# EPIDEMIOLOGICAL FACTORS OF CLEFT LIP AND PALATE CHILDREN: A CROSS-SECTIONAL STUDY IN NORTHERN REGION OF BANGLADESH

**Latifa Howlader[1], Abul Hossain[2], Gias Uddin[3] and Tanzima Yeasmin[4]***

[1]*Institute of Biological Sciences, University of Rajshahi, Bngladesh* [2]*Dental Unit, Rajshahi Medical College, Rajshahi, Bangladesh*
[3]*Dental Surgeon, Upazilla Health Complex, Charghat, Rajshahi, Bangladesh*
[4]*Dept. of Biochemistry and Molecular Biology, University of Rajshahi, Bangladesh*

## Abstract

The life-threatening or potentially-disabling nature of congenital anomalies, which are defined as abnormalities of anatomy, function, or metabolism apparent at birth, makes them a serious public health problem. To evaluate the oral health status and measure the prevalence of nutritional deficiency of cleft lip and palate children. All patients with cleft lip and/or palate treated at Thengamara Mohila Sabuj Sangha (TMSS) Medical College, Bogura, and Islami Bank Medical College, Rajshahi, Bangladesh, participated in this cross-sectional study. A purposive sample of sixty individuals from the general population was used in the investigation. It was revealed that majority (35.0%) of the respondents were in the age group of six months to one year with unilateral cleft lip and palate (63.3%). The majority of the babies (33.3%), 60.0%, were born weighing less than 2.5 kg, and 63.3% were born weighing 4-10 kg. About 80.0% were from urban area 41.67% lived in tin shade house, 65.0% used wood stoves for cooking their food, 35.0% had electric device like TV and refrigerator. It was found that, 55.0% had feeding problems associated with their cleft lip and palate. Regarding monthly family income, it was found that, 33.3% had <10,000 taka as monthly family income. On the subject of fathers' occupation, 36.6% were farmers, 58.3% of the mothers were housewife. Concerning education of father, 38.33% did not have any education, 53.3% of the mothers did not have any education. About 63.33% of the respondents' fathers were in the age group of 20-35 years, 70.0% of the mothers were in the age group of 20-35 years. This study would help to assess the cleft lip and palate among the children and make their parents aware.

**Key words**: Cleft lip and palate, Epidemiological factors, Northern region.

## Introduction

One of the most prevalent craniofacial abnormalities that can be found in children is cleft lip and palate (CL/P). It manifests clinically as a noticeable birth defect due to abnormalities in the midline fusion of the palate and lip that do not occur during development. Newborns with inadequately managed cleft lip and palate (CL/P) or cleft palate alone (CPO) suffer from substantial functional morbidity in addition to aesthetic defects (Phalke and Goldman 2023). When some face processes fail to fuse during the early stages of embryonic development, the most frequent structural abnormalities in the maxillofacial region are cleft lip and

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*Author for correspondence: yeasmin_bio@ru.ac.bd

cleft palate. These conditions are caused by birth defects (Mossey and Modell 2012). Patients who are born with a cleft lip and palate (CLP) have a significantly increased risk of morbidity throughout their entire lifetimes. In addition to the facial symptoms, those affected by these disorders may have trouble speaking, hearing, chewing, swallowing, and breathing (Paranaíba et al. 2011). According to the data that are currently available, the prevalence of CLP is roughly 1 in 700 children over the world when they are born. This encompasses individuals who have either a cleft lip (CL) or a cleft palate (CP), or both (Mossey and Modell 2012). There are considerable differences based on factors such as geographic location and ethnic background, with Asians and Native Americans having the highest occurrence (1 in 500). The prevalence is considered to be moderate among populations of Caucasians, Hispanics, and Latinos (1 in 1000), while the prevalence is considered to be the lowest among populations of Africans (1 in 2500) (Dixon et al. 2011, Parada and Chai 2012). Cleft lip and palate affects nearly three times as often boys as it does girls, with a ratio of about three to two among sufferers (Omo-Aghoja et al. 2010). During the first few months of pregnancy, a mother's exposure to tobacco smoke, an insufficient diet, viral infections, pharmaceutical medications, and dangerous substances found in the workplace and the house are all potential risk factors that could play a role in the development of cleft lip and palate. Other risk factors include viral infections, pharmaceutical drugs, and harmful substances found in the environment. The exposure of a parent to chemicals that they encounter in their line of work has the potential to play a role in the development of oro-facial clefts. During pregnancy, the use of certain drugs, including diazepam, phenytoin, phenobarbital, and corticosteroids, has been linked to an increased risk of certain abnormalities (Mossey and Little 2009). The age of the mother and the presence of a consanguineous marriage are two possible additional factors that contribute to the development of cleft lip and palate (Khan et al. 2012).

The newborn's capacity to feed is affected by CL/P in various ways. These include increased nasal reflux, inability to acquire an appropriate latch, and tiredness caused by increased strain of feeding. It is important to diagnose congenital syndromes that include CL/P and CPO, as these anomalies are not uncommon on their own. Early identification and care of these syndromes can help improve outcomes (Phalke and Goldman 2023). The purpose of this study was to investigate the prevalence of cleft lip and palate in this particular area (Rajshahi and Bogura), as well as to identify the disorders and/or factors that are linked to cleft lip and palate.

**Materials and Methods**

**Setting and participants:** This hospital based cross sectional design study was carried out in all the cleft lip and palate patients attending TMSS Medical College, Bogura and Islami Bank Medical College, Rajshahi, Bangladesh. Sample size was 60 and that was selected purposively during the study period (July 2018 to June 2019).

**Inclusion/exclusion criteria:** Sixty patients, aged from newborn (0 years) to 15 years, presenting with cleft lip and palate deformities, irrespective of their age and gender during the study period considered as inclusion criteria. Patients who were not interested to participate were excluded from this study.

**Data collection procedure:** The researchers herself collected data from the patients aged from newborn 0 years to 15 years, presenting with cleft lip and palate deformities, irrespective of their age and gender during the study period from attending TMSS Medical College, Bogura and Islami Bank Medical College, Rajshahi, Bangladesh. MUAC (Mid Upper Arm Circumference) test was done by measuring mid-point of the upper arm of Right hand of patients. The mid-point is between the tip of the shoulder and the elbow. MUAC test less than 110 mm (11.0 cm), Red color on tape, indicates Severe Acute Malnutrition (SAM). Between 110mm

(11.0 cm) and 125 mm (12.5 cm), Red color or Orange color, indicates Moderate Acute Malnutrition (MAM). MUAC over 135 mm (13.5 cm), Green color, indicates that the child is well nourished. This work was commissioned by the World Health Organization (WHO). A semi-structured questionnaire was used to gather information. Study participants were interviewed face-to-face to acquire baseline data on socio-demographic factors and the prevalence of cleft lip and palate malformations. Every attempt was made to ensure the accuracy of the data collected. When posed an open-ended question, respondents were given the opportunity to elaborate on their thoughts in a natural and impartial setting. There were no slanted inquiries made.

**Outcome variable:** To evaluate the dietary habit of both mother and cleft lip and palate children.

**Independent variables:** Age of the respondents, sex, residence, socio-economic status, type of cleft lip and palate, birth weight, associated problems with CLAP patients, birth order of child, mother's different health status and BMI of mothers.

**Consent of the participants:** The respondents were given an explanation of the technique, risks, and advantages of the study in language that was simple to comprehend, and then informed consent was obtained from each participant. The study's goals and objectives, as well as the procedure, were presented to the respondents.

**Statistical analysis:** After proper verification, data were coded and entered into the computer by using SPSS/PC (Version 23) programme. Data were analyzed according to the objectives of the study by using SPSS/PC+ software computer programme. Descriptive variables were explained with mean and standard deviation.

**Results and Discussion**

Table 1 revealed that majorities (35.0%) of the respondents were in the age group of 6 months to 1 year and 33.3% were in the age group of up to 6 months. Regarding type of cleft lip and palate most (63.3%) had unilateral, 21.67% had bilateral and 15.0% had median type of cleft lip and palate.

**Table 1:** Distribution of cleft lip and palate child according to age and type of cleft lip and palate.

| Age | | Boys | Girls | Total | Percentage (n = 60) | P-value |
|---|---|---|---|---|---|---|
| 0 to 6 months | | 8 | 12 | 20 | 33.3% | 0.351 |
| 6 months-1 year | | 10 | 11 | 21 | 35.0% | |
| 1 to 5 year | | 2 | 4 | 6 | 10.0% | |
| 5 to 15 year | | 8 | 5 | 13 | 21.67% | |
| **Cleft lip and palate type** | | | | | | |
| Unilateral cleft lip and palate | Left sided | 10 | 13 | 23 | 38.33% | 0.068 |
| | Right sided | 8 | 9 | 17 | 28.33% | |
| Bilateral cleft lip and palate | | 8 | 4 | 12 | 20% | |
| Median cleft lip and palate | | 2 | 6 | 8 | 13.33% | |

In Table 2 63.3% had <2.5 Kg and 28.3% had 2.5-4.0 Kg birth weight, regarding present weight, 60.0% were 4-10 Kg, 13.3% were 2.5-4 Kg and 6.67% were 10-20 Kg, as regards birth order of the child 33.3% were 1st child, 28.3% were 3rd and 23.3% were 2nd child. It was found that, 55.0% had feeding problems associated with their CLAP, 96.67% had limb abnormalities with cleft child and 3.33% had family history of cleft.

On the subject of fathers' occupation, 36.6% were farmers, 18.3% were day labor and 16.67% were in business on the other hand, 58.3% of the mothers were housewife and 13.3% were garments workers. Concerning education of father, 38.33% did not have any education, 23.3% had secondary education and 20.0% had primary education, in comparison to mothers 53.3% did not have any education, 20.0% had primary education and 16.6% had secondary education. About 63.33% of the respondent's fathers were in the age group of 20-35 years, 36.67% were in the age group of >35 years in comparison to mothers age group, 70.0% were in the age group of 20-35 years, 26.67% were <20 years' age group. About 65.0% used wood stoves for cooking their food, 35.0% had electric device like TV and refrigerator. Regarding monthly family income, it was found that, 33.3% had <10,000 Taka as monthly family income, 28.3% had 20001-40000 Taka and 23.3% had 10001-20000 Taka.

**Table 2:** Distribution of the respondents with different socio-demographic and clinical presentation.

| Variables | Group | No (n = 60) | % | P-value |
|---|---|---|---|---|
| Birth weight (kg) | <2.5 kg | 38 | 63.33 | 0.309 |
| | 2.5- 04 kg | 17 | 28.33 | |
| | >04 kg | 5 | 8.33 | |
| Present weight (kg) | <2.5 kg | 0 | 0.0 | 0.610 |
| | 2.5-04 kg | 8 | 13.3 | |
| | 04-10 kg | 36 | 60.0 | |
| | 10-20 kg | 4 | 6.67 | |
| | >20 | 12 | 20.0 | |
| Birth order of child | 1st | 20 | 33.3 | 0.644 |
| | 2nd | 14 | 23.3 | |
| | 3rd | 17 | 28.3 | |
| | 4th | 9 | 15.0 | |
| Associated problems with CLAP patients | Feeding problem | 33 | 55.0 | 0.163 |
| | Nasal regurgitation | 11 | 18.3 | |
| | Speech disorder | 03 | 5.0 | |
| | None | 13 | 21.67 | |
| Limb anomalies in cleft child | Absent | 58 | 96.67 | 0.613 |
| | Present | 02 | 3.33 | |
| Abnormal child present in family of cleft child | Yes | 02 | 3.33 | 0.516 |
| | No | 58 | 96.67 | |

| | | | | |
|---|---|---|---|---|
| Occupation of patient`s father | Farmer | 22 | 36.67 | 0.641 |
| | Service | 12 | 20 | |
| | Business | 10 | 16.67 | |
| | Daily labour | 11 | 18.33 | |
| | Garments worker | 05 | 8.33 | |
| Occupation of patient`s mother | House wife | 35 | 58.33 | 0.384 |
| | Service | 12 | 20 | |
| | Business | 5 | 8.33 | |
| | Garments worker | 8 | 13.33 | |
| Education of father | No education | 23 | 38.33 | 0.908 |
| | Primary | 12 | 20.0 | |
| | Secondary | 14 | 23.33 | |
| | SSC and above | 11 | 18.33 | |
| Education of mother | No education | 32 | 53.33 | .619 |
| | Primary | 12 | 20.0 | |
| | Secondary | 10 | 16.67 | |
| | SSC and above | 7 | 11.67 | |
| Age of father | <20 | 00 | 0.0 | |
| | 20-35 | 38 | 63.33 | |
| | >35 | 22 | 36.67 | |
| Age of mother | <20 | 16 | 26.67 | |
| | 20-35 | 42 | 70.0 | |
| | >35 | 02 | 3.33 | |
| Cooking stoves used in kitchen | Wood stoves | 39 | 65.0 | |
| | Kerosene stoves | 08 | 13.33 | |
| | Gas stoves | 13 | 21.67 | |
| Electronics device access (TV& Refrigerator) | Yes | 21 | 35.0 | |
| | No | 39 | 65.0 | |
| Family income in BDT | <10,000 | 38 | 33.3 | |
| | 10,001- 20,000 | 11 | 23.3 | |
| | 20,001-40,000 | 8 | 28.3 | |
| | >40,000 | 3 | 15.0 | |

Table 3 showed the association between BMI of mother, maternal age during child birth, early marriage, folic acid consumption, vitamins calcium and other supplements, anemia of mother and severe nausea and vomiting in $1^{st}$ trimester of pregnancy with clap patients. There is no any statistical significant relationship among them.

**Table 3:** Association between maternal factors and occurrence of cleft lip and palate.

| Variables | Total N (%) | Clap patients | | χ² value | P-value |
|---|---|---|---|---|---|
| | | No | % | | |
| BMI of mother | Under weight | 32 | 53.33% | 5.30 | 0.651 |
| | Normal weight | 14 | 23.33% | | |
| | Over weight | 13 | 21.67% | | |
| Maternal age during child birth (year) | <20 | 19 | 31.7% | 3.437 | 0.488 |
| | 20-35 | 40 | 66.7% | | |
| | >35 | 01 | 1.7% | | |
| Early marriage | Yes | 32 | 53.33% | 1.881 | 0.390 |
| | No | 28 | 46.67% | | |
| Folic acid consumption | Yes | 24 | 40% | 8.552 | 0.741 |
| | No | 36 | 60% | | |
| Vitamins, calcium and other supplements | Yes | 22 | 36.7% | 10.769 | 0.549 |
| | No | 38 | 63.33% | | |
| Severe nausea and vomiting in 1st trimester of pregnancy | Yes | 37 | 61.66% | | |
| | No | 23 | 38.33% | 0.839 | 0.697 |
| Anemia of mothers | Present | 44 | 83.33% | 0.278 | 0.870 |
| | Absent | 16 | 16.67% | | |

About 80.0% were from rural area and 20.0% were from urban area (Fig. 1).
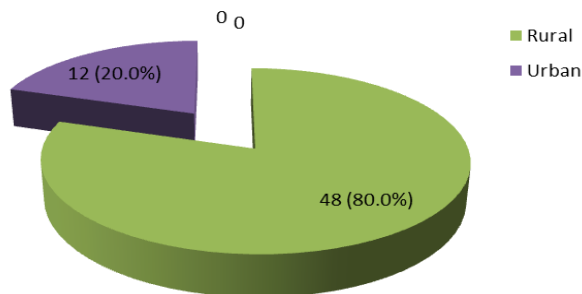


**Fig. 1:** Distribution of the respondents by residence.

It was revealed that, 41.67% lived in tin shade house, 38.3% in soil made house and 20.0% in building (Fig. 2).
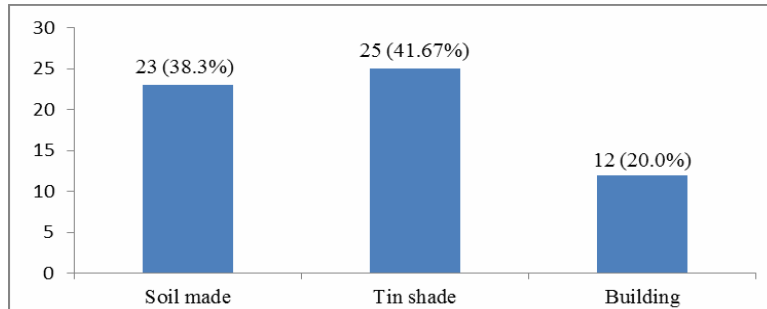


**Fig. 2:** Distribution of the respondents by living conditions.

## Discussion

The results of this descriptive, cross-sectional study on the nutritional status of children with cleft lip and/or palate and the dietary practices of their mothers are presented. TMSS Medical College Hospital of Bogura and Update Dental College Hospital of Dhaka participated in this study of CLAP youngsters receiving medical care. Consistent with the findings of Omo-Aghoja et al. (2010) who found that cleft malformations were more common in female than male in Nigeria, our study, which included 28 boys and 38 girls, reveals distribution of CLAP variation according to age and sex with a male female ratio of 1:1.14. Palate-only involvement was found to be 1.3 times more common in males (57.6%) than in females (42.3%). These results are consistent with those found by Pons-Bonals et al. (2017), who found a ratio of 2.1:1 between the involvement of the palate in males (58%) and females (27%). Fusion of the palatine shelves is more prevalent in females, which is why cleft palates are more common in females than males. Cleft lips are also more common in males. Another study indicated that males had a higher rate of CL and CP diagnoses, and this association was statistically significant ($p < 0.045$). CL was also more common in males (n = 183) and on the left side of the body (Peña-Soto et al. 2021). The development of clefts can be traced back to a complex set of events, including those related to genes and the environment. The origin of this issue has been linked to environmental risk factors such as maternal poor nutrition, early pregnancy, and poor socioeconomic situation, according to a number of studies. Most mothers of infants born with cleft lip and/orpalate have no formal education and did not take any folic acid, vitamin, or calcium supplements duringpregnancy. Folic acid shortage also contributes to a variety of birth defects, the most of which are linked withneural tube disorders; however, a search of the relevant literature reveals that there is some evidence tosuggest that it is also associated with cleft lip and palate (Krapels et al. 2004).

The mean of MUAC among th chindren was 5.30 ± 0.651. According to WHO guideline it has been noticed that all of the study children with cleft lip and palate are malnourished by using MUAC test. Reference from 2006 WHO child growth standards (WHO standards). Alcohol, tobacco use, teratogenic medications, injuries, diabetes, insufficient folic acid consumption, and high fever during pregnancy are some of the environmental and genetic factors that impact the frequency of cleft abnormalities. Endogamy and a family history of cleft defects are also known to increase the likelihood of cleft deformities.

Infants in the CLAP program are more likely to have a low birth weight, and the MUAC test revealed that all of the infants in the study were malnourished and suffered from acute malnutrition. In addition, the moms are underweight, and throughout the first trimester of their pregnancies, they have nausea and vomiting.

## Conclusion

Females outnumber males in our sample when it comes to cleft lip and/or palate. In order to better manage conditions like CP, which was the most common diagnosis, and CLP, which was more common on the left side and in males, it is vital to change mothers' lifestyles throughout pregnancy. This research adds to our understanding of the prevalence and clinical characteristics of CLP in the public health system in Bangladesh. To facilitate complete care for people with CLP and to guide health service planning and policy, Bangladesh must implement a birth surveillance system for congenital abnormalities.

## Acknowledgements

## Conflict of interest

There is no potential for a conflict of interest (COI) between the authors in terms of their personal relationships, their jobs, their finances, or any other circumstances.

**Remarks:** Cleft lip and palate patients in the impoverished nations may not seek medical attention for their condition because of a lack of awareness that it is treatable. This results in a higher rate of untreated clefts in people of adult size in this region. About 33.3% were in the age group of 0-6 months which is an important part of result. If the conditions can be treated by this time the whole life of the child may be free of any disturbance.

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