

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

**Demographic Events and Safe Motherhood
Practices – 2013**

Scientific Report No. 127



Chakaria Health and Demographic Surveillance System

Focusing on the Poor and Vulnerable

Demographic Events and Safe Motherhood Practices – 2013

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CHAPTER I

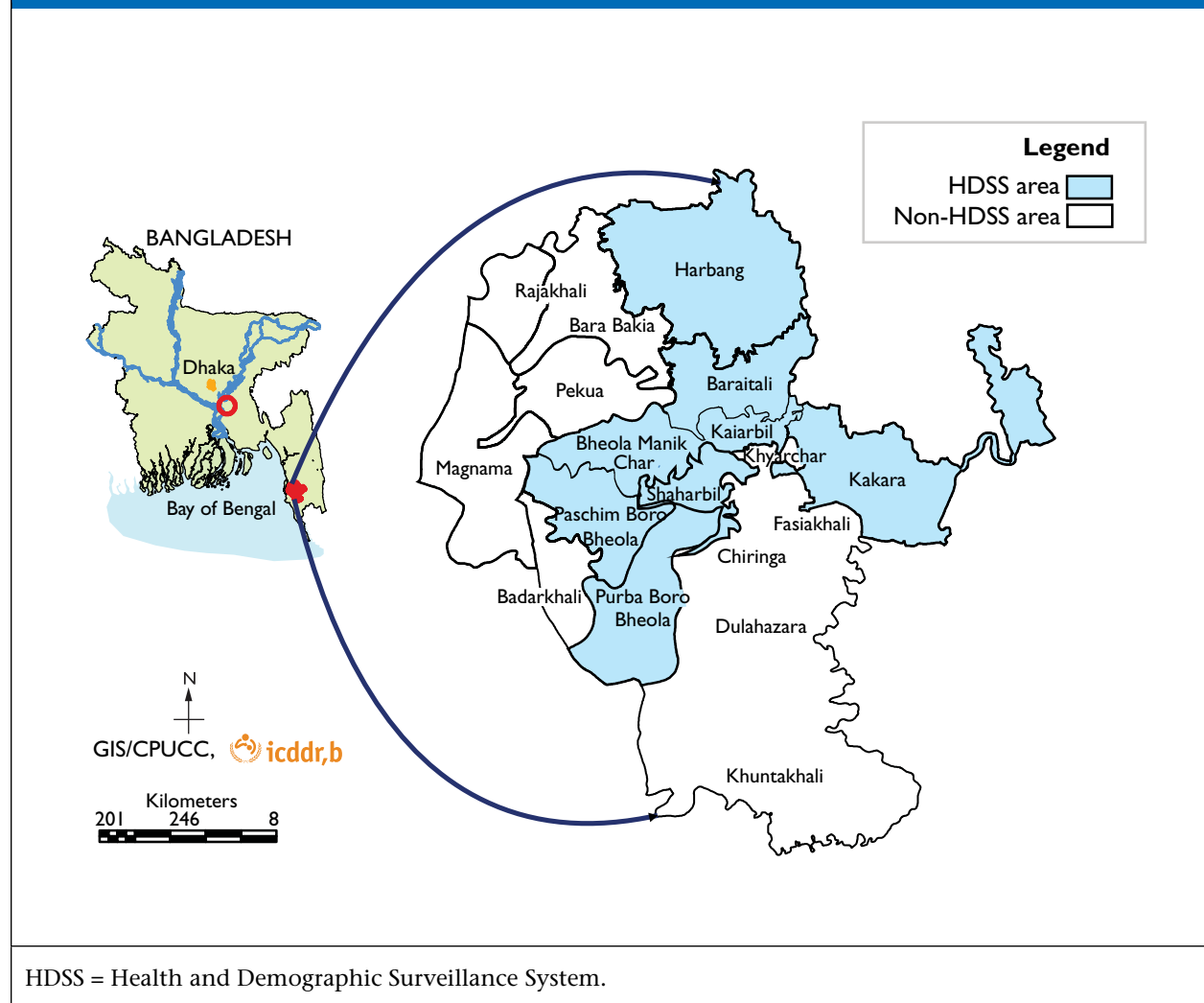
Introduction

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 511,861 in 2013. 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 area 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 2013.

Existing health services in Chakaria HDSS area, 2013	
Healthcare facility/provider	No.
icddr,b facilitated and Community initiated	
Village health post	5
Trained midwife	12
Qualified physician	1
Male paramedic	10
Medical assistant	4
Government	
Union Health and Family Welfare Centre (UHFWC)	11
EPI centre	264
Family Welfare Visitor (FWV)	10
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	4
HDSS = Health and Demographic Surveillance System.	

Fig. 1. Map of Chakaria showing Chakaria HDSS area



CHAPTER 2

Methods and Materials

The Chakaria HDSS covered 11 unions, namely Baraitali, Kaiarbil, Bheola Manik Char, Paschim Boro Bheola, Shaharbil, Kakara, Harbang, Purba Boro Bheola, Surajpur Manikpur, Konakhali, and Dhemoshia. 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, prior to 2011 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 82,029 individuals (16,624 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. 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 demographic and health indicators. The list of assets included *almirah*, table/chair, van/rickshaw, *choki/khat*, 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.

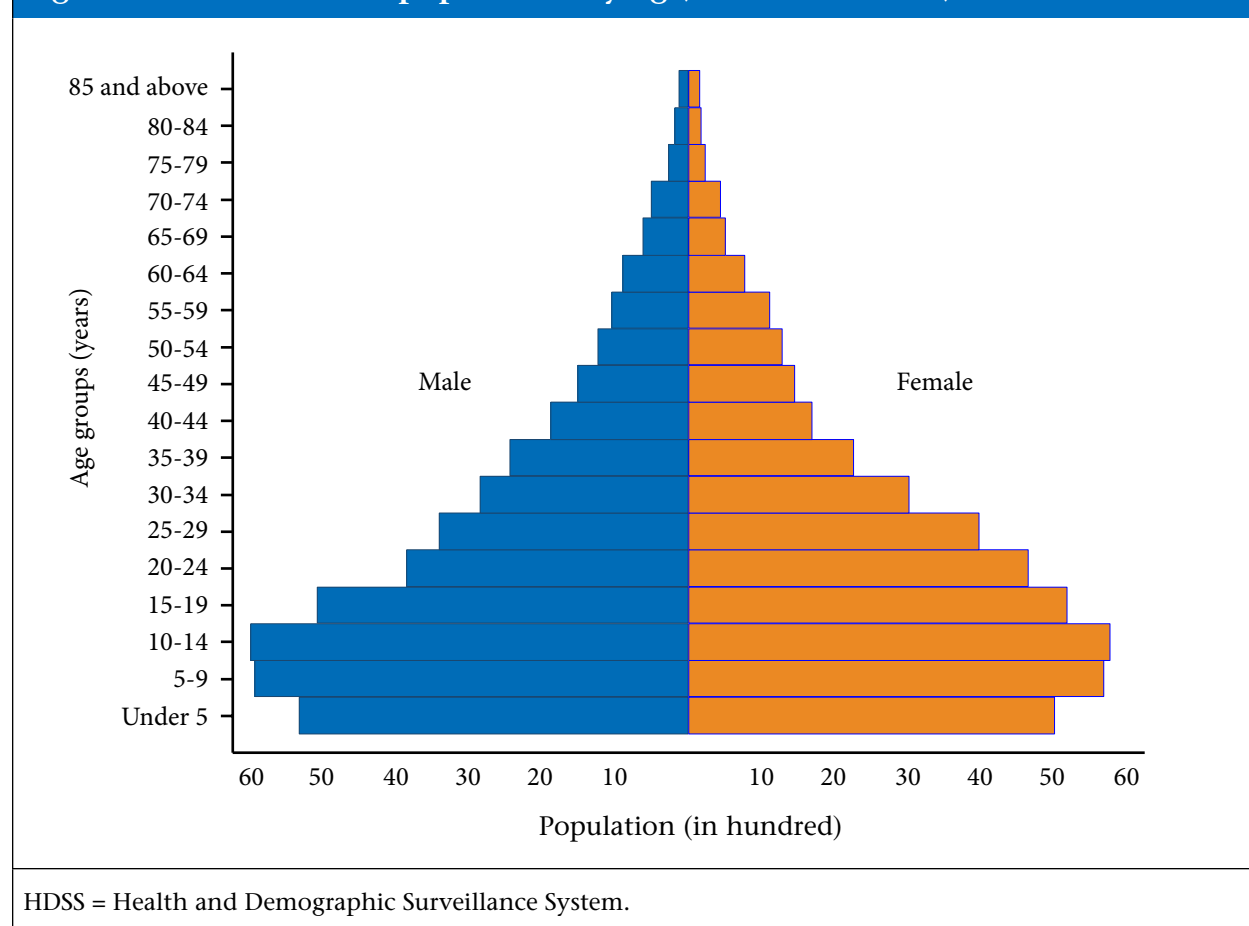
It should be mentioned that the number of observations in the tables presented in this report differ in some instances due to missing information for some variables.

CHAPTER 3

Population and Population Changes

The population pyramid based on the population of 2013 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 101 in 2013. The age dependency ratio¹ was 78 in 2013 (see Appendix A).

Fig. 2. Male and female population by age, Chakaria HDSS, 2013



The major demographic and health indicators during 2007-13 are presented in Table 1. A declining trend in the fertility indicators and natural rate of population increase had been observed during 2007-13. Most of the rates in Chakaria HDSS area are much higher than those in the Matlab government service area, another rural field site of icddr,b (4). In 2013, the rate of natural increase and the annual population growth rate in the surveillance area was 1.9 % and 1.3% respectively (Table 1).

¹ 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).

Seventeen percent of births in Chakaria were delivered at facilities (Hospital or Clinic) in 2013. The percentage of births at facilities in 2013 has increased compared to 2012. About one-third of the births were attended by Skilled Birth Attendant (SBA) in Chakaria and there has been a very small increase in deliveries by SBAs from 29.2% in 2012 to 29.7% in 2013 (Table 1).

The legal age of marriage is 18 years for female and 21 years for male in Bangladesh. In 2013, 37.2% of the women married before reaching their 18th birthday. The percentage of underage female marriage remained same during 2012 to 2013. 23.3% of the males were married before the age of 21 years in 2013. The proportion of male marriages before 21 years has also stayed same between 2012 and 2013. The percentage of underage marriage for females remained higher than males during 2007 to 2013.

Table 1. Demographic and health indicators, Chakaria HDSS, 2007–2013								
Rates per 1,000	Chakaria HDSS area							Matlab HDSS
	2007	2008	2009	2010	2011	2012	2013	Govt. area 2012
Crude birth rate	26.6	25.5	22.9	22.7	27.7	25.4	24.9	20.5
Total fertility rate*	3.5	3.3	2.8	2.7	3.3	2.9	2.8	2.5
Neonatal mortality**	34.8	29.0	36.8	32.1	38.1	28.0	40.6	30.3
Post-neonatal mortality**	13.3	14.9	21.3	17.5	14.5	13.7	5.9	7.1
Infant mortality rate**	48.0	43.9	58.1	49.6	52.6	41.7	46.5	37.4
Child mortality rate (1-4 yrs)	4.6	4.7	4.7	4.5	3.4	3.7	5.0	1.1
Crude death rate	6.1	6.1	6.5	6.0	5.7	5.6	5.4	6.7
Rate of natural increase	20.6	20.2	16.4	16.8	22.0	19.8	19.4	13.8
In-migration rate	24.6	26.6	29.8	28.7	36.8	33.9	37.4	44.6
Out-migration rate	32.0	35.5	40.6	42.2	39.7	35.2	44.0	53.5
Growth rate (%)	1.3	1.1	0.6	0.3	1.9	1.9	1.3	0.6
Facility-based delivery (%)	5.1	14.4	12.0	14.1	14.0	16.1	16.7	37.9
Received assistance from SBA during delivery (%)	19.1	16.2	25.3	28.1	25.7	29.2	29.7	40.3
Male marriage at ages under 21 years (%)	25.6	24.7	24.8	25.0	22.8	23.4	23.3	-
Female marriage at ages under 18 years (%)	43.2	47.5	39.3	36.4	33.6	37.1	37.2	32.8

*Per woman; **Per 1,000 live births; '-' Data not available.
HDSS = Health and Demographic Surveillance System.

CHAPTER 4

Mortality

Age-specific mortality rates by sex are presented in Table 2. The crude death rate was 5.4 per 1,000 population in 2013. Infant mortality rate was 46.5 per 1,000 live births. Child mortality rate was 5.0 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 68 years for males and 71 years for females. The rate of mortality of children aged less than 5 years (under-five mortality) was 65.6 per 1,000 live births in Chakaria in 2013 (Table 4). Figure 3 shows the probability of survival by sex during various age groups. The probability of survival of females remained nearly same as males up to age 25 years, but after age 25 probability of survival increased for females.

Table 2. Age-specific death rate per 1,000 population by sex, Chakaria HDSS, 2013

Age (years)	No. of death			Death rate		
	Male	Female	Both	Male	Female	Both
<1*	59	36	95	54.1	37.8	46.5
<1 month	51	32	83	46.7	33.6	40.6
1-11 month	8	4	12	7.3	4.2	5.9
1-4	18	21	39	4.5	5.5	5.0
5-9	3	4	7	0.5	0.7	0.6
10-14	4	0	4	0.7	0.0	0.4
15-19	6	5	11	1.3	1.1	1.2
20-24	1	3	4	0.3	0.7	0.5
25-29	7	1	8	2.2	0.3	1.2
30-34	3	6	9	1.1	2.1	1.6
35-39	4	1	5	1.8	0.5	1.2
40-44	5	4	9	2.8	2.4	2.6
45-49	9	9	18	6.4	6.5	6.4
50-54	11	10	21	9.0	7.7	8.4
55-59	14	8	22	14.3	8.0	11.1
60-64	14	15	29	16.0	20.0	17.8
65-69	17	13	30	28.9	27.9	28.5
70-74	22	15	37	45.6	36.7	41.5
75-79	17	12	29	65.9	56.1	61.4
80-84	16	9	25	91.4	54.2	73.3
85+	21	22	43	166.7	152.8	159.3
All	251	194	445	6.1	4.7	5.4

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

Table 3. Abridged Life Table, Chakaria HDSS, 2013

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	0.0568	0.0540	100,000	95,138	68.0	0.0373	0.0361	100,000	96,748	71.2
1	0.0045	0.0178	94,598	375,023	70.9	0.0055	0.0219	96,387	381,329	72.9
5	0.0005	0.0025	92,914	463,987	68.2	0.0007	0.0035	94,277	470,574	70.4
10	0.0007	0.0035	92,681	462,603	63.3	0.0000	0.0000	93,952	469,760	65.7
15	0.0013	0.0063	92,361	460,346	58.5	0.0011	0.0055	93,952	468,475	60.7
20	0.0003	0.0014	91,778	458,569	53.9	0.0007	0.0035	93,438	466,367	56.0
25	0.0022	0.0109	91,650	455,743	49.0	0.0003	0.0014	93,109	465,220	51.2
30	0.0011	0.0055	90,647	451,988	44.5	0.0021	0.0103	92,979	462,504	46.3
35	0.0018	0.0091	90,148	448,681	39.7	0.0005	0.0024	92,022	459,553	41.7
40	0.0028	0.0137	89,324	443,570	35.1	0.0024	0.0121	91,799	456,221	36.8
45	0.0064	0.0313	88,104	433,614	30.5	0.0065	0.0319	90,689	446,217	32.2
50	0.0090	0.0441	85,342	417,311	26.4	0.0077	0.0380	87,798	430,650	28.2
55	0.0143	0.0689	81,582	393,860	22.5	0.0080	0.0391	84,462	414,054	24.2
60	0.0160	0.0768	75,962	365,232	19.0	0.0200	0.0951	81,160	386,499	20.1
65	0.0289	0.1348	70,131	327,019	15.4	0.0279	0.1304	73,440	343,260	17.0
70	0.0456	0.2048	60,677	272,310	12.4	0.0367	0.1680	63,864	292,501	14.1
75	0.0659	0.2829	48,247	207,119	9.9	0.0561	0.2459	53,137	233,017	11.5
80	0.0914	0.3721	34,600	140,814	7.8	0.0542	0.2387	40,070	176,436	9.4
85+	0.1667	1.0000	21,726	130,354	6.0	0.1528	1.0000	30,504	199,665	6.5

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;

${}_n q_x = \frac{{}_n m_x}{(1/n) + \frac{{}_n m_x}{2} + \frac{{}_n m_x^2}{12} (\log_e c)}$;

$\log_e c = .095$

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

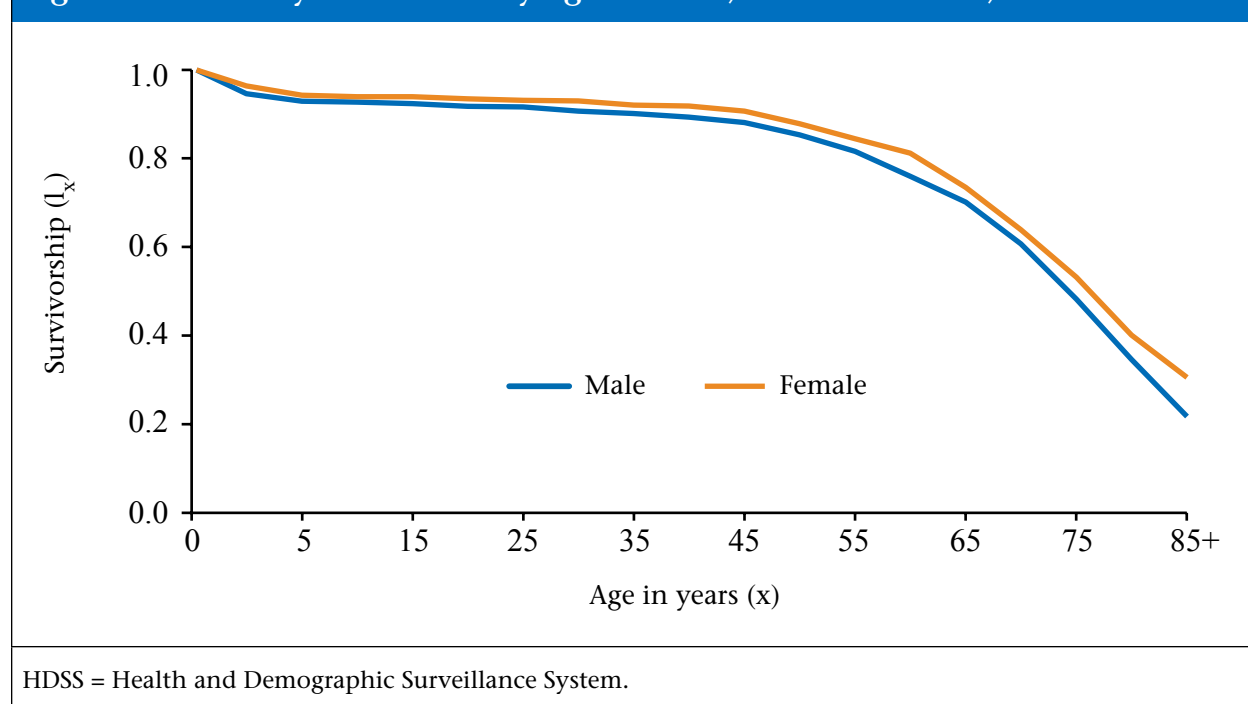
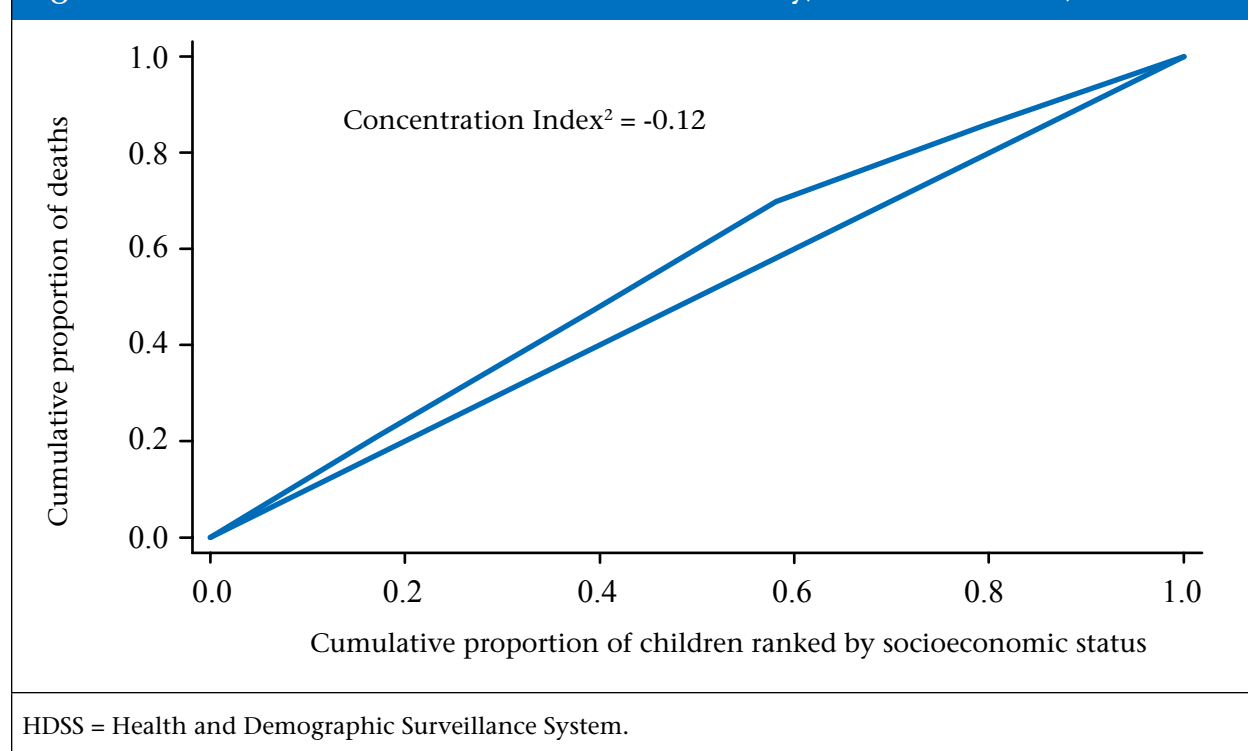
Fig. 3. Probability of survival by age and sex, Chakaria HDSS, 2013

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 2 times 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, 2013

Asset quintile	No. of births	No. of under-5 deaths	Under-5 mortality rate
Lowest	345	28	81.2
Second	454	35	77.1
Middle	422	30	71.1
Fourth	390	21	53.8
Highest	417	19	45.6
All	2,028	133	65.6

HDSS = Health and Demographic Surveillance System.

Fig. 4. Concentration curve for under-5 mortality, Chakaria HDSS, 2013

Causes of death

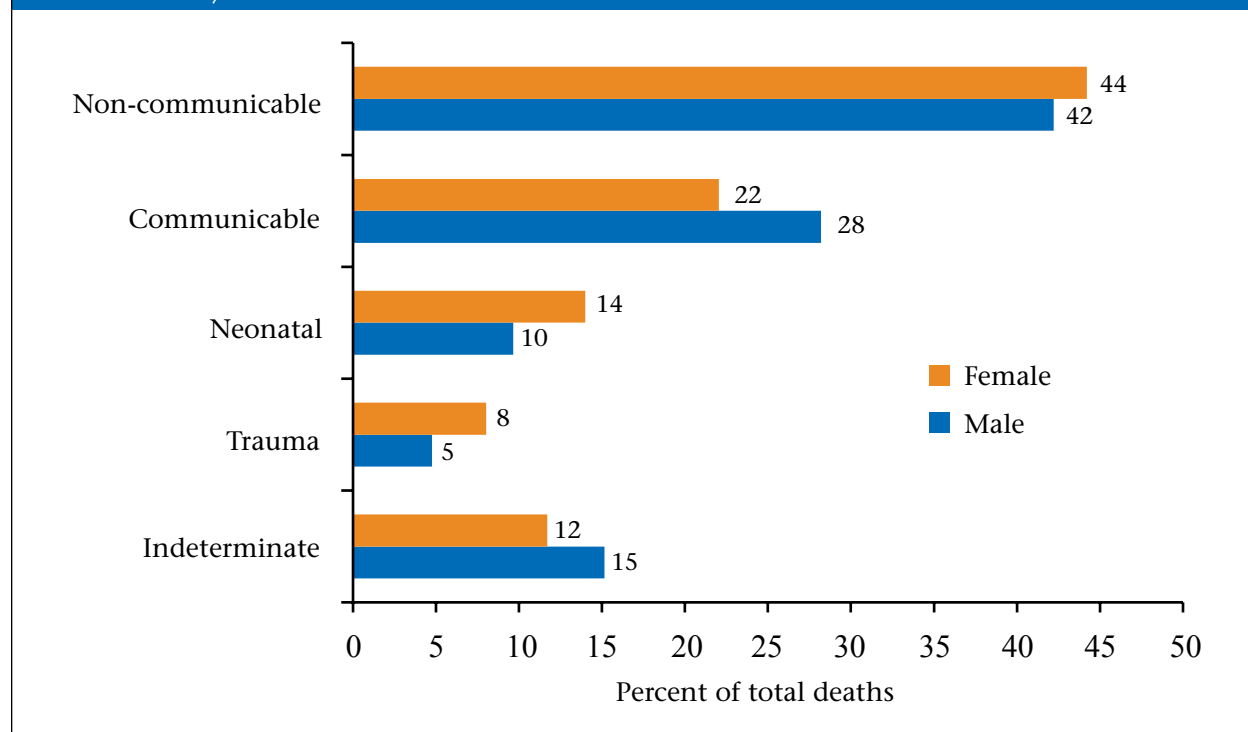
Verbal autopsy data on signs, symptoms and circumstances leading to death, and medical history of the deceased were collected during the quarterly household visits from an informed household member. A total of 455 deaths were registered in 2013. Data were analyzed using “InterVA-4.01” (5) to ascertain causes of death.

Broad pattern of cause of death

Non-communicable conditions (43%) were the leading cause of death for both men and women. This was followed by communicable diseases (25%), neonatal condition (12%), and trauma (7%). For non-communicable diseases, the proportion of deaths was higher for females than for males. In case of communicable diseases, the proportion of deaths was higher for males than for females (Fig. 5). 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 adults and elderly people (Table 5).

² 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, 2013



HDSS = Health and Demographic Surveillance System.

Table 5. Distribution of causes of death, Chakaria HDSS, 2013

Cause group	Children (%)	Adults (%)	Elderly (%)
01 Communicable	22.8	28.5	26.3
02 Non-communicable	8.7	40.6	63.8
03 Neonatal	32.9	8.1	0.0
04 Trauma	10.3	15.3	1.7
05 Indeterminate	25.3	7.6	8.3
Total	100.0	100.0	100.0

HDSS = Health and Demographic Surveillance System.

Pulmonary tuberculosis, stroke, chronic obstructive pulmonary diseases, unspecified neoplasms, and acute respiratory infection (including pneumonia) 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, 2013

Causes	Male	Female	Both
01.01 Sepsis (non-obstetric)	0.0	0.2	0.1
01.02 Acute respiratory infection, including pneumonia	5.4	4.7	5.1
01.03 HIV/AIDS related death	4.6	2.3	3.5
01.04 Diarrhoeal diseases	0.9	2.5	1.6
01.05 Malaria	2.1	2.2	2.1
01.06 Measles	0.0	0.0	0.0
01.07 Meningitis and encephalitis	3.7	2.4	3.1
01.09 Pulmonary tuberculosis	10.5	6.9	8.9
01.10 Pertussis	0.4	0.5	0.5
01.11 Haemorrhagic fever	0.0	0.0	0.0
01.99 Other and unspecified infectious diseases	0.6	0.5	0.5
02.01 Oral neoplasms	0.2	0.5	0.4
02.02 Digestive neoplasms	2.4	1.1	1.8
02.03 Respiratory neoplasms	2.0	0.5	1.3
02.04 Breast neoplasms	0.0	0.9	0.4
02.05 & 02.06 Reproductive neoplasms M, F	1.5	0.6	1.1
02.99 Other and unspecified neoplasms	5.8	4.3	5.2
03.01 Severe anaemia	0.7	1.5	1.1
03.02 Severe malnutrition	1.1	3.1	2.0
03.03 Diabetes mellitus	3.2	4.3	3.7
04.01 Acute cardiac disease	1.8	0.7	1.3
04.02 Stroke	6.4	9.1	7.6
04.99 Other and unspecified cardiac diseases	3.0	6.0	4.3
05.01 Chronic obstructive pulmonary disease	6.8	6.1	6.5
05.02 Asthma	0.1	0.0	0.1
06.01 Acute abdomen	1.3	2.1	1.7
06.02 Liver cirrhosis	2.4	1.4	2.0
07.01 Renal failure	0.8	1.0	0.9
08.01 Epilepsy	1.3	0.9	1.2
09.03 Pregnancy-induced hypertension	0.0	0.5	0.2
09.04 Obstetric haemorrhage	0.0	1.2	0.6
09.05 Obstructed labour	0.0	0.2	0.1
09.99 Other and unspecified maternal causes of death	0.0	0.5	0.2
10.01 Prematurity	2.0	3.3	2.6
10.02 Birth asphyxia	1.2	1.4	1.3

Table 6. (contd...)

Causes	Male	Female	Both
10.03 Neonatal pneumonia	1.2	3.2	2.1
10.04 Neonatal sepsis	2.6	1.9	2.3
10.06 Congenital malformation	0.8	0.7	0.8
10.99 Other and unspecified neonatal causes of death	1.8	1.1	1.5
12.01 Road traffic accident	1.2	1.3	1.3
12.02 Other transport accident	1.0	1.4	1.1
12.03 Accidental fall	0.0	0.0	0.0
12.04 Accidental drowning and submersion	1.2	3.6	2.3
12.05 Accidental exposure to smoke fire & flame	0.5	0.0	0.3
12.06 Contact with venomous plant/animal	0.0	0.5	0.2
12.07 Accidental poisoning & noxious substances	0.0	0.0	0.0
12.08 Intentional self-harm	0.0	0.0	0.0
12.09 Assault	0.8	1.0	0.9
12.99 Other and unspecified external causes of death	0.0	0.2	0.1
98 Other and unspecified non-communicable diseases	1.4	0.0	0.8
99 Indeterminate	15.2	11.7	13.6
All	100.0	100.0	100.0
HDSS = Health and Demographic Surveillance System.			

CHAPTER 5

Fertility

The crude birth rate in 2013 was 24.9 per 1,000 population, which was lower than the rate in 2012 (25.4 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, 2013

Age (years)	No. of females	No. of births			Birth rate
		Male	Female	Both	
15-19	4,557	132	124	256	56.2
20-24	4,249	407	368	775	182.4
25-29	3,595	324	277	601	167.2
30-34	2,899	161	123	284	98.0
35-39	2,061	54	48	102	49.5
40-44	1,644	11	11	22	13.4
45-49	1,389	1	2	3	2.2
All	20,394	1,090	953	2,043	
TFR					2,844

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, 2013

Asset quintile	Midyear population	No. of births	Birthrate
Lowest	13,655	345	25.3
Second	16,315	454	27.8
Middle	16,397	382	23.3
Fourth	17,987	430	23.9
Highest	17,345	417	24.0
All	81,699	2,028	24.8

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.

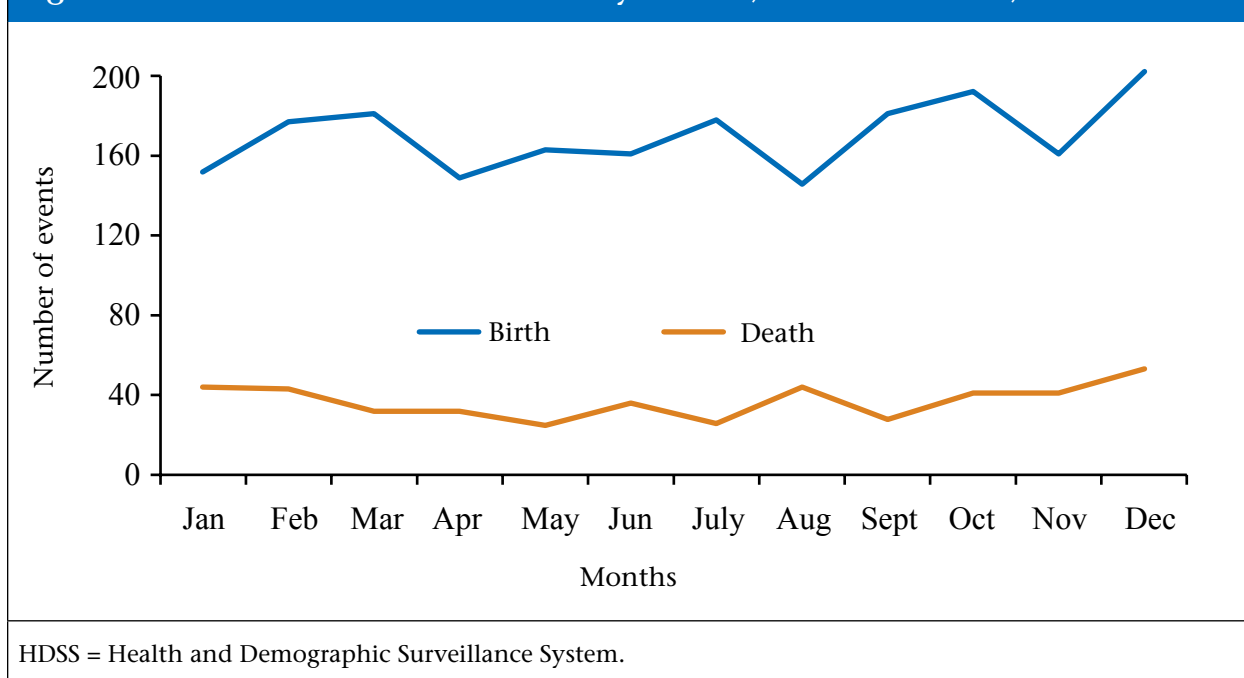
Of the pregnancies in 2013, 11.3% of 2,505 were terminated prematurely and spontaneously, 5.1% were terminated through induction, and 2.0% resulted in stillbirths (Table 9).

Table 9. Pregnancy outcome, Chakaria HDSS, 2013

Pregnancy outcome	No.	%
Spontaneous abortion	282	11.3
Induced abortion	129	5.1
Stillbirth	51	2.0
Live birth*	2,043	81.6
Total no. of pregnancies	2,505	100.0

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

Fig. 6. Number of births and deaths by month, Chakaria HDSS, 2013



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

CHAPTER 6

Migration

In 2013, the rate of out-migration was higher at 43.9 per 1,000 population than that of in-migration at 37.2 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 2013. The sex differential in migration was prominent. The rate of in-migration of males and females was highest in January. The rate of out-migration was highest among the males in October and among the females in June.

Table 10. Migration rate per 1,000 population by asset quintile, Chakaria HDSS, 2013

Asset quintile	Midyear population	In-migration rate	Out-migration rate
Lowest	13,655	30.4	41.5
Second	16,315	47.1	45.7
Middle	16,397	31.8	37.3
Fourth	17,987	36.3	42.2
Highest	17,345	39.4	52.4
All	81,699	37.2	43.9

HDSS = Health and Demographic Surveillance System.

Table 11. Number of migrants by sex and month, Chakaria HDSS, 2013

Month	In-migration			Out-migration		
	Male	Female	Both	Male	Female	Both
January	192	250	442	117	138	255
February	126	157	283	73	115	188
March	110	160	270	111	144	255
April	85	113	198	116	142	258
May	114	177	291	128	160	288
June	86	151	237	142	236	378
July	90	155	245	109	174	283
August	92	131	223	139	157	296
September	65	107	172	126	155	281
October	116	176	292	188	230	418
November	54	147	201	148	196	344
December	79	133	212	159	208	367
All	1,209	1,857	3,066	1,556	2,055	3,611

HDSS = Health and Demographic Surveillance System.

Origin and destination of migrants

During 2013, 5.6% of 3,066 in-migrants moved into Chakaria HDSS households from outside of Bangladesh whereas 11.2% of 3,611 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).

Table 12. Origin and destination of migrants by sex, Chakaria HDSS, 2013						
Origin or destination	In-migration			Out-migration		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Inside Bangladesh	86.6	99.5	94.4	74.6	99.6	88.8
Outside Bangladesh	13.4	0.5	5.6	25.5	0.4	11.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total number of migrants	1,209	1,857	3,066	1,556	2,055	3,611
Cox's Bazar District						
Inside Chakaria	78.2	80.2	79.5	82.2	76.6	78.7
Outside Chakaria	21.8	19.9	20.5	17.8	23.4	21.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	809	1,506	2,315	991	1,651	2,642
Chakaria Upazila						
Inside HDSS area	79.0	75.0	76.4	88.8	78.2	82.2
Outside HDSS area	21.0	25.0	23.6	11.2	21.8	17.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	614	1,165	1,779	768	1,270	2,038
HDSS = Health and Demographic Surveillance System.						

Reasons for migration

Table 13 presents the reasons of migration by sex. 39.1% of the migrants moved out due to family-related issues - mostly marriage, followed by work (32.0%), housing (23.3%), and education (3.1%). Reasons for moving out for males were different from those of females. 45.7% of male in-migrants moved due to work related issues whereas only 17.5% of the females moved due to that reason. On the other hand, 66.2% of female in-migrants moved due to family related issues - mostly marriage, while 29.8% 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, 2013

Reasons for migration	In-migration			Out-migration		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Family-related	29.8	66.2	51.8	18.1	55.0	39.1
Work-related	45.7	17.5	28.6	48.5	19.6	32.0
Housing-related	16.1	10.8	12.9	28.3	19.5	23.3
Education	7.0	3.9	5.2	3.7	2.6	3.1
Other	1.5	1.6	1.6	1.4	3.3	2.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	1,209	1,857	3,066	1,556	2,055	3,611
HDSS = Health and Demographic Surveillance System.						

CHAPTER 7

Marriage

In total 1,694 marriages took place in the surveillance villages in Chakaria during 2013 and the crude marriage rate was 20.7 per 1,000 population. The highest number of marriages took place in June and the lowest in August. The number of marriages showed a downward trend from June to August (Fig.7). Table 14 presents singulate mean age at marriage (SMAM) and median age at first marriage. The SMAM was 26.6 years for males and 20.3 years for females. The SMAM was decreased for both males and females between 2012 and 2013. The median age at first marriage for males and females were 26.3 and 20.0 years. Both the indicators for males and females were almost positively associated with household socioeconomic status (Table 14). The crude divorce rate was 1.1 per 1,000 population in 2013.

Table 14. Age at marriage by sex and asset quintile, Chakaria HDSS, 2013

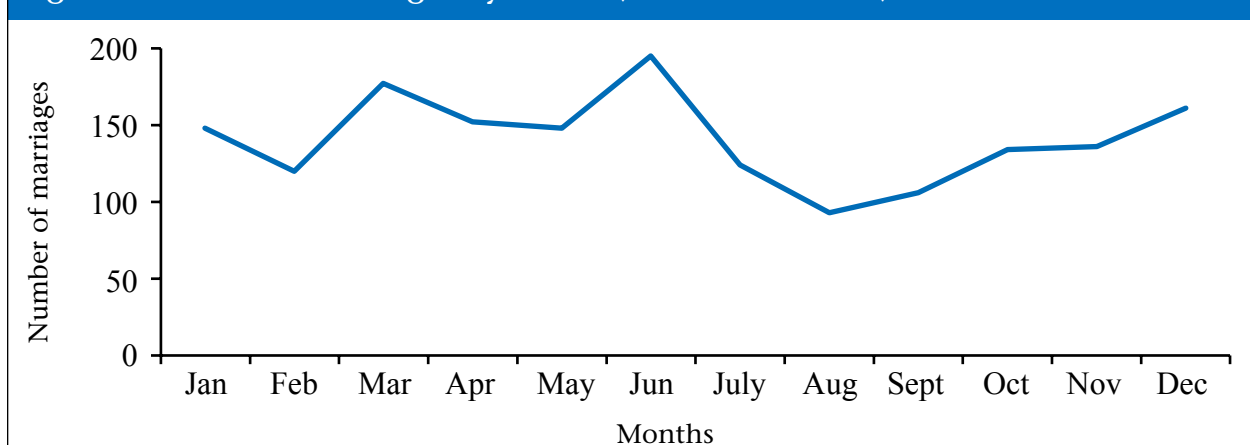
Asset quintile	Male		Female	
	SMAM*	Median age at first marriage*	SMAM*	Median age at first marriage*
Lowest	23.6	23.8	19.7	19.8
Second	24.7	24.4	19.7	19.8
Middle	25.8	25.6	19.8	19.6
Fourth	27.6	27.3	20.5	20.1
Highest	29.4	29.4	20.9	20.3
All	26.6	26.3	20.3	20.0

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, 2013



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.

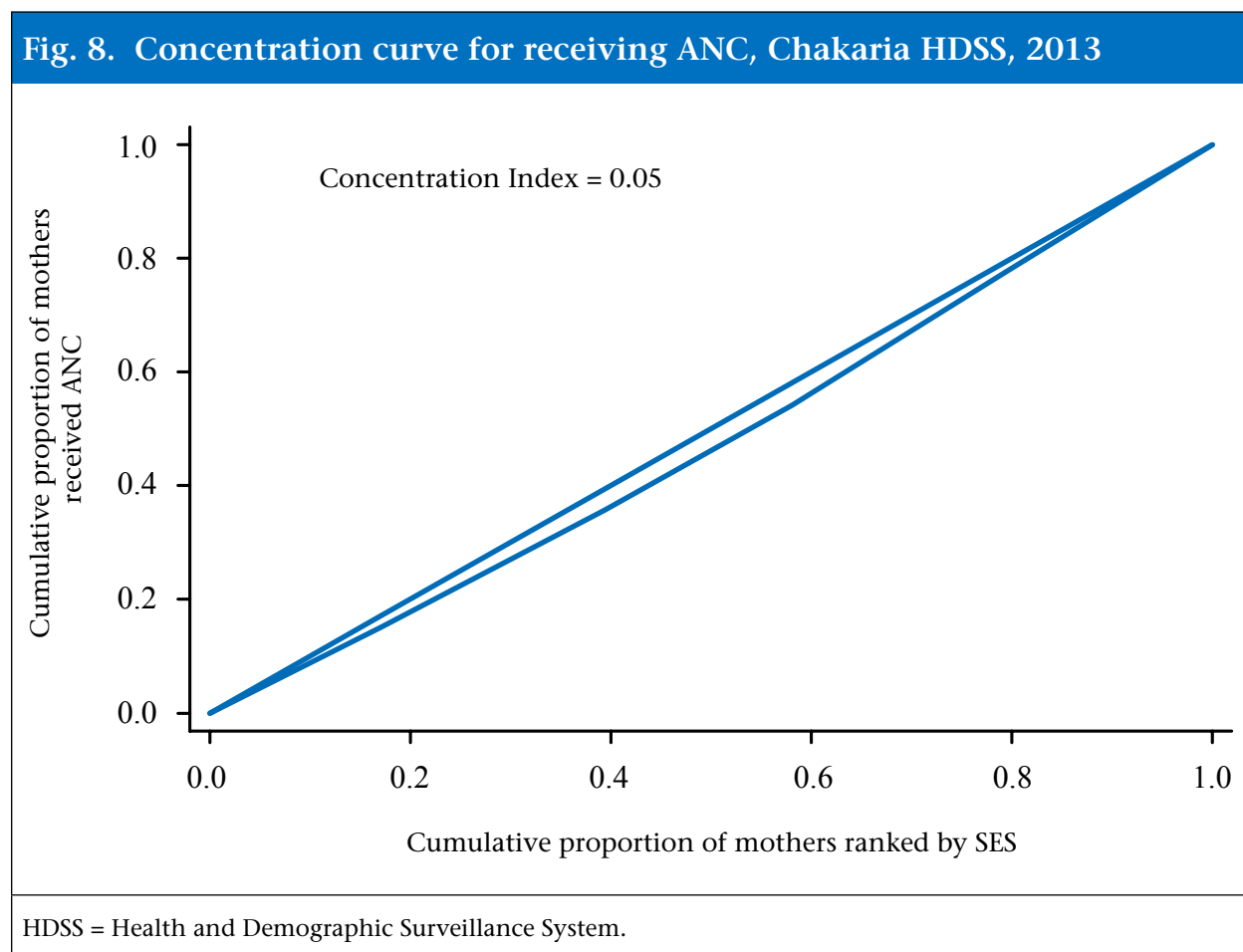
At present, the Upazila Health Complex of the government and four private hospitals provide healthcare services at the headquarters of Chakaria. At the union level, 11 Union Health and Family Welfare Centres (UHFWCs) of the government, and 5 village health posts which were initiated by the community members 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, 2013							
Asset quintile	Received any ANC (%)	Midwife*	FWV*	Nurse/doctor*	FDSR/CMH*	None (%)	No. of women
Lowest	58.8	14.5	20.9	17.4	21.4	41.2	345
Second	61.4	18.1	16.5	22.3	21.0	38.6	448
Middle	65.7	14.9	16.5	29.3	21.5	34.3	376
Fourth	73.2	13.8	14.7	47.6	15.4	26.8	429
Highest	72.6	8.2	9.7	57.1	10.2	27.4	413
Total	66.6	13.9	15.5	35.3	17.8	33.4	2,011
*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.							

Among 2,011 pregnant women who gave live births, 66.6% of them 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 Table 15 and Figure 8 indicated that the use of ANC services concentrated to richer segments of the population.



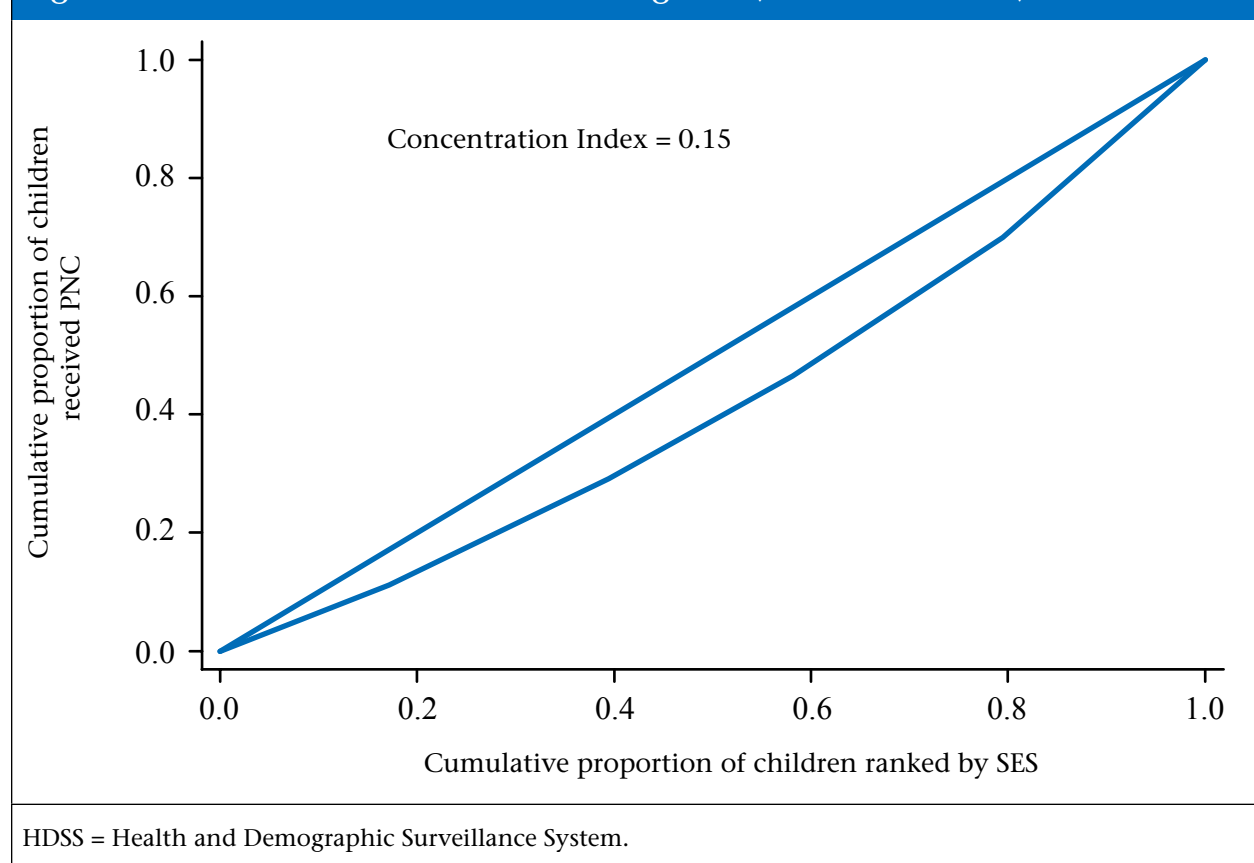
Use of postnatal care services

It was observed that only 36.2% of the pregnant women received at least one postnatal care (PNC) in 2013. 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, 2013

Asset quintile	Received any PNC (%)	Midwife* (%)	FWV* (%)	Nurse/doctor* (%)	FDSR/CMH* (%)	None (%)	No. of women
Lowest	23.8	4.6	2.6	17.4	0.6	76.2	345
Second	29.0	4.9	6.0	21.0	0.2	71.0	448
Middle	33.8	5.1	4.0	26.3	1.6	66.2	376
Fourth	39.9	9.6	4.7	28.7	1.2	60.1	429
Highest	52.8	9.0	4.4	43.1	0.7	47.2	413
Total	36.2	6.7	4.4	27.5	0.8	63.8	2,011

*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, 2013

Assistance during delivery

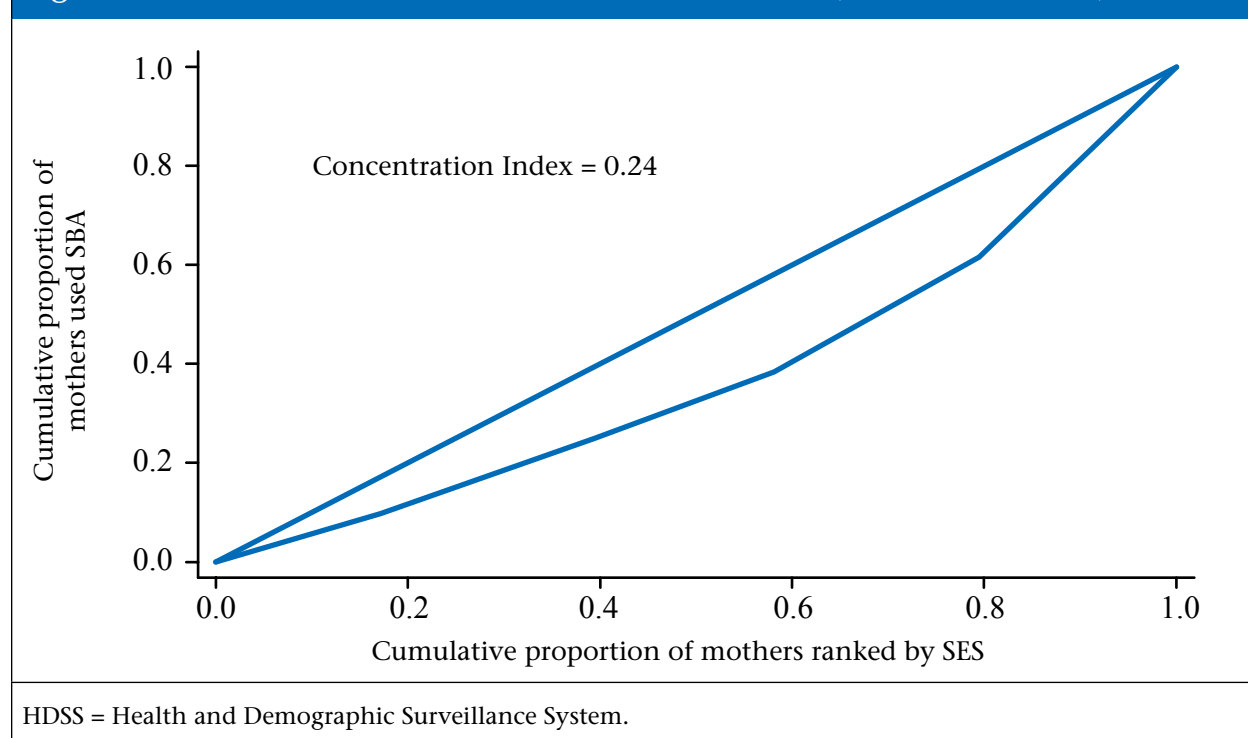
Table 17. Assistance during delivery by asset quintile, Chakaria HDSS, 2013

Asset quintile	Midwife (%)	FWV (%)	Nurse/ doctor (%)	TBA (%)	No. of women
Lowest	5.8	3.5	7.5	83.2	345
Second	7.6	3.8	8.9	79.7	448
Middle	6.4	2.9	12.0	78.7	376
Fourth	11.7	4.4	16.3	67.6	429
Highest	12.1	4.4	39.0	44.6	413
Total	8.9	3.8	17.0	70.3	2,011

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. 70.3% of 2,011 deliveries in Chakaria were assisted by the TBAs as opposed to 29.7% 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 (Table 17 and Fig. 10).

Fig. 10. Concentration curve for use of SBA services, Chakaria HDSS, 2013



Place of delivery

Eighty three percent of the deliveries took place at home. Only 16.7% of 2,011 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 (Table 18 and Fig. 11).

Table 18. Place of delivery by asset quintile, Chakaria HDSS, 2013			
Asset quintile	Hospital/Clinic (%)	Home (%)	No. of women
Lowest	7.2	92.8	345
Second	8.3	91.7	448
Middle	11.2	88.8	376
Fourth	17.0	83.0	429
Highest	38.5	61.5	413
Total	16.7	83.3	2,011

HDSS = Health and Demographic Surveillance System.

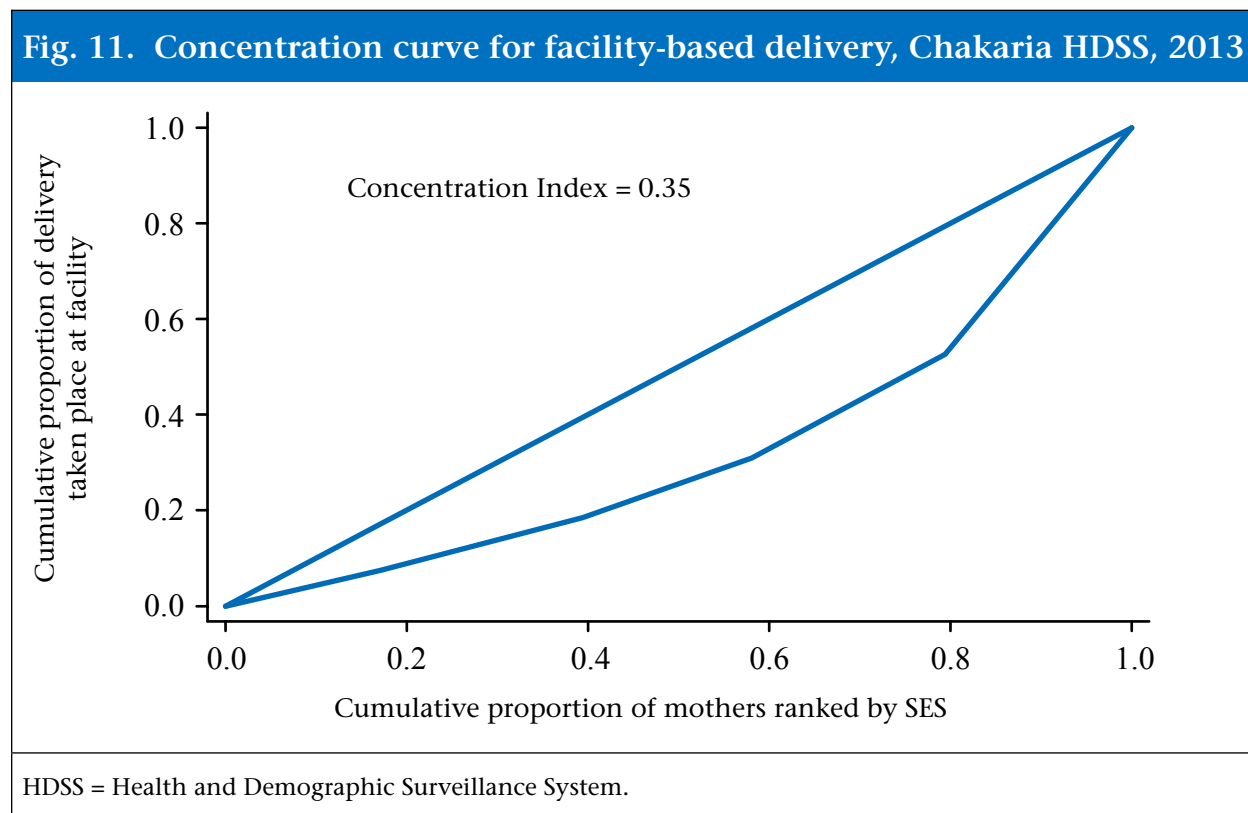


Table 19 shows caesarean-section delivery by household asset quintile in 2013. Caesarean-section delivery accounted for 7.5% of the deliveries in the Chakaria HDSS

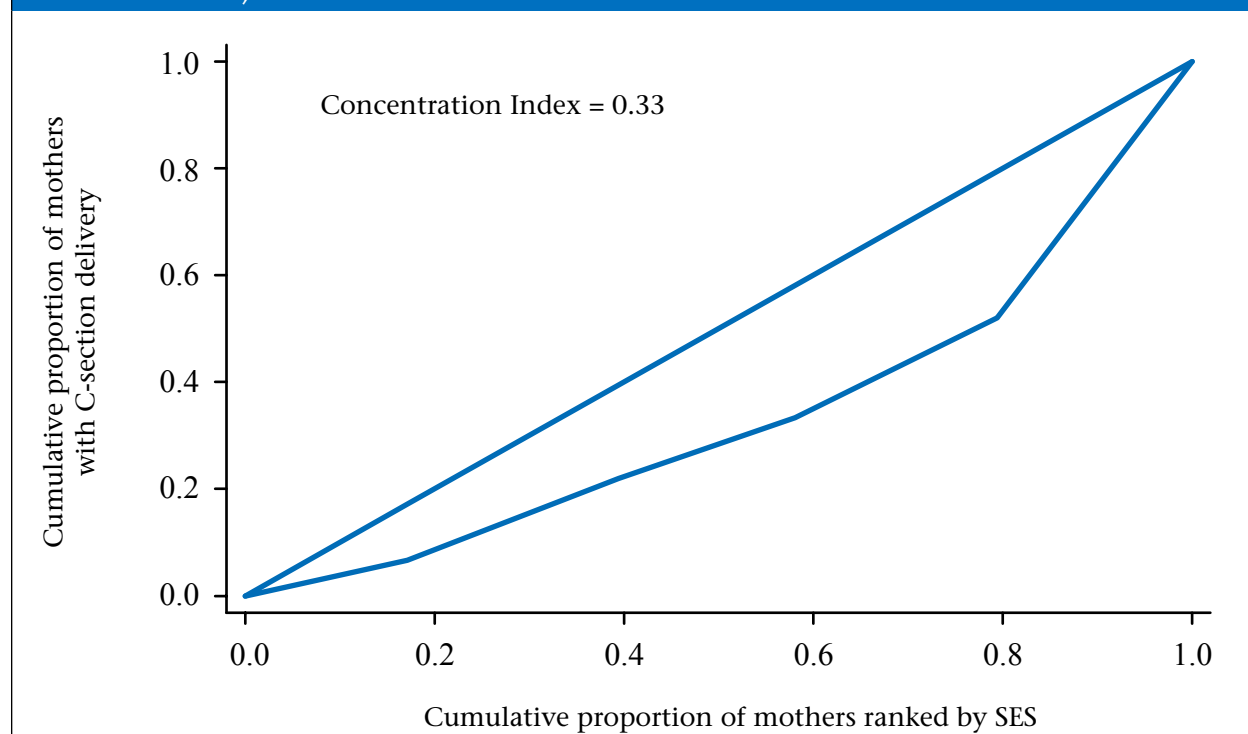
area in 2013. Although the number of caesarean sections was small, the number of women with caesarean sections exhibited huge discrepancies between highest and lowest quintile (Table 19 and Fig. 12).

Table 19. Proportion of caesarean-section delivery by asset quintile, Chakaria HDSS, 2013

Asset quintile	No. of caesarean-section delivery	Caesarean-section delivery (%)	Total no. of deliveries
Lowest	10	2.9	345
Second	23	5.1	448
Middle	17	4.5	376
Fourth	28	6.5	429
Highest	72	17.4	413
Total	150	7.5	2,011

HDSS = Health and Demographic Surveillance System.

Fig. 12. Concentration curve for caesarean-section delivery, Chakaria HDSS, 2013



HDSS = Health and Demographic Surveillance System.

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APPENDIX A

Midyear population by age and sex, Chakaria HDSS, 2013

Age (years)	Midyear population			Percentage distribution of midyear population		
	Male	Female	Both	Male	Female	Both
<1	1,039	964	2,003	2.5	2.4	2.4
1-4	4,010	3,796	7,806	9.7	9.3	9.5
5-9	5,962	5,785	11,747	14.5	14.1	14.3
10-14	5,782	5,515	11,297	14.1	13.5	13.8
15-19	4,739	4,557	9,296	11.5	11.1	11.3
20-24	3,584	4,249	7,833	8.7	10.4	9.5
25-29	3,182	3,595	6,777	7.7	8.8	8.3
30-34	2,716	2,899	5,615	6.6	7.1	6.8
35-39	2,179	2,061	4,240	5.3	5.0	5.2
40-44	1,817	1,644	3,461	4.4	4.0	4.2
45-49	1,413	1,389	2,802	3.4	3.4	3.4
50-54	1,221	1,291	2,512	3.0	3.2	3.1
55-59	981	1,003	1,984	2.4	2.5	2.4
60-64	877	751	1,628	2.1	1.8	2.0
65-69	588	466	1,054	1.4	1.1	1.3
70-74	482	409	891	1.2	1.0	1.1
75-79	258	214	472	0.6	0.5	0.6
80-84	175	166	341	0.4	0.4	0.4
85+	126	144	270	0.3	0.4	0.3
All	41,131	40,898	82,029	100.0	100.0	100.0

APPENDIX B

Cause-specific mortality rates per 1,000 population by age and sex, Chakaria HDSS, 2013

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
Male							
01.01 Sepsis (non-obstetric)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01.02 Acute respiratory infection including pneumonia	0.0	0.8	0.0	0.0	0.0	1.1	4.9
01.03 HIV/AIDS related death	0.0	0.0	0.2	0.1	0.2	1.2	1.1
01.04 Diarrhoeal diseases	0.0	0.0	0.2	0.0	0.0	0.0	0.9
01.05 Malaria	0.0	0.0	0.8	0.0	0.0	0.0	0.5
01.06 Measles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01.07 Meningitis and encephalitis	24.8	4.4	0.4	0.1	0.0	0.0	0.0
01.09 Pulmonary tuberculosis	0.0	0.0	0.0	0.0	0.2	1.8	9.8
01.10 Pertussis	0.0	1.0	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	0.3	0.0	0.0	0.0	0.0	0.6
02.01 Oral neoplasms	0.0	0.0	0.0	0.0	0.0	0.2	0.0
02.02 Digestive neoplasms	0.0	0.0	0.0	0.0	0.1	0.5	1.4
02.03 Respiratory neoplasms	0.0	0.0	0.0	0.0	0.0	1.0	1.2
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	0.0	0.3	1.6
02.99 Other and unspecified neoplasms	0.0	0.0	0.0	0.0	0.1	1.1	5.2
03.01 Severe anaemia	0.0	0.0	0.0	0.1	0.0	0.0	0.4
03.02 Severe malnutrition	0.0	0.9	0.2	0.1	0.0	0.0	0.0
03.03 Diabetes mellitus	0.0	0.0	0.0	0.1	0.0	0.4	3.4
04.01 Acute cardiac disease	0.0	0.0	0.0	0.0	0.1	0.5	0.9
04.02 Stroke	0.0	0.0	0.0	0.0	0.1	1.4	6.1
04.99 Other and unspecified cardiac diseases	0.0	0.0	0.0	0.0	0.0	0.6	3.3
05.01 Chronic obstructive pulmonary disease	0.0	0.0	0.0	0.0	0.0	1.2	7.8
05.02 Asthma	0.0	0.0	0.0	0.0	0.0	0.0	0.2
06.01 Acute abdomen	0.0	0.0	0.0	0.0	0.0	0.5	0.7
06.02 Liver cirrhosis	0.0	0.0	0.0	0.0	0.1	0.3	1.2
07.01 Renal failure	0.0	1.0	0.0	0.0	0.0	0.0	0.0
08.01 Epilepsy	7.3	0.7	0.2	0.1	0.0	0.0	0.0

Appendix B. (contd...)

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
09.03 Pregnancy-induced hypertension	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09.04 Obstetric haemorrhage	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09.05 Obstructed labour	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09.99 Other and unspecified maternal causes of death	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.01 Prematurity	59.5	0.0	0.0	0.0	0.0	0.0	0.0
10.02 Birth asphyxia	35.2	0.0	0.0	0.0	0.0	0.0	0.0
10.03 Neonatal pneumonia	36.1	0.0	0.0	0.0	0.0	0.0	0.0
10.04 Neonatal sepsis	75.2	0.0	0.0	0.0	0.0	0.0	0.0
10.06 Congenital malformation	23.9	0.0	0.0	0.0	0.0	0.0	0.0
10.99 Other and unspecified neonatal causes of death	52.5	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	0.1	0.0	0.0
12.02 Other transport accident	0.0	0.0	0.2	0.0	0.1	0.0	0.0
12.03 Accidental fall	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.04 Accidental drowning and submersion	0.0	0.0	0.7	0.0	0.0	0.0	0.0
12.05 Accidental exposure to smoke fire & flame	0.0	0.0	0.0	0.0	0.0	0.0	0.6
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	0.0	0.0	0.0
12.09 Assault	0.0	0.0	0.0	0.0	0.0	0.3	0.6
12.99 Other and unspecified external causes of death	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98 Other and unspecified non-communicable diseases	0.0	0.0	0.0	0.0	0.0	0.0	1.5
99 Indeterminate	178.4	5.4	0.5	0.0	0.1	1.0	5.7
All causes	493.0	15.5	3.6	0.6	1.4	12.9	58.7

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	0.0	0.0	0.0	0.0	0.1	0.0
01.02 Acute respiratory infection including pneumonia	0.0	0.0	0.0	0.0	0.0	0.6	5.1
01.03 HIV/AIDS related death	0.0	0.0	0.3	0.0	0.1	0.1	0.0
01.04 Diarrhoeal diseases	0.0	1.1	0.3	0.2	0.0	0.3	0.0
01.05 Malaria	0.0	0.0	0.7	0.0	0.0	0.3	0.0
01.06 Measles	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01.07 Meningitis and encephalitis	13.6	1.8	0.3	0.1	0.0	0.0	0.0
01.09 Pulmonary tuberculosis	0.0	0.0	0.0	0.1	0.2	1.1	3.5
01.10 Pertussis	0.0	0.0	0.3	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	0.0	0.0	0.0	0.0	0.0	0.7
02.01 Oral neoplasms	0.0	0.0	0.0	0.0	0.0	0.0	0.7
02.02 Digestive neoplasms	0.0	0.0	0.0	0.0	0.0	0.4	0.6
02.03 Respiratory neoplasms	0.0	0.0	0.0	0.0	0.0	0.0	0.7
02.04 Breast neoplasms	0.0	0.0	0.0	0.0	0.0	0.3	0.0
02.05 & 02.06 Reproductive neoplasms M, F	0.0	0.0	0.0	0.0	0.0	0.1	0.3
02.99 Other and unspecified neoplasms	0.0	0.0	0.0	0.0	0.1	1.2	2.5
03.01 Severe anaemia	0.0	0.0	0.0	0.0	0.0	0.3	1.6
03.02 Severe malnutrition	0.0	0.0	0.0	0.0	0.0	0.0	3.5
03.03 Diabetes mellitus	0.0	0.0	0.0	0.0	0.0	0.5	4.8
04.01 Acute cardiac disease	0.0	0.0	0.0	0.0	0.0	0.0	0.8
04.02 Stroke	0.0	0.0	0.0	0.0	0.1	1.4	8.4
04.99 Other and unspecified cardiac diseases	0.0	0.0	0.0	0.0	0.0	1.2	4.8
05.01 Chronic obstructive pulmonary disease	0.0	0.0	0.0	0.0	0.1	0.8	5.3
05.02 Asthma	0.0	0.0	0.0	0.0	0.0	0.0	0.0
06.01 Acute abdomen	0.0	0.0	0.0	0.0	0.0	0.5	0.7
06.02 Liver cirrhosis	0.0	0.0	0.0	0.0	0.0	0.3	0.9
07.01 Renal failure	0.0	0.0	0.0	0.0	0.0	0.2	0.5
08.01 Epilepsy	0.0	0.0	0.3	0.0	0.0	0.0	0.6

Appendix B. (contd...)

Causes	Age groups (years)						
	Neonate	Infant	1-4	5-14	15-49	50-64	65+
09.03 Pregnancy-induced hypertension	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09.04 Obstetric haemorrhage	0.0	0.0	0.0	0.0	0.1	0.0	0.0
09.05 Obstructed labour	0.0	0.0	0.0	0.0	0.0	0.0	0.0
09.99 Other and unspecified maternal causes of death	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.01 Prematurity	87.0	0.0	0.0	0.0	0.0	0.0	0.0
10.02 Birth asphyxia	38.1	0.0	0.0	0.0	0.0	0.0	0.0
10.03 Neonatal pneumonia	85.4	0.0	0.0	0.0	0.0	0.0	0.0
10.04 Neonatal sepsis	50.2	0.0	0.0	0.0	0.0	0.0	0.0
10.06 Congenital malformation	0.0	1.5	0.0	0.0	0.0	0.0	0.0
10.99 Other and unspecified neonatal causes of death	28.2	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	0.1	0.0	0.7
12.02 Other transport accident	0.0	0.0	0.5	0.0	0.0	0.0	0.0
12.03 Accidental fall	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12.04 Accidental drowning and submersion	0.0	0.0	1.8	0.0	0.0	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	0.0
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	0.0	0.0	0.0
12.09 Assault	0.0	0.0	0.3	0.0	0.0	0.0	0.0
12.99 Other and unspecified external causes of death	0.0	0.5	0.0	0.0	0.0	0.0	0.0
98 Other and unspecified non-communicable diseases	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99 Indeterminate	78.7	5.1	0.6	0.0	0.1	0.4	4.4
All causes	381.3	10.1	5.1	0.4	1.4	10.4	51.0

APPENDIX C

Migration rate per 1,000 population by age and sex, Chakaria HDSS, 2013

Age (years)	No. of migrants			Migration rate per 1,000 population		
	Male	Female	Both	Male	Female	Both
In-migration						
<1	54	58	112	52.0	60.2	55.9
1-4	162	157	319	40.4	41.4	40.9
5-9	177	133	310	29.7	23.0	26.4
10-14	102	139	241	17.6	25.2	21.3
15-19	106	545	651	22.4	119.6	70.0
20-24	110	379	489	30.7	89.2	62.4
25-29	185	175	360	58.1	48.7	53.1
30-34	122	85	207	44.9	29.3	36.9
35-39	71	41	112	32.6	19.9	26.4
40-44	40	19	59	22.0	11.6	17.0
45-49	18	13	31	12.7	9.4	11.1
50-54	17	13	30	13.9	10.1	11.9
55-59	13	22	35	13.3	21.9	17.6
60-64	6	19	25	6.8	25.3	15.4
65-69	8	16	24	13.6	34.3	22.8
70-74	9	14	23	18.7	34.2	25.8
75-79	6	11	17	23.3	51.4	36.0
80-84	1	10	11	5.7	60.2	32.3
85+	2	8	10	15.9	55.6	37.0
All	1,209	1,857	3,066	29.4	45.4	37.4
Out-migration						
<1	58	53	111	55.8	55.0	55.4
1-4	142	151	293	35.4	39.8	37.5
5-9	148	135	283	24.8	23.3	24.1
10-14	129	191	320	22.3	34.6	28.3
15-19	193	566	759	40.7	124.2	81.6
20-24	241	472	713	67.2	111.1	91.0
25-29	188	218	406	59.1	60.6	59.9
30-34	172	88	260	63.3	30.4	46.3
35-39	114	41	155	52.3	19.9	36.6
40-44	60	13	73	33.0	7.9	21.1
45-49	31	18	49	21.9	13.0	17.5
50-54	14	12	26	11.5	9.3	10.4
55-59	14	25	39	14.3	24.9	19.7
60-64	13	18	31	14.8	24.0	19.0
65-69	8	15	23	13.6	32.2	21.8
70-74	15	20	35	31.1	48.9	39.3
75-79	6	5	11	23.3	23.4	23.3
80-84	6	9	15	34.3	54.2	44.0
85+	4	5	9	31.7	34.7	33.3
All	1,556	2,055	3,611	37.8	50.2	44.0

APPENDIX D

Number of migrants by origin or destination, Chakaria HDSS, 2013

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	1,046	216	175	100	98	86	137	94	48	26	11	55
Outside Bangladesh	163	0	2	2	8	23	49	28	23	14	7	7
Inside Chakaria	634	129	105	76	71	45	71	53	30	14	7	33
Outside Chakaria	175	38	35	10	18	21	21	15	7	1	2	7
Inside HDSS area	485	94	78	59	58	36	58	38	21	10	4	29
Outside HDSS area	129	24	25	9	16	14	15	16	2	1	1	6
Female												
Inside Bangladesh	1,848	214	132	139	540	380	174	85	40	18	13	113
Outside Bangladesh	9	1	1	0	2	2	1	0	0	2	0	0
Inside Chakaria	1,207	128	78	93	365	252	105	46	24	12	8	96
Outside Chakaria	299	34	29	21	92	54	29	19	9	3	2	7
Inside HDSS area	875	94	57	69	259	171	66	34	15	11	9	90
Outside HDSS area	290	17	12	19	130	64	23	9	5	3	1	7
Out-migration												
Male												
Inside Bangladesh	1,160	200	148	127	137	138	110	106	71	33	22	68
Outside Bangladesh	396	0	0	2	56	103	78	66	42	28	9	12
Inside Chakaria	817	116	79	82	104	130	83	86	52	31	12	42
Outside Chakaria	174	24	26	19	31	19	17	14	10	7	0	7
Inside HDSS area	681	90	60	60	94	109	76	77	39	30	8	38
Outside HDSS area	87	12	16	15	14	7	8	7	6	1	1	0
Female												
Inside Bangladesh	2,047	204	134	190	565	470	218	86	41	13	18	108
Outside Bangladesh	8	0	1	1	1	2	0	2	0	0	0	1
Inside Chakaria	1,264	127	74	107	385	283	124	40	23	9	9	83
Outside Chakaria	387	27	19	43	128	101	35	17	8	1	1	7
Inside HDSS area	992	88	59	83	312	220	97	33	14	6	7	73
Outside HDSS area	278	14	10	24	103	81	31	8	3	1	0	3

APPENDIX E

Number of in-migrants by reasons for migration, Chakaria HDSS, 2013

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	145	0	0	14	12	48	24	15	16	4	3	9
Family friction/ breakdown	175	9	11	18	21	17	29	26	13	7	4	20
Others	40	2	5	3	2	8	6	1	3	2	0	8
Work-related												
New job/job transfer	218	0	1	11	15	39	64	31	24	16	8	9
To look for work/ lost job	299	0	0	22	14	5	5	2	1	165	84	1
Others	33	0	0	0	4	6	8	8	3	1	1	2
Housing-related												
Wanted to own home/new house	179	2	16	16	19	18	40	30	10	8	9	11
Education												
To acquire education	85	2	41	19	13	5	1	3	0	1	0	0
Reasons not reported	35	5	3	0	7	2	8	6	1	1	0	2
All	1,209	20	77	103	107	148	185	122	71	205	109	62
Female												
Family related												
To join spouse	845	0	0	39	425	261	67	24	10	6	4	9
Family friction/ breakdown	327	3	14	24	38	78	59	30	16	5	4	56
Others	77	7	4	6	10	6	2	4	3	2	2	31
Work-related												
New job/job transfer	7	0	0	0	1	1	2	1	0	2	0	0
To look for work/ lost job	174	0	0	26	33	39	35	17	5	5	3	11
Others	11	0	0	0	3	4	1	1	1	1	0	0
Housing-related												
Wanted to own home/new house	294	3	7	33	10	15	5	3	163	62	0	3
Education												
To acquire education	73	5	27	24	11	2	1	2	1	0	0	0
Reasons not reported	49	14	2	4	4	11	3	3	4	1	0	3
All	1,857	32	54	156	535	417	175	85	203	84	13	113

APPENDIX F

Number of out-migrants by reasons for migration, Chakaria HDSS, 2013

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	64	0	0	2	10	20	12	7	2	4	3	4
Family friction/ breakdown	110	0	0	6	15	25	14	27	16	3	4	0
Others	9	0	0	0	1	2	0	2	1	1	2	0
Work-related												
New job/job transfer	347	0	26	36	85	161	10	5	2	2	2	18
To look for work/ lost job	8	0	0	1	3	3	1	0	0	0	0	0
Others	17	0	0	0	1	2	6	2	4	1	0	1
Housing-related												
Wanted to own home/new house	832	8	45	58	122	155	135	125	79	44	18	43
Education												
To acquire education	133	7	16	26	17	19	10	4	9	6	5	14
Reasons not reported	36	2	16	9	3	2	2	0	0	1	1	0
All	1,556	17	103	138	257	389	190	172	113	62	35	80
Female												
Family-related												
To Join spouse	798	0	1	10	271	375	84	43	5	0	1	8
Family friction/ breakdown	465	4	4	155	62	62	23	13	6	60	40	36
Others	17	0	0	0	5	8	1	1	2	0	0	0
Work-related												
New job/job transfer	32	1	1	2	7	7	9	1	2	1	0	1
To look for work/ lost job	1	0	0	1	0	0	0	0	0	0	0	0
Others	8	0	1	1	0	3	0	1	2	0	0	0
Housing-related												
Wanted to own home/new house	319	4	49	50	41	35	45	39	21	4	10	21
Education												
To acquire education	171	5	11	30	17	40	38	10	10	7	2	1
Reasons not reported	244	11	17	33	80	49	14	13	3	4	3	17
All	2,055	25	84	282	483	579	214	121	51	76	56	84

APPENDIX G

**Population, births, deaths, in and out-migration by village,
Chakaria HDSS, 2013**

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Maizpara	1,641	48	7	63	56	29.3	4.3	38.4	34.1
Daingakata	1,929	45	7	45	100	23.3	3.6	23.3	51.8
Baniachara	3,131	75	17	202	173	24.0	5.4	64.5	55.3
Dakshin Baraitali	2,284	61	11	62	93	26.7	4.8	27.1	40.7
Gobindapur	4,652	114	21	123	157	24.5	4.5	26.4	33.7
Hapaliakata	3,554	98	11	157	160	27.6	3.1	44.2	45.0
Baraitali	17,191	441	74	652	739	25.7	4.3	37.9	43.0
Katakhal	376	12	1	6	15	31.9	2.7	16.0	39.9
Rakhainpara	673	10	7	27	39	14.9	10.4	40.1	57.9
Shantinagar	1,760	54	11	109	79	30.7	6.3	61.9	44.9
Kulalpara	186	3	2	7	4	16.1	10.8	37.6	21.5
Palpara	251	2	3	3	21	8.0	12.0	12.0	83.7
Stationpara	610	18	4	31	15	29.5	6.6	50.8	24.6
Kattoli	431	9	4	23	17	20.9	9.3	53.4	39.4
Harbang	4,287	108	32	206	190	25.2	7.5	48.1	44.3
Purbo Kunakhali	1,686	34	11	36	59	20.2	6.5	21.4	35.0
Maddhya Kunakhali	4,510	114	31	146	149	25.3	6.9	32.4	33.0
Furoti a Khali	3,038	79	13	99	164	26.0	4.3	32.6	54.0
Konakhali	9,234	227	55	281	372	24.6	6.0	30.4	40.3

Appendix G. (contd...)

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Krisnapur	1,499	47	15	64	83	31.4	10.0	42.7	55.4
Chhainama Para	2,617	65	17	81	76	24.8	6.5	31.0	29.0
Dakshin Bahaddarkata	2,377	50	14	112	116	21.0	5.9	47.1	48.8
BM Char	6,493	162	46	257	275	24.9	7.1	39.6	42.4
Chotta Bheola	861	19	3	35	23	22.1	3.5	40.7	26.7
Hasimar Kata	1,006	29	5	26	37	28.8	5.0	25.8	36.8
Hamidullah Sikderpara	795	16	7	29	46	20.1	8.8	36.5	57.9
Dwipkul	976	28	6	29	38	28.7	6.1	29.7	38.9
Baniarkum	1,143	31	9	32	64	27.1	7.9	28.0	56.0
Dakshin Khilsadok	1,806	47	15	57	80	26.0	8.3	31.6	44.3
Kaiarbil	6,587	170	45	208	288	25.8	6.8	31.6	43.7
Kaddachura	1,601	42	9	46	86	26.2	5.6	28.7	53.7
Sikder Para	3,900	93	32	137	173	23.8	8.2	35.1	44.4
Baniarchar	882	31	2	35	28	35.1	2.3	39.7	31.7
Kalagazi Sikderpara	1,317	25	5	45	60	19.0	3.8	34.2	45.6
Mabiar Baper Para	712	17	7	26	33	23.9	9.8	36.5	46.3
Jele Para	619	16	2	9	15	25.8	3.2	14.5	24.2
Purba B. Bheola	9,031	224	57	298	395	24.8	6.3	33.0	43.7
Sharharbil Purba Para	1,161	29	7	58	59	25.0	6.0	50.0	50.8
Shaharbil Paschim Para	1,013	18	5	36	42	17.8	4.9	35.5	41.5
Madrasha Para	488	11	5	31	27	22.5	10.2	63.5	55.3
Maizghona Purba Para	1,411	30	4	28	73	21.3	2.8	19.8	51.7
Shahapura	977	21	7	56	44	21.5	7.2	57.3	45.0
Failla Para	336	15	0	12	24	44.6	0.0	35.7	71.4
Shaharbil	5,386	124	28	221	269	23.0	5.2	41.0	49.9

Appendix G. (contd...)

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Saker Mohammad Char	5,157	143	13	292	213	27.7	2.5	56.6	41.3
Uttar Lotony	1,838	42	8	45	68	22.9	4.4	24.5	37.0
Proper Kakara	2,987	60	21	99	136	20.1	7.0	33.1	45.5
Kakara	9,982	245	42	436	417	24.5	4.2	43.7	41.8
Dakshin Surajpur	1,303	39	6	37	61	29.9	4.6	28.4	46.8
Dakshin Manikpur	2,817	67	16	119	143	23.8	5.7	42.2	50.8
Uttar Manikpur	4,259	103	19	106	193	24.2	4.5	24.9	45.3
Surajpur Manikpur	8,379	209	41	262	397	24.9	4.9	31.3	47.4
Muchar Para	497	9	0	17	29	18.1	0.0	34.2	58.4
Demoshia Bazar Para	1,046	32	5	41	56	30.6	4.8	39.2	53.5
Ammer Dera Para	1,410	36	9	72	69	25.5	6.4	51.1	48.9
Daskhali Para	894	17	2	40	44	19.0	2.2	44.7	49.2
Dhemoshia	3,847	94	16	170	198	24.4	4.2	44.2	51.5
Darbeshkata Manik Para	734	25	4	19	37	34.1	5.4	25.9	50.4
Tekhsira Para	878	14	5	56	34	15.9	5.7	63.8	38.7
Paschim B. Bheola	1,612	39	9	75	71	24.2	5.6	46.5	44.0
All	82,029	2,043	445	3,066	3,611	24.9	5.4	37.4	44.0

APPENDIX H

Percentage of population by age and marital status, Chakaria HDSS, 2013

Age (years)	Married	Divorced	Widower/ Widow	Never married	Population
Male					
10-14	0.0	0.0	0.0	100.0	5,782
15-19	2.9	0.0	0.0	97.1	4,739
20-24	22.0	0.2	0.0	77.9	3,584
25-29	57.6	0.4	0.1	42.0	3,182
30-34	85.4	0.5	0.1	14.0	2,716
35-39	95.6	0.6	0.1	3.8	2,179
40-44	98.1	0.2	0.3	1.5	1,817
45-49	99.0	0.2	0.1	0.8	1,413
50-54	97.0	0.6	1.4	1.0	1,221
55-59	98.2	0.0	1.1	0.7	981
60-64	97.5	0.1	1.4	1.0	877
65-69	95.2	0.2	4.5	0.2	588
70-74	90.9	0.6	7.8	0.8	482
75-79	88.0	1.1	11.0	0.0	258
80-84	82.0	0.5	17.5	0.0	175
85+	68.4	1.4	30.2	0.0	126
All	49.8	0.2	0.7	49.3	30,120
Female					
10-14	0.7	0.0	0.0	99.3	5,515
15-19	24.7	0.3	0.0	75.1	4,557
20-24	73.2	0.8	0.2	25.8	4,249
25-29	90.0	1.6	0.8	7.7	3,595
30-34	93.9	1.3	2.4	2.5	2,899
35-39	91.0	1.8	5.7	1.5	2,061
40-44	88.6	1.6	8.5	1.3	1,644
45-49	81.5	1.5	14.7	2.3	1,389
50-54	75.0	1.1	22.3	1.6	1,291
55-59	65.4	1.6	31.0	2.0	1,003
60-64	51.8	1.6	44.4	2.2	751
65-69	38.9	0.4	59.2	1.6	466
70-74	26.5	0.5	73.1	0.0	409
75-79	16.2	0.9	83.0	0.0	214
80-84	10.1	0.0	89.9	0.0	166
85+	4.4	0.0	95.6	0.0	144
All	56.1	0.9	8.3	34.7	30,353

APPENDIX I

Chakaria HDSS project team, Chakaria HDSS, 2013

Name of Staff	Designation
Dhaka	
Abbas Bhuiya	Project Director
Mohammad Iqbal	Deputy Project Coordinator
SM Manzoor Ahmed Hanifi	Associate Scientist
Sabrina Rasheed	Associate Scientist
Amena Sultana	Research Officer
Mohammad Nahid Mia	Research Officer
Md. Kashem Iqbal	Office Manager
Chakaria	
Shahidul Hoque	Field Research Manager
Mijanur Rahaman	Senior Field Research Officer
Ashish Paul	Data Management Officer
Md. Sharif -Al Hasan	Field Research Officer
Md. Rehmat Ali	Senior Field Assistant
Armanul Maowa	Surveillance Worker (Rural)
Papi Prova Das	Surveillance Worker (Rural)
Fatema Johura Surma	Surveillance Worker (Rural)
Fatema Zannat	Surveillance Worker (Rural)
Jannatul Bakea Rima	Surveillance Worker (Rural)
Sharmin Akter	Surveillance Worker (Rural)
Ismat Jahan Khuki	Surveillance Worker (Rural)
Kawsar Jannat	Surveillance Worker (Rural)
Jesmin Jannat Rano	Surveillance Worker (Rural)
Kulsuma Aktar	Surveillance Worker (Rural)
Mina Dhar	Surveillance Worker (Rural)
Dezi Akter	Surveillance Worker (Rural)
Monuara Begum	Surveillance Worker (Rural)
Nazma Akter	Surveillance Worker (Rural)
Merina Jannat Resmi	Surveillance Worker (Rural)
Riasmin Zannat	Surveillance Worker (Rural)
Rosan Ara	Surveillance Worker (Rural)
Jesmin Jannat	Surveillance Worker (Rural)
Tanjina Zannat Ara	Surveillance Worker (Rural)
Zannatul Ferdous	Surveillance Worker (Rural)
Zosna Begum	Surveillance Worker (Rural)
Jannatul Mowa	Surveillance Worker (Rural)
Tunajjina Alam	Surveillance Worker (Rural)
Kawkaba Zannat	Surveillance Worker (Rural)
HDSS = Health and Demographic Surveillance System.	

