

## Health-Related Factors Associated with Parental Migration among Left-Behind Secondary School Children in the Monga Areas of Bangladesh

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### ABSTRACT

*Parental migration is detrimental to children's health and affects their behaviors which significantly happens in the poverty-stricken community in Bangladesh, especially in the northern region (Monga area). But little is known about the health status of this region's left-behind children (LBC). This study identified the health-related factors associated with parental migration among left-behind secondary school children in the Monga areas of Bangladesh. A cross-sectional study was conducted in Lalmonirhat and Kurigram districts under Rangpur Division from January to March 2021. Data were collected from 400 secondary school-going children of classes VI-X aged 11 to 18 years by face-to-face interview method using a standardized and structured questionnaire. The Snowball sampling technique was employed to select the respondents. Univariate and bivariate statistical analyses were performed to analyze the data and to attain the objective. The results revealed that more than two-thirds of the total respondents were aged 13-15 years (mean age = 14.4 years) and there were 54.50% female children. Among the respondents around 28.5% were found in class VII, and 51.75% of the students were LBC. Around two-fifth respondents' fathers were migrated and they were migrated due to poverty for a long time ( $\geq 84$  months, mean time = 106.57 months) and they met to their children very often ( $n = 113$ , 54.59%) by six months (mean time = 6.31 months). During parental migration, most LBC were engaged in household works, and their academic performance was found unsatisfactory. Almost all LBC replied that their parental migration has impacted bad effects on their health (80.19%), they were suffering from different types of health complications (20.29%), and importantly they were mentally depressed (65.22%) though their body mass indexes (BMI) Z-scores*

*were found normal. Different types of demographic factors (age, number of siblings, parental education and profession, housing condition, working status beside study, having family loan, present academic result), and health-related factors (having health complications, availability and place of healthcare services, suffering from depression, taking meals three times in a day, taking tiffin in schools, BMI Z-score, and having sanitary latrine) are significantly associated with LBC status. To better engage the LBC and promote their mental health, community-based interventions may help them. Social leaders as well as school teachers may contribute to LBC's mental development through counseling. Government should take effective policies and programs for the development of LBCs' well-being and education.*

**Key Words:** *Monga area; Parental migration; Left-behind children; BMI z-scores.*

## **INTRODUCTION**

Migration is a shifting, either permanent or temporary, of residence of a person or people from one place to another. Generally, migration happens from rural to urban areas within a country (internal migration) or from one country to another (international migration). Global estimate shows 281 million (3.6%) people have migrated from one country to another, and 61% of global migrants are living in Europe and Asia (McAuliffe, Khadria, & Bauloz, 2019). Social and economic transformation contributes to shape the migration pattern, and migration is considered as an important way of improving livelihood conditions. A large number of rural residents migrate to urban areas to seek employment opportunities due to rapid urbanization and economic change. In many cases migrants have chosen to leave their children behind in rural areas relatively bring them to the city where services, like education can be difficult to access (Hu, Cook, & Salazar, 2008; Keung Wong, Li, & Song, 2007). Moreover, they leave their children due to financial constraints and or temporary nature for working at the destination (Givaudan & Pick, 2013; Islam, Khan, & Mondal, 2019; Siriwardhana et al., 2015; Wen & Lin, 2012). Those children aged <18 years who were left-behind in their residence when one or both parents migrate elsewhere to work for at least six months during the previous year are addressed as left-behind children (LBC) (Duan & Zhou, 2005). These LBC having early separation from mothers or fathers or both, have drawn attention from the researchers and policy makers.

In some developing countries (e.g., Bangladesh, China, Philippines, Mexico, etc.), millions of parents leave their children and migrate to other regions or countries for jobs. Both national and international immigration happens in Bangladesh and this country is considered as the major labor-exporting

countries in the world. It is estimated that 14-40% rural Bangladeshi households have at least one migrant and majority of them have LBC (Cortes, 2008). Migration in Bangladesh is always assessed from the standpoint of its positive impact on the economy through the remittances sent to improve the family life of the dependents left-behind (e.g., LBC) (Akhter & Islam, 2019). The earnings through migration may increase households spending on children's living cost (e.g., food, nutrition, healthcare, education). But parental migration naturally leads to parental absence from the home and prolonged separation of children from one or both parents (Botezat & Pfeiffer, 2014; Gao et al., 2010; Zhao, Wang, Li, Zhou, & Hesketh, 2017). This type of parental absence might be harmful for the children's physical and mental well-being, having a negative impact on their development. Some studies conducted in China found negative impacts of parental migration on LBC's health and nutritional development (Wen et al., 2008; Yue et al., 2020; Yueping & Yaoguang, 2009). Consequently, poor health status of LBC has become a major public health issue (Dillon & Walsh, 2012; Chowdhury et al., 2016) as parental migration is globally affecting children's health behaviors and particularly impacting their both physical and psychological development (Lu & Treiman, 2011; Su, Li, Lin, Xu, & Zhu, 2013; Wen & Lin, 2012; Wen, Su, Li, & Lin, 2015).

In Bangladesh, parental migration is notably significant at poverty-stricken and disaster affected region especially at northern region, which is poverty and natural calamities prone area. Flood, riverbank erosion, drought and cold waves, all of which occurs more frequently and intensely in northern region than other regions of the country and make the livelihood miserable of people in this region. Therefore, the poverty-stricken rural people of this region usually migrate to urban areas in searching of job opportunities. Moreover, northern region of Bangladesh mostly depends on agriculture, which yields only one or sometimes two annual harvests. However, there yield three crops per year in more fertile and benign parts of the region. In these areas, local employment remains unavailable from October to December in every year. Besides this, the landless and poorest people survive on agricultural wage labor, their opportunities and ensuing incomes drop in this period, and trapped in what is called 'monga' a cyclical phenomenon of poverty and hunger; which also termed as seasonal poverty (Elahi & Ara, 2008). Therefore, monga affected people rush to cities for better earnings for their LBC and family. Most of the LBC are brought up to their mother and/or grandparents. Such parental absence endangers the social security of LBC and negatively impact on their physical and psychological health. Moreover, due to poor earnings and inadequate food security in migrant households, LBC may be deprived from their basic rights like education and three times meal. LBC may be encountered more educational problems, like higher rates of absence and dropout rates, and they may be found to be more

vulnerable to psychological problems such as loneliness, depression, anxiety, and introversion. Moreover, Bangladesh is one of the countries with high child malnutrition rate (NIPORT, 2020) and a leading country of high-level migration. Due to scarcity of adequate research, almost nothing is known yet in Bangladesh about the impact of migration on LBC's health status. Therefore, the main aim of this study is to find health-related factors associated with parental migration among left-behind secondary school children in the monga areas of Bangladesh. Hopefully, the findings of this study would be very helpful to the policymakers and healthcare professionals to improve the health status of those young people by taking needful actions.

## METHODS

### *Sampling and sample size determination*

This cross-sectional study used primary data, collected by multistage stratified sampling technique. In the 1<sup>st</sup> stage, two districts (Lamonirhat and Kurigram) of Rangpur Division were selected; in the 2<sup>nd</sup> stage, four Upazilas were selected from those districts; in the 3<sup>rd</sup> stage, sixteen villages were considered for data sources; and in the 4<sup>th</sup> stage (final stage), the respondents were selected by means of snowball sampling technique from each village. Relevant data of socio-economic and demographic were collected by face-to-face interview using structured questionnaire. Since the schools were closed during the pandemic situation of coronavirus disease 2019 (COVID-19), data were collected during January to March, 2021 from school going children by visiting their residences. This study included only the students of secondary schools of classes VI-X, who were aged 11-18 years. However, the children within 11-18 years age bracket who had some forms of physical disability were not included in this study. The total sample size is determined by following the formula (Cochran, 1977):

$$n = \frac{Z^2 p(1-p)}{\epsilon^2} = \frac{Z^2 pq}{\epsilon^2}, \quad (1)$$

where,  $n$  = sample size,  $Z$  = tabulated value = 1.96 (at 5% level of significance),  $p$  = portion of success (assuming that,  $p=0.05$ ),  $q$  = portion of failure =  $1-p$  and  $\epsilon$  = margin of error = 0.05. Based on the above formula (Eq. (1)) the study was supposed to select 384 respondents but for the betterment of research 400 respondents were considered for this study.

### *Socio-demographic factors*

Data on socio-demographic factors like age (in years), gender, religion, class, number of siblings; father's age (in years), education, and profession; mother's age (in years), education, and profession; parental migration status, primary caregivers, etc. were collected. In this study, a primary caregiver is

considered as a person who takes primary responsibility for care of the LBC and had lived together with the LBC for more than six months in the past year. Migration-related information about LBC include type of migration of the parents (father or mother or both), duration of migration (in months), causes of migration, present guardian due to parental migration, doing household works in absence of their parents, housing condition, parents meeting duration (in months), desire to stay with parents, sending money is enough for their study, have enough social security for them, eating tiffin in schools, working beside study, having family loan, sent money by their migrant parents is enough for paying the loan, comparing academic results between present and previous years, eating food three times in a day, etc. are collected.

### ***Health and nutrition-related factors***

Health and nutrition-related information like bad effects of parental migration on health, presently suffering from depression and health complications, weight (in kilogram [kg]), height (in meter), access to healthcare and hygiene facilities like available healthcare services, healthcare service places, sanitary toilet facility, etc. of both LBC and non-LBC were collected. The LBC status of the respondents is classified into LBC and non-LBC. LBC were categorized into three types: mothers at home but fathers are migrated; fathers at home but mothers are migrated; and both parents are migrated. Separations due to divorced/separated or deceased parents were not included LBC cases.

### ***Anthropometric measures***

The anthropometric information such as weight and height of each child was collected to calculate body mass index (BMI) and BMI Z-score. The anthropometric measurement tools employed were a 'weighing scale' and 'height-rod' for measuring the weight and height of each child, respectively. Weighing scale was placed on flat hard surface and children stood on it barefooted without having any kind of weight with them. The weight shown in kg on the screen of weighing scale was noted down for every child. The height-rod, marked in centimeter (cm) scale, was used to match the height of every child. The BMIs were calculated by using the following formula:

$$BMI = \frac{\text{weight in kg}}{(\text{height in meter})^2} \quad (2)$$

In order to calculate the Z-scores of BMI by sexes, the following formulas (Flegal & Cole, 2013) were used:

$$Z = \frac{\left(\frac{BMI_{m,f}}{M}\right)^L}{SL} \quad \text{when, } L \neq 0; \text{ and} \quad (3)$$

$$Z = \frac{\ln\left(\frac{BMI_{m,f}}{M}\right)}{S} \quad \text{when, } L = 0 \quad (4)$$

where,  $L$ ,  $M$ , and  $S$  are the values were taken from the appropriate tables constructed by the World Health Organization (WHO) corresponding to the age in months of the children;  $BMI_m$  and  $BMI_f$  are  $BMI$ s for boys and girls, respectively. Again,  $Z$  is the value of z-score correspond exactly to percentiles, e.g., z-scores of -1.881, -1.645, -1.282, -0.674, 0.674, 1.036, 1.282, 1.645, and 1.881 correspond to the 3<sup>rd</sup>, 5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 85<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup>, and 97<sup>th</sup> percentile, respectively. The nutritional status of the respondents was categorized as underweight (BMI Z-score <5<sup>th</sup> percentile), normal weight (BMI Z-score: 5<sup>th</sup>-85<sup>th</sup> percentile), and overweight and obese (BMI Z-score >85<sup>th</sup> percentile).

### ***Statistical analysis***

Descriptive analyses (e.g., mean, standard deviation [SD], percentage distribution) were performed to analyze the background characteristics of the respondents. Health status of the respondents was assessed following the reference categories of the WHO nutritional status. Thus, nutritional status was calculated by anthropometric measures e.g., BMI and BMI Z-scores. Moreover,  $\chi^2$ - test was performed to compare health status between LBC and Non-LBC, and to investigate the relations among nutritional status of both groups of children and socio-demographic and health behavior related variables. All statistical analyses were performed at Statistical Package for Social Science (SPSS) for Windows 22.0 (SPSS Inc., Chicago, IL).

### ***Ethical approval***

Ethical consideration was approved by the ethical committee of Institute of Biological Sciences at the 71<sup>st</sup> meeting of the Board of Governors of the Institute of Biological Sciences (Resolution No. 57) and of the meeting of the Syndicate of University of Rajshahi, Bangladesh (Memo No. 473(18)/320/IAMEBBC/IBSC, date: 05 October, 2019).

## **RESULTS**

### ***Socio-demographic characteristics of the respondents***

Background characteristics of the respondents are presented in Table 1. Among the total respondents, boys were 45.50%. Most of the respondents (67.75%) were aged 13-15 years (mean ( $n = 128$ , 32.0%), fathers' profession was agriculture ( $n = 140$ , 35.0%), mothers' age was 30-35 years ( $n = 176$ , 44.0%, mean age = 35.74 years), and mothers' education level was secondary ( $n = 165$ , 41.3%).

**Table 1.** Socio-demographic characteristics of the respondents, ( $N=400$ )

Characteristics	Levels	Frequency ( $n$ )	Percentage (%)	Mean $\pm$ SD
Age (in years)	$\leq 12$	63	15.75	14.04 $\pm$ 1.45
	13-15	271	67.75	
	$\geq 16$	66	16.50	
Gender	Male	182	45.50	-
	Female	218	54.50	
Religion	Islam	351	87.75	-
	Others	49	12.25	
Class	VI	75	18.75	-
	VII	114	28.50	
	VIII	84	21.00	
	IX	80	20.00	
	X	47	11.75	
Number of siblings	1-2	196	49.00	2.81 $\pm$ 1.19
	3-4	165	41.25	
	>4	39	9.75	
Father's age (in years)	$\leq 35$	36	9.00	43.88 $\pm$ 7.41
	35-40	128	32.00	
	40-45	122	30.50	
	45-50	59	14.75	
	$\geq 50$	55	13.75	
Father's education	Illiterate	119	29.75	-
	Primary	101	25.25	
	Secondary	128	32.00	
	Higher secondary	31	7.75	
	Others	21	5.25	
Father's profession	Job	106	26.50	-
	Business	54	13.50	
	Agriculture	140	35.00	
	Others	100	25.00	
Mother's age (in years)	$\leq 30$	57	14.20	35.74 $\pm$ 4.85
	30-35	176	44.00	
	35-40	118	29.50	
	40-45	34	8.50	
	$\geq 45$	15	3.80	
Mother's education	Illiterate	99	24.75	-
	Primary	110	27.50	
	Secondary	165	41.25	
	Higher secondary	19	4.75	
	Others	7	1.75	
Mother's profession	Housewife	352	88.00	-
	Job	48	12.00	
Parental migration	Not migrated	193	48.25	-
	Migrated	207	51.75	

Note: 'SD, standard deviation'.

### ***Socio-demographic characteristics of the LBC ( $N_1 = 207$ )***

Background characteristics of the LBC are presented in Table 2 and found that more than half (51.75%) of the students were LBC. Around two-fifth respondents' fathers were migrant ( $n=151$ , 72.95%) and a few respondents' mothers were also migrant ( $n=10$ , 4.83%). Most of the parents ( $n=118$ , 57%) had migrated for a long time ( $\geq 84$  months, mean time = 106.57 months) and they meet to their children very often ( $n=113$ , 54.59%) by six months (mean time = 6.31 months). The respondents stated that economic constraints were major cause of migration; most of the respondents' ( $n=159$ , 76.80%),

fathers or mothers were migrated due to poverty family loan and poor housing condition ( $n=119$ , 57.49%). When the parents were migrated, most of their children were been living with others relatives ( $n=125$ , 60.39%) except grandparents and they had to performed household works ( $n=115$ , 55.56%). Almost all LBC ( $n=154$ , 74.40%) expressed their desire to stay with their parents. The higher portion of LBC (72.95%) said that they are socially safe, and they have taken tiffin in schools (52.66%). Academic performance of some LBC was good ( $n=60$ , 28.99%) though they worked beside study (77.29%), and sent money by their migrated parents were sufficient for their educational expense ( $n=125$ , 60.39%).

**Table 2.** Background characteristics of the left behind children, ( $N_1 = 207$ )

Characteristics	Levels	Frequency ( <i>n</i> )	Percentage (%)	Mean $\pm$ SD
Parental migration status	Mother	10	4.83	-
	Father	151	72.95	
	Both	46	22.22	
Duration of migration (in months)	$\leq 12$	23	11.11	106.57 $\pm$ 54.71
	13-36	18	8.70	
	37-60	31	14.98	
	61-84	17	8.21	
	$\geq 84$	118	57.00	
Cause of migration	Poverty	92	44.44	
	Work unavailable	25	12.08	-
	Loan	22	10.63	
	Both poverty and work unavailable	51	24.64	
	Others	17	8.21	
Present guardian	Grandfather	54	26.09	-
	Grandmother	28	13.53	
	Others	125	60.39	
Doing household works	No	92	44.44	-
	Yes	115	55.56	
Housing condition	Hut	119	57.49	
	Semi concrete	47	22.71	-
	Full concrete	41	19.81	
Parents meeting duration (in months)	$\leq 3$	72	34.78	6.31 $\pm$ 4.919
	3-6	81	39.13	
	9-12	8	3.86	
	$\geq 12$	46	22.22	
Desire to stay with parents	No	53	25.60	-
	Yes	154	74.40	
Sending money is enough for study	No	82	39.61	-
	Yes	125	60.39	
Think socially safe	No	56	27.05	-
	Yes	151	72.95	
Eating tiffin in schools	No	98	47.34	-
	Yes	109	52.66	
Working beside study	No	160	77.29	-
	Yes	47	22.71	
Having family loan	No	48	23.19	-
	Yes	159	76.81	
Present result compared to previous	Not good	46	22.22	
	Fairly	101	48.79	-
	Good	60	28.99	
Eating food three times in a day	No	63	30.43	-
	Yes	144	69.57	

Note: 'SD, standard deviation'.

***Health and nutrition-related characteristics of the LBC***

Health related characteristics of the LBC are presented in Table 3. Around 85.02% of the LBC were found at normal weight (mean BMI Z-score = -0.28), their weights were 35-45 kilogram (48.79%, mean weight = 45.23 kilogram), and their heights were 1.40-1.60 meter (68.12%, mean height = 1.53 meter). Almost all LBC replied that their parental migration has impacted bad effects on their health (80.19%), they were suffering from different types of health complications (20.29%), and importantly they were mentally depressed (65.22%). Most of the respondents were taken healthcare services from village doctors (52.66%) though modern healthcare facilities were available (69.57%). Most of the respondents (73.43%) did not have sanitary latrines in the study areas.

**Table 3.** Health related characteristics of the left behind children, ( $N_1 = 207$ )

Characteristics	Levels	Frequency	Percentage	Mean $\pm$ SD
<b>Bad effect on health</b>	No	41	19.81	-
	Yes	166	80.19	-
<b>Presently suffering from health complications</b>	No	165	79.71	-
	Yes	42	20.29	-
<b>Available modern healthcare services</b>	No	63	30.43	-
	Yes	144	69.57	-
<b>Healthcare service places</b>	Hospital	34	16.43	-
	Clinic	37	17.87	-
	Homeopathic doctor	14	6.76	-
	Village doctor	109	52.66	-
	Kabiraj	13	6.28	-
<b>Depression for parental migration</b>	No	72	34.78	-
	Yes	135	65.22	-
<b>Weight (in kilogram)</b>	<35	26	12.56	45.23 $\pm$ 9.28
	35-45	101	48.79	
	45-55	55	26.57	
	>55	25	12.08	
<b>Height (in meter)</b>	1.10-1.40	18	8.70	1.53 $\pm$ 0.10
	1.40-1.60	141	68.12	
	1.60-1.75	48	23.18	
<b>BMI Z-scores</b>	Under-weight	18	8.70	-0.28 $\pm$ 0.10
	Normal weight	176	85.02	
	Over-weight and obese	13	6.28	
<b>Having sanitary toilet</b>	No	152	73.43	-
	Yes	55	26.57	-

Note: 'SD, standard deviation', 'BMI, body mass index'.

***Associations between 'socio-demographic' factors and LBC status of the respondents***

The  $\chi^2$  – test has identified that respondents' age ( $p < 0.08$ ), number of siblings ( $p < 0.007$ ), fathers' education ( $p < 0.004$ ), profession ( $p < 0.000$ ), mothers' age ( $p < 0.08$ ), education ( $p < 0.02$ ), profession ( $p < 0.000$ ), housing condition ( $p < 0.073$ ), working status beside study ( $p < 0.003$ ), having family loan ( $p < 0.059$ ), and present academic result ( $p < 0.008$ ) are significantly associated with the LBC status (Table 4).

**Table 4.** Associations between demographic factors and LBC and non-LBC

Characteristics	Levels	Non-LBC (%)	LBC (%)	Overall (%)	p-values
Age (in years)	≤12	24(12.44)	39(18.84)	63(15.75)	0.080
	13-15	141(73.06)	130(62.80)	271(67.75)	
	≥16	28(14.50)	38(18.36)	66(16.50)	
Number of siblings	1-2	83(43.01)	113(54.59)	196(49.00)	0.007
	3-4	83(43.01)	82(39.61)	165(41.25)	
	>4	27(13.98)	12(5.80)	39(9.75)	
Father's age (in years)	≤35	15(7.77)	21(10.14)	36(9.00)	0.193
	35-40	54(27.98)	74(35.75)	128(32.00)	
	40-45	59(30.57)	63(30.43)	122(30.50)	
	45-50	33(17.10)	26(12.56)	59(14.75)	
	≥50	32(16.58)	23(11.11)	55(13.75)	
Father's education	Illiterate	60(31.09)	59(28.50)	119(29.75)	0.004
	Primary	48(24.87)	53(25.60)	101(25.25)	
	Secondary	49(25.39)	79(38.16)	128(32.00)	
	Others	36(18.65)	16(7.73)	52(13.00)	
Father's profession	Job	19(9.84)	87(42.03)	106(26.50)	<0.001
	Business	44(22.80)	10(4.83)	54(13.50)	
	Agriculture	102(52.85)	38(18.6)	140(35.00)	
	Others	28(14.51)	72(34.78)	100(25.00)	
Mother's age (in years)	≤30	27(13.99)	30(14.49)	57(14.25)	<0.001
	30-35	72(37.31)	104(50.24)	176(44.00)	
	35-40	56(29.02)	62(29.95)	118(29.50)	
	≥40	38(19.69)	11(5.31)	49(12.25)	
Mother's education	Illiterate	51(26.42)	48(23.19)	99(24.75)	0.012
	Primary	56(29.02)	54(26.09)	110(27.50)	
	Secondary	67(34.72)	98(47.34)	165(41.25)	
	Others	19(9.84)	7(3.38)	26(6.50)	
Mother's profession	Housewife	184(95.34)	168(81.16)	352(88.00)	<0.001
	Job	9(4.66)	39(18.84)	48(12.00)	
Housing condition	Hut	93(48.19)	119(57.49)	212(53.00)	0.073
	Semi concrete	63(32.64)	47(22.71)	110(27.50)	
	Full concrete	37(19.17)	41(19.81)	78(19.50)	
Working status beside study	No	123(63.73)	160(77.29)	283(70.75)	0.003
	Yes	70(36.27)	47(22.71)	117(29.25)	
Having family loan	No	61(31.61)	48(23.19)	109(27.25)	0.059
	Yes	132(68.39)	159(76.81)	291(72.75)	
Present result compared to previous	Not good	22(11.40)	46(22.22)	68(17.00)	0.008
	Fairly	97(50.26)	101(48.79)	198(49.50)	
	Good	74(38.34)	60(28.99)	134(33.50)	
<b>Total</b>		<b>193(48.25)</b>	<b>207(51.75)</b>	<b>400(100.00)</b>	

Note: 'LBC, left-behind children'

#### *Associations between 'health- and nutrition-related' factors and LBC status of the respondents*

Again, the  $\chi^2$  – test also confirmed that having health complications ( $p < 0.05$ ), availability of healthcare services ( $p < 0.000$ ), place of healthcare services ( $p < 0.002$ ), suffering from depression ( $p < 0.000$ ), taking meals three times in a day ( $p < 0.022$ ), taking tiffin in schools ( $p < 0.033$ ), BMI Z-score ( $p < 0.013$ ), and having sanitary latrine ( $p < 0.000$ ) are significantly associated with LBC status (Table 5).

**Table 5.** Associations between health factors and LBC and non-LBC

Characteristics	Levels	Non-LBC (%)	LBC (%)	Overall (%)	p-values
<b>Having health complications</b>	No	168(87.05)	165(79.71)	333(83.25)	0.050
	Yes	25(12.95)	42(20.29)	67(16.75)	
<b>Available healthcare services</b>	No	28(14.51)	63(30.43)	91(22.75)	<0.001
	Yes	165(85.49)	144(69.57)	309(77.25)	
<b>Healthcare service places</b>	Hospital	54(27.98)	34(16.43)	88(22.00)	0.002
	Clinic	32(16.58)	37(17.87)	69(17.25)	
	Homeopathic doctor	4(2.07)	14(6.76)	18(4.50)	
	Village doctor	81(41.97)	109(52.66)	190(47.50)	
	Kabiraj	22(11.40)	13(6.28)	35(8.75)	
<b>Suffering depression</b>	No	105(54.40)	72(34.78)	177(44.25)	<0.001
	Yes	88(45.60)	135(65.22)	223(55.75)	
<b>Eating three times in a day</b>	No	39(20.21)	63(30.43)	102(25.50)	0.022
	Yes	154(79.79)	144(69.57)	298(74.50)	
<b>Taking tiffin in schools</b>	No	71(36.79)	98(47.34)	169(42.25)	0.033
	Yes	122(63.21)	109(52.66)	231(57.75)	
<b>BMI Z-scores</b>	Normal weight	145(36.79)	176(85.02)	321(80.25)	0.013
	Others <sup>a</sup>	48(63.21)	31(14.98)	79(19.75)	
<b>Having sanitary toilet</b>	No	106(54.92)	152(73.43)	258(64.50)	<0.001
	Yes	87(45.08)	55(26.57)	142(35.50)	
<b>Total</b>		<b>193(48.25)</b>	<b>207(51.75)</b>	<b>400(100)</b>	

Note: 'LBC, left-behind children', 'BMI, body mass index', 'a, others included under-weighted, over-weight and obese'.

## DISCUSSION

To the best of our knowledge this is the first study which explores the background characteristics of the LBC and non-LBC; migration and health related issues of LBC among left-behind secondary school children; and compares the health status and health related behaviors of the LBC in the Monga areas of Bangladesh. This study considered a good number of variables and identified the factors that are significantly associated with parental migration. This study identified that parental migration has played an important role of having adverse effects on health of the LBC due to lack of monitoring. The children living with their parents is one of the most important determinants of adolescent health behavior and development. In case of Bangladesh, little is known about the health status of the LBC, particularly in the Monga areas. Thus, the findings of this study may be very helpful to make policies for development of LBC's well-being.

The current study found several socio-demographic factors including children's age, number of children, father's education and occupation, mother's age, education and profession, housing condition, working status beside study, having family loan, and academic performance are significantly associated with children's LBC status. At individual level, children's age seemly affect parent's decision to leave their children behind. Adolescent children are more likely to be left-behind than younger ones, but preschoolers are also more likely to be left-behind than their older siblings. One possible reason is that, older children especially children aged > 16 years, are more likely able to take

care themselves if they are left-behind. Sometimes adolescents are left-behind to take care of the remaining family, including their younger siblings (Tong, Yan, & Kawachi, 2019; Li, & Wang, 2015). Another reason for older children being left-behind is the schooling issues of them. In case of the higher number of children, parents do not want to go outside from their destination. This study identified that the parents who have less children ( $\leq 2$  children), they mostly migrated for works.

Again, parental educational status is a significant issue for LBC. Usually less educated persons do not have satisfactory jobs. Consequently, fathers' education, occupation, mothers' age, education and occupation are significantly associated with LBC status. The children whose housing condition is not good, their parents want to have a good housing status and try to have more money and consequently they go outside for better earnings. Sometime to cover family needs their children work outside their study. Family loan is a vital factor of parental migration. Moreover, parental migration can impose financial burdens on family members remaining behind and their LBC try to meet the financial constrains by joining any type of work (Alam et al., 2008). With respect to children's education, it is very common that parents went migrated for work to further their children's education, but their efforts were for nothing. In most cases parental migration affect their children's long-term academic opportunities. Moreover, it results in children's behavioral issues and increased families' financial burdens. These consequences may lead worse school performance and even dropping out, and thus reducing children's life time educational attainment (Wassink & Viera, 2021; Islam et al., 2009).

The health-related factors including children's having health complications, health services availability, place of healthcare services, depression, eating frequency, taking tiffin in school, nutritional status, and having sanitary toilets were significantly associated with the LBC status. When the parents were migrated the LBC did not get proper healthcare services. General observation about the impact of parental migration on children's well-being is 'migration is a double-edged sword'. Parental migration has an independent, long-lasting negative effect on children and poor parent-child connection is strongly associated with children's mental health. In one hand, incomes are seen improving the children's material well-being, but on the other hand, parental absence is perceived to deprive children of emotional support and care that are detrimental to the children's welfare. Usually, only parents can give proper care to their children, but when their parents were not available in their home, the lifestyle of LBC is degraded; their eating times and frequency were not followed properly;

and they do not have sufficient food items as well. In the tiffin period, the LBC do not take tiffin regularly compared to the non-LBC.

## **CONCLUSION**

The parental migration resulted in the LBC's education, and health (both physical and mental). Lengthy separation due to parental migration often disrupts parent-child relationships and results in psychosocial difficulties in LBC as well as their academic performance. Most of the LBC's father migrated, their migration duration was very long, and main cause was poverty. During parental migration most LBC were engaged in household works, and their academic performance was not satisfactory. The LBC wanted to stay with their parents. Most LBC were suffering from depression though their BMI Z-scores were found normal as nutritional status. To better engage of the LBC and promote their mental health, community-based interventions may be helpful. Social leaders as well as school teachers may contribute to LBC's mental development through counseling. Government should take effective policies and programs for the development of LBCs' well-being and education.

**List of abbreviations:** 'Body mass index, BMI', 'Centimeter, cm', 'Kilogram, Kg', 'Left behind children, LBC', 'Standard deviation, SD', 'World Health Organization, WHO'.

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## REFERENCES

1. Akhter, N., & Islam, M. (2019). The Impact of Migration and Migrant Remittances on Household Poverty in Bangladesh. *Asian Development Perspectives*, 10(1), 43-59.
2. Alam, S., Mondal, M.N.I., Rahman, M.R., Kabir, M. (2008). Child Labor Due to Poverty: A Study on Dinajpur District, Bangladesh. *The Social Sciences*, 3(5), 388-391.
3. Botezat, A., & Pfeiffer, F. (2014). The impact of parents migration on the well-being of children left behind—initial evidence from Romania. ZEW-Centre for European Economic Research Discussion Paper(14-029).
4. Chowdhury, M.R.K., Rahman, M.S., Khan, M.M.H., Mondal, M.N.I., Rahman, M.M., Billah, B. (2016). Risk Factors for Child Malnutrition in Bangladesh: A Multilevel Analysis of a Nationwide Population-Based Survey. *J Pediatr.*, 172, 194-201.
5. Cochran, W. G. (1977). Sampling techniques: John Wiley & Sons.
6. Cortes, R. (2008). Children and Women Left Behind in labour sending countries: an appraisal of social risks. New York: United Nations Children's Fund (UNICEF), Policy, Advocacy and Knowledge Management Section, Division of Policy and Practice.
7. Dillon, M., & Walsh, C. A. (2012). Left behind: The experiences of children of the Caribbean whose parents have migrated. *Journal of Comparative Family Studies*, 43(6), 871-902.
8. Duan, C., & Zhou, F. (2005). A study on children left behind. *Popul Res*, 29(1):29-36.
9. Elahi, K. M., & Ara, I. (2008). Understanding the Monga in northern Bangladesh. Academic Press and Publishers Library, Dhaka; Bangladesh.
10. Flegal, K. M., & Cole, T. J. (2013). Construction of LMS parameters for the Centers for Disease Control and Prevention 2000 growth charts. *Natl Health Stat Report*, 11(63), 1-3.
11. Gao, Y., Li, L. P., Kim, J. H., Congdon, N., Lau, J., & Griffiths, S. (2010). The impact of parental migration on health status and health behaviours among left behind adolescent school children in China. *BMC public health*, 10(1), 1-10.
12. Givaudan, M., & Pick, S. (2013). Children left behind: how to mitigate the effects and facilitate emotional and psychosocial development. *Child abuse & neglect*, 37(12):1080-90.
13. Hu, X., Cook, S., & Salazar, M. A. (2008). Internal migration and health in China. *The Lancet*, 372(9651), 1717-1719.
14. Islam, M. M., Khan, M. N., & Mondal, M. N. I. (2019). Does parental migration have any impact on nutritional disorders among left-behind children in Bangladesh? *Public health nutrition*, 22(1), 95-103.

15. Islam, M.M., Mondal, M.N.I., Ali, M.A., Rahman, M.M. (2009). School Attendance of Child Labor: A Pilot Survey in Gaibandha District of Bangladesh. *International NGO Journal*, 2009; 4(4), 109-115.
16. Keung Wong, D. F., Li, C. Y., & Song, H. X. (2007). Rural migrant workers in urban China: living a marginalised life. *International Journal of Social Welfare*, 16(1), 32-40.
17. Li, C. H., & Wang, Z. B. (2015). Associations between parents' migration and time arrangement of left-behind children: evidence from a big data analysis in China. *South China Population*, 30(1), 34-46.
18. Lu, Y., & Treiman, D. J. (2011). Migration, remittances and educational stratification among blacks in apartheid and post-apartheid South Africa. *Social forces*, 89(4),1119-1143.
19. McAuliffe, M., Khadria, B., & Bauloz, C. (2019). World migration report 2020: International Organization for Migration, Geneva, Switzerland, 2020.
20. NIPORT. (2020). Bangladesh demographic and health survey 2017-18. National Institute of Population Research and Training (NIPORT), Dhaka; Bangladesh.
21. Siriwardhana, C., Wickramage, K., Siribaddana, S., Vidanapathirana, P., Jayasekara, B., et al. (2015). Common mental disorders among adult members of 'left-behind' international migrant worker families in Sri Lanka. *BMC public health*, 15(1), 1-9.
22. Su, S., Li, X., Lin, D., Xu, X., & Zhu, M. (2013). Psychological adjustment among left- behind children in rural C hina: the role of parental migration and parent–child communication. *Child: care, health and development*, 39(2), 162-170.
23. Tong, L., Yan, Q., & Kawachi, I. (2019). The factors associated with being left-behind children in China: Multilevel analysis with nationally representative data. *Plos one*, 14(11), e0224205.
24. Wassink, J. T., & Viera, J. A. (2021). Does Parental Migration During Childhood Affect Children's Lifetime Educational Attainment? Evidence From Mexico. *Demography*, 58(5), 1765-1792.
25. Wen, M., & Lin, D. (2012). Child development in rural China: Children left behind by their migrant parents and children of nonmigrant families. *Child development*, 83(1), 120-136.
26. Wen, M., Su, S., Li, X., & Lin, D. (2015). Positive youth development in rural China: The role of parental migration. *Social Science & Medicine*, 132, 261-269.
27. Wen, Y., Wang, J., Liu, R., Yao, Y., Jin, Y., & Zhao, C. (2008). Study on health status of left behind children in rural southern Anhui. *Mod Prev Med*, 35(4), 690-692.

28. Yue, A., Bai, Y., Shi, Y., Luo, R., Rozelle, S., Medina, A., & Sylvia, S. (2020). Parental migration and early childhood development in rural China. *Demography*, 57(2), 403-422.
29. Yueping, S., & Yaoguang, Z. (2009). Parental migration, child health and healthcare services utilization in rural China. *Population Research*, 33(6), 57.
30. Zhao, C., Wang, F., Li, L., Zhou, X., & Hesketh, T. (2017). Long-term impacts of parental migration on Chinese children's psychosocial well-being: mitigating and exacerbating factors. *Social psychiatry and psychiatric epidemiology*, 52(6), 669-677.