara Begum	Surveillance worker
Sakuntaj Begum	Surveillance worker
Shamima Khanam	Surveillance worker
Tanjina Zannat Ara	Surveillance worker
Tanjimul Zannat	Surveillance worker
Zannatul Ferdous	Surveillance worker
Zosna Begum	Surveillance worker
HDSS = Health and Demographic Surveillance System.	



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