




RESEARCH ARTICLE

Prevalence of Autism Spectrum Disorder (ASD) among the children aged 18-36 months in a rural community of Bangladesh: A cross sectional study [version 1; referees: 1 approved, 2 approved with reservations]

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Abstract

Background: Autism spectrum disorder (ASD) refers to a group of complex neurodevelopment disorders characterized by repetitive and characteristic patterns of behavior and difficulties with social communication and interaction. In Bangladesh, autism in children is a significant burden of disease. Early identification of ASD could improve quality of life. The study has explored at the prevalence of ASD among rural community children aged between 18-36 months.




Methods: A cross sectional study was conducted among the 5286 children aged between 18-36 months in a rural community. Household level data was collected using screening tool MCHAT. Primarily screening positive 66 children were invited for final diagnosis in a health camp. Diagnosis was made by different staging started from primary screening, followed by validation using MCHAT and flash card. Final diagnosis was made by the paediatric neurologists, child clinical psychologists and development therapist using diagnostic tools (DSM-IV & ADOS).



Results: 04 children were diagnosed with autism spectrum disorder (ASD). Prevalence of the ASD in rural community was found 0.75/1000 children. Among the four ASD cases three were boys and one was girl and age range was between 20- 30 months. Whereas, the highest prevalence rate found was for the cerebral palsy which was 5.6/1000 children and Developmental delay (2.6/1000) was the next to that.

Conclusions: Age specific autism (18-36 months) in children is found higher in rural community of Bangladesh. In order to get more comprehensive information on autism in other age groups of children in rural community, further study is required. Early detection in rural community could help the policy makers to decentralization of health services among the ASD children in rural community.

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Introduction

In recent years, epidemiological studies have shown a rapid increase in the prevalence of autism spectrum disorders (ASD)^{1,2}. Throughout the world, it is reported to be 1 in 150 children (See [Centre for Research and Information site](#)). According to estimates of the Centre for Disease Control and Prevention (CDC)'s Autism and Developmental Disease Monitoring (ADDM) Network, approximately 1 in 68 children aged 8 years are identified with ASD³. California Department of Developmental Services (CDDS) and IDEA data sets are qualitatively consistent in suggesting a strong increase in autism prevalence over recent decades⁴. Prevalence studies from European countries, with an age range of birth to adulthood, varied from 1.9/10000 to 72/10000⁵. A systematic review article reported differences in prevalence of autism in South Asia. It ranged from 0.09% in India to 1.07% in Sri Lanka⁶.

The disease manifests at an early age in children, and is likely to last for life⁷. ASD severely affects the social functioning of an individual and may have a negative impact on the entire family of the affected individual¹. The accuracy of the numbers regarding prevalence of ASD depends on diagnostic criteria, age and geographical location, service availability and awareness of ASD⁸. Advanced maternal and perinatal age is also a risk factor for ASD, with significantly increased risk with each 10-year increase in maternal age⁹.

Average prevalence of ASD in Asia was 1.9/10000 before 1980, while it is 14.8/10000 from 1980 to present¹⁰. The overall reported prevalence of ASD in recent studies was higher than previously reported in Asia.

In Bangladesh, it has been predicted that autism is an underestimated, yet significant health problem. In community studies done by Mullick and Rabbani in 2005 and 2009, autism was 0.2 and 0.84/1000 children respectively^{11,12}. From a systematic review, the prevalence of ASD was found to be ranging from 0.15–0.8% in Bangladesh⁶. Cambridge medical university's patient registration records showed an increased rate of autistic children seeking treatment, from 12 children in 2001 to 105 children in 2009¹³. A national level study in Bangladesh in 2013 using a community level approach found prevalence of autism to be 0.15% amongst a population of 7200 in seven upazilas (Debhata, Wazirpur, Pirgong, Godagari, Pekua, Madhupur and Kulaura and a city corporation ward of Dhaka city)¹⁴. In another study by the ministry of Social Welfare, Bangladesh 2016, the proportion of autism was found to be 19% of total neurological disabilities recorded^{15,16}.

It is essential to identify the cases of ASD as early as possible because educational planning and initiation of interventions results in better outcomes for these children^{17–19}. There are different methodologies applied in different studies to identify prevalence in Bangladesh. However, age specific prevalence of autism is not yet determined in Bangladesh. This study has explored

the age specific (18–36 months) ASD prevalence among children from a rural community of Bangladesh.

Methods

A cross sectional study was conducted during the period of April 2016 to June 2016.

Study area

Raiganj upazila (sub-district) of Sirajganj district is located in the northern part of Bangladesh. The upazila consists of nine unions (small unit of upazila) with a population of more than 300,000. The study implementing organization Center for Injury Prevention and Research, Bangladesh (CIPRB) has its own ongoing surveillance system functioning in six unions of this upazila. Thus, the study has chosen rural community of all six unions for the study.

Study population

A total number of 255,265 populations reside in 55,492 households of the six unions of Raiganj upazila in Sirajganj district. All households of the selected unions were included for this study.

Sampling

The study selected all children aged from 18 months to 36 months. Their information was recruited from the household database of the six unions' surveillance system. A total number of 5600 children were identified from the surveillance data base. All households of those children were selected for collection of data at the household level ([Figure 1](#)).

Expected outcome: The study looked for autism spectrum disorder as outcome and exposure was children of age 18–36 months either boys and girls in rural community.

Data collection

Fifteen field level survey data collectors were recruited. Three supervisors were assigned to supervise and monitor the survey data collectors throughout the process of data collection and to confirm positive screened cases at the household level. All field level staff received one-day comprehensive training on data collection, which was conducted by a team of paediatric neurologists, public health specialists and child development therapists. The data collectors and supervisors were trained on using pictorial flash cards, which they were instructed to use during the time of interview to collect desired information (examples of flash cards are available in [Supplementary File 1](#)).

The data collectors performed face to face interviews with the mother at the household level using a structured questionnaire ([Supplementary File 2](#)). M-CHAT (Modified Checklist for Autism in Toddlers) was used as the primary screening tool for ASD. The survey data collectors used pictorial flash cards for each of the 23 questions of M-CHAT to let the mother

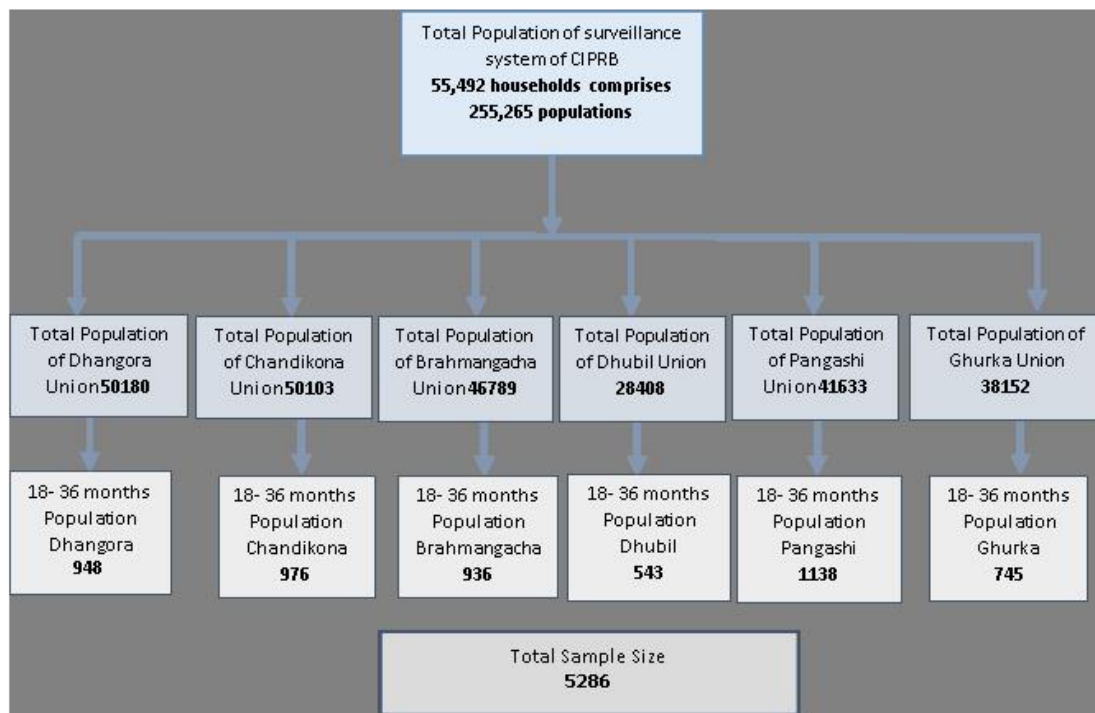


Figure 1. Framework of sampling technique.

understand if their children have similar type of manifestations as shown in the pictorial flash cards.

A total number of 98 primarily screened positive cases were listed by the survey data collectors using M-CHAT. Out of 5600 children, the data collectors were able to collect data from 5286 children aged between 18 months to 36 months. Remaining families had either migrated from the unions or were not found during the data collection period. No respondent refused to provide information. The study has included participants those who were identified as M-CHAT positive during screening at the households to invite in the health camp.

Data quality assurance and confirmation of MCHAT positive cases

Three supervisors visited the 98 households after initial identification of the positive screened cases by the survey data collectors. The same M-CHAT and flash cards were used by the supervisors to confirm the primary diagnosis. Out of 98 primary positive screened cases, 68 cases were identified as M-CHAT positive cases. 30 cases were primarily screened out as MCHAT positive by the data collectors, did not match with the M-CHAT criterion during the 2nd visit by the supervisors. Before the exclusion of the 30 cases, investigators checked the MCHAT collected by the data collectors and the

supervisors through a discussion meeting. Finally, 68 positive screened families were invited with their children to attend the medical camp for final diagnosis. Health camp was organized at CIPRB's Raiganj research field office located in Dhangora union on 31st May 2016. Additionally, the investigators were involved in the process of quality assurance throughout the whole procedure of participation in trainings, data collection. They also randomly selected 5% of positive cases to check the consistency of data collection.

Bias and confounders: The study identified bias in identification of M-chat positive by the field level data collectors using pictorial flash cards. Initially, 98 children were identified as M CHAT positive. To prevent potential bias, all 98 children with positive M CHAT were visited by skilled supervisors. 68 cases finally identified M-CHAT positive, remains which were found M Chat negative, the supervisors sit with the research investigators to come up on final discussion to exclude from the study. The study did not address for any confounders.

Instruments used for diagnosis

- I. **M-CHAT:** It is a validated tool for assessing the risk of ASD in screening toddlers aged between 16 to 36 months. The M-CHAT can be administered and scored as part of a well-child check-up, and also can be used

by specialists or other professionals to assess risk for ASD. Users need to be aware that even with the follow-up questions, a significant number of the children who fail the M-CHAT will not be diagnosed with an ASD. However, these children are at risk for other developmental disorders or delays, and therefore, evaluation are warranted for any child who fails the screening. Children who fail more than 3 items total or 2 critical items has been identified as initial screening positive for further diagnostic evaluation by professional experts to evaluate ASD in very young children^{20,21}.

- II. **DSM- IV TR:** Diagnostic and Statistical Manual of Mental Disorders (DSM-IV TR), published by the American Psychological Association, is the standard for the classification of mental disorders. As ASD became known throughout the United States, and common symptoms and behaviors were agreed upon by many researchers, it gained increasingly specific diagnostic criteria in the DSM. Here, autism is traced throughout the four main domains of the DSM²².
- III. **ADOS:** The Autism Diagnostic Observation Schedule (ADOS) is an instrument for diagnosing and assessing autism. It became commercially available in 2001 through the Western Psychological Services (WPS). The protocol consists of a series of structured and semi-structured tasks that involve social interaction between the examiner and the subject. The examiner observes and identifies segments of the subject's behavior and assigns these to predetermined observational categories. Categorized observations are subsequently combined to produce quantitative scores for analysis²³.
- IV. **Flash card:** Twenty-three pictorial flash cards were developed based on 23 questions for M-CHAT to use in this study. All flash cards were drawn in a pictorial format. Flash cards were used during the survey at the household and shown each of the sign/symptoms in a pictorial form for better understanding for the mothers.

Diagnosis of ASD and other neurodevelopmental disorders (NDDs)

A medical camp was organized at the upazila level to confirm the diagnosis and management of affected children. Out of M-CHAT positive 68 children, 66 children with their parents came to health camp for diagnosis. A team of two paediatric neurologists, three medical doctors experienced in working with children with autism, two child clinical psychologists, one development therapist from Institute of Paediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU) along with a public health specialist (epidemiologist) conducted the health camp. The diagnosis and treatment were performed on three groups of children. The first group were all diagnosed with the DSM-4 TR, suspected ASD positive cases were then sent to the child clinical

psychologist group for confirmation of ASD using the ADOS test. Finally, the third group provided management for all children including those who were identified as ASD or other NDDs (Figure 2).

Management and referral

Three medical doctors, including one senior doctor, were involved in providing treatment for the children according to the diagnosis made by the paediatric neurologists. Management includes prescribing medicine, counseling, provision of physical therapy and emergency referral to a nearby referral centre of the district or IPNA of BSMMU.

Data analysis

SPSS version 20 for windows was used for descriptive analysis. The prevalence and the confidence intervals were calculated using the software EPI Info Version 6.04d.

Ethical clearance

Ethical permission for this study was obtained from the Institutional Review Committee, Centre for Injury Prevention and Research, Bangladesh [Memo: CIPRB/ERC/2016/009]. Participants of the study were children aged between 18–36 months, to obtain details information about the children, written consent was obtained from the each of the parents to participate and provide information.

Results

The majority of the mothers were aged between 18 and 30 years (74.2%). Most of them were had a low level of education or had no formal education (56.1%). The majority of the children were diagnosed between the age of 31 and 36 months (41%). Boys had found higher prevalence of diseases then girls (65% vs 55%) [Table 1].

Among the 66 children of rural community of Raiganj upazila, three children were found to with no disease (4.5%). Several children were identified to have cerebral palsy (45.5%), whereas autism was diagnosed in only 6.1% of cases (n=4). Developmental delay was found as the second highest disease amongst the children (21.2%) (Figure 3).

Prevalence of ASD and other neurological disorders

From the total sample (n=5286), only 4 cases were found to have ASD with a prevalence of 0.75/1000 children. Among the four cases three were boys and one was a girl, and their age ranged from 20–30 months. The highest prevalence rate found was for cerebral palsy at 5.6/1000 children. Developmental delay (2.6/1000) was the second highest prevalence (Figure 4).

Health service delivery

Out of 66 children, three children were diagnosed with no disease and no treatment or advice was suggested for them. For the remaining 63 children, 10% of the children were directly referred to the specialized centre for further management.

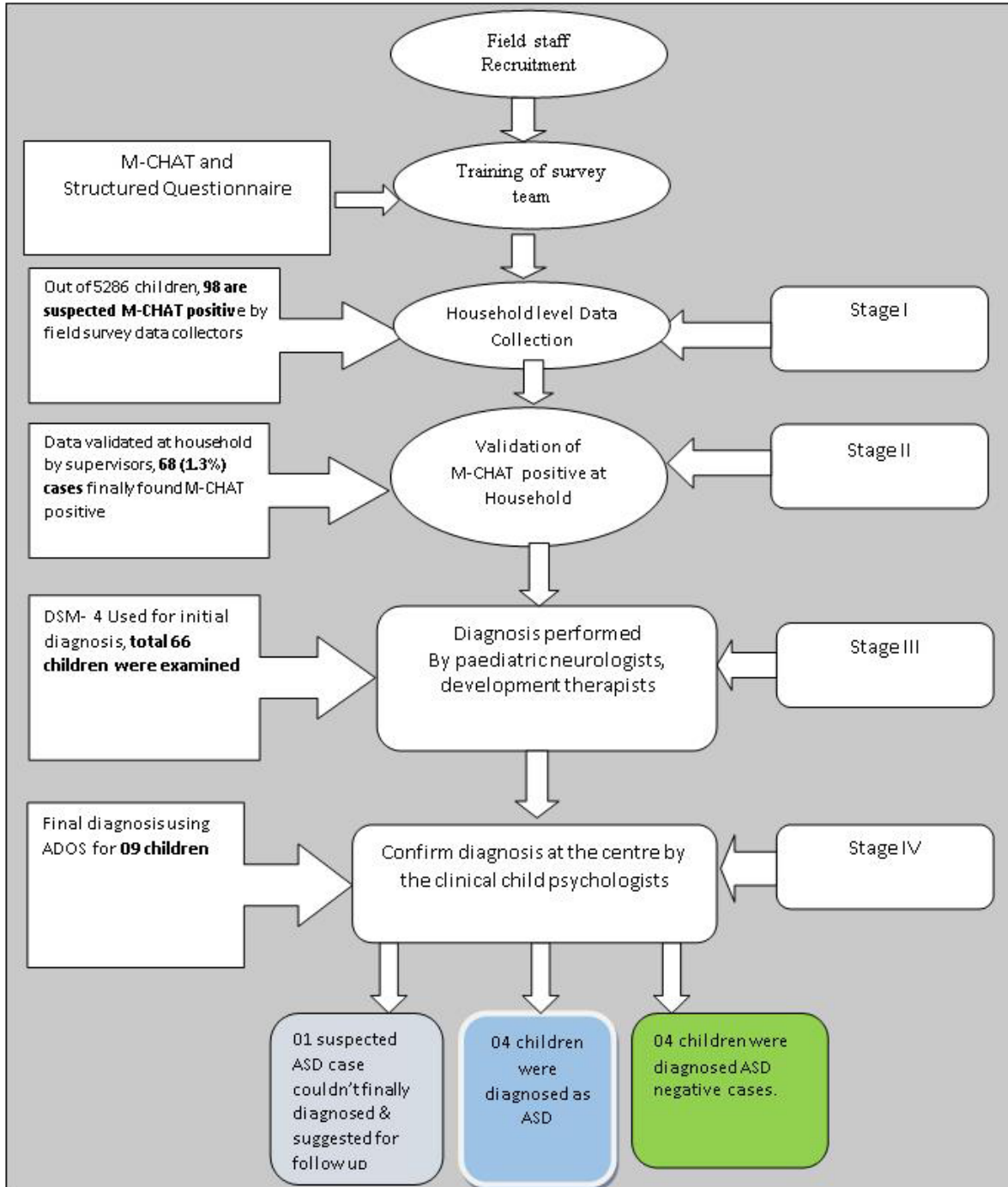


Figure 2. Methodological framework.

Table 1. Characteristics of rural mothers and children in the study.

Characteristics of mother and child	Percentage (%)
Age of the mothers	
18 – 30 years	83.3 (n=55)
31 – 35 years	9.0 (n=6)
31 – 45 years	7.5 (n=5)
Mother's education	
Illiterate	9.1 (n=6)
Up to primary education	47.0 (n=31)
Up to secondary education	39.4 (n=26)
Up to higher secondary education	4.5 (n=3)
Child age	
18 – 24 months	33.0 (n=22)
25 – 30 months	26.0 (n=17)
31 – 36 months	41.0 (n=27)
Sex of child	
Boys	65.0 (n=43)
Girls	35.0 (n=23)
M-CHAT	
Positive	62.0 (n=41)
Negative	38.0 (n=15)
ADOS	
Yes	13.6 (n=9)
No	86.4 (n=57)

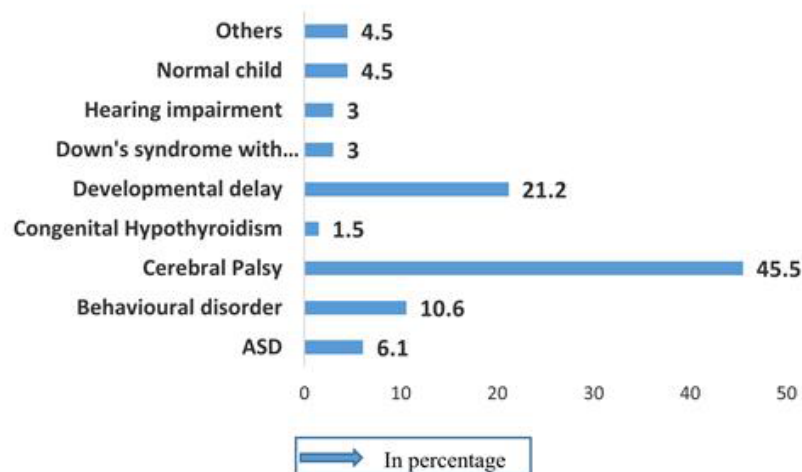


Figure 3. Diseases diagnosed among the suspected cases (n=66).

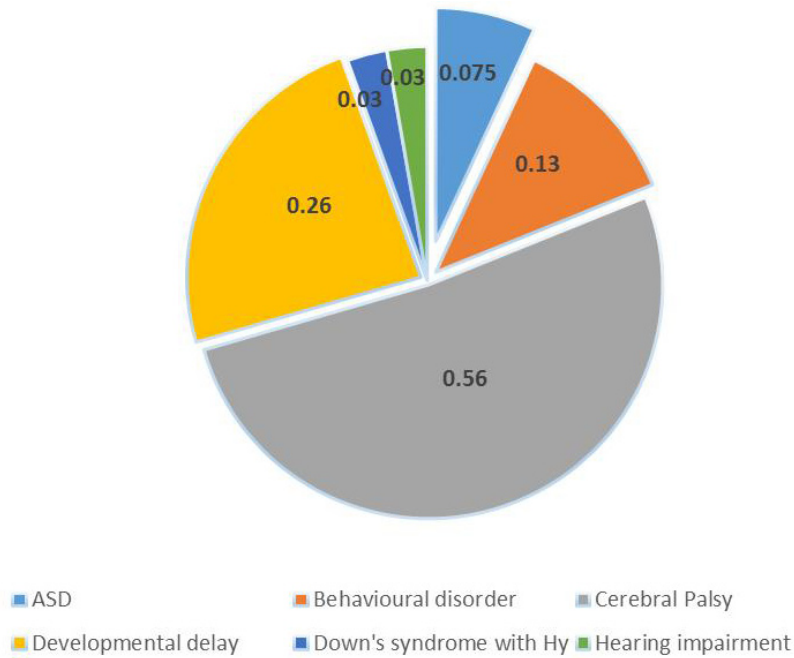


Figure 4. Prevalence of ASD (in percentage) and other neurological disorders.

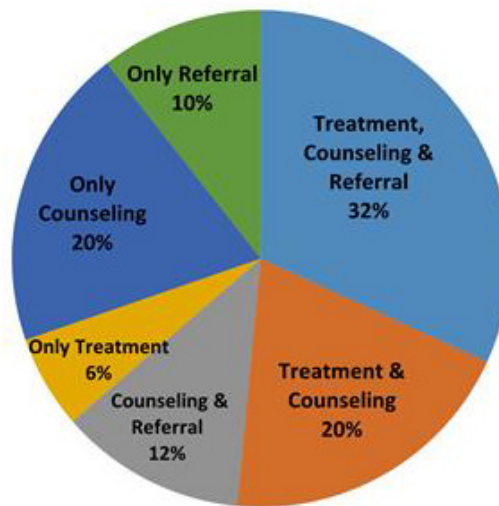


Figure 5. Treatment, counseling and referral of the suspected children.

A combination of medication, counseling and referral were advised for around 32% of children (Figure 5).

Discussion

The study found that the prevalence of autism is 0.75/1000 in rural children aged between 18–36 months, with prevalence of cerebral palsy and developmental delays being much higher. Age specific early diagnosis of autism in the rural community was not explored earlier. A national study conducted in 2013 showed that the overall prevalence of ASD was 1.55/1000 amongst

the study group of 7280 children aged between 0–9 years. The study also revealed that prevalence of ASD in the rural community studied was 0.68/1000¹⁴. Although it was estimated that about 300,000 children were affected with autism in Bangladesh with one case in every 94 boys, and one in every 150 girls, was estimated to suffer from ASD (see [Autistic Children’s Welfare Foundation site](#)). These findings are consistent with the present study. In the study by ministry of Social welfare of Bangladesh prevalence came out as 3% of total population. But in the study all the age groups were included¹⁵.

This study examined early detection of autism in children considering that the major symptoms of autism can be identified at this age group (2–3 years), and proper management as well as improved quality of life can be achieved from early detection²⁴. ASD is usually described as a childhood neuro-developmental disorder with onset usually before 3 years of age²⁵.

This study found that 56.1% of the mothers of ASD suspected children had low level or no formal education background. Another study also found the highest prevalence of ASD amongst children whose mothers only attended primary schools²⁶. Contrary to this one study found children of parents with a higher educational background had a higher prevalence of childhood autism²⁷.

This study also revealed that 74.2% mothers of suspected cases were aged between 18 to 30 years, with mothers with an early age of pregnancy had the higher rate of autistic children. This is in contrast with the study where advancing maternal age had found to be associated with higher risk of autism²⁸. We also found autism to be more prevalent in boys than girls (65% vs 55%). A study in the US also revealed similar findings, where one in 42 boys and one in 189 girls were found with ASD²⁹.

A number of good examples were found on the estimation of prevalence of autism from the perspective of developed countries. Some countries used DSM-III for diagnostic purposes whereas others used ADOS^{30,31}. Bangladesh has trialed for the first-time a community based system in the detection of autism among rural and urban communities through three stages of data collection, processing, and confirmation of cases¹⁵. This study used a community based population level survey at the household using pictorial flip cards to screen the cases for the first time. The study also used a four-stage data collection and confirmed diagnosis using a community based health camp. The study also followed the pathway of diagnosis to management, which creates a boarder spectrum of benefits for the early detection of autism and other neuro developmental diseases, as well as referral to the higher centers like 'child development center' run by the Government of Bangladesh in different Medical Colleges and IPNA, BSMMU. Moreover, during management, each of the parents were counseled by the doctors who could help to improve overall quality of care for those children with autism and other neuro developmental disorders.

It is alarming that other neuro developmental diseases like cerebral palsy and developmental delays are many folds higher than autism. It is important to do further research on other NDDs so that special interventions can be designed based on the findings.

The study has been done at the sub district level within a confined population which may not be representative of the country. For better understanding of the real magnitude of the problem, a larger study is required, in a bigger population considering early age detection of ASD and other NDDs. Move over, it is also important to do further community based studies using the new approach adopted for primary diagnosis.

The country is well ahead for the reduction of under-five and infant mortality rate³². The country also has a very structured community level health infrastructure and primary health care delivery system, where community clinics have delivered health care services to people's doors. It is time to respond on early detection of the ASD and other NDDs using the primary health care model. Although the definite causes of ASD are genetic, environmental modification and improvement of the quality for health care will improve the overall situation. Like this, early detection of ASD and NDDs will help the parents and their family to take immediate care for their better healthy quality of life.

Data availability

The study involved multiple stakeholders including government, professional organizations and research institute. Data is stored at the CIPRB and in Institute of Paediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka. Due to sensitivity of the data (contains identifying information), permission is required from the ethical committee for sharing data with a third party. Data requests should be sent to Institute of Paediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka who will contact the ethical review committee to gain approval to share the data. The conditions for gaining data access are a formal request with a clear objective and formal permission from the ethical committee. Please contact the Prof. Shaheen Akhter, Institute of Paediatric Neurodisorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka through email : shaheenk33@gmail.com in order to request the data.

Author contributions

Authors SA, EH, FR and AB designed this study. Authors SA, JS, GKK and AB reviewed literatures, analyzed surveyed data and prepared the manuscript.

Competing interests

No competing interests were disclosed.

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Supplementary material

Supplementary File 1 – Zip file contain examples of the flash cards used in this study

[Click here to access the data.](#)

Supplementary File 2 – Study questionnaire (with English translation)

[Click here to access the data.](#)

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Open Peer Review

Current Referee Status:



Version 1

Referee Report 28 June 2018

doi:10.5256/f1000research.14732.r35553



Soumyadeep Bhaumik

The George Institute for Global Health, New Delhi, Delhi, India

This manuscript intends to estimate the prevalence of autism spectrum disorder in rural children of 18-36 months. It uses a cross-sectional study design for this purpose. Comments for consideration are :

1. The use of the word age-specific in the objective is not necessary in my opinion.
2. The manuscript would benefit if it follows the STROBE reporting guidelines for cross-sectional study. Such reporting will enable understanding of the methodology better for the purpose of critique and reproducibility. This is mandatory as per F1000 guidelines.
3. Please clarify if the criteria for selection of unions - was it all the rural unions in Raiganj Upazila or was it the functioning ongoing surveillance system. Are the three unions which were not included as rural classified as urban by the government? It might be good to name the six unions included.
4. The manuscript mentions all households of selected union was included - how was the list of universe of households obtained?
5. Not sure what the expected outcome sub-section within sampling is for - consider deletion.
6. Please provide reference to MCHAT and flash card methods being used in this study in other similar study. I am not sure why DSM-IV TR or ADOS is explained in the manuscript. Consider discussing why the issues are different in different studies.
7. Explain how the study size was calculated - was it powered for gender disaggregation. Was it powered for measuring other neurological conditions described in the paper. The result thus provides many other things and there is need of clarity to understand this better.
9. Discussion needs a section on potential limitations of the study and ways that has been taken to address the bias. How do the results of the study compare to that in other SEARO countries.
10. The Abstract conclusion mentions " Age specific autism (18-36 months) in children is found higher in rural community of Bangladesh. " It is not clear higher in comparison to what? The idea about needing more studies in future is generic. Please consider providing more specific information.
11. Some points mentioned in the discussion like the "56.1% of the mothers of ASD suspected children had low level or no formal education background. " are probably of no interpretive value considered this is not a RR or OR and the fact that only 4 cases were found. Same for other things in the discussion.

Is the work clearly and accurately presented and does it cite the current literature?

Partly

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: My organisation has a drowning prevention project , along with CIPRB , the institution of two authors. I am involved with this project peripherally and have previously conducted a training session at CIPRB for this purpose. No other conflict of interest to declare.

Referee Expertise: research methodology, evidence syntheses

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Referee Report 27 June 2018

doi:[10.5256/f1000research.14732.r35443](https://doi.org/10.5256/f1000research.14732.r35443)



Helen McConachie 

Institute of Health and Society, Newcastle University, Newcastle upon Tyne, UK

This cross-sectional study makes an estimate of the prevalence of autism spectrum disorder in very young children (18-36 months) in Bangladesh. The study utilised the opportunity of an ongoing rural surveillance system to carry out door to door screening using the M-CHAT tool enhanced by the use of flash-cards. Screen-positive status was checked by supervisors, and around two-thirds confirmed. These children were invited for diagnostic assessment, including where indicated assessment using a gold-standard diagnostic tool, the Autism Diagnostic Observation Schedule. A prevalence estimate of 0.75/1000 was concluded.

The paper cites the most relevant literature, including a 2013 Survey of Autism and Neurodevelopmental Disorders in Bangladesh conducted for the Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh. That survey found a very similar prevalence estimate of ASD in rural children of 0.68/1000. It is therefore incorrect for the authors to state in the Abstract: "Age specific autism (18-36 months) in children in found higher in rural community of Bangladesh". The estimate is low in comparison globally.

The methodology adopted for the study appears strong in the main. However, a prevalence estimate with confidence intervals would require that a random sample of children screened negative were also invited for further assessment. Some of the interpretation of results is also inappropriate as statements are made, for example, about the numbers of children identified with cerebral palsy, without clearly stating

that this estimate is within only the screened positive and assessed children.

The authors' conclusions are encouraging, that systems for early detection and management of neurodevelopmental disorders can now be used across Bangladesh, because of good primary health care and the establishment of Child Development Centres in the Medical College Hospitals.

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Partly

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Partly

Competing Interests: No competing interests were disclosed.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Referee Report 18 April 2018

doi:[10.5256/f1000research.14732.r32768](https://doi.org/10.5256/f1000research.14732.r32768)



Olalekan A. Uthman 

Warwick Medical School, Health Sciences Research Institute, University of Warwick, Coventry, UK

The authors of the manuscript conducted a cross-sectional study to estimate the prevalence of Autism Spectrum Disorder among children in Bangladesh. The manuscript has potential to contribute to the body of knowledge in the field. The authors should be congratulated on bringing to light this important, but often neglected spectrum of medical conditions in resource-limited settings. The manuscript reads well and conclusion stated were not beyond the findings of this cross-sectional study.

I have no major concerns in the conduct and reporting of this study:

1. Abstract: '04' should be changed to word at the start of that sentence.
2. Table 1: column two, consider reporting the number and percentage in the bracket and change the column heading to 'Number (%)'
3. Discussion: Consider adding study strengths and limitations

4. Discussion: In addition, consider adding sub-heading to the discussion section, such as 'Main findings', 'Implications for policy and research', 'Study strengths and limitations'
5. Conclusion: consider also adding conclusion at the end of the discussion section

Is the work clearly and accurately presented and does it cite the current literature?

Yes

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

Yes

Are all the source data underlying the results available to ensure full reproducibility?

Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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