

Factors associated with parental stress among mothers of school-age children in rural Bangladesh

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ABSTRACT

Given the paucity of studies on parental stress among mothers with school-age children in low- and middle-income countries (LMICs), this cross-sectional study aimed to examine the association between maternal parental stress and child characteristics including behavioral and psychosocial difficulties and growth status in rural Bangladesh. A subset of data from a five-year follow-up study of a cluster randomized controlled trial that evaluated the effectiveness of the MCH handbook in Narail District, Bangladesh was used. Interviews using structured questionnaires of 617 mother-child dyads from September to November 2023 were analyzed. Maternal stress was measured with the Parental Stress Scale (PSS). Multiple linear regression analysis was performed to understand the relationship between the PSS scores and children's factors including Strengths and Difficulties Questionnaire (SDQ)-Total Difficulties Score (TDS), growth status and gender. The analyzed covariates included the mothers' socio-demographics and distribution of the maternal and child health (MCH) handbook. Results showed that higher SDQ-TDS and stunting were significantly associated with higher maternal parental stress. Distribution of the MCH handbook had a modifying effect on the SDQ-TDS factors. Interaction of SDQ-TDS and MCH handbook use was statistically significant (interaction $p=0.012$). In the subgroup analysis of a multiple regression model, the partial regression coefficient of SDQ-TDS was 0.308 ($p<0.001$) in the MCH handbook group and 0.542 ($p<0.001$) in the non-MCH handbook group. PSS among mothers in nuclear families and those with more monthly expenditure were significantly higher in covariate variables. Results suggested that children's behavioral and psychosocial difficulties and stunting were associated with the mother's parental stress. Although SDQ-TDS was the factor most affecting maternal parental stress, having the MCH handbook moderated its influence on parental stress level. More research is needed to understand effective support for mothers experiencing higher stress due to their children's difficulties and growth, including the role of the MCH handbook.

Keywords:

Bangladesh; child behavioral and psychosocial difficulties; maternal parental stress; school-age children

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INTRODUCTION

Parental stress is a psychological reaction to the demands associated with the role of parenting.¹ All parents experience parental stress to varying degrees; however, the accumulation of daily hassles can become a major source of stress for parents.² Higher levels of parenting stress during child rearing can lead not only to parental mental health problems but also negatively affect parenting itself.¹ Many studies focus on maternal parental stress regarding younger-age children,³ but parental stress is not restricted to parents with infants and toddlers. Parental stress may increase when the child becomes school-age, especially when a child does not perform as parents expect physically, academically, emotionally or behaviorally.⁴ Children could be vulnerable during the transition to formal education, and parents might have concerns that would affect their parenting.⁵ Once children enter school, parents have more opportunities to compare their children with others in terms of their growth and behavioral problems, which might create concerns for the mothers that would hence affect their level of parental stress. In a previous qualitative study, compared to urban contexts, mothers in rural Bangladesh expressed greater concern about their children's growth. They cited the potential consequences of improper growth as poor education, job attainment and decreased marriage prospects.⁶ Children's growth during school age might affect maternal stress. However, such factors have not yet been analyzed in the form of maternal parental stress studies in Bangladesh. Past studies also reported the relationship between parental stress and behavioral characteristics of children.⁷ In Bangladesh, there are limited studies that assessed behavioral and psychosocial issues of children and youth.⁸ Moreover, studies that specifically assessed children's

behavioral and psychosocial difficulties as factors of maternal parental stress are also limited in Bangladesh.

Parental stress is multifactorial. Past studies have shown that parents' age, marital status, gender of child,^{9,10} employment status,⁹ family type,¹⁰ and income^{10,11} are associated with parental stress. However, a literature review suggests that there is no consistency and evidence demonstrating an association between income, maternal age, gender of child and parental stress.³ For example, previous research highlighted the link between older parents and parenting stress,^{9,10} meanwhile studies of a relatively wide age range (e.g., 16 to 40 years) found no association with parental stress, and studies of a narrower age range indicated a negative association.³ Concerning the child's gender, while it was not a relevant factor for parental stress in most studies, it could act as a moderator in the relationship between specific factors and parental stress.³ Higher parental stress among parents of boys was confirmed.^{9,10}

While studies on parental stress have increased globally over the past four decades,¹² evidence from non-clinical populations in low-and-middle-income countries (LMICs) like Bangladesh, studies related to maternal parental stress are still limited. As is the case elsewhere, Bangladeshi studies about parental stress have also been targeting at-risk populations. However, there are few studies on maternal parental stress, using population-based studies in rural areas. Additionally, most past studies used general stress questionnaires, instead of focusing on measuring "parental stress" specifically.

Thus, this study aimed to identify factors associated with parental stress among mothers with non-clinical school-age children in rural Bangladesh with special attention to children's

characteristics including behavioral and psychosocial difficulties, current growth, and gender. Mothers' socio-demographics were examined as covariates. In LMICs like Bangladesh, health service is provided scarcely particularly for low-risk populations; therefore, it is essential to develop preventive support strategies by targeting non-clinical populations. Addressing maternal parental stress correlates with improvement in their well-being and prevention of future adverse outcomes for both parenting and child behavioral and psychosocial development. Investigating factors associated with maternal parental stress of school-age children in rural Bangladesh could inform the design of a parental support program with specific subgroups of mothers who should be prioritized in community-based initiatives in similar rural areas of Bangladesh.

METHODS

Study design, population, site and procedure

This study employed a cross-sectional design and analyzed a subset of data from a five-year follow-up study¹³ of a cluster randomized controlled trial that evaluated the effectiveness of the MCH handbook in Lohagora Upazila, Narail District, in the southwestern region of Bangladesh in 2017-2018.¹⁴ Structured interviews were conducted during the time period, September to November 2023. The study details and participant recruitment are provided elsewhere.^{13,14} In the follow-up study, based on sample size calculation using G*Power v.3.1.9.6,¹⁵ 617 mother-child dyads (308 from the MCH handbook-distributed area and 309 from the control area) in nine unions were analyzed and this study used the same 617 dyads' dataset.¹³

Measurements

The primary outcome of this study was measured using the Parental Stress

Scale (PSS). PSS was designed to measure subjective stress arising specifically from parenting, and it was developed by Barry and Jones.¹⁶ It has an 18-item brief self-report instrument with a 5-point Likert-type scale. Few studies that used PSS in Bangladesh were found. Therefore, we conducted forward-backward translation with Bangladeshi researchers in related fields. In our previous study with the same dataset, we used only 6 items (3, 9, 10, 12, 13, and 16) of PSS after explanatory factor analysis and confirmatory factor analysis due to the lack of satisfactory level of Cronbach's alpha.¹³ This study also used those 6 items in a one-factor structure as we used the same dataset. Cronbach α with this one-factor structure of PSS was 0.84.¹³

The primary explanatory variable was the parent-reported Strengths and Difficulties Questionnaire (SDQ), which captures children's behavioral and psychosocial difficulties. It was developed by Goodman¹⁷ and validated to be used in Bangladesh.¹⁸ SDQ has 25 questions with 5 subscales and is scored with a three-point scale. SDQ-Total Difficulties Score (TDS) (0-40) was generated by summing scores from all the scales except the prosocial scale. Higher SDQ-TDS indicates that the children have more behavioral and psychosocial difficulties. In this study, Cronbach's α for SDQ-TDS was 0.53.

Other explanatory variables were children's growth and gender. Weight and height were measured following the World Health Organization (WHO) standard procedure and were converted to z scores in this study.¹⁹ Furthermore, school enrollment was collected by a structured questionnaire in this study as children's background information.

Covariates were mothers' demographic and socioeconomic variables including current age, marriage status, family structure (nuclear family or extended family), whether currently living with the husband or not, number of children, occupation, and monthly

expenditure as grouped based on the average of non-food/food expenditure of rural Bangladesh in the Household Income and Expenditure Survey (HIES)²⁰ of 2022 (as $\leq 13,000$ BDT (=0) versus $>13,000$ BDT (=1)). As background information for mothers, having a boy among children was also examined. Due to the sampling methods in this study,¹³ the information regarding past MCH handbook distribution (MCH handbook intervention group versus control group) was also included as a covariate. This was intended to control the past MCH handbook distribution's effect on the current maternal parental stress.

Data analysis

Data were analyzed using EZR version 1.6²¹ and R version 4.2.3.²² The Height-for-Age Z scores (HAZ), Weight-for-age Z scores (WAZ), and Body Mass

Index-for-age Z scores (BMIZ) were calculated from measurements using the R package “anthroplus”.²³ Socioeconomic and demographic characteristics of the participants were calculated by frequencies and percentages. Pearson's correlation coefficients and t-test were used to examine the relationship between the total score of the PSS and SDQ-TDS, and the maternal and child socioeconomic demographic data. Multiple linear regression analysis was conducted to determine to what extent independent variables explained the PSS and which factors may significantly affect maternal parental stress. No multicollinearity among variables was detected. Effect modification was also examined between MCH handbook distribution and explanatory factors. A p-value less than 0.05 was considered as the level of significance.

RESULTS

Table 1. Characteristics of mother–child dyads (N=617)

Characteristics	Group	Total n (%)
Mother's background		
Current age (years)	Mean (SD)	29.10 (4.89)
	20-29	356 (57.7)
	30-39	238 (38.6)
	40+	23 (3.7)
Marriage status	Married	608 (98.5)
	Divorced/Widowed	9 (1.5)
Family structure	Nuclear family	482 (78.1)
	Extended family	135 (21.9)
Live with husband	Yes	448 (72.6)
	No	169 (27.4)
Occupation	Housewife	609 (98.7)
	Others (employed)	8 (1.3)
Monthly expense (BDT)	Mean (SD)	14805 (3098)
Monthly expense (BDT)	≤ 13000	208 (33.7)
	>13000	409 (66.3)
Number of children	Mean (SD)	2.06 (0.90)
	1	173 (28.0)
	2	288 (46.7)
	3	114 (18.5)
	4	34 (5.5)

Characteristics	Group	Total n (%)
	5	7 (1.1)
	6	1 (0.2)
Having at least one boy in children	Yes	446 (72.3)
	No	171 (27.7)
MCH handbook distribution	Yes	308 (49.9)
	No	309 (50.1)
Index children's background		
Age in month	Mean (SD)	74.33 (4.04)
Gender	Boy	317 (51.4)
	Girl	300 (48.6)
Attended school	Yes	522 (84.6)
	No	95 (15.4)
SDQ-TDS	Mean (SD)	8.91 (3.51)
	Boys' Mean (SD)	9.25 (3.83)
	Girls' Mean (SD)	8.55 (3.11)
SDQ-TDS	Low (0-13)	566 (91.7)
	Borderline (14-16)	29 (4.7)
	High (17-40)	22 (3.6)

Abbreviation: SD - standard deviation, BDT – Bangladeshi Taka, SDQ – Strength and Difficulties Questionnaire, TDS – Total Difficulties Score

A total of 617 Bangladeshi mother-child dyads were included in the analysis. Mothers' characteristics are shown in Table 1. The mean (SD) age of the mothers was 29.10 (4.89), ranging from 21 to 46 years old. About 98.5% of mothers were married and 98.7% of mothers were housewives. One in five mothers (21.9%) lived with their extended families. Among married mothers, about a quarter of them did not live with their husbands due to migrant work either domestically or overseas. Only 1.3% of mothers were employed. The mean of the monthly expense was 14,805 BDT (about 135 USD). The monthly expenditure was dichotomized into two groups: the lower expenditure (≤ 13000 BDT) and the higher expenditure (>13000 BDT), which were 33.7 % and 66.3% respectively. The mean number of children was 2.06 (0.90),

ranging from 1 to 6 children. About 70% of mothers had a boy among their children. Table 1 also shows the index children's characteristics. The mean age of the index children was 74.33 (4.04) months and 51.4 % of the index children were boys. Additionally, 84.6% of the index children started attending school.

In this study, SDQ-TDS was used as a continuous variable to examine the relationships with PSS. The mean of SDQ-TDS was 8.91 (3.51) and was significantly higher in index boys than girls ($p=0.0138$). For descriptive purposes, the SDQ-TDS was categorized into three groups: low (0-13), borderline (14-16) and high (17-40) as proposed by the scale developer¹⁷ and used in a recent study in Bangladesh.²⁴ About 3.6 % of index children had high SDQ-TDS and another 4.7% had borderline scores.

Table 2. Growth status of index children (N=617)

Growth status	Group	Total n (%)
Boys		
Stunting (HAZ<-2)	Not stunting	280 (88.3)
	Stunted	37 (11.7)
Underweight (WAZ<-2)	Not underweight	260 (82.0)
	Underweight	57 (18.0)

Growth status	Group	Total n (%)
Obesity (BMIZ >2)	Not obesity	308 (97.2)
	Obesity	9 (2.8)
Thinness (BMIZ <-2)	Not thinness	274 (86.4)
	Thinness	43 (13.6)
Girls		
Stunting (HAZ<-2)	Not stunting	266 (88.7)
	Stunting	34 (11.3)
Underweight (WAZ<-2)	Not underweight	261 (87.0)
	Underweight	39 (13.0)
Obesity (BMIZ >2)	Not obesity	298 (99.3)
	Obesity	2 (0.7)
Thinness (BMIZ <-2)	Not thinness	251 (83.7)
	Thinness	49 (16.3)
Total		
Stunted (HAZ<-2)	Not stunted	546 (88.5)
	Stunted	71 (11.5)
Underweight (WAZ<-2)	Not underweight	521 (84.4)
	Underweight	96 (15.6)
Obesity (BMIZ >2)	Not obesity	606 (98.2)
	Obesity	11 (1.8)
Thinness (BMIZ <-2)	Not thinness	525 (85.1)
	Thinness	92 (14.9)

The growth status of index children is presented in Table 2. About 11.7%, 18.0%, and 2.8% of boys' growth status fell into the categories of stunting (HAZ<-2), underweight (WAZ<-2), and obesity (BMIZ >2), respectively. Among girls,

11.3%, 13.0%, and 0.7% fell into these categories, respectively. In total, 11.5% of them exhibited stunting, 15.6% of them were classified as underweight and 1.8% of them exhibited obesity.

Table 3. Bivariate analysis of Parental Stress Scale (PSS) across various characteristics of mother–child dyads (N=617)

Variables	Group	n (%)	PSS Score (6 items)		p-value	Pearson's correlation	p-value
			Mean	SD			
Characteristics of mothers							
Current age (years)		617 (100.0)				0.072	0.076
Marriage status	Married	608 (98.5)	13.82	4.29	0.962		
	Divorced/Widowed	9 (1.5)	13.89	5.44			
Family structure	Nuclear family	482 (78.1)	14.12	4.53	0.001*		
	Extended family	135 (21.9)	12.75	3.17			
Live with husband	Yes	448 (72.6)	14.08	4.45	0.013*		
	No	169 (27.4)	13.12	3.80			
Occupation	Housewife	609 (98.7)	13.76	4.25	0.001*		
	Others (employed)	8 (1.3)	18.75	5.55			
Monthly expense (BDT)	<=13000	208 (33.7)	12.88	3.15	<0.001*		
	>13000	409 (66.3)	14.30	4.72			
Number of children		617 (100.0)				0.042	0.299
Having at least one boy in children	Yes	446 (72.3)	14.05	4.30	0.418		
	No	171 (27.7)	13.73	4.31			
MCH handbook distribution [†]	Yes	308 (49.9)	13.54	4.22	0.053		
	No	309 (50.1)	14.10	4.37			
Characteristics of index children							
Gender	Boy	317 (51.4)	13.77	4.30	0.765		
	Girl	300 (48.6)	13.87	4.32			
Attended school	Yes	522 (84.6)	13.87	4.30	0.486		
	No	95 (15.4)	13.54	4.33			
SDQ total difficulties score		617 (100.0)				0.365	<0.001*
Stunting (HAZ<-2)	Not stunting	546 (88.5)	13.60	4.11	<0.001*		
	Stunting	71 (11.5)	15.55	5.27			
Underweight (WAZ<-2)	Not underweight	521 (84.4)	13.62	4.16	0.006*		
	Underweight	96 (15.6)	14.93	4.87			
Thinness (BMIZ <-2)	Not thinness	525 (85.1)	13.75	4.32	0.351		
	Thinness	92 (14.9)	14.21	4.23			

Variables	Group	n (%)	PSS Score (6 items)		p-value	Pearson's correlation	p-value
			Mean	SD			
Obesity (BMIZ >2)	Not obesity	606 (98.2)	13.75	4.22	0.005*		
	Obesity	11 (1.8)	17.45	6.90			

p-value -* significant at $p < 0.05$

[†] Data for this variable extracted from Table 2 of Watabe et al.¹³

Table 4. Factors associated with parental stress among mothers in this study: Multiple linear regression ($N=617$)

Independent variables	B	Standard error	p-value	β
Behavioral and psychosocial difficulties (SDQ- TDS)	0.539	0.063	<0.001*	0.440
Stunting	1.474	0.491	0.003*	0.109
Index children's gender (boy)	-0.444	0.313	0.156	-0.052
Mother's current age	0.002	0.041	0.954	0.003
Extended family	-1.676	0.406	<0.001*	-0.161
Monthly expenditure (>13,000 BDT)	1.921	0.365	<0.001*	0.211
Number of children	-0.151	0.222	0.496	-0.032
MCH handbook (distributed)	1.273	0.853	0.136	0.148
MCH handbook $\times$ SDQ-TDS	-0.223	0.089	0.012*	-0.223
Adjusted R squared	0.199			

Abbreviation: B - partial regression coefficient, β - standardized partial regression coefficient

p-value -* significant at $p < 0.05$

Table 5. Factors associated with parental stress among mothers in this study: Multiple linear regression models by subgroups

Independent variables	B	Standard error	p-value	β	B	Standard error	p-value	β
	MCH handbook (N=308)				Control (N=309)			
Behavioral and psychosocial difficulties (SDQ- TDS)	0.308	0.066	<0.001*	0.258	0.542	0.062	<0.001*	0.434
Stunting	1.430	0.704	0.043*	0.110	1.572	0.698	0.025*	0.113
Index children's gender (boy)	-0.153	0.453	0.737	-0.018	-0.715	0.436	0.102	-0.082
Mother's current age	0.021	0.058	0.714	0.024	-0.017	0.058	0.771	-0.020
Extended family	-1.724	0.563	0.002*	-0.178	-1.675	0.597	0.005*	-0.149
Monthly expenditure (>13,000 BDT)	2.049	0.546	<0.001*	0.224	1.816	0.494	<0.001*	0.201
Number of children	-0.269	0.306	0.379	-0.059	-0.023	0.329	0.945	-0.005
Adjusted R squared	0.125				0.251			

Abbreviation: B - partial regression coefficient, β - standardized partial regression coefficient
p-value -* significant at $p < 0.05$

Table 3 shows the bivariate analysis between PSS and independent variables. Significantly higher PSS was observed among the mothers living in a nuclear family ($p=0.001$), living with their husbands ($p=0.013$), whose status was employed ($p=0.001$), and whose monthly expenses were more than 13000 BDT ($p<0.001$). Mothers' marital status did not show a statistically significant relationship with PSS. Current mother's age and number of children were not significantly correlated with PSS. Table 3 also shows

bivariate analysis between maternal parental stress and the index children's characteristics. A positive correlation was observed between SDQ-TDS and PSS ($r = 0.365$; $p < 0.001$). Significantly higher PSS was observed among children with the following growth status; stunting ($p<0.001$), underweight ($p=0.006$) and obesity ($p=0.005$). The index child's gender, thinness and school enrollment did not show a statistically significant relationship with PSS.

The contributors to maternal parental stress

When multiple linear regression analysis was conducted, the SDQ-TDS ($B=0.539$, $p<0.001$) and stunting in index children ($B=1.474$, $p=0.003$) remained significant and were associated with PSS as shown in Table 4. The interaction term (MCH handbook $\times$ SDQ-TDS) was significant ($B=-0.223$, $p=0.012$), indicating a modification effect. Therefore, multiple linear regression models were stratified by MCH handbook distribution as shown in Table 5. Stratified models showed that SDQ-TDS predicted maternal parental stress in both groups but with a smaller coefficient among the MCH handbook group ($B=0.308$) than controls ($B=0.542$). Stunting was also significant in both groups. Gender of index children was not associated with PSS. Among covariates, family structure and monthly expense were significantly associated with PSS in both groups, as shown in Table 5. SDQ-TDS contributed the most to maternal parental stress in both models. Other significantly associated independent variables identified in the bivariate analysis such as obesity and mothers' occupation were not included in the multiple regression model due to small numbers. Underweight and cohabitation with husband were not included, as they were associated with stunting and family structure, respectively.

DISCUSSION

In this study, children's behavioral and psychosocial difficulties were the most significant factor affecting maternal parental stress. These results were consistent with previous studies and literature reviews.^{3,7} Higher SDQ-TDS in boys was consistent with the previous study.⁷ Compared to one study targeting non-clinical school children, aged 13-16 years old, in Dhaka, the capital of

Bangladesh,²⁴ children in our study scored lower SDQ-TDS and had lower percentages of both high and borderline scores. About 3.6% of index children had high SDQ-TDS in our study. Compared to the previous study, our children were younger and lived in a rural area. As other Bangladeshi studies have reported, rural parents tend not to notice behavioral problems in younger children as they work hard to grow food or earn money for living, and children also have spaces to roam.²⁵ In addition, large families and neighborly connections, characteristics of rural communities, provide advantages such as fewer hazards in the environment surrounding children.²⁶ Thus, it is possible that the percentage of parents who rate children's behavior as a problem could be lower. Nevertheless, parents should receive parenting information when their children with difficulties are referred for consultation. Interestingly, in our study, effect modification was found between SDQ-TDS and the MCH handbook regarding PSS. Mothers in the group who were given the MCH handbooks were less likely to experience parental stress for their children with behavioral and psychosocial difficulties. Access to the handbook's educational information could help mothers respond to parenting challenges, which may lead to self-efficacy and reduce parental stress, as discussed in the previous study.¹³ The current results suggest that these effects may be particularly pronounced among mothers experiencing behavioral and psychosocial difficulties in their children. Further research is needed to clarify the mechanisms through which the MCH handbook influences parental stress.

In a recent study of healthy school-age children aged 6-10 years (boy's mean age 8.04 (1.42) and girl's mean age 8.04 (1.42)) in Mymensingh, Bangladesh, the nutritional status using the same WHO standard as this study showed underweight, stunting and obesity to be 14.7%, 6.7%, and

4.0% among boys, and 13.3%, 4.8%, and 2.0% among girls.²⁷ Compared to the past study, a larger percentage of stunting and a smaller percentage of obesity were observed in our study. The proportion of obesity in boys was higher than in girls, consistent with the past result. Lohagora Upazila appears to have more rural characteristics compared to Mymensingh, a provincial local city. Thus, it is reasonable that the underweight and stunting percentages would be higher in our study, also considering the lower monthly expenditures in this study compared to the national rural average. Notably, despite a relatively smaller prevalence, obesity was also observed in school-age children in Lohagora, indicating that underweight/stunting and obesity co-existed in Lohagora similarly to a study in urban areas of Bangladesh.²⁸

In our study, mothers who had index children with stunting had higher PSS in the multiple regression analysis. Previous studies also found an association between stunting in children and mothers' psychological distress.^{29,30} In our univariate analysis, mothers who had index children with obesity had higher PSS. A past study showed the association between children's obesity-related behaviors including fast food consumption and lack of physical activities and parent-perceived stress.³¹ Mothers may feel more stress when acknowledging unhealthy behaviors of children with obesity. Future research should explore how children's obesity affects mother's perception and its relationship with parental stress using a larger sample size of children. This study suggests that either maternal parental stress could be related to a child's growth in terms of both stunting and obesity risks, or having a child with growth problems could be negatively associated with maternal parental stress. Further longitudinal studies examining the relationship between parental stress and children's growth status will be needed.

In our study, mothers who lived in nuclear families reported more parental stress, which supported a previous study.¹⁰ PSS was also higher among mothers who were employed and working in the univariate analysis. This was not consistent with a previous study using PSS in Portugal.⁹ In a Bangladeshi study conducted in the same Khulna Division, employment status was not associated with parental stress.¹⁰ In our study, only 8 (1.3%) mothers were employed; thus, the number is too small for drawing conclusions. However, considering that the tradition in rural Bangladesh is that women mainly shoulder the housework burden, employed women may therefore face more challenges with time management. In this context, the feeling of being less in control of their lives may relate to maternal parental stress.

In our descriptive data, out of 169 (27.4%) mothers who did not cohabitate with their husbands, 160 of them were left behind by the migrant worker husbands domestically or overseas. An increase in male labor migration in Bangladesh has been reported, and this trend has been accelerating.³² A previous study showed that wives left behind by their husbands due to their migrant work tended to be more susceptible to psychosocial stress, and that is buffered by extended family support.³³ In our study, however, the parental stress was higher among mothers living with their husbands than those not living with their husbands in the univariate analysis. In the context of Bangladesh, wives are often expected to support their husbands rather than receive their assistance in parenting, which may lead to an increased level of wives' stress. Another issue that could be considered, related to the presence of the husband, is intimate partner violence in Bangladesh. Almost 70% of ever-married women experienced violence by their husbands in their lifetime.³⁴

In order to understand the economic condition, monthly household expenditure was applied as a proxy for income. The

average monthly expenditure of households was much lower than the average rural monthly household expenditure, 26,207 BDT, in the latest HIES 2022.²⁰ While economic growth is accelerating in Bangladesh, Lohagora is a typical agricultural area where the composition of the rural industries and economic conditions have not changed very much. Mothers need to meet their families' needs beyond food self-sufficiency, and this could be a source of mothers' stress.

The main findings of this study indicate that the factors most strongly influencing parental stress among mothers of school-age children in rural Bangladesh were the child's behavioral and psychosocial difficulties and stunting. Furthermore, the MCH handbook had a modifying effect on the factor of child's behavioral and psychosocial difficulties. The positive association between maternal parental stress and the child's behavioral and psychosocial difficulties was significantly weaker in the MCH handbook group compared to the non-MCH handbook group. Longitudinal studies are needed to understand how the MCH handbook alleviates parental stress among mothers of children with behavioral and psychosocial difficulties, as well as to explore further mechanisms linking stunting with parental stress.

Limitations

Several limitations of this study can be mentioned. First, this study could only demonstrate an association between certain factors related to index children and mothers' socio-demographic characteristics and maternal parental stress. Causality could not be precluded because this study was a cross-sectional study. Second, this study was conducted only in one upazila of a district; hence, any generalizations based on the results would be limited. Third, Cronbach's alpha for SDQ was relatively low in this study. Fourth, although this

study was a cross-sectional study, the MCH handbook distribution variable was analyzed due to the sampling method applied in this study and to control for the past MCH handbook's effect on current maternal parental stress. As a previous study suggested, further research will be needed on how much the MCH handbook contributed to alleviating maternal parental stress.¹³ Fifth, this study did not use all items of the PSS due to low Cronbach coefficients and the resulting factor analysis.¹³ Therefore, there are limitations to the comparison of this study with previous studies using PSS.

RECOMMENDATIONS

Children's behavioral and psychosocial difficulties and growth status (stunting) are linked to higher parental stress among mothers with school-age children in rural Bangladesh. Moreover, the correlation between maternal parental stress and children's behavioral and psychosocial difficulties was significantly different depending on the MCH handbook distribution. Nuclear family status and higher monthly household expenditures were also associated with maternal parental stress in the multiple regression model. The results of this study are expected to contribute to designing future interventions, including providing appropriate parenting information to those with support needs. For example, utilizing health centers or other community resources to create accessible spaces where mothers—those who perceive parental stress, such as behavioral issues or growth (particularly stunting) in their school-age children, or those in nuclear families with limited support—can seek consultation more easily. Furthermore, additional research is needed to clarify the relationship between the MCH handbook and parental stress.

AUTHOR CONTRIBUTIONS

YW: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. SEH: Conceptualization, Investigation, Project administration, Supervision, and Writing – review & editing. BKD: Conceptualization, Investigation, Project administration, and Writing – review & editing. AK: Conceptualization, Investigation, Project administration, and Writing – review & editing. MN: Conceptualization, Formal analysis, Methodology, Supervision, and Writing – review & editing. RGT: Conceptualization, Writing – review & editing. RM: Conceptualization, Methodology, Supervision, and Writing – review & editing.

ETHICAL CONSIDERATION

This study was approved by the Ethics Committee of the Bangladesh Medical Research Council (BMRC) on September 11, 2023 (Registration number: 53702052023). Written informed consent was obtained from all participants prior to the interviews.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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