**Research Paper**

# Childhood cerebral palsy: Sociodemographic profiles and birth practices in urban slum dweller mothers in Rajshahi Metropolis, Bangladesh

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***ABSTRACT:*** *A cross-sectional survey using a structured questionnaire was conducted from August 2019 to January 2020 in 15 urban slum areas of Rajshahi Metropolis to collect data on sociodemographic profiles (SDPs), birth practices and the incidence of childhood cerebral palsy (CP) in a total of 361 respondents. Results demonstrate mothers of >30 years constitute the dominant group (33.0%), age at marriage of a bulk majority mothers (72.9%) fell within 15 years, illiteracy predominated (49.3%) as compared to primary (33.5%) and secondary (17.2%) levels, where house wives (58.4%) constituted the major occupation in comparison with the day labourers (33.0%), service holders (3.6%), unemployed (2.8%) and garments workers (2.2%). Nuclear family (71.2%) dominated over the joint family and almost half of the people (42.4%) belonged to low family income group (BDT 2,001-5,000). Despite medical check-ups, tetanus toxoid vaccines and pre-delivery antenatal cares of higher proportions of the respondents (74.0%, 83.9% and 65.9%, respectively), 68.7% mothers had home deliveries, 72.0% suffered from complications during their deliveries and 80.6% suffered from prolong labour. At the time of the study, a total of 30 children with CP (8.3%) were recorded, majority of whose mothers (80.0%) belonged to low monthly family income. Early age pregnancies (56.7%), most of whom (70.0%) had suffered from prolong labour and frequency of the first child (50.0%) was much higher than that of the second (33.3%) and third (16.7%) children with CP in the families. Awareness of childhood disabilities, postnatal checkup for women who prefer home deliveries and hygienic birth practices, especially for illiterate, poor and house maker women in the slum areas, need to be improved to reduce the incidence of childhood CP in the community.*

***KEYWORDS:*** *Cerebral palsy (CP), Sociodemographic profiles (SDPs), Health-related quality of life (HRQOL), Birth practices, Slum dweller women, Rajshahi Metropolis.*

## I.  INTRODUCTION

Cerebral palsy (CP) is a group of disorders of the development of movement and posture, causing activity limitation, that are attributed to non-progressive disturbances that occurred in the developing foetal or infant brain (Carr *et al*., 2005). CP therefore is caused by damage or abnormal development in the parts of the brain that control movement which can happen before, during, or shortly after birth or in the first few years of life, when the brain is still developing (CDC, 2013).

Numerous studies have explored the relationships between sociodemographic profiles (SDPs) as well as health-related quality of life (HRQOL) and children with CP around the world *viz*., nine EU regions (Colver *et al*., 2010), India (Jain *et al*., 2015), Turkey (Karadog & Bilsin, 2016), Iran (Jalali-Farahani *et al*., 2017) and Nigeria (Olagunju *et al*., 2017; Michael *et al*., 2019). Recent reports from Brazil (da Silva Peixoto *et al*., 2020a, b), Indonesia (Jahan *et. al*., 2020), Greece and Italy (Tsibidaki, 2020), China (Ao *et al*., 2021) and Cameroon (Mangamba *et al*., 2022) further evaluated the associations between SDPs/HRQOL and CP. Accordingly, a huge amount of data report several SDPs, such as age, gender, levels of literacy and education, marital status, occupation and individual's income, to be significantly associated with HRQOL and CP from Dhaka and adjacent areas, Bangladesh (Mahmud *et al*., 2017; Quaderi *et al*., 2019; Al Imam *et al*., 2021).

HRQOL refers to a multi-dimensional subjective perception of individuals that encompasses the physical, emotional, and social components associated with an illness or treatment (Revicki, 1989). However, contemporary interpretations of HRQOL are based on the WHO's definition of health as a state of complete physical, mental, and social well-being and not merely the absence of disease (WHO, 2006). In broad terms, HRQOL may be conceived as the ratio of an individual's actual status over expected status. Several determinants including SDPs could play an important role in the conception of individuals regarding their health status and so, they have a significant influence on HRQOL (Litwin, 2007; Romero *et al.* 2013; Jalali-Farahani *et al.*, 2017). In the present study, SDPs of the respondent mothers, in general, have reflected their HRQOL.

The patterns of birth related practices amongst women from slum populations in Dhaka (Hoque & Selwyn, 1996; Fronczak *et al.*, 2007; Moran *et al.*, 2009; Choudhury *et al.*, 2012), and Narayanganj and Narsingdi (Jolly *et al.*, 2016) have been reported in the past. But such information, particularly the prevalence of CP in slum areas, is lacking for Rajshahi. Moreover, no literature is available on childhood CP in relation to SDPs/HRQOL in the northern region of Bangladesh. Keeping the aforesaid review in mind, the present cross-sectional study was conducted within urban slum dweller mothers in Rajshahi Metropolis to provide baseline information on SDPs, HRQOL, birth practices and children with CP that will help in developing integrated health care services for this group of people in the country.

## II. METHODOLOGY

**Study area and collection of data:** The study was conducted from August 2019 to January 2020 in the following 15 urban slum areas situated at Meharchandi (TT colony), University Station, Vadra Rail Line (Jamalpur); Vadra, Sree-Rampur (T-Dam), Gugipara (Court), Paltu (Talaimari), Panchoboti Shasan Ghat, Rail Quarters, Seroil, Court Station, Moddho Nowdapara, Shalbagan, BSCIC (Bangladesh Small and Cottage Industries Corporation) and Padma Bank under Rajshahi Metropolis. Descriptive cross sectional research design was considered to find out the impacts of SDPs, birth practices and respondent mothers' profiles on the incidence of children with CP. The CP children aged over 5 years and the mothers of children who were not willing to take part in the study were excluded. A total of 361 slum dweller mothers were available for face to face interviews, which were carried out in the home of the respondents according to their convenience and data were collected using a structured questionnaire. The following information of the respondents was recorded as described by previous workers (Choudhury *et al.*, 2012; Jalali-Farahani *et al.*, 2017; Quaderi *et al.*, 2019 and Al Imam *et al.*, 2021).

**Sociodemographic profiles (SDPs):** Age group, age at marriage, educational status, self and husband's occupation, family types and monthly family income (Table 1).

**Birth practices:** Medical check-up during pregnancy, tetanus toxoid vaccination, child delivery pattern, place of child delivery, complications during pregnancy, pre-delivery antenatal care, instruments used for cutting umbilical cord and decision makers in the family (Table 2).

**Respondent mothers of children with CP:** Age of the mother, birth practices, birth order of the CP child and monthly family income (Table 3).

The raw data were categorized according to the experimental design and finally corresponding frequency and percentage values were calculated for comparisons between groups of variables under study.

## III. RESULTS AND DISCUSSION

*SDPs of the respondent mothers*

Distribution of 361 respondent mothers by their SDPs in slum-dwelling area of Rajshahi Metropolis is presented in Table 1. Results demonstrate that at the time of the survey, mothers of >30 years constitute the dominant group (33.0%), followed by mothers of 26-30 years (24.4%), 21-25 years (21.3%), 16-20 years (19.9%) and ≤15 years (1.4%). Interestingly, age at marriage of a bulk majority of 263 mothers (72.9%) fell within 15 years, while that in the rest 98 mothers (27.1%) was >15 years. Illiteracy, on the other hand, predominated (49.3%) as compared to the educational status of primary (33.5%) and secondary (17.2%) levels, where house wives (58.4%) constituted the major occupation in comparison with the day labourers (33.0%), service holders (3.6%), unemployed (2.8%) and garments workers (2.2%) in the slums under study. With respect to husbands' occupations, day labourers (43.8%) topped the list, followed by rickshaw pullers (22.4%), businessmen (16.1%), service holders (13.8%) and garments workers (3.9%). As regards the family types, nuclear family (71.2%) dominated over the joint family (28.8%). On the basis of monthly family income of the respondents, however, medium income group (BDT 5,001-10,000) was slightly higher (42.7%) than the low-

income group of people (BDT 2,001-5,000; 42.4%), while the high-income group (BDT >10,000) was least frequent (14.9%) in the present study.

**Table 1** Sociodemographic profiles (SDPs) of the urban slum dweller mothers in Rajshahi Metropolis (n= 361)

| Sociodemographic profiles | Frequency | Percentage |
|---|---|---|
| *Age group (yrs)* | | |
| ≤15 | 5 | 1.4 |
| 16-20 | 72 | 19.9 |
| 21-25 | 77 | 21.3 |
| 26-30 | 88 | 24.4 |
| >30 | 119 | 33.0 |
| *Age at marriage (yrs)* | | |
| ≤15 | 263 | 72.9 |
| >15 | 98 | 27.1 |
| *Educational status* | | |
| Illiterate | 178 | 49.3 |
| Primary level | 121 | 33.5 |
| Secondary level | 62 | 17.2 |
| Tertiary level | 0 | - |
| *Occupation* | | |
| House wife | 211 | 58.4 |
| Day labourer | 119 | 33.0 |
| Service holder | 13 | 3.6 |
| Unemployed | 10 | 2.8 |
| Garments worker | 8 | 2.2 |
| *Husbands' occupation* | | |
| Day labourer | 158 | 43.8 |
| Rickshaw puller | 81 | 22.4 |
| Businessman | 58 | 16.1 |
| Service holder | 50 | 13.8 |
| Garments worker | 14 | 3.9 |
| *Family types* | | |
| Nuclear family | 257 | 71.2 |
| Joint family | 104 | 28.8 |
| *Monthly family income (BDT)* | | |
| Low (2,001-5,000) | 153 | 42.4 |
| Medium (5,001-10,000) | 154 | 42.7 |
| High (>10,000) | 54 | 14.9 |

### Birth practices of the respondent mothers

The child delivery practices/patterns of the experimental mothers (Table 2) revealed that despite medical check-ups, tetanus toxoid vaccines and pre-delivery antenatal cares of higher proportions of the respondents (74.0%, 83.9% and 65.9%, respectively), 72.0% mothers suffered from complications during their child deliveries and 80.6% suffered from prolong labour. Over two-third of the mothers had home delivery (68.7%) in contrast to less than one-third who had their child deliveries in hospitals (31.3%), the decision makers of which were husbands (71.5%), both the couples (19.6%) and mother-in-laws (8.9%). In most of the cases, blades (74.0%) were used for cutting the umbilical cords of the newborn babies compared to scissors (26.0%).

**Table 2** Birth practices of the urban slum dweller mothers in Rajshahi Metropolis (n= 361)

| Characteristics of birth practices | Frequency | Percentage |
|---|---|---|
| ***Medical check-up during pregnancy*** | | |
| Yes | 267 | 74.0 |
| No | 94 | 26.0 |
| ***Received tetanus toxoid vaccine*** | | |
| Yes | 303 | 83.9 |
| No | 58 | 16.1 |
| ***Child delivery pattern*** | | |
| Normal delivery with prolong labour | 291 | 80.6 |
| Caesarean delivery | 70 | 19.4 |
| ***Place of child delivery*** | | |
| Home | 248 | 68.7 |
| Hospital | 113 | 31.3 |
| ***Complications during delivery*** | | |
| Yes | 101 | 28.0 |
| No | 260 | 72.0 |
| ***Received pre-delivery antenatal care*** | | |
| Yes | 238 | 65.9 |
| No | 123 | 34.1 |
| ***Instruments used for cutting umbilical cord*** | | |
| Blades | 267 | 74.0 |
| Scissors | 94 | 26.0 |
| ***Decision makers in the family*** | | |
| Husband | 258 | 71.5 |
| Husband and wife | 71 | 19.6 |
| Mother-in-law | 32 | 8.9 |

**Characteristics of respondent mothers having children with CP**

At the time of the survey, a total of 30 children with CP (8.3%) were recorded in 361 slum dweller mothers in Rajshahi Metropolis (Table 3). Early age pregnancies (56.7%) were found to dominate over the normal age (26.6%) and late age (16.7%) pregnancies. Here also, most of the mothers (70.0%) suffered from prolong labour compared to those who had forceps deliveries (30.0%). Frequency of the first CP child (50.0%) was much higher than that of the second (33.3%) and third (16.7%) children with CP in the families. Mothers belonging to low monthly family income group (80.0%) prevailed over the medium income group (20.0%), but the high monthly family income group was absent in this category.

**Table 3 Respondent mothers** giving birth to children with CP in Rajshahi Metropolis (n= 30)

| Characteristics | Frequency | Percentage |
|---|---|---|
| ***Age of the mother (yrs)*** | | |
| Early pregnancy (12-18) | 17 | 56.7 |
| Normal pregnancy (19-35) | 8 | 26.6 |
| Late pregnancy (>36) | 5 | 16.7 |
| ***Birth practices*** | | |
| Normal delivery with prolong labour | 21 | 70.0 |
| Forceps delivery | 9 | 30.0 |
| ***Birth order of the CP child*** | | |
| 1st | 15 | 50.0 |

| | | |
|---|---|---|
| 2nd | 10 | 33.3 |
| 3rd | 5 | 16.7 |
| *Monthly family income (BDT)* | | |
| Low (2,001-5,000) | 24 | 80.0 |
| Medium (5,001-10,000) | 6 | 20.0 |
| High (>10,000) | 0 | - |

Sundrum *et al.* (2005) reported that the prevalence of CP was higher in lower income families than the middle- and upper-income families in India, which is similar to ours. SDPs like gender biasness and family support system were found to affect childhood CP profoundly in India (Jain *et al*., 2015). In Turkey, Karadağ & Bilsin (2016) diagnosed that SDPs of the families and health problems of children with CP were correlated. Analyzing the QOL (quality of life) and its relation to sociodemographics of Northern Israeli families, Schertz *et al.* (2016) observed 17.1% children with CP. SDPs had a significant influence on HRQOL in urban Iranian population (Jalali-Farahani *et al.*, 2017) while mothers of children with CP were found to experience substantial psychological and social problems in Nigeria (Michael *et al*., 2019). Relatively low prevalence of CP (1.37 per 1,000 people) in Brazil was mostly from minor groups, who live in extreme poverty (da Silva Peixoto *et al*., 2020a) and CP children had low birth weight and preterm birth weight ((da Silva Peixoto *et al*., 2020b). The present findings revealed a relatively higher frequency of children with CP in the studied slum areas (8.3%), where SDPs of the respondent mothers corroborate with those mentioned above.

In Indonesia (Jahan *et al*., 2020) and Greece and Italy (Tsibidaki, 2020), however, SDPs seemed to have important predictors of well-being and strengthen parents and families raising a child with CP. Very recently, Mangamba *et al*. (2022) diagnosed 4.86% children with CP in Cameroon, where gender and family income significantly affected this perinatal disability. These findings are in good agreement with the present results except that a higher proportion of childhood CP was prevalent in Rajshahi.

Home deliveries in the majority of mothers in the present study (68.7%) were associated with prolong labour (80.6%), which was much higher than a previous report from Dhaka, where 28.3% prolong and obstructed labour was recorded (Gami *et al*., 1998). From the medical point of view there is risk in the home delivery of a baby. The risk emanates from the unhygienic practices such as the use of unwashed hands or the non use of antiseptic medicines. The absence of necessary medical knowledge and facilities may also prompt the application of force to deliver the child with the probable implication of physical injury both to the mother and the baby (Khan & Islam, 2006). Majority of the respondents (80.5%) had home deliveries in rural women of Dhamrai Upazila in Dhaka district (Begum *et al*., 2013) which, however, was much higher than the present estimate in urban slums of Rajshahi (68.7%).

In an earlier report, Hoque & Selwyn (1996) described the patterns of birth practices amongst 289 women from an urban slum population in Dhaka City, where < 4% of all births was delivered in hospitals and 78% were delivered at home by the local traditional birth attendants. Another report by Fronczak *et al.* (2007) showed that associations exist among maternal characteristics, delivery-related complications, delivery-location, birthing practices and early postpartum morbidity in 1,506 women in slum areas of Dhaka. Moran *et al*. (2009) and Choudhury *et al*. (2012) observed that much higher proportions of slum dweller women in Dhaka (84% and 85%, respectively) gave birth at home. Cultural beliefs and traditional birth practices also reinforced this behaviour, which include home delivery without skilled assistance and mostly landladies served as advisors and decision makers. Data on SDPs and birth practices of the poorest and illiterate women from over 50 slums of Narayanganj City Corporation and Narsingdi Sadar Municipality revealed that a great majority of mothers had suffered from complications during their deliveries at home (Jolly *et al*., 2016).

CP is one of the most common causes of childhood disability in the world, with a frequency of 1.4-2.7/1000 live births (Ref). According to a previous estimate, the incidence of CP in low-middle-income countries varied from 2.9 to 4.0 per 1000 live births (Einspieler *et al*., 1997). Out of 12051 children studied in Narayanganj, 74 cases were confirmed CP, suggesting a frequency of 6.1/1000 (Bin Tabib, 2009), where boys (6.8/1000) had a higher rate than that of girls (5.5/1000). Risk factors included difficulty in delivery (55.4%), low birth weight (40.5%), prolong labour (27%), and preterm delivery (18.9%).

Gladstone (2010) reviewed literature relating to the prevalence, incidence, type and aetiology of CP in low-income settings. Population-based studies provided rates of childhood disability of 31–160/1000. Rates of CP in population-based settings in China and India gave figures of 2–2.8/1000 births, similar to western settings. Hospital-based studies showed increased rates of meningitis, jaundice and asphyxia and lower rates of low birth weight and prematurity in CP populations.

Using Key Information Method (KIM), Murthy *et al*. (2014) assessed the prevalence of CP up to 3.7/1000 children in Bangladesh. According to a conservative estimate, there existed some 260,000 children with CP in Bangladesh (Khandaker *et al*., 2015). However, later population based studies from Bangladesh and

Uganda showed childhood CP of 3.4 and 2.9 per 1000 children, respectively (Kakooza-Mwesige *et al.*, 2017; Khandaker *et al.*, 2019). Our present estimate of 8.3% childhood CP in the urban slums of Rajshahi is much higher than those reviewed above.

Increased risk of having a child with CP in mothers had pregnancy age of 13-19 years (Wu *et al.*, 2011; Begum & Ahmed, 2019) which is similar to this study, where the 1st child was affected in 50% cases and early pregnancy (12-18 years) resulted in over 56% CP children. This is also in agreement with Schneider *et al.* (2018) where babies who were first born had greater chances of having CP.

The associations between SDPs/HRQOL and childhood CP are apparent from several recent studies. A cross sectional survey by Mahmud *et al.* (2017) at the Centre for the Rehabilitation of the Paralysed (CRP), Dhaka, showed that such factors as age, gender, educational attainments, occupation and household monthly income have strong correlation with locomotor disabilities like CP. Similar to CP, other neurological morbidities such as perinatal asphyxia and epilepsy in children at Dhaka Shishu Hospital were mostly related to their parental SDPs and/or HRQOL (Quaderi *et al.*, 2019). Recent data from Bangladesh Cerebral Palsy Register (BCPR) showed that parental literacy status (illiterate and primary level goers) coupled with low monthly family income (~USD 59-118) contributed a lot to the prevalence of children with CP in the country (Al Imam *et al.*, 2021). These lend support to the present results in that vital factors like maternal illiteracy, occupation, monthly family income, early age pregnancy, home delivery and prolong labour might have raised the incidence of childhood CP in the urban slums in Rajshahi.

## III. CONCLUSIONS

There is paucity of information on the risk factors and prevalence of childhood CP in Bangladesh, greater Rajshahi in particular. This cross sectional study reports for the first time the sociodemographic risk factors, birth practices and the frequency of CP children in the urban slum dwellers of Rajshahi Metropolis, where a community-based rehabilitation model focusing on SDPs and CP clinical characteristics of the disabled children should be a public health priority. SDPs and prevailing birth practices in slum dwellers might have contributed significantly to the increased incidence of CP in the community, which need proper medical attention. Addressing preventable causes of CP and improving awareness in the people would be of great help to reduce CP in such communities. Postnatal checkup for women who prefer home delivery needs to be improved, and for sustainable improvement of maternal health outcomes in urban slums, the programme needs to facilitate access to maternal health services, especially for illiterate, poor and house maker women.

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