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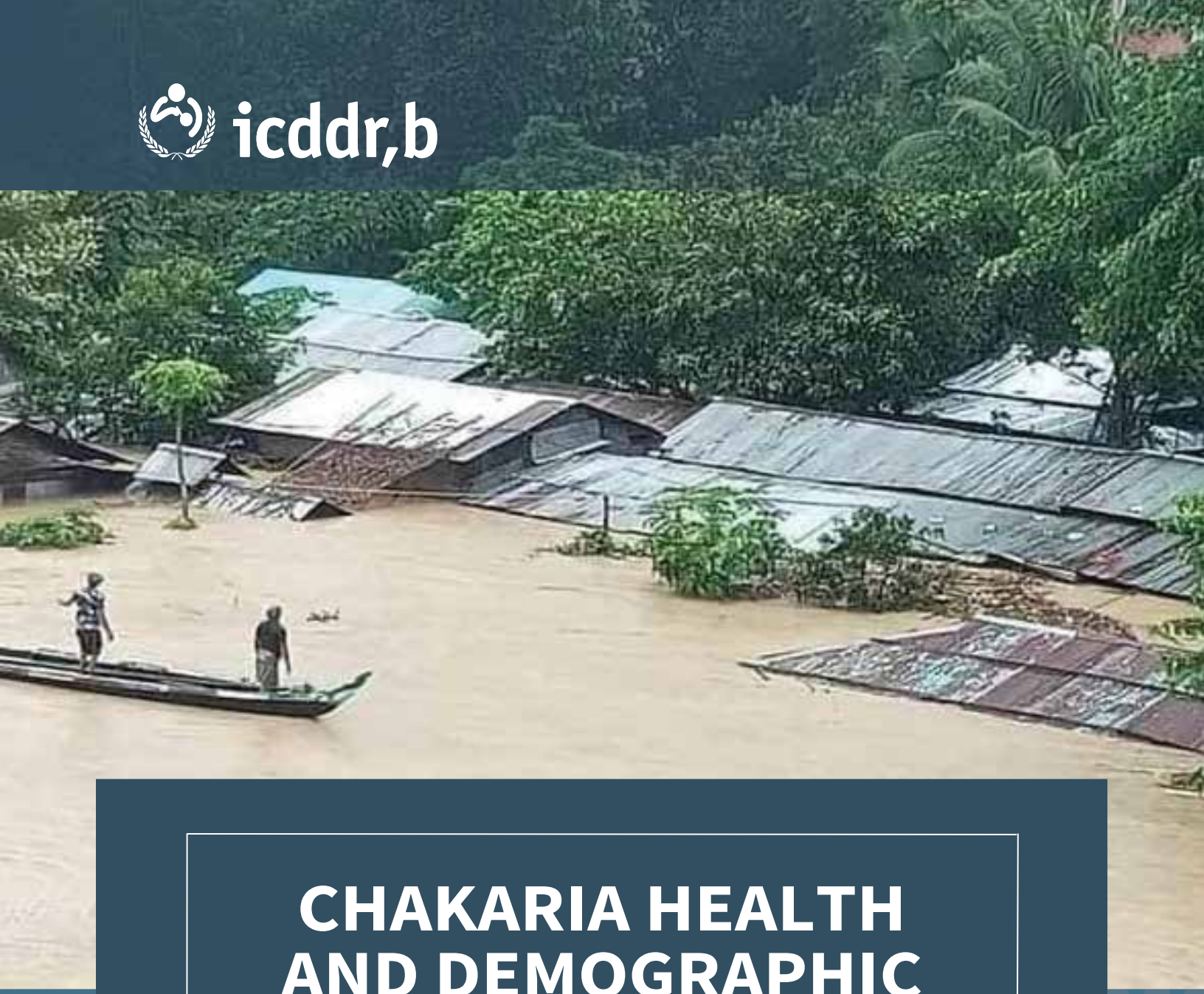

CHAKARIA HEALTH AND DEMOGRAPHIC SURVEILLANCE SYSTEM

2021

FOCUSING ON

CLIMATE CHANGE AND HEALTH

SCIENTIFIC REPORT NO. 149

CHAKARIA HEALTH AND DEMOGRAPHIC SURVEILLANCE SYSTEM 2021

Focusing on Climate Change and Health

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Cover page: Flood-stricken Chakaria HDSS area

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
CI	Concentration Index
CMH	Christian Memorial Hospital
CSBA	Community Skilled Birth Attendant
EPR	Employment-to-Population Ratio
FDSR	Family Development Services and Research
FWV	Family Welfare Visitor
GAC	Global Affairs Canada
GIS	Geographic Information System
HIV	Human Immunodeficiency Virus
HDSS	Health and Demographic Surveillance System
INDEPTH	International Network of field sites with Continuous Demographic Evaluation of Population and Their Health in Developing Countries
MDG	Millennium Development Goals
NGO	Non-Government Organization
PNC	Postnatal Care
SACMO	Sub-Assistant Community Medical Officer
SBA	Skilled Birth Attendant
SDG	Sustainable Development Goals
Sida	Swedish International Development Cooperation Agency
SMAM	Singulate Mean Age at Marriage
SW	Surveillance Worker
TBA	Traditional Birth Attendant
TFR	Total Fertility Rate
UHFWC	Union Health and Family Welfare Centre
UKAid	Foreign, Commonwealth and Development Office, UK
VHP	Village Health Post
WHO	World Health Organization

CONTENTS

TABLES

FIGURES

APPENDICES

CHAPTER 1

Introduction

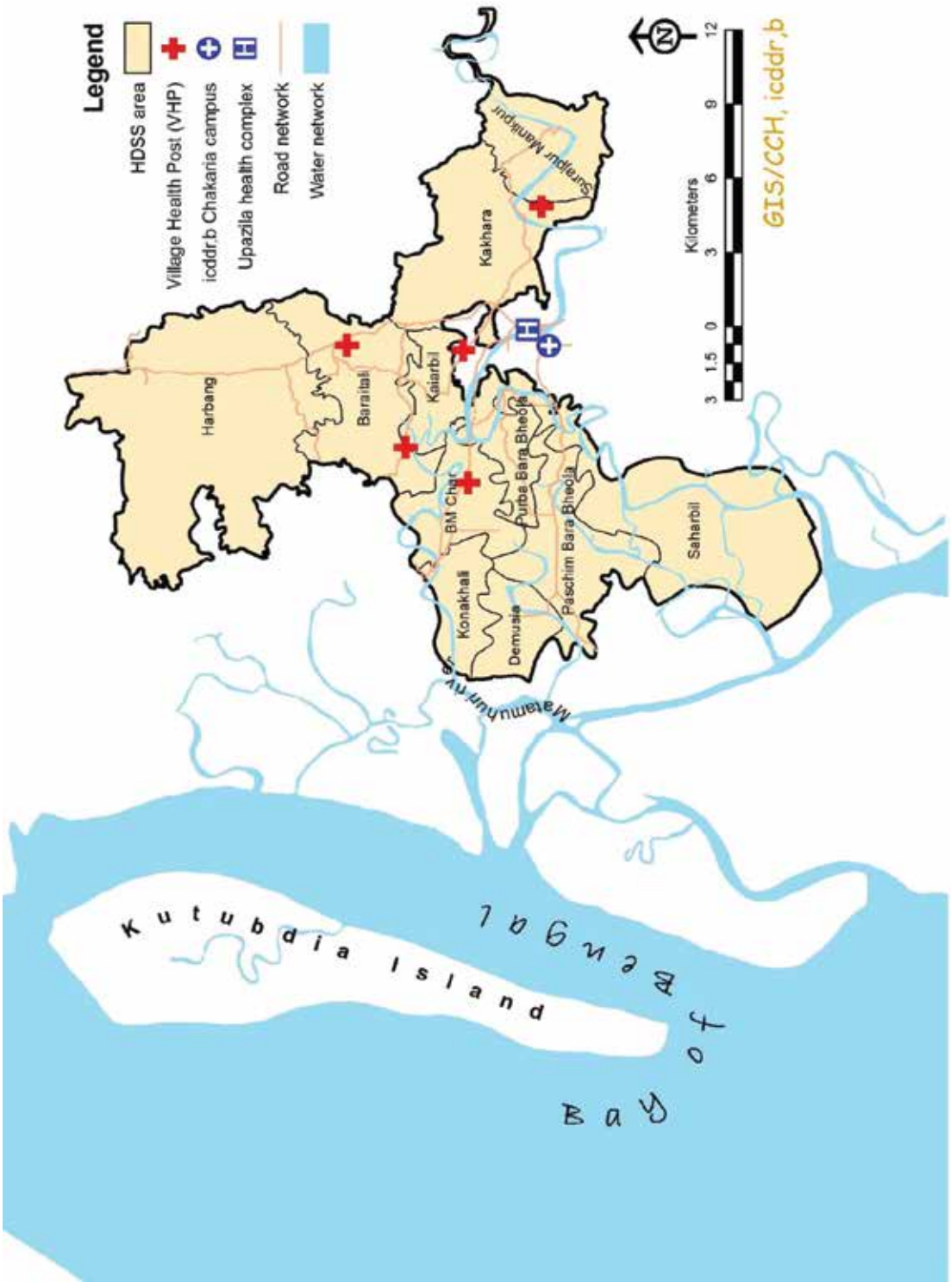
Chakaria is one of the 492 Upazilas (sub-district) in Bangladesh, located between latitudes 21°34' and 21°55' north and longitudes 91°54' and 92°13' east in the southeastern coast of the Bay of Bengal. Administratively, it is under Cox's Bazar district with an estimated population of 5,89,811* in 2021. The highway from Chattogram to Cox's Bazar passes through Chakaria. The eastern side of Chakaria is hilly, while on the western side, towards the Bay of Bengal is lowland. A map showing the location of Chakaria HDSS area is presented in Figure 1.

icddr,b started its activities in Chakaria in 1994. The focus of the activities has been on facilitating local initiatives to improve the health of the villagers, specifically children, women, and the poor. Thus, project activities have been conducted with participatory approach emphasizing empowerment by raising awareness about health, encouraging positive preventive behavior through health education, and providing technical assistance to any health initiatives led by the village-based indigenous self-help organizations. Some major initiatives taken by the villagers included health needs assessment, defining actions for health, implementing them, and monitoring both their implementation and outputs. Among the health-related activities, identifying volunteers for health education, mobilizing local resources to establish village health posts (VHP) and their management, introducing a pre-paid family health card, and establishing 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 currently available in the surveillance area are presented in the box on the following page. Collection of data from households on a quarterly basis, referred hitherto as Chakaria Health and Demographic Surveillance System (Chakaria HDSS), has been initiated in the area in 1999. The primary purpose of this surveillance system is to monitor the impact of interventions with a focus on equity and to generate relevant health, demographic and socioeconomic information for policies and programmes, and further research. Also, Chakaria HDSS monitors 23 SDG indicators using its longitudinal data. This report presents data collected through the Chakaria HDSS during 2021.

*Estimated population based on Census 2011, Bangladesh Bureau of Statistics (BBS), SID, Ministry of Planning, Government of the People's Republic of Bangladesh, December 2013.

Existing health services in Chakaria HDSS area, 2021	
Healthcare facility/provider	**Number**
icddr,b facilitated and Community initiated	
Village health post	5
Trained midwife	12
Physician	1
Male paramedic	10
Medical assistant	2
Government	
Union Health and Family Welfare Centre (UHFWC)	11
EPI outreach centre	264
Physician	0
Family Welfare Visitor (FWV)	5
Sub-Assistant Community Medical Officer (SACMO)/Medical assistant	4
Family Welfare Assistant (Community skilled birth attendant)	20
Community Clinics	24
Community Healthcare Provider	24
Private	
Village doctor (allopathic)	241
Village doctor (homeopathic)	102
Allopathic pharmacy	177
Homeopathic pharmacy	15
Diagnostic centre	4
NGO	
Health and development activities	5
Paramedic	4
Health worker	30
Outdoor Hospital (Christian Memorial & Hope Foundation)	2

Figure 1. Map of Chakaria HDSS area



CHAPTER 2

Methods and Materials

The Chakaria HDSS covers 11 unions, namely Baraitali, Kaiyarbil, Bheola Manik Char, Paschim Bara Bheola, Saharbil, Kakhara, Harbang, Purba Bara Bheola, Surajpur Manikpur, Konakhali, and Demusia. In 1999, 1,66,405 people were living in 26,979 households. A household is defined as a blood or otherwise related group of members and unrelated individuals living in the same compound at least once a month and sharing food from the same kitchen. A household member is considered to have migrated out if they have left the household and do not intend to come back within six months since they left. A person is considered to have migrated in if they were not previously listed as a household member and intend to live in the household at least once 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, systematically collected from 7,042 households randomly chosen from a total of 26,979 households. Data have been collected through quarterly visits by a team of surveillance workers (SWs) supervised by two supervisors. Prior to 2011, a typical day for an SW involved receiving a list of assigned households by the supervisors from office, traveling to respondents' households, updating the events and returning the collected data sheets to the office. This method of data collection and data management required a significant amount of time and money, involving daily travel to the households by SWs. data collection system was modified in 2011. The modification involved choosing 49 villages randomly from a total of 183. The 49 villages were divided into 13 work areas, and 13 SWs residing in each of the work areas were recruited for data collection. Most of the households included in the system prior to this modification were also included in the new system. The modification of the system 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 surveillance system includes complete villages (3). Currently, surveillance covers 89,633 individuals (17,955 households). From the beginning of 2015, the data collection process was shifted from paper-based to a web-based system. A web-based software application was designed and developed. 14 tabs (smartphones) are connected with mobile internet through mobile operator network. The SWs collect data using these devices, and data are stored directly in a database in the central server.

One supervisor had been assigned to supervise the data-collection process. To detect any anomalies, a team of four independent interviewers re-visited 5% of the households, chosen randomly, within 2 days of the SWs' visit. Afterward, the supervisor and the relevant field workers jointly resolved any inconsistencies in the collected data. All the filled-up questionnaires were electronically checked within the database to ensure completeness and resolve 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 asset list of individual households is updated annually from the household head, their spouses or any other adult member. The list includes almirah, table/chair, chowki/khat, television, cycle, motorcycle, fridge, sofa, electric fan, sewing machine, telephone, electricity, showcase, and watch/clock. The principal component analytical technique was used for calculating household asset index scores (4). Major demographic indicators and safe motherhood practices have been tabulated across various asset quintiles.

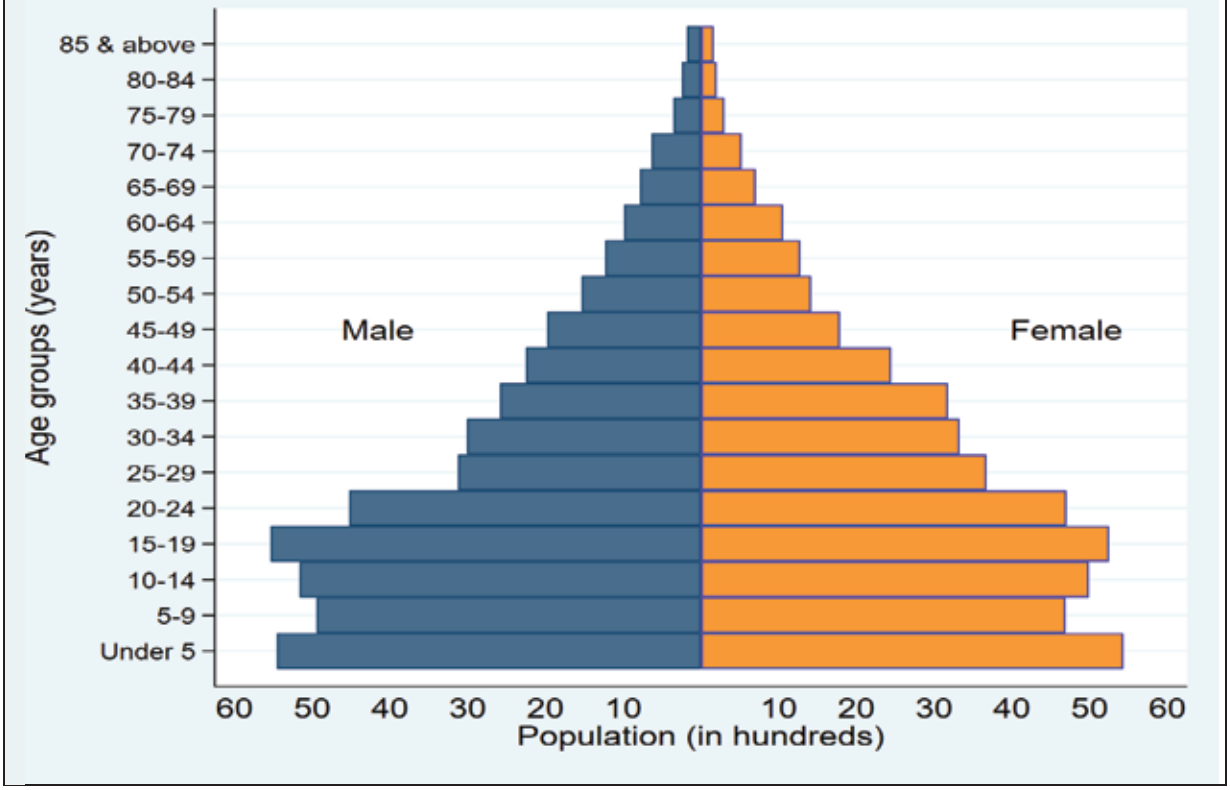
It is worth mentioning that the number of observations in the tables presented in this report may differ in some instances due to missing information for certain variables.

CHAPTER 3

Population and Population Changes

The population pyramid based on the population of Chakaria HDSS area in 2021 is presented in Figure 2. The shape of the pyramid is typical of a developing country with declining rates of mortality and fertility. The population sex ratio (male per 100 females) was 98.7 in 2021. The age dependency ratio[1] was 63.4% in 2021 (see Appendix A).

Figure 2. Male and female population by age, Chakaria HDSS, 2021



[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).

CHAPTER 4

Mortality

Crude death rates and age-specific mortality rates by sex are presented in Table 1. The crude death rate was 6.0 per 1,000 population in 2021. The infant mortality rate was 37.1 per 1,000 live births. The child mortality rate was 2.0 per 1,000 children aged 1-4 years (Table 1).

Abridged Life Table for males and females are presented in Table 2. Life expectancy at birth was about 69 years for males and 71 years for females. Figure 3 shows the probability of survival by sex for various age groups. The survivorship curve for males lies closely beneath that for females from early on and remains lower; however, after the age of 70 the female survivorship curve goes down faster and the gap between the two curve decreases. The rate of mortality of children aged less than 5 years (under-five mortality) was 43.9 per 1,000 live births in Chakaria HDSS in 2021 (Table 3).

Table 1. Age-specific death rate per 1,000 population by sex, Chakaria HDSS, 2021

Age (years)	No. of death			Death Rate		
	Male	Female	Both	Male	Female	Both
<1 year*	54	39	93	44.1	30.5	37.1
<1 month	49	29	78	40.0	22.7	31.2
1-11 month	5	10	15	4.1	7.8	6.0
1-4	11	6	17	2.6	1.4	2.0
5-9	4	4	8	0.8	0.9	0.8
10-14	5	2	7	1.0	0.4	0.7
15-19	5	4	9	0.9	0.8	0.8
20-24	5	3	8	1.1	0.6	0.9
25-29	2	3	5	0.6	0.8	0.7
30-34	5	4	9	1.7	1.2	1.4
35-39	1	6	7	0.4	1.9	1.2
40-44	8	10	18	3.6	4.1	3.8
45-49	8	10	18	4.0	5.6	4.8
50-54	15	12	27	9.8	8.5	9.1
55-59	14	15	29	11.4	11.7	11.6
60-64	18	23	41	18.2	21.8	20.0
65-69	36	15	51	45.9	21.3	34.3
70-74	28	27	55	44.1	51.8	47.6
75-79	30	17	47	85.2	56.3	71.9
80-84	15	16	31	61.2	80.0	69.7
85+	32	24	56	177.8	147.2	163.3
All	**296**	**240**	**536**	**6.6**	**5.3**	**6.0**

*Per 1,000 live births

Table 2. Abridged Life Table, Chakaria HDSS, 2021

Age (years)	Male					Female				
	$_nm_x$	$_nq_x$	l_x	$_nL_x$	e_x	$_nm_x$	$_nq_x$	l_x	$_nL_x$	e_x
0	0.0462	0.0443	100,000	96,009	68.8	0.0322	0.0313	100,000	97,181	71.3
1	0.0026	0.0102	95,565	380,308	71.0	0.0014	0.0057	96,868	386,373	72.6
5	0.0008	0.0040	94,589	471,990	67.7	0.0009	0.0043	96,319	480,568	69.0
10	0.0010	0.0048	94,207	469,898	62.9	0.0004	0.0020	95,909	479,063	64.2
15	0.0009	0.0045	93,752	467,704	58.2	0.0008	0.0038	95,717	477,673	59.4
20	0.0011	0.0055	93,329	465,362	53.5	0.0006	0.0032	95,353	476,004	54.6
25	0.0006	0.0032	92,815	463,334	48.8	0.0008	0.0041	95,049	474,276	49.7
30	0.0017	0.0083	92,519	460,681	43.9	0.0012	0.0060	94,661	471,888	44.9
35	0.0004	0.0019	91,754	458,325	39.3	0.0019	0.0094	94,094	468,259	40.2
40	0.0036	0.0176	91,576	453,849	34.3	0.0041	0.0202	93,210	461,335	35.6
45	0.0040	0.0200	89,963	445,311	29.9	0.0056	0.0276	91,324	450,322	31.2
50	0.0098	0.0477	88,161	430,294	25.5	0.0085	0.0414	88,804	434,823	27.1
55	0.0114	0.0553	83,956	408,177	21.6	0.0117	0.0570	85,125	413,490	23.1
60	0.0182	0.0870	79,314	379,313	17.7	0.0218	0.1033	80,271	380,632	19.4
65	0.0459	0.2059	72,411	324,771	14.2	0.0213	0.1010	71,981	341,729	16.3
70	0.0441	0.1986	57,498	258,944	12.2	0.0518	0.2294	64,710	286,441	12.9
75	0.0852	0.3513	46,080	189,931	9.6	0.0563	0.2467	49,866	218,571	10.9
80	0.0612	0.2655	29,893	129,622	8.5	0.0800	0.3333	37,562	156,510	8.7
85+	0.1778	1.0000	21,956	123,505	5.6	0.1472	1.0000	25,042	170,074	6.8

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

$_nm_x$ = Central mortality rate

$_nq_x$ = Probability of dying between the ages x and x+n;

$_nq_x$ = $_nm_x/[(1/n) + {}_nm_x\{1/2+n/12({}_nm_x-\log_e c)\}]$;

$\log_e c=.095$

l_x = Survivors to exact age x = $(1- {}_nq_{x-n})\, l_{x-n}$

$_nL_x$ = 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 = T_x / l_x where, $T_x = \sum L_Y$

Figure 3. Probability of survival by age and sex, Chakaria HDSS, 2021

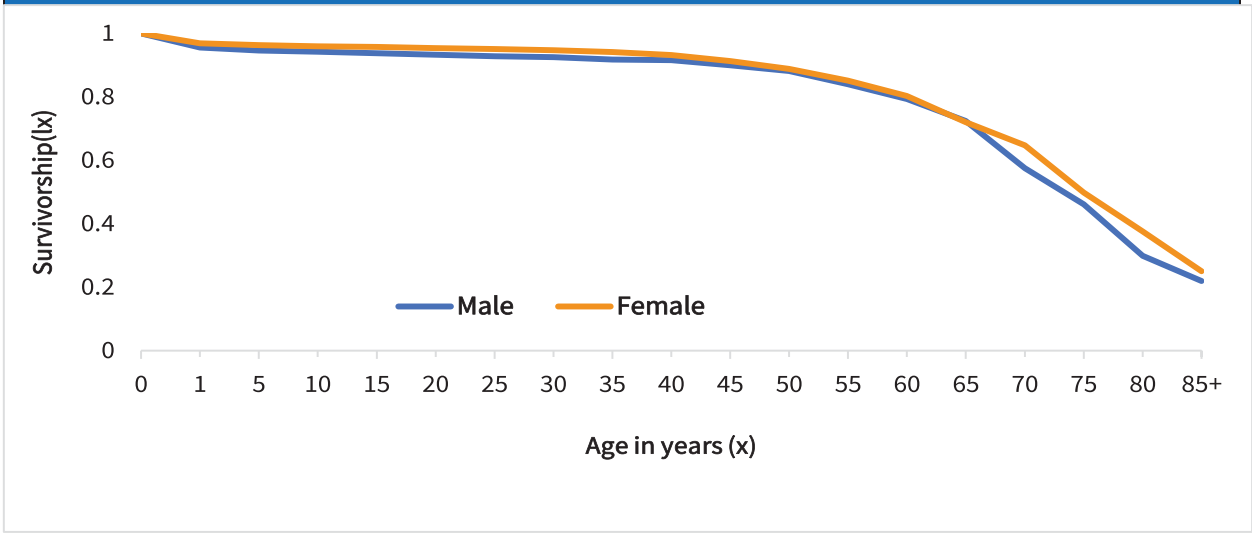
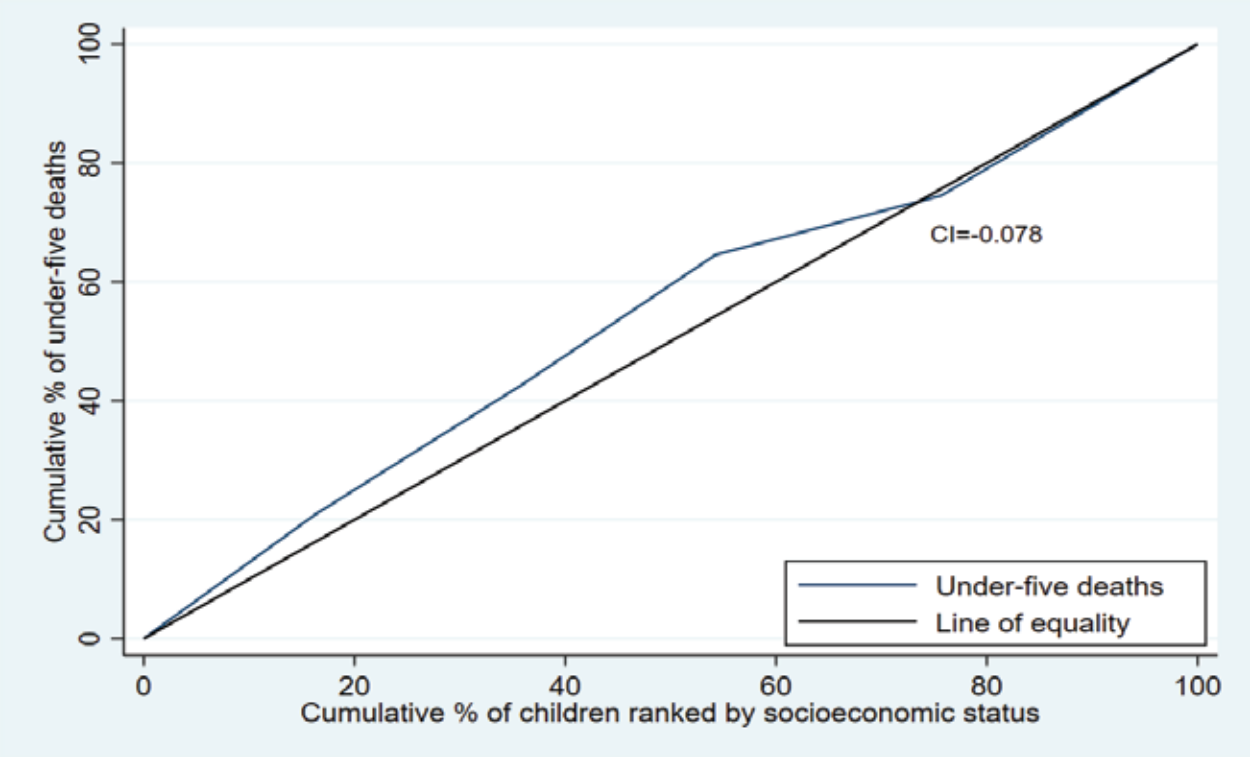


Table 3 presents the under-five mortality rate by household asset quintile. The under-five mortality rate was highest in the lowest asset quintile and lowest in the fourth asset quintile. The under-five mortality rate was higher among the boys compared to the girls. The concentration curve for under-five mortality is presented in Figure 4. The curve lies above the line of equality up to the middle quintile and then drops beneath the line of equality for the highest two quintiles, and the concentration index for the area was negative. These findings indicate that under-five deaths are concentrated among the poorer segment of the population.

Table 3. Under-five mortality rate per 1,000 live births by asset quintile and sex,Chakaria HDSS, 2021

Asset quintile	No. of births			No. of under-five deaths			Under-five mortality rate		
	Boy	Girl	Both	Boy	Girl	Both	Boy	Girl	Both
Lowest	221	187	408	18	5	23	81.4	26.7	56.4
Second	241	250	491	12	12	24	49.8	48.0	48.9
Middle	209	250	459	10	14	24	47.8	56.0	52.3
Fourth	259	278	537	8	3	11	30.9	10.8	20.5
Highest	295	314	609	17	11	28	57.6	35.0	46.0
All	1,225	1,279	2,504	65	45	110	53.1	35.2	43.9

Figure 4. Concentration curve for under-five mortality, Chakaria HDSS, 2021



CI=Concentration Index[2]

Causes of death

Verbal Autopsy (VA) 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 using a structured VA questionnaire which was developed by WHO and modified in 2016 (5). A trained medical assistant analyzed the information available against each case of death and ascertained the causes of death as per International Classification of Diseases (10th Revision). A total of 536 deaths were registered in 2021.

Broad pattern of the causes of death

Non-communicable conditions were the leading cause of death for both males and females (62%). This was followed by maternal and neonatal condition (male-16%, female-15%) and

[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 is distributed in favour of the poor (6). A value of zero indicates no relation between health and socioeconomic status (7).

trauma (male-10%, female-6%), and communicable diseases (male-10%, female-12%). For trauma, the proportion of deaths was higher for males than for females (Figure 5). Neonatal conditions were the leading causes of death in <15 years children and non-communicable diseases were the leading causes of death for adults and elderly people (Table 4).

Figure 5. Distribution of deaths by leading causes for males and females, Chakaria HDSS, 2021

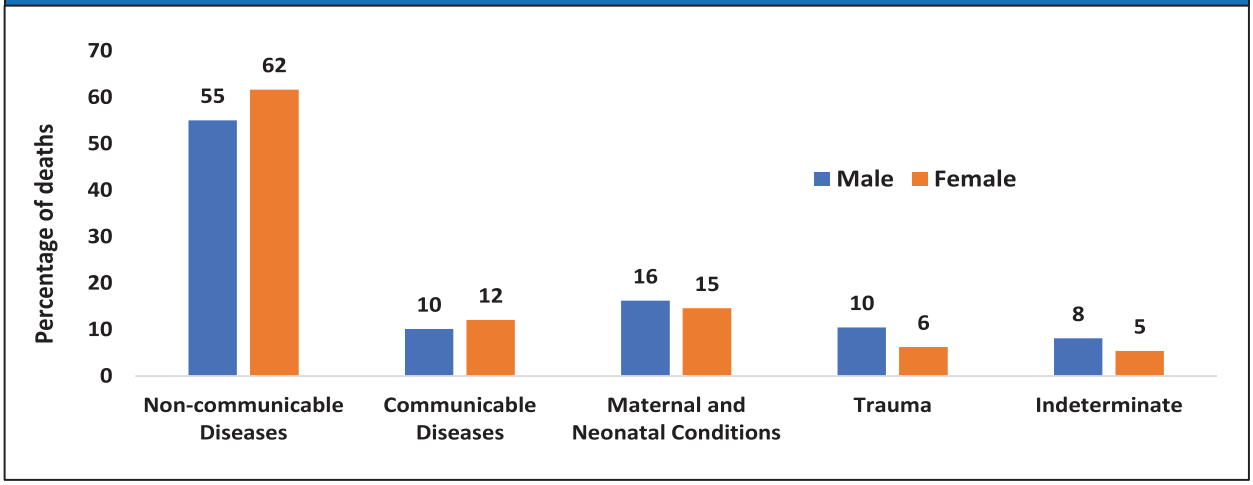


Table 4. Distribution of deaths by leading causes according to age groups, Chakaria HDSS, 2021

Cause group	Children (<15 years) (%)	Adults (15-49 years) (%)	Elderly (50+ years) (%)
Communicable Diseases	13.6	16.2	8.9
Non-communicable Diseases	3.2	52.7	79.5
Maternal and Neonatal Conditions	60.8	8.1	0.3
Trauma	16.8	18.9	3.3
Indeterminate	5.6	4.1	8.0
Total	100	100	100

The leading causes of death for all ages in 2021 were stroke, other forms of heart diseases, malignant neoplasm, ischemic heart diseases, chronic obstructive pulmonary disease (COPD), COVID-19, respiratory infections, birth asphyxia, all other neonatal conditions, and drowning. Table 5 presents the distribution of causes of death for males and females.

Table 5. Distribution of causes of death among males and females, Chakaria HDSS, 2021			
Cause	Male (n=296)	Female (n=240)	Both (n=536)
Diarrhoea	1.0	2.5	1.7
Tuberculosis	2.4	0.0	1.3
Respiratory Infections	3.0	3.8	3.4
Septicaemia	0.7	0.0	0.4
COVID-19	3.0	5.0	3.9
All Other Communicable Disease	0.0	0.8	0.4
Maternal Deaths	0.0	2.5	1.1
Premature and Low Birth Weight	4.1	1.7	3.0
Birth Asphyxia	4.4	2.1	3.4
Neonatal Sepsis	2.7	0.4	1.7
Cerebral Ischaemia (HIE)	1.4	1.3	1.3
All Other Neonatal Conditions	3.0	3.8	3.4
Nutritional Deficiencies	0.3	0.4	0.4
Congenital Malformation	0.3	2.5	1.3
Malignant neoplasm	8.8	7.9	8.4
Malignant neoplasms of female	0.0	0.8	0.4
Diabetes	2.0	2.5	2.2
Neuro-pschiatric	0.3	0.8	0.6
Hypertensive Diseases	1.7	2.5	2.1
Ischaemic Heart Diseases	9.5	7.1	8.4
Stroke	12.2	15.8	13.8
Other forms of heart disease	7.4	10.4	8.8
All Other Circulatory System Diseases	2.0	3.8	2.8
COPD	7.1	5.8	6.5
Asthma	0.3	0.0	0.2
All Other Respiratory Diseases	0.0	0.4	0.2
Digestive Diseases	1.7	2.1	1.9
Renal Failure	1.4	1.3	1.3
Nephritic Syndrome	0.3	0.0	0.2
Other Urinary	0.3	0.0	0.2
All Other Non-Communicable Diseases	0.0	0.4	0.2
Transport Accidents	2.0	1.7	1.9
Falls	0.3	0.8	0.6
Drowning	4.7	1.7	3.4
Poisoning	0.3	0.0	0.2
All Other External Causes of Accidental Injury	2.0	0.4	1.3
Suicide	0.0	1.3	0.6
Homicide	1.0	0.0	0.6
All Other External Causes of Mortality	0.0	0.4	0.2
Fever of unknown Origin	1.7	1.7	1.7
Sudden Infant Death	0.0	0.4	0.2
All Other Unknown and Unspecified Causes	6.4	3.3	5.0
All	**100**	**100**	**100**

CHAPTER 5

Fertility

The crude birth rate in 2021 was 27.9 per 1,000 population, which was slightly higher than the rate in 2020 (27.7 per 1,000 population) (Table 20). The fertility rate was highest among women aged 20-24 years (Table 6). The total fertility rate (TFR) in 2021 was 3.1 per woman, which was higher than that of 2020 (2.8 per woman).

Table 6. Age-specific fertility rate per 1,000 women aged 15-49 years, Chakaria HDSS, 2021

Age (years)	No. of females	No. of births			Birth rate
		Male	Female	Both	
15-19	5249	163	156	319	60.8
20-24	4701	403	460	863	183.6
25-29	3672	308	325	633	172.4
30-34	3327	230	218	448	134.7
35-39	3177	103	108	211	66.4
40-44	2447	15	10	25	10.2
45-49	1787	2	1	3	1.7
All	24360	1,225	1,279	2,504	-
TFR (15-49)					3.1
TFR=Total fertility rate expressed per 1000 woman					

Table 7 presents crude birth rates by household asset quintiles. The crude birth rate for both sexes was lowest among the second quintile.

Table 7. Crude birth rate per 1,000 population by asset quintile and sex, Chakaria HDSS, 2021

Asset quintile	Midyear population			No. of births			Birth rate		
	Male	Female	Both	Boy	Girl	Both	Boy	Girl	Both
Lowest	7,656	7,803	15,459	221	187	408	28.9	24.0	26.4
Second	9,549	9,505	19,054	241	250	491	25.2	26.3	25.8
Middle	7,992	8,077	16,069	209	250	459	26.2	31.0	28.6
Fourth	9,438	9,355	18,793	259	278	537	27.4	29.7	28.6
Highest	9,884	10,374	20,258	295	314	609	29.8	30.3	30.1
All	44,519	45,114	89,633	1,225	1,279	2,504	27.5	28.4	27.9

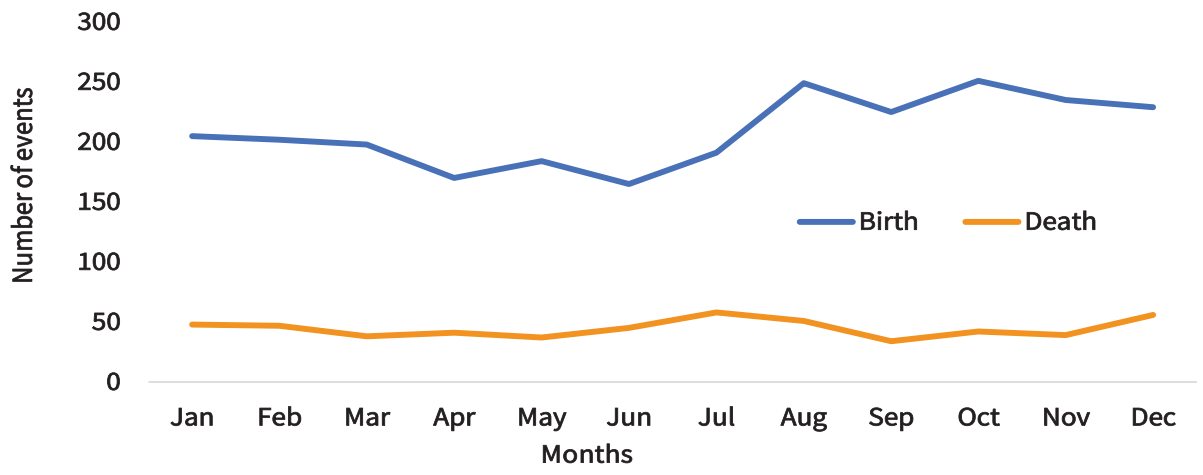
Of the 2,950 pregnancy outcomes in 2021, 84.0% ended with live births. Among the remaining 16.0%, 11.0 percentage points were spontaneous abortions, 2.2 percentage points were induced abortions, and 2.8 percentage points resulted in stillbirths (Table 8).

Table 8. Pregnancy outcome, Chakaria HDSS, 2021

Pregnancy outcome	No.	%
Spontaneous abortion	325	11.0
Induced abortion	66	2.2
Stillbirth	82	2.8
Live birth*	2477	84.0
Total number of pregnancies	2950	100.0

*For any multiple birth pregnancy, the outcome is recorded as live birth if at least one of the issues is live born. Twenty-six (Two live births-24 and three live births-2) multiple live births were recorded.

Figure 6. Number of births and deaths by month, Chakaria HDSS, 2021



The distribution of births and deaths by month is shown in Figure 6. There is no apparent seasonality in the death pattern, but in case of birth, some seasonality was observed with a rise in birth rate between August and December.

CHAPTER 6

Migration

In 2021, the out-migration rate was slightly higher at 45.4 than in-migration rate at 44.6, per 1,000 population (Table 9). The rates were higher for both out-migration and in-migration compared to those in 2020 (Table 20). Monthly data on migration are presented in Table 10. Data showed that the number of in-migrants was lower than that of out-migrants during 2021. The sex differential in both types of migrations was prominent. The number of in-migration and the number of out-migration was highest in January for both males and females.

Table 9. Migration rate per 1,000 population by asset quintile and sex, Chakaria HDSS, 2021

Asset quintile	Midyear population			In-migration number			Out-migration number		
	Male	Female	Both	Male	Female	Both	Male	Female	Both
Lowest	7656	7803	15459	49.0	63.8	56.5	53.0	67.7	60.4
Second	9549	9505	19054	29.1	46.0	37.5	29.2	51.0	40.1
Middle	7992	8077	16069	26.3	43.8	35.1	30.9	49.5	40.3
Fourth	9438	9355	18793	27.1	56.1	41.6	34.5	52.0	43.2
Highest	9884	10374	20258	39.1	65.2	52.4	36.6	52.6	44.8
All	44519	45114	89633	33.8	55.2	44.6	36.4	54.2	45.4

Table 10. Number of migrants by sex and month, Chakaria HDSS, 2021

Month	In-migration number			Out-migration number		
	Male	Female	Both	Male	Female	Both
January	246	312	558	180	252	432
February	144	205	349	161	195	356
March	188	269	457	179	247	426
April	109	176	285	131	158	289
May	69	143	212	93	181	274
June	130	226	356	122	196	318
July	97	200	297	136	226	362
August	114	193	307	91	160	251
September	110	182	292	104	190	294
October	103	210	313	136	222	358
November	100	196	296	102	170	272
December	95	178	273	185	248	433
All	1505	2490	3995	1620	2445	4065

Origin and destination of migrants

In 2021, 17.1% of 1,505 male in-migrants moved into Chakaria HDSS households from abroad, whereas 26.4% of 1,620 male out-migrants moved out of Bangladesh from the Chakaria HDSS area (Table 11). International in and out migration by females was negligible. Around 79.1% of the in-migrations within Bangladesh originated from the Cox's Bazar district, and 84.6% out-migrations were destined for Cox's Bazar. Among all in-migrations and out-migrations within Chakaria upazila in 2021, 37.8% originated from and 51.8% were destined outside the HDSS area.

Table 11. Origin and destination of migrants by sex, Chakaria HDSS, 2021

Origin of destination	In-migration			Out-migration number		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Inside Bangladesh	82.9	99.2	93.0	73.6	99.4	89.2
Outside Bangladesh	17.1	0.8	7.0	26.4	0.6	10.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	1505	2490	3995	1620	2445	4065
Cox's Bazar District						
Inside Bangladesh	78.9	79.3	79.1	84.2	84.8	84.6
Outside Bangladesh	21.1	20.7	20.9	15.8	15.2	15.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	866	1895	2761	1065	2220	3285
Chakaria Upazila						
Inside HDSS area	61.5	62.6	62.2	42.8	50.7	48.2
Outside HDSS area	38.5	37.4	37.8	57.2	49.3	51.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	683	1502	2185	897	1882	2779

Reasons for migration

Table 12 presents the reasons for migration by sex. Forty-nine percent of the migrants moved out due to family-related issues, followed by housing (10.1%), work (30.5%), and education (5.7%). The reasons for moving out for males were different from those of females. Fourteen percent of male out-migrants moved due to housing-related issues whereas only 7.6% of the females moved due to that reason. On the other hand, 67.7% of female in-migrants moved due to family-related issues - mostly marriage, while 29.0% of males moved in due to family-related reasons (Table 12). The reasons of movement for out-migration were similar to the reasons for in-migration. Migration due to COVID-19 was found to be decreased in 2021, which accounted for 1.2% of male in-migrations and 0.2% of female in-migrations (9.4% of male in-migrations and 2.1% of female in-migrations in 2020).

Table 12. Reasons for migration, Chakaria HDSS, 2021

Reasons for migration	In-migration			Out-migration number		
	Male (%)	Female (%)	Both (%)	Male (%)	Female (%)	Both (%)
Family-related	29.0	67.7	53.1	22.8	65.9	48.8
Work/business-related	47.0	17.2	28.4	51.4	16.7	30.5
Housing-related	12.0	7.7	9.3	14.0	7.6	10.1
Education-related	6.6	4.3	5.2	6.9	5.0	5.7
Due to COVID-19 pandemic	1.2	0.2	0.6	0.1	0.0	0.1
Other reasons	4.1	2.9	3.4	4.9	4.7	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0
Total no. of migrants	1505	2490	3995	1620	2445	4065

CHAPTER 7

Marriage

In total 3,033 marriages took place in the surveillance villages in Chakaria in 2021 and the crude marriage rate was 43.9 per 1,000 population, with the rate among females being almost twice as much the rate among males. Among males, the highest marriage rate was found in the age group of 25-29 years and in the age group of 15-19 years for females. Throughout 2021, 163 divorces were registered in the Chakaria HDSS area, and the crude divorce rate was 2.4 per 1,000 population with rates being higher for females than for males (Table 13). The highest number of marriages took place in March and the lowest in May (Figure 7).

Table 13. Crude rate of marriage and divorce by age and sex, Chakaria HDSS, 2021

Age (years)	Marriage			Divorce		
	Male	Female	Both	Male	Female	Both
10-14	0.0	11.6	5.7	0.0	0.0	0.0
15-19	19.7	207.8	111.3	0.4	5.1	2.7
20-24	67.9	131.9	100.5	1.8	9.4	5.6
25-29	90.6	40.0	63.3	2.9	5.4	4.3
30-34	72.7	15.3	42.6	6.3	3.3	4.7
35-39	21.7	7.2	13.7	3.1	1.3	2.1
40-44	6.7	4.5	5.5	1.3	0.4	0.9
45-49	5.1	1.7	3.5	1.0	0.0	0.5
50-54	3.9	1.4	2.7	0.7	0.0	0.3
55-59	5.7	1.6	3.6	0.8	0.8	0.8
60-64	3.0	0.9	2.0	1.0	0.0	0.5
65+	4.1	0.0	2.2	0.5	0.0	0.2
All	30.0	57.4	43.9	1.6	3.1	2.4

Figure 7. Number of marriages by month, Chakaria HDSS, 2021

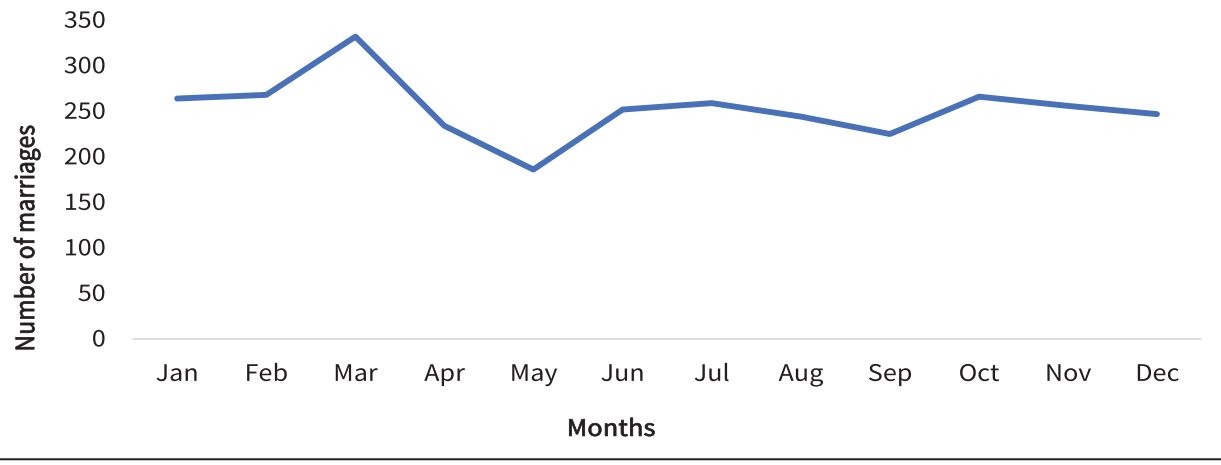


Table 14 presents singulate mean age at marriage (SMAM), and mean and median ages at first marriage. The SMAM, mean and median ages at first marriage for males were 28.3 years, 26.3 years, and 28.1 years respectively. For females, the mean and median ages at first marriage were 19.9 and 21.4 years, and the SMAM was 22.1 years. The SMAM, mean and median ages at first marriage increased slightly for both males and females compared to those in 2020. All indicators for males and females were almost positively associated with household socioeconomic status (Table 14).

Table 14. Age at marriage by sex and asset quintile, Chakaria HDSS, 2021

Asset quintile	Male			Female		
	SMAM*	Mean age at first marriage	Median age at first marriage*	SMAM*	Mean age at first marriage	Median age at first marriage*
Lowest	25.3	24.0	25.1	21.3	18.6	20.7
Second	26.8	24.1	26.3	21.3	19.6	20.7
Middle	27.9	25.0	27.4	21.8	19.7	21.2
Fourth	29.2	26.6	29.2	22.4	19.9	21.7
Highest	31.0	28.5	31.0	22.7	20.8	21.5
All	28.3	26.3	28.1	22.1	19.9	21.4

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.

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, delivery services, and postnatal care) provided by the trained midwives from village health posts, established and managed by the villagers since the late nineties. Apart from this, the physicians and the paramedics employed by icddr,b also provided healthcare services to the villagers from these VHPs. Government trained Community Skilled Birth Attendants (CSBAs) provide safe motherhood services at Union Health and Family Welfare Centres (UHFWCs), community clinics and at domiciliary level.

At present, the government Upazila Health Complex and 10 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 healthcare services. The Family Development Services and Research (FDSR), an NGO also provides healthcare services in Chakaria surveillance area.

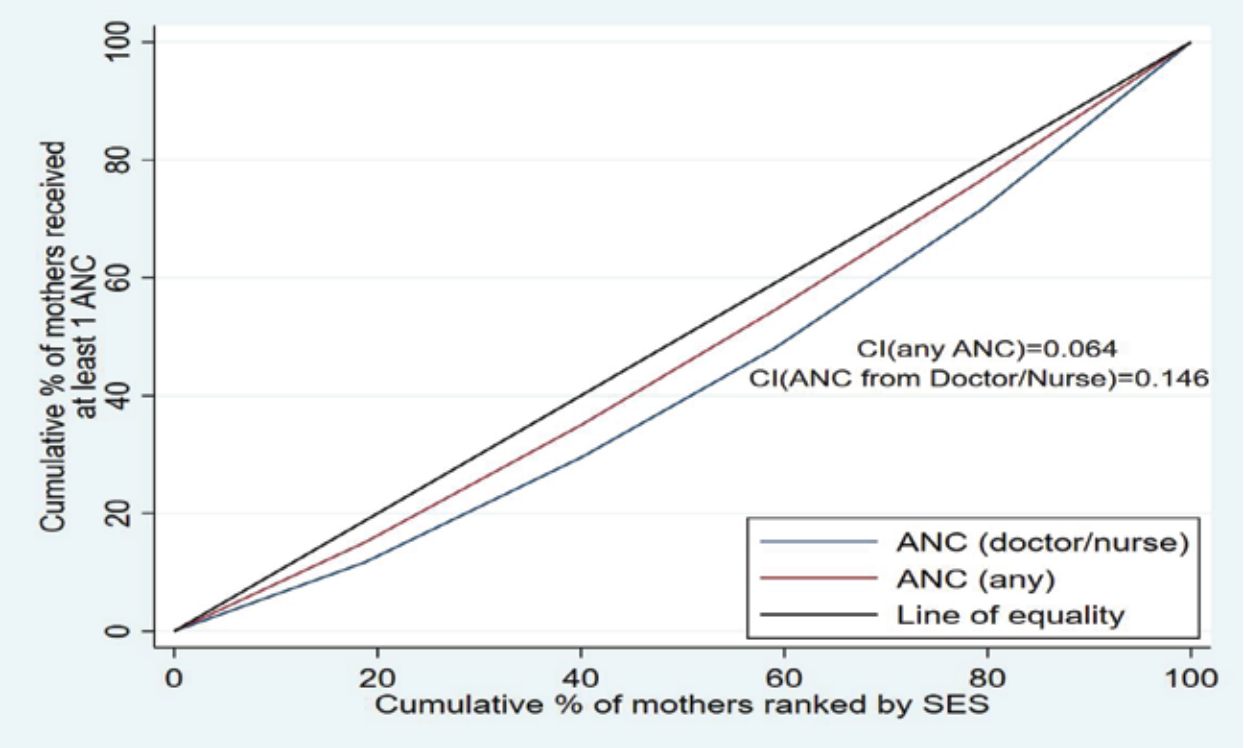
Use of antenatal care services

Among 2,476 pregnant women who gave live births, 80% of them received at least one antenatal care (ANC). These women received services from various sources. Among these sources, the nurses/doctors were dominant, followed by midwives, FWV, and FDSR/CMH (Table 15). The use of at least one ANC during pregnancy was inequitable in 2021 in the Chakaria HDSS area. Sixty-four percent of the pregnant women from the lowest socioeconomic quintile used at least one ANC during pregnancy as opposed to 91% of the women in the highest socioeconomic quintile (Table 15). The concentration curve and the concentration index of at least one ANC use also depicts similar picture where the curve lies closely below the line of equality, the index of 0.06 indicates the level of disparity to be very low (Figure 8). On the contrary, the use of ANC service by doctors or nurses indicated a higher level of inequity where the rate was 84.4% for women in the highest socioeconomic quintile and only 38.1% for women in the lowest socioeconomic quintile (Table 15). This is visible in Figure 8 where the concentration curve for ANC use from doctors or nurses lies further away from the line of equality with higher concentration index (0.146). Thus, the distribution of ANC service from doctor/nurse was more unequal than the distribution of ANC service from any other sources.

Table 15. Antenatal care by sources and asset quintile, Chakaria HDSS, 2021							
Asset quintile	Received any ANC (%)	Midwife (%)	FWV (%)	Nurse/doctor (%)	FDSR/ CMH (%)	None (%)	No. of Pregnancies
Lowest	64.3	15.3	17.4	38.1	9.3	35.7	405
Second	74.9	16.1	20.8	51.2	6.9	25.1	491
Middle	81.8	20.5	23.8	59.5	9.5	18.2	452
Fourth	86.7	15.5	17.1	70.7	8.0	13.3	528
Highest	91.0	8.5	12.6	84.4	6.6	9.0	600
Total	80.0	15.1	18.3	61.1	8.0	20.0	2476

*Multiple responses from same woman recorded if she had multiple pregnancies in 2021
¥Some pregnancies were omitted due to missing ANC information as mother herself could not be interviewed
ANC=Antenatal care; FWV=Family welfare visitor; FDSR=Family Development Services and Research;
CMH= Christian Memorial Hospital

Figure 8. Concentration curve for receiving at least one ANC, Chakaria HDSS, 2021



CI=Concentration Index

Use of postnatal care services

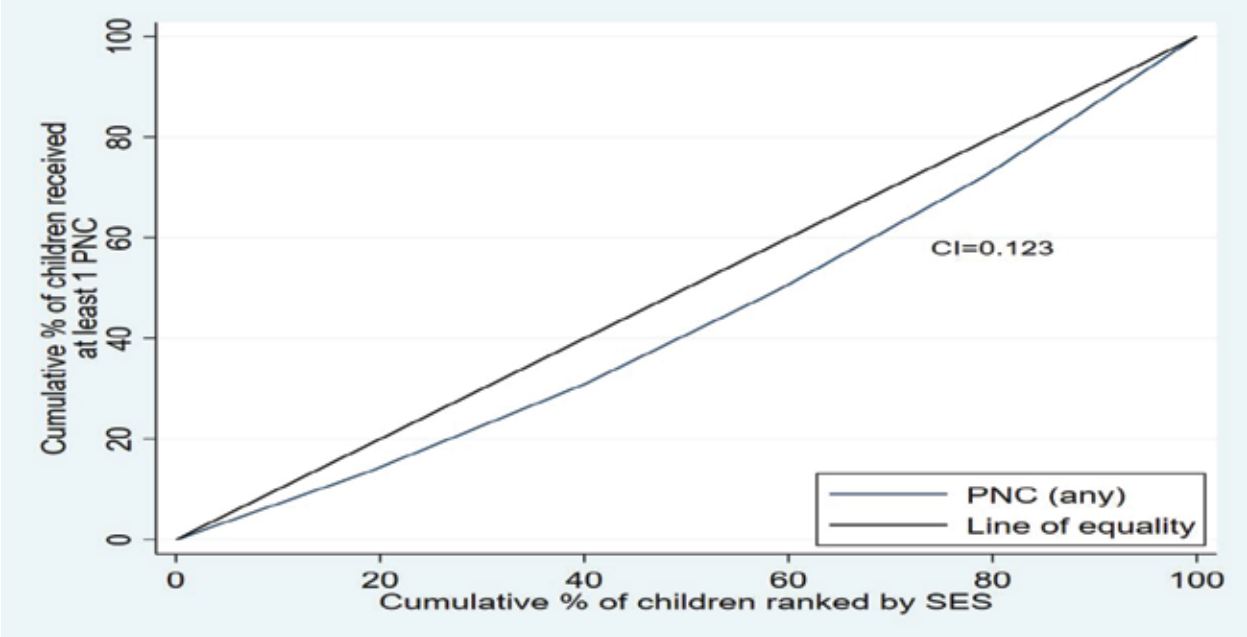
Any postnatal check-up of both women and children up to 42 days of their delivery is of interest here. It was observed that only 53.4% of the delivering women received at least one postnatal care (PNC) in 2021. The nurses, doctors and midwives were the dominant sources for PNC. The utilization of services was characterized by large inequities and the services concentrated among the richest segment of the society (Table 16). Figure 9 also shows the current inequality of the use of PNC services among different socioeconomic groups. The positive value of concentration index (CI) indicates that the rich people were more interested to receive the services compared to the poor.

Table 16. Postnatal care by sources and asset quintile, Chakaria HDSS, 2021

Asset quintile	Received any PNC (%)	Midwife (%)	FWV (%)	Nurse/doctor (%)	FDSR/CMH (%)	None (%)	No. of Pregnancies
Lowest	38.1	6.0	3.9	24.6	2.1	61.9	405
Second	44.1	10.6	5.5	26.1	3.4	56.2	491
Middle	52.7	13.7	3.3	33.6	3.3	47.3	452
Fourth	59.9	11.3	6.4	39.0	5.2	40.1	528
Highest	71.3	8.7	2.5	57.4	5.5	28.7	600
Total	53.4	10.1	4.3	36.3	3.9	46.6	2476

*Multiple responses from same woman recorded if she had multiple pregnancies in 2021
PNC = Postnatal care
¥Some pregnancies were omitted due to missing ANC information as mother herself could not be interviewed

Figure 9. Concentration curve for receiving at least one PNC, Chakaria HDSS, 2021



Assistance during delivery

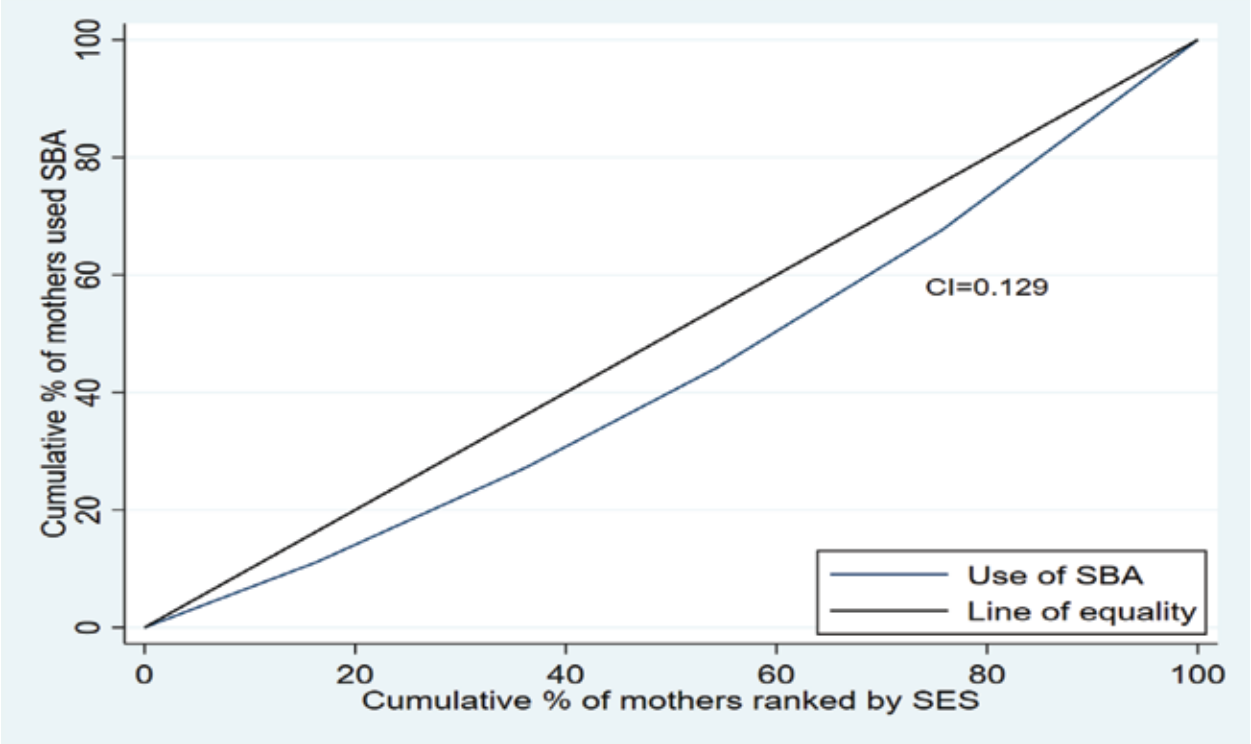
In Chakaria, the traditional birth attendants (TBAs) were used more than the skilled birth attendants (SBAs) (e.g. nurses/doctors, FWVs, midwives) for assisting deliveries. 53.2% of 2,476 deliveries in Chakaria were assisted by the TBAs as opposed to 46.8% of the deliveries assisted by the SBAs. The rate of seeking services from nurses/doctors by the women from the highest quintile was much higher than those by women from the lowest quintiles (Table 17). Overall, the services of SBAs were more concentrated towards the richer segment of the population as the concentration curve lies below the line of equality (Figure 10.)

Table 17. Assistance during delivery by asset quintile, Chakaria HDSS, 2021

Asset quintile	Midwife (%)	FWV (%)	Nurse/doctor (%)	TBA (%)	No. of Pregnancies
Lowest	10.1	5.7	16.1	68.2	405
Second	12.2	6.9	18.7	62.1	491
Middle	13.5	5.5	24.8	56.2	452
Fourth	12.5	6.6	32.2	48.7	528
Highest	8.7	5.2	48.5	37.7	600
Total	11.3	6.0	29.5	53.2	2476

*Multiple responses from same woman recorded if she had multiple pregnancies in 2021

Figure 10. Concentration curve for use of SBA services, Chakaria HDSS, 2021



Place of delivery

Of the 2,476 deliveries in total, 66.1% took place at home. Only 33.9% of all 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 with a very high level of disparity (Table 18 and Figure 11).

Table 18. Place of delivery by asset quintile, Chakaria HDSS, 2021

Asset quintile	Hospital/Clinic (%)	Home (%)	No. of Pregnancies*
Lowest	21.7	78.3	405
Second	22.6	77.4	491
Middle	28.3	71.7	452
Fourth	35.4	64.6	528
Highest	54.3	45.7	600
Total	33.9	66.1	2476

*Multiple responses from same woman recorded if she had multiple pregnancies in 2021

Figure 11. Concentration curve for facility-based delivery, Chakaria HDSS, 2021

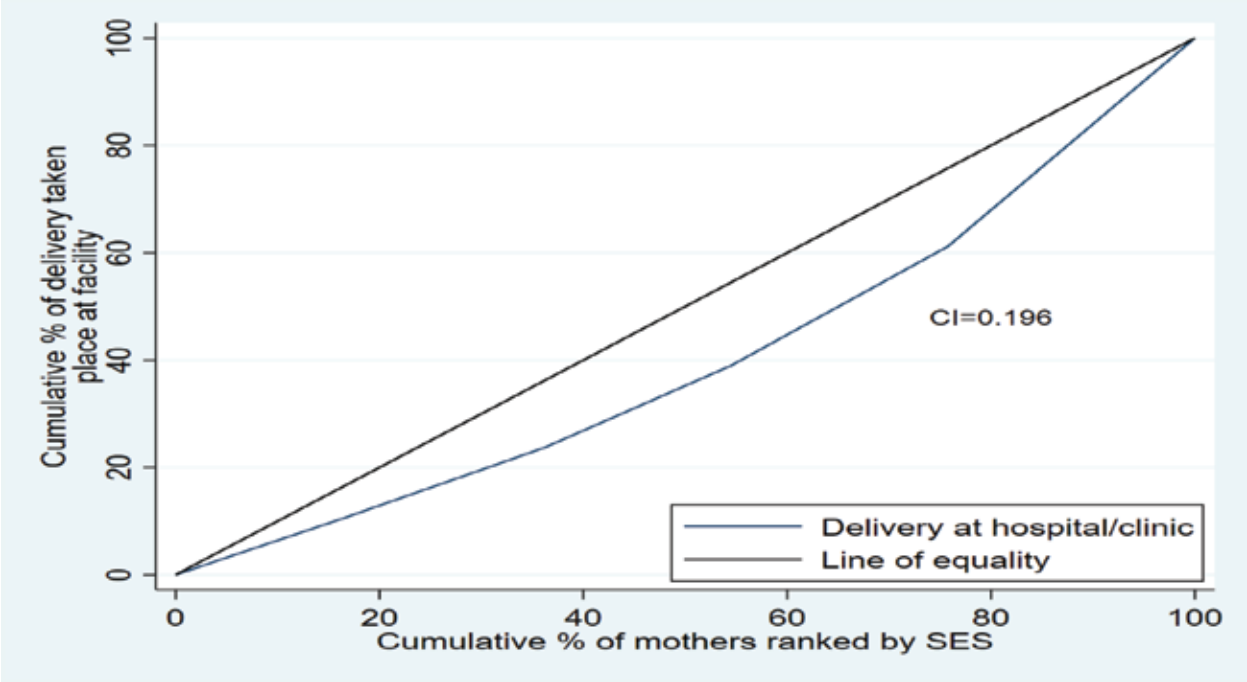


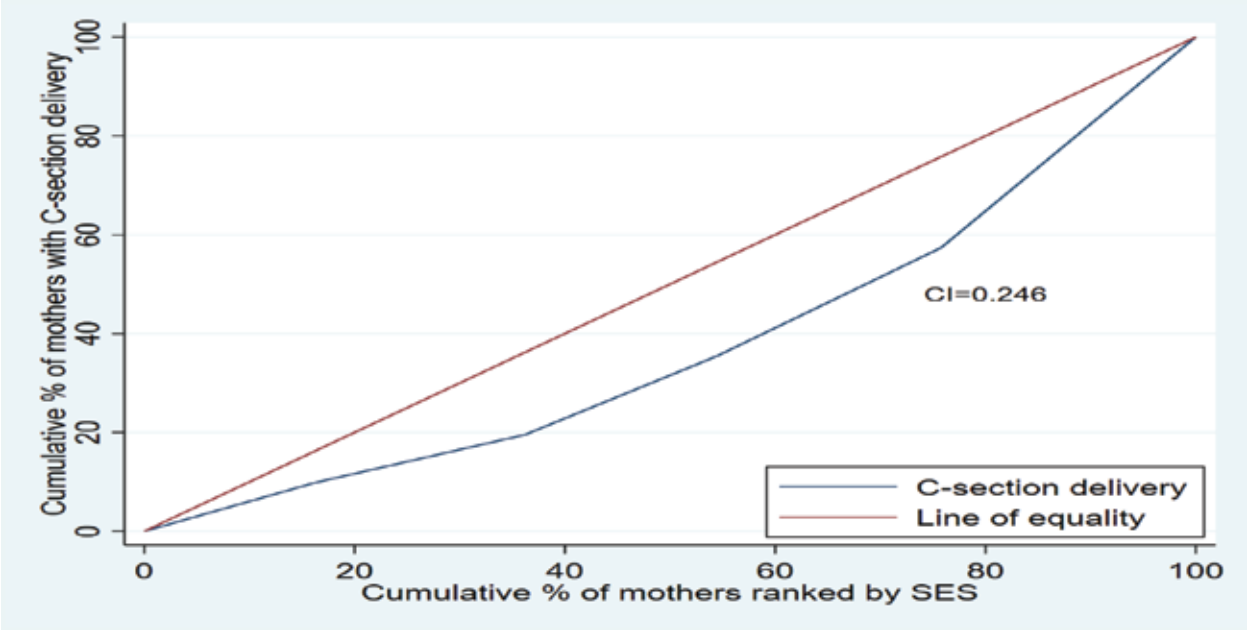
Table 19 shows caesarean-section delivery by household asset quintile in 2021. Caesarean-section delivery accounted for 13.7% of the total deliveries and 39.6% of the facility-based deliveries in the Chakaria HDSS area in 2021. Although the number of deliveries through caesarean sections was small, the number of women giving birth by caesarean sections exhibited high level of discrepancies between the highest and lowest quintiles (Table 19 and Figure 12).

Table 19. Caesarean-section delivery by asset quintile, Chakaria HDSS, 2021

Asset quintile	No. of caesarean-section delivery	Caesarean-section delivery (%)	Total no. of Deliveries*
Lowest	33	8.1	405
Second	32	6.5	491
Middle	53	11.7	452
Fourth	73	13.8	528
Highest	142	23.7	600
Total	340	13.7	2476

*Multiple responses from same woman recorded if she had multiple pregnancies in 2021

Figure 12. Concentration curve for caesarean-section delivery, Chakaria HDSS, 2021



CHAPTER 9

SDG and Other Health and Socio-demographic Indicators

Sustainable Development Goals, popularly known as SDGs, include 17 goals with 169 associated targets which were announced for United Nations member states to eradicate poverty, inequality, injustice, and climatic changes by 2030. Despite Bangladesh's notable achievements in Millennium Development Goals (MDGs), most indicators could not meet the desired targets. The SDGs address the origins of poverty and universal development needs, working for all people and thus expectantly going much further than the MDGs. Sixteen indicators out of all basic and complementary SDG indicators can be calculated using the data of Chakaria HDSS (8).

The major demographic and health indicators (including the SDGs) during 2017-21 are presented in Table 20. The fertility indicators were almost similar, and a declining trend in the natural rate of population increase was observed during 2017-19-slightly increasing in 2020-21. Indicator rates in the Chakaria HDSS area have been compared with those in the Matlab government service area, another rural surveillance site of icddr,b (9). In 2021, the rates of natural increase and annual population growth in the surveillance area of Chakaria were 21.9 and 2.1%, respectively (Table 20).

Facility (hospital or clinic) based births in Chakaria HDSS increased from twenty-nine (in 2020) to thirty-two percent (in 2021) and about forty-three percent of the deliveries were assisted by Skilled Birth Attendants (SBAs) in Chakaria during 2021 (Table 20).

The legal age of marriage is 18 years for females and 21 years for males in Bangladesh. The percentage of underage female marriage declined from 34 (in 2020) to 31.3 in 2021. Among males, 18% were married before the age of 21 years in 2020. The proportion of male marriages before 21 years slightly increased in 2021 compared to the previous year. The percentage of women aged 20-24 years who were in marital union by the age of 18 remained on the decline from 2017 to 2021.

Total fertility rate and death rate in the Chakaria HDSS area during 2021 were higher than their national counterparts. Facility-based deliveries, receiving service from SBAs, and antenatal care coverage were comparatively lower and postnatal care coverage was slightly higher than the national rates. The full immunization coverage rate was found to be slightly lower than both the rates in the previous years and the respective national rate.

In terms of boys' education, 68% completed the last grade of primary-level education, and 31.6% completed the last grade of secondary-level education; while among the girls, the primary and secondary completion rates were 93.4% and 41.7%, respectively. The primary level and secondary level completion rates were higher for the girls than for the boys, and

these rates for girls were higher compared to the national level, whereas this is otherwise for their male counterparts. The literacy rate of 15-24- year-old men was lower than the national literacy rates of men whereas, for women, the literacy rate was higher than that. Compared to the national level, a lower percentage of active-age groups for women were engaged in economic activities in the Chakaria HDSS area.

Table 20. SDG and other health and socio-demographic indicators, Chakaria HDSS, 2017 – 2021, Matlab HDSS and National

Rate	Chakaria HDSS area					Matlab HDSS Govt. service area		National
	2017	2018	2019	2020	2021	2020		
Crude birth rate	25.6	24.9	24.2	27.7	27.9	21.9	-	18.5[e]
Total fertility rate[a]	2.9	2.8	2.7	2.8	3.1	2.7	SDG	2.3[d]
Neonatal mortality[b]	35.2	31.3	29.5	34.0	31.2	21.8	SDG	30.0[d]
Post-neonatal mortality[b]	15.6	9.3	13.3	7.8	6.0	4.3	-	-
Infant mortality rate[b]	50.8	40.6	42.9	41.8	37.1	26.1	-	38.0[d]
Child mortality rate (1-4 yrs)	2.9	3.1	2.9	2.8	2.0	1.3	-	-
Under-five mortality rate[b]	61.3	52.3	50.5	51.3	43.9	23.2	SDG	45.0[d]
Crude death rate	5.8	5.9	5.8	5.9	6.0	8.5	-	5.5[e]
Rate of natural increase	19.8	19	18.4	21.8	21.9	13.4	-	-
In-migration rate	33.6	34.4	24.6	34.6	44.6	59.7	-	-
Out-migration rate	46.9	42.7	34.1	38.9	45.4	47.7	-	-
Growth rate (%)	0.6	1.1	0.9	1.7	2.1	1.4	-	1.1[e]
Adolescent birth rate	54.8	43.2	47.0	68.6	60.8	81.9	SDG	83.0[e]
Stillbirth rate[c]	34.0	27.7	39.2	41.8	32.0	16.2	SDG	25.0[e]
Facility-based delivery (%)	23.6	26.6	28.6	28.7	31.6	70.0	-	50.0[d]
Received assistance from SBA during delivery (%)	38.7	37.4	39.7	42.9	42.7	75.2	SDG	53.0[d]
Antenatal care coverage (at least 1 visit) (%)	87.3	85.2	88.8	82.3	80.0	93.4	SDG	92.0[d]
Antenatal care coverage (at least 4 visits) (%)	32.9	28.6	28.9	24.2	25.0	24.8	SDG	47.0[d]
Postnatal care coverage (1 visit) (%)	53.2	51.6	54.3	49.7	53.4	-	SDG	52.5[d]
Male marriage at ages under 21 years (%)	19.0	20.4	18.1	18.1	18.5	5.5	-	-
Female marriage at ages under 18 years (%)	32.8	29.2	29.5	34	31.3	29.6	-	-
Female aged 20-24 who were married or in a union by age 18 (%)	28.8	27.1	25.9	24.7	23.5	-	SDG	59.0[d]

Table 20. (contd…)

Rate	Chakaria HDSS area					Matlab HDSS Govt. area		National
	2017	2018	2019	2020	2021	2020		
Children receiving full immunization (%)	84.2	86.3	85.5	82.9	80.7	-	SDG	85.6[d]
1-year old children immunized against measles (%)	87.9	88.7	88.5	85.6	83.2	-	SDG	87.9[d]
Primary education completion rate for girls (%)	88.9	90.1	91.6	90.1	93.4	-	SDG	89.3[d]
Primary education completion rate for boys (%)	60.5	63.3	65.2	64.1	68.0	-	SDG	82[d]
Secondary education completion rate for girls (%)	39.2	43.3	44	42.1	41.7	-	SDG	34.3[d]
Secondary education completion rate for boys (%)	31	32.5	32.9	30.2	31.6	-	SDG	40.8[d]
Tertiary enrollment rate for women (%)	15.5	19.2	17.7	12.0	13.8	-	SDG	29[d]
Tertiary enrollment rate for men (%)	13	15	13.4	8.4	11.3	-	SDG	37.4[d]
Literacy rate of 15-24-year-old women (%)	97.8	98.2	98.4	98.6	98.8	-	SDG	97.3[d]
Literacy rate of 15-24-year-old men (%)	92.5	93.1	93.6	93.9	94.7	-	SDG	95.8[d]
Employment to population ratio (EPR) for women (15+ years of age) (%)	14.8	14.9	14.9	13.4	9.0	-	SDG	33.9[e]
Employment to population ratio (EPR) for men (15+ years of age) (%)	83	82.9	82.7	80.9	77.6	-	SDG	78.0[e]
Women without incomes of their own (%)	5.9	5.6	5.4	5.3	5.5	-	SDG	6.7[e]

[a]Per woman; [b]Per 1,000 live births; [c]Per 1,000 total births;

Sources:

[d]National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International. 2019. *Bangladesh Demographic and Health Survey 2017-2019: Key Indicators*. Dhaka, Bangladesh, and Rockville, Maryland, USA: NIPORT, Mitra and Associates, and ICF International;

[e]The World Bank. Available at: http://data.worldbank.org;

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APPENDIX A

Mid-year population by age and sex, Chakaria HDSS, 2021

Age (years)	Mid-year population			Percent distribution of mid-year population		
	Male	Female	Both	Male	Female	Both
<1 year	1,169	1,210	2,379	2.6	2.7	2.7
1-4	4,286	4,222	8,508	9.6	9.4	9.5
5-9	4,945	4,688	9,633	11.1	10.4	10.7
10-14	5,162	4,991	10,153	11.6	11.1	11.3
15-19	5,534	5,249	10,783	12.4	11.6	12.0
20-24	4,524	4,701	9,225	10.2	10.4	10.3
25-29	3,125	3,672	6,797	7.0	8.1	7.6
30-34	3,011	3,327	6,338	6.8	7.4	7.1
35-39	2,584	3,177	5,761	5.8	7.0	6.4
40-44	2,251	2,447	4,698	5.1	5.4	5.2
45-49	1,977	1,787	3,764	4.4	4.0	4.2
50-54	1,535	1,418	2,953	3.4	3.1	3.3
55-59	1,231	1,278	2,509	2.8	2.8	2.8
60-64	989	1,056	2,045	2.2	2.3	2.3
65-69	784	705	1,489	1.8	1.6	1.7
70-74	635	521	1,156	1.4	1.2	1.3
75-79	352	302	654	0.8	0.7	0.7
80-84	245	200	445	0.6	0.4	0.5
85+	180	163	343	0.4	0.4	0.4
All	44,519	45,114	89,633	100.0	100.0	100.0

APPENDIX B

Cause-specific mortality rate per 1,000 population by age and sex,Chakaria HDSS, 2021

Causes	Age groups (years)						
	Neonate	Post-neonate	1-4	5-14	15-49	50-64	65+
Male							
Diarrhoea	0.0	0.0	0.2	0.1	0.0	0.0	0.5
Tuberculosis	0.0	0.0	0.0	0.0	0.1	0.5	1.4
Respiratory Infections	0.0	2.7	0.5	0.1	0.0	0.0	1.4
Septicaemia	0.0	0.0	0.0	0.0	0.0	0.3	0.5
COVID-19	0.0	0.0	0.0	0.0	0.0	1.3	1.8
Premature and Low Birth Weight	9.8	0.0	0.0	0.0	0.0	0.0	0.0
Birth Asphyxia	10.6	0.0	0.0	0.0	0.0	0.0	0.0
Neonatal Sepsis	6.5	0.0	0.0	0.0	0.0	0.0	0.0
Cerebral Ischaemia (HIE)	3.3	0.0	0.0	0.0	0.0	0.0	0.0
All Other Neonatal Conditions	7.3	0.0	0.0	0.0	0.0	0.0	0.0
Nutritional Deficiencies	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Malignant neoplasm	0.0	0.0	0.0	0.0	0.3	2.7	4.6
Congenital Malformation	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Diabetes	0.0	0.0	0.0	0.0	0.0	0.5	1.4
Neuro-pschiatric	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Hypertensive Diseases	0.0	0.0	0.0	0.0	0.0	0.0	1.8
Ischaemic Heart Diseases	0.0	0.0	0.0	0.0	0.2	2.4	6.8
Stroke	0.0	0.0	0.0	0.0	0.1	1.6	12.3
Other forms of heart disease	0.0	0.0	0.0	0.0	0.1	1.1	7.3
All Other Circulatory System Diseases	0.0	0.0	0.0	0.0	0.0	0.0	2.7
COPD	0.0	0.0	0.0	0.0	0.0	0.5	8.7
Asthma	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Digestive Diseases	0.0	0.0	0.0	0.0	0.0	0.5	0.9
Renal Failure	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Nephritic Syndrome	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Urinary	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Transport Accidents	0.0	0.0	0.0	0.1	0.1	0.5	0.0
Falls	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Drowning	0.0	0.0	1.6	0.5	0.0	0.0	0.5
Poisoning	0.0	0.9	0.0	0.0	0.0	0.0	0.0
All Other External Causes of Accidental Injury	0.0	0.0	0.2	0.0	0.2	0.0	0.0
Homicide	0.0	0.0	0.0	0.0	0.1	0.0	0.5
Fever of unknown Origin	0.0	0.0	0.0	0.0	0.0	0.3	1.8
All Other Unknown and Unspecified Causes	1.6	0.0	0.0	0.1	0.0	0.0	6.8
All causes	40.0	4.6	2.6	0.9	1.5	12.5	64.2

Appendix B. (contd…)

Causes	Age groups (years)						
	Neonate	Post-neonate	1-4	5-14	15-49	50-64	65+
Female							
Diarrhoea	0.0	0.9	0.5	0.0	0.1	0.0	0.5
Respiratory Infections	1.6	2.7	0.0	0.0	0.0	0.0	1.6
COVID-19	0.0	0.0	0.0	0.1	0.2	0.3	2.6
All Other Communicable Disease	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Maternal Deaths	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Premature and Low Birth Weight	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Birth Asphyxia	3.9	0.0	0.0	0.0	0.0	0.0	0.0
Neonatal Sepsis	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Cerebral Ischaemia (HIE)	2.3	0.0	0.0	0.0	0.0	0.0	0.0
All Other Neonatal Conditions	7.0	0.0	0.0	0.0	0.0	0.0	0.0
Nutritional Deficiencies	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Malignant neoplasm	0.0	0.9	0.0	0.0	0.2	2.7	1.6
Malignant neoplasms of female	0.0	0.0	0.0	0.0	0.0	0.3	0.5
Congenital Malformation	1.6	2.7	0.2	0.0	0.0	0.0	0.0
Diabetes	0.0	0.0	0.0	0.0	0.0	0.8	1.6
Neuro-pschiatric	0.0	0.0	0.2	0.0	0.0	0.3	0.0
Hypertensive Diseases	0.0	0.0	0.0	0.0	0.0	0.5	2.1
Ischaemic Heart Diseases	0.0	0.0	0.0	0.0	0.2	1.9	3.2
Stroke	0.0	0.0	0.0	0.0	0.1	3.5	12.2
Other forms of heart disease	0.0	0.0	0.0	0.0	0.2	1.6	7.9
All Other Circulatory System Diseases	0.0	0.0	0.0	0.0	0.0	0.3	4.2
COPD	0.0	0.0	0.0	0.0	0.0	1.1	4.8
All Other Respiratory Diseases	0.8	0.0	0.0	0.0	0.0	0.0	0.0
Digestive Diseases	0.0	0.0	0.0	0.1	0.0	0.0	1.6
Renal Failure	0.0	0.0	0.0	0.0	0.1	0.0	0.5
All Other Non-Communicable Diseases	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Transport Accidents	0.0	0.0	0.2	0.0	0.0	0.0	1.1
Falls	0.0	0.0	0.0	0.0	0.0	0.0	1.1
Drowning	0.0	0.0	0.2	0.2	0.0	0.0	0.0
All Other External Causes of Accidental Injury	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Suicide	0.0	0.0	0.0	0.2	0.0	0.0	0.0
All Other External Causes of Mortality	0.0	0.0	0.0	0.0	0.0	0.3	0.0
Fever of unknown Origin	0.0	0.9	0.0	0.0	0.0	0.0	1.6
Sudden Infant Death	0.8	0.0	0.0	0.0	0.0	0.0	0.0
All Other Unknown and Unspecified Causes	0.8	0.9	0.0	0.0	0.1	0.0	2.1
All Cause	22.7	8.9	1.4	0.6	1.6	13.3	52.4

APPENDIX C

Migration rate per 1,000 population by age and sex, Chakaria HDSS, 2021

Age (years)	No. of migrants			Migration rate per 1,000 population		
	Male	Female	Both	Male	Female	Both
In-migration						
<1	80	96	176	68.4	79.3	74.0
1-4	186	180	366	43.4	42.6	43.0
5-9	186	165	351	37.6	35.2	36.4
10-14	127	172	299	24.6	34.5	29.4
15-19	108	727	835	19.5	138.5	77.4
20-24	125	543	668	27.6	115.5	72.4
25-29	159	215	374	50.9	58.6	55.0
30-34	171	122	293	56.8	36.7	46.2
35-39	117	81	198	45.3	25.5	34.4
40-44	89	54	143	39.5	22.1	30.4
45-49	53	23	76	26.8	12.9	20.2
50-54	30	20	50	19.5	14.1	16.9
55-59	20	8	28	16.2	6.3	11.2
60-64	18	20	38	18.2	18.9	18.6
65-69	8	15	23	10.2	21.3	15.4
70-74	15	21	36	23.6	40.3	31.1
75-79	6	13	19	17.0	43.0	29.1
80-84	4	9	13	16.3	45.0	29.2
85+	3	6	9	16.7	36.8	26.2
All	1505	2490	3995	33.8	55.2	44.6
Out-migration						
<1	45	65	110	38.5	53.7	46.2
1-4	146	133	279	34.1	31.5	32.8
5-9	157	146	303	31.7	31.1	31.5
10-14	133	171	304	25.8	34.3	29.9
15-19	145	724	869	26.2	137.9	80.6
20-24	264	597	861	58.4	127.0	93.3
25-29	201	243	444	64.3	66.2	65.3
30-34	196	129	325	65.1	38.8	51.3
35-39	112	69	181	43.3	21.7	31.4
40-44	85	30	115	37.8	12.3	24.5
45-49	48	18	66	24.3	10.1	17.5
50-54	26	18	44	16.9	12.7	14.9
55-59	10	20	30	8.1	15.6	12.0
60-64	12	21	33	12.1	19.9	16.1
65-69	14	15	29	17.9	21.3	19.5
70-74	11	19	30	17.3	36.5	26.0
75-79	6	13	19	17.0	43.0	29.1
80-84	7	8	15	28.6	40.0	33.7
85+	2	6	8	11.1	36.8	23.3
All	1620	2445	4065	36.4	54.2	45.4

APPENDIX D

Number of migrants by origin and migration, Chakaria HDSS, 2021

Origin/Destination	All ages	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	1248	263	183	127	106	108	110	108	78	54	34	77
Outside Bangladesh	257	3	3	0	2	17	49	63	39	35	19	27
Inside Chakaria	683	145	94	75	62	61	60	57	38	27	16	48
Outside Chakaria	183	35	31	23	16	13	17	15	12	7	5	9
Inside HDSS area	420	80	63	53	40	29	36	29	25	15	13	37
Outside HDSS area	263	65	31	22	22	32	24	28	13	12	3	11
Female												
Inside Bangladesh	2469	274	161	172	727	541	208	121	80	52	22	111
Outside Bangladesh	21	2	4	0	0	2	7	1	1	2	1	1
Inside Chakaria	1502	151	82	100	491	336	108	71	38	33	14	78
Outside Chakaria	393	40	24	28	122	96	34	13	22	4	0	10
Inside HDSS area	940	83	50	75	319	199	62	45	24	15	9	59
Outside HDSS area	562	68	32	25	172	137	46	26	14	18	5	19
Out-migration												
Male												
Inside Bangladesh	1193	190	156	133	111	119	117	128	69	59	33	78
Outside Bangladesh	427	1	1	0	34	145	84	68	43	26	15	10
Inside Chakaria	897	139	128	102	83	89	82	96	50	43	27	58
Outside Chakaria	168	34	16	19	13	18	20	18	13	6	2	9
Inside HDSS area	384	54	66	48	43	37	31	34	13	14	9	35
Outside HDSS area	513	85	62	54	40	52	51	62	37	29	18	23
Female												
Inside Bangladesh	2431	197	145	171	724	590	240	129	68	29	18	120
Outside Bangladesh	14	1	1	0	0	7	3	0	1	1	0	0
Inside Chakaria	1882	155	112	128	563	446	181	101	56	24	14	102
Outside Chakaria	338	20	19	27	107	91	37	20	4	3	1	9
Inside HDSS area	955	74	45	71	319	227	74	38	22	9	7	69
Outside HDSS area	927	81	67	57	244	219	107	63	34	15	7	33

APPENDIX E

Number of in-migrants by reasons for migration, Chakaria HDSS, 2021

Reason for migration	All ages	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	20	2	1	0	2	6	3	0	3	2	0	1
Family friction/ breakdown	334	43	32	27	30	33	46	47	22	14	9	31
Others	45	6	1	5	7	4	4	5	4	3	3	3
Work-related												
New job/job transfer	256	3	3	4	2	17	48	61	38	35	18	27
To look for work/lost job	345	150	69	37	20	21	17	13	6	3	2	7
Others	178	19	15	9	14	19	25	24	23	14	7	9
Housing-related												
Wanted to own home/new house	149	27	17	16	14	13	9	9	11	8	9	16
Education												
To acquire education	98	8	41	22	12	2	2	1	4	3	1	2
Special reasons												
Due to COVID-19 pandemic	18	1	1	1	1	3	2	4	2	1	1	1
Reasons not reported	62	7	6	6	6	7	3	7	4	6	3	7
All	**1505**	**266**	**186**	**127**	**108**	**125**	**159**	**171**	**117**	**89**	**53**	**104**
Female												
Family-related												
To Join spouse	972	0	2	19	559	315	45	13	9	7	0	3
Family friction/ breakdown	556	66	26	21	84	139	74	43	21	17	10	55
Others	84	15	5	6	6	11	7	8	5	3	1	17
Work-related												
New job/job transfer	40	2	7	7	7	2	8	2	1	2	1	1
To look for work/lost job	360	143	56	48	28	29	17	13	8	3	3	12
Others	149	22	14	13	10	23	25	21	9	9	1	2
Housing-related												
Wanted to own home/new house	166	17	17	24	12	13	26	13	15	9	3	17
Education												
To acquire education	104	6	32	31	13	5	2	5	6	1	1	2
Special reasons												
Due to COVID-19 pandemic	5	0	1	0	0	0	2	0	1	1	0	0
Reasons not reported	54	5	5	3	8	6	9	4	6	2	3	3
All	**2490**	**276**	**165**	**172**	**727**	**543**	**215**	**122**	**81**	**54**	**23**	**112**

APPENDIX F

Number of out-migrants by reasons for migration, Chakaria HDSS, 2021

Reason for migration	All ages	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	22	0	0	0	2	11	5	3	0	0	0	1
Family friction/ breakdown	272	22	24	17	27	39	41	30	16	19	5	32
Others	74	7	8	14	12	7	5	5	2	2	5	7
Work-related												
New job/job transfer	446	2	3	3	38	146	84	69	45	28	17	11
To look for work/lost job	234	112	59	30	10	6	4	3	1	2	0	7
Others	275	25	12	10	13	36	47	63	30	21	5	13
Housing-related												
Wanted to own home/new house	94	8	10	11	13	10	5	15	3	5	7	7
Education												
To acquire education	111	11	31	36	12	3	5	2	6	0	2	3
Special reasons												
Due to COVID-19 pandemic	1	0	0	0	0	0	0	0	0	0	0	1
Reasons not reported	91	4	10	12	18	6	5	6	9	8	7	6
All	1620	191	157	133	145	264	201	196	112	85	48	88
Female												
Family-related												
To Join spouse	1093	0	0	47	535	359	110	33	4	3	1	1
Family friction/ breakdown	432	23	23	19	96	113	48	28	16	7	4	55
Others	104	13	3	9	12	13	7	12	6	2	4	23
Work-related												
New job/job transfer	37	3	5	4	4	8	4	4	3	1	0	1
To look for work/lost job	283	116	54	35	19	22	10	6	3	0	2	16
Others	204	13	11	11	18	57	45	14	13	10	1	11
Housing-related												
Wanted to own home/new house	101	18	14	8	9	15	11	4	8	3	4	7
Education												
To acquire education	121	6	28	28	22	4	7	15	7	1	1	2
Special reasons												
Due to COVID-19 pandemic	1	0	0	0	1	0	0	0	0	0	0	0
Reasons not reported	69	6	8	10	8	6	1	13	9	3	1	4
All	2445	198	146	171	724	597	243	129	69	30	18	120

APPENDIX G

Population, births, deaths, in and out-migration by village, Chakaria HDSS, 2021

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Maizpara	1792	51	12	94	82	28.5	6.7	52.5	45.8
Daingakata	1808	40	7	51	76	22.1	3.9	28.2	42.0
Baniachara	3512	104	15	186	174	29.6	4.3	53.0	49.5
Dakshin Baraitali	2275	45	12	88	129	19.8	5.3	38.7	56.7
Gobindapur	5202	173	30	163	230	33.3	5.8	31.3	44.2
Hapaliakata	3906	107	27	163	127	27.4	6.9	41.7	32.5
Baraitali	**18495**	**520**	**103**	**745**	**818**	**28.1**	**5.6**	**40.3**	**44.2**
Katakhali	431	19	1	27	19	44.1	2.3	62.6	44.1
Rakhainpara	625	10	11	14	38	16.0	17.6	22.4	60.8
Shantinagar	2099	53	11	160	110	25.3	5.2	76.2	52.4
Kulalpara	177	3		14	9	16.9	0.0	79.1	50.8
Palpara	209	4	3	9	26	19.1	14.4	43.1	124.4
Stationpara	711	23	4	53	15	32.3	5.6	74.5	21.1
Kattoli	473	18	7	38	27	38.1	14.8	80.3	57.1
Harbang	**4725**	**130**	**37**	**315**	**244**	**27.5**	**7.8**	**66.7**	**51.6**
Purbo Kunakhali	1800	52	7	76	68	28.9	3.9	42.2	37.8
Maddhya Kunakhali	5049	158	21	167	278	31.3	4.2	33.1	55.1
Krisnapur	1696	47	8	82	87	27.7	4.7	48.3	51.3
Chhainama Para	3191	122	24	194	142	38.2	7.5	60.8	44.5
Furotia Khali	3324	85	20	162	160	25.6	6.0	48.7	48.1
Dakshin Bahaddarkata	2626	78	17	99	145	29.7	6.5	37.7	55.2
BM Char	**17686**	**542**	**97**	**780**	**880**	**30.6**	**5.5**	**44.1**	**49.8**

Appendix G. (contd…)

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Chotta Bheola	905	24	5	45	57	26.5	5.5	49.7	63.0
Hasimar Kata	978	22	4	39	44	22.5	4.1	39.9	45.0
Hamidullah Sikderpara	885	22	9	64	52	24.9	10.2	72.3	58.8
Dwipkul	992	27	4	30	46	27.2	4.0	30.2	46.4
Baniarkum	1257	40	14	70	78	31.8	11.1	55.7	62.1
Dakshin Khilsadok	1776	54	12	75	126	30.4	6.8	42.2	70.9
Kaiyerbil	**6793**	**189**	**48**	**323**	**403**	**27.8**	**7.1**	**47.5**	**59.3**
Kaddachura	1817	60	14	69	102	33.0	7.7	38.0	56.1
Sikder Para	4361	106	24	176	174	24.3	5.5	40.4	39.9
Baniarchar	1005	30	3	44	53	29.9	3.0	43.8	52.7
Kalagazi Sikderpara	1448	37	9	80	42	25.6	6.2	55.2	29.0
Mabiar Baper Para	724	13	3	31	59	18.0	4.1	42.8	81.5
Jele Para	667	23	4	28	8	34.5	6.0	42.0	12.0
Purba Bara Bheola	**10022**	**269**	**57**	**428**	**438**	**26.8**	**5.7**	**42.7**	**43.7**
Sharharbil Purba Para	1276	44	5	59	60	34.5	3.9	46.2	47.0
Shaharbil Paschim Para	1124	31	3	56	62	27.6	2.7	49.8	55.2
Madrasha Para	535	12	4	29	36	22.4	7.5	54.2	67.3
Maizghona Purba Para	1661	50	12	108	69	30.1	7.2	65.0	41.5
Shahapura	1105	30	7	47	44	27.1	6.3	42.5	39.8
Failla Para	343	13	3	18	24	37.9	8.7	52.5	70.0
Shaharbil	**6044**	**180**	**34**	**317**	**295**	**29.8**	**5.6**	**52.4**	**48.8**

Appendix G. (contd…)

Village	Population	Birth	Death	In-migration	Out-migration	Birth rate	Death rate	In-migration rate	Out-migration rate
Saker Mohammad Char	6101	167	31	313	224	27.4	5.1	51.3	36.7
Uttar Lotony	2045	60	7	85	54	29.3	3.4	41.6	26.4
Proper Kakara	3053	64	28	111	119	21.0	9.2	36.4	39.0
Dakshin Surajpur	1306	49	9	42	56	37.5	6.9	32.2	42.9
Dakshin Manikpur	2876	53	20	97	108	18.4	7.0	33.7	37.6
Uttar Manikpur	4514	128	28	141	164	28.4	6.2	31.2	36.3
Kakara	**19895**	**521**	**123**	**789**	**725**	**26.2**	**6.2**	**39.7**	**36.4**
Muchar Para	537	20	3	18	29	37.2	5.6	33.5	54.0
Demoshia Bazar Para	1014	23	10	42	48	22.7	9.9	41.4	47.3
Ammer Dera Para	1415	33	9	55	63	23.3	6.4	38.9	44.5
Daskhali Para	1196	33	7	91	32	27.6	5.9	76.1	26.8
Darbeshkata Manik Para	758	17	2	30	50	22.4	2.6	39.6	66.0
Tekhsira Para	1053	27	6	62	40	25.6	5.7	58.9	38.0
Paschim Bara Bheola	**5973**	**153**	**37**	**298**	**262**	**25.6**	**6.2**	**49.9**	**43.9**
All	**89633**	**2504**	**536**	**3995**	**4065**	**27.9**	**6.0**	**44.6**	**45.4**

APPENDIX H

Percentage of population by age and marital status, Chakaria HDSS, 2021

Age (years)	Married	Divorced	Widower/ Widow	Never married	Population
Male					
10-14	0.02	0	0	99.98	5,162
15-19	2.55	0.04	0	97.42	5,534
20-24	19.68	0.18	0	80.15	4,523
25-29	54.05	0.38	0.03	45.54	3,125
30-34	82.52	0.47	0	17.01	3,010
35-39	94.39	0.46	0.04	5.11	2,583
40-44	98.05	0.44	0.13	1.38	2,251
45-49	98.94	0.25	0.25	0.56	1,977
50-54	98.76	0.33	0.52	0.39	1,535
55-59	98.46	0.41	0.73	0.41	1,231
60-64	96.87	0.3	2.83	0	989
65-69	94.64	0.26	4.72	0.38	784
70-74	93.23	0.31	5.98	0.47	635
75-79	84.94	1.14	13.64	0.28	352
80-84	83.27	0	16.73	0	245
85+	71.67	1.11	26.67	0.56	180
All	51.17	0.25	0.78	47.79	34,116
Female					
10-14	0.24	0	0	99.76	4,991
15-19	21.07	0.3	0.02	78.6	5,248
20-24	67.15	1.15	0.15	31.55	4,700
25-29	88.29	1.31	0.65	9.75	3,671
30-34	94.32	1.47	1.41	2.8	3,327
35-39	93.89	1.35	3.15	1.61	3,177
40-44	91.3	1.19	6.91	0.61	2,447
45-49	85.34	2.13	11.92	0.62	1,787
50-54	78.42	1.2	19.61	0.78	1,418
55-59	68.78	1.49	29.34	0.39	1,278
60-64	56.02	1.23	42.37	0.38	1,055
65-69	44.26	1.13	54.33	0.28	705
70-74	31.86	0.96	67.18	0	521
75-79	18.21	0.99	80.79	0	302
80-84	11	0	88.5	0.5	200
85+	7.36	0.61	92.02	0	163
All	58.71	0.98	8.47	31.83	34,990

APPENDIX I

Chakaria HDSS project team, 2021

Name of Staff	Designation
Dhaka	
Manzoor Ahmed Hanifi	Scientist
Sabrina Rasheed	Scientist
Shehrin Shaila Mahmood	Associate Scientist
Md. Mehedi Hasan	Research Officer
Srizan Chowdhury	Research Officer
Ashish Paul	Data Management Officer
Mohammad Shohel Rana	Administrative Officer
Chakaria	
Dr. Md. Moajjam Hossain	Medical Officer
Md. Mijanur Rahaman	Senior Field Research Officer
Md. Sharif Al Hasan	Field Research Officer
Md. Rehmat Ali	Field Research Supervisor
Fatema Zannat	Surveillance Worker (Rural)
Ismat Jahan Khuki	Surveillance Worker (Rural)
Jesmin Akter Rano	Surveillance Worker (Rural)
Kawsar Jannat	Surveillance Worker (Rural)
Kulsuma Akter	Surveillance Worker (Rural)
Monuara Begum	Surveillance Worker (Rural)
Mosharafa Sultana	Surveillance Worker (Rural)
Nasima Jannat	Surveillance Worker (Rural)
Nazma Akter	Surveillance Worker (Rural)
Raihan Zannat	Surveillance Worker (Rural)
Kajal Rekha	Surveillance Worker (Rural)
Tanjina Zannat Ara	Surveillance Worker (Rural)
Umme Habiba Mamata	Surveillance Worker (Rural)