

Original Research Article

Prevalence of attention deficit hyperactivity disorder symptoms among primary school children in Nigeria: a comparison of teachers and parent reports

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ABSTRACT

Background: Attention deficit hyperactivity disorder (ADHD) is one of the most common neuro-behavioral disorders of childhood. Though ADHD is the most extensively studied neuro-behavioral disorder in childhood, its prevalence rate has not been documented in our environment. Aim of the current study was to determine the prevalence and subtypes of ADHD among primary school pupils living in Ikot-Ekpene, a semi-urban area in Nigeria's rainforest.

Methods: This was a cross-sectional study conducted among 1174 primary school pupils aged 6-12 years selected from twelve primary schools in Ikot Ekpen local government area of Akwa Ibom state. The Vanderbilt rating scale for both teachers and parents were administered by teachers and parents of the pupils and the prevalence rate of ADHD was determined.

Results: One hundred and forty-six pupils met the rating scale criteria for probable ADHD using the teacher's scale with a prevalence of 12.4%, while 8.5% met the criteria using the parent's scale. Of the three different subtypes of ADHD, the hyperactive subtype was the most prevalent subtype on both the teacher's and parent's scales (52.7% and 46% respectively). The inattentive subtype was 32.9% and 33.0% on the teachers and parents scale respectively. The combined subtype was the least prevalent on both scales.

Conclusions: Prevalence rate of ADHD in children is significant in our environment. Policies should be put in place to implement the screening test for ADHD under the school health program for the early identification of pupils with ADHD.

Keywords: Attention deficit hyperactivity disorder, Prevalence, Children, Ikot Ekpen

INTRODUCTION

ADHD is one of the most common neuro-behavioural disorders of childhood.¹ It is defined by persistent, pervasive, impairing and developmentally excessive levels of hyperactivity/impulsivity and inattention.^{2,3} ADHD is characterized by inattention, increased distractibility and difficulty sustaining attention, poor impulse control and decreased self-inhibitory capacity.¹ For a diagnosis of ADHD to be made, the symptoms must persist for at least 6 months to a degree that is inconsistent with developmental level and negatively

impacts directly on social and academic activities.² Children with ADHD may present with inattention and hyperactivity/impulsivity or one symptom pattern may predominate.¹ Three presentations commonly seen include the inattentive subtype, hyperactive/impulsive subtype and the combined subtype.² The etiology of ADHD is multi-factorial, no single factor determines the expression of ADHD.¹ The global consensus data on the prevalence of ADHD suggests that ADHD occurs in 5.9% of children and 2.5% of adults. It is more prevalent in males.⁴ However, meta-regression analysis has estimated the worldwide prevalence of ADHD to be

5.29% and 7.1% in children and adolescents respectively. Up to half of these persons have their symptoms persisting into adulthood.⁵⁻⁷ The prevalence at the extremes of age is less well studied and thus less well known.⁸

The diagnostic and statistical manual-V has suggested that differences in the interpretation of behavior may account for differences in the prevalence of ADHD worldwide.^{3,9} A meta-analysis of studies on children and adolescents diagnosed with ADHD found that the prevalence of ADHD in individuals aged ≤ 18 years of age varied between countries worldwide, and the prevalence estimate for Europe specifically was just under 5%.⁵ The meta-analysis reviewed 102 studies from five continents of the world and found the reported prevalence of ADHD was highest in South America (12%) and Africa (8%) but lowest in Asia (3%).⁵ It should be noted, however, that only four studies were included from Africa for the meta-analysis and six from South America compared to 32 studies each from Europe and North America.⁵ ADHD has been noted to co-exist with other psychiatric conditions.¹ Coexisting conditions with ADHD include oppositional defiant disorder, anxiety disorders, conduct disorder, depressive disorders, learning disorders and language disorders.¹ These problems, if they remain undiagnosed can make the children a problem for themselves, their teachers, parents and siblings.¹⁰ When pupils with ADHD are left unidentified the cumulative effect of low self-esteem, chronic school failure and inadequate social skills may lead to adolescent antisocial behavior which includes alcoholism, substance abuse and school dropouts.^{10,11} Few studies have been carried out on this disabling condition in Nigeria, and no study has been conducted among primary school pupils in Akwa Ibom State, Nigeria. It was expected that findings from this study will increase the knowledge of ADHD and its awareness and allow for proper planning of health care policies and funding.

METHODS

This descriptive cross-sectional study was conducted among primary school pupils in Ikot Ekpene, a semi-urban local government area in the rainforest region of Southern Nigeria and was about 643 km from Lagos, the economic capital of the country. It had a population of over 350,000 people and over half are under the age of 18 years. The period of the study spanned over 4 months, from April 2018 to July 2018. The pupils recruited for the study were between six and twelve years of age and had been in the class for two consecutive school terms, thereby giving sufficient time for the observation of their behaviors by the teachers. A multistage sampling method was used after obtaining approval to conduct the study from the health research and ethics committee of the university of Uyo teaching hospital, Uyo. Written consent and assent were obtained from the parents of the participants and the older participants over the age of

seven years respectively. Verbal consent was obtained from head teachers and class teachers before embarking on the study.

Sample size estimation

The minimum sample size was calculated from the formula,¹²

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

where,

n=minimum sample size,

Z=the normal deviate, set at 1.96 corresponding to the 95 percent confidence level,

p=prevalence of ADHD assumed to be 50%, due to the absence of studies in Akwa Ibom State,

d²=total width of the expected confidence interval set at 0.03.

With projected attrition of 10% calculated to be 107, the minimum sample size was summed up to 1174.^{12,13}

Selection of schools

A multi-stage sampling method was used. Ikot Ekpene had 60 primary schools consisting of 33 government-owned primary schools and 27 private primary schools. 12 schools were chosen using the purposive sampling method. The private primary schools were alphabetically listed separately from the public primary schools. The private schools were numbered 01 to 27 and the public schools were numbered 01 to 33. The number of public schools and private schools to be sampled was determined by proportionate sampling using the relative proportions of public and private schools in the area, for public schools= $12 \times 55 / 100 = 7$ schools, for private schools= $12 \times 45 / 100 = 5$ schools. Using the table of random numbers, three pages were printed out, and then one page of the table of random numbers was randomly picked using the ballot method.¹² The starting point on the selected page of the table of random numbers was determined by the investigator dropping one finger on the page with her eyes closed to select the column and the corresponding row. Moving in up-to-down direction (in the column), the school whose code number corresponds with the last two digits of the random numbers was picked. The succeeding column was read until the twelve schools were obtained after completing the selection of numbers in the initial column. This procedure was repeated in the column until seven public schools and five private schools were obtained. Any particular number picked already was subsequently ignored when encountered again.

Sampling method

The number of subjects selected per school was determined as follows,

$$n = \frac{N}{M} \times \text{sample size (1,174)}$$

where,

N=total population that met the inclusion criteria in a school,

M=total population that met the inclusion criteria in the 12 selected schools (8,185 pupils); the sample size of the study being 1,174;

n=number of subjects expected from a school. For example: in school A, 1000 pupils met the inclusion criteria.

To determine the number of pupils to be sampled in school A=1000/8185×1174=143 pupils. The calculated number of pupils for each of the twelve selected schools was in turn used to obtain the specific number of pupils to be sampled in the different class arms of the given school. The number of pupils to be sampled per class arm was determined using the following formula,

The number of subjects selected per class arm in a school was determined as follows,

$$Z = \frac{(a \times n)}{N},$$

where,

Z=number of pupils to be sampled in a class arm,

a=number of pupils that met the inclusion criteria in the class arm,

N=total population that met the inclusion criteria in a school and,

n=number of subjects expected from a school.

For example: in school A, where 143 pupils are to be recruited, using the class register, 40 pupils met the inclusion criteria in a class arm, 1000 met the inclusion criteria in that school. So, this was calculated as 40/1000×143=6.

So, 6 pupils were sampled in that class arm. The selected pupils were identified by the class teacher and the structured questionnaire, the vanderbilt ADHD for both teachers and parents were administered. A structured questionnaire, the Vanderbilt ADHD diagnostic teacher rating scale was administered by the classroom teacher on a selected child, after adequate training of the

teachers on the questionnaire to be administered.¹⁴ Uniformity of administration of the Vanderbilt teacher rating scale administered by the teachers was assessed class by class, if wrong marking was done, the teacher was retrained and a new questionnaire was administered. All the selected pupils in the class were identified by the class teacher.

The Vanderbilt assessment scale; teacher Informant is a frequency-based instrument that rates the subscale items according to the frequency of occurrence. Listed on the left column of each subscale were 35 symptoms, three academic performance ratings and five classroom behaviour ratings. On the right side of the scale, against each of the 35 symptoms are the four specified types of rating (scored 0-3) depending on the frequency of the symptom assessed corresponding to symptoms never observed (0), occasionally observed (1), often observed (2) and very often observed (3). The academic performance and classroom behaviour scale rates the pupil's performance from 1-5 with 1 corresponding to excellent, 2 to above average, 3 to average, 4 to being somewhat of a problem and 5 to being problematic. Among the behaviour, items numbered 1-35, the number of questions in each section 1-9, 10-18, 19-28, and 29-35 in which there is a score of 2 or 3 was counted. Then the performance items 36-43 were checked to determine whether at least one item has a score of 4-5. Then the diagnostic subtype of ADHD was determined.

A child was adjudged to have ADHD predominantly Inattentive subtype if the individual scored 2 or 3 in 6 out of 9 items in question 1-9, and score 4 or 5 in any of the performance questions in items 36-43. For the hyperactive/impulsive subtype ADHD, a child scored 2 or 3 in 6 out of 9 items on questions 10-18 and score 4 or 5 on any of the performance questions 36-43. A diagnosis of combined inattention/hyperactivity subtype was made when the pupil met the criteria in both inattention and hyperactivity/impulsivity subtypes.

Administration of the vanderbilt assessment scale-parent informant

Parents of selected pupils were invited to the school for the administration of the parent informant questionnaire. Parents who were unable to come to the school were visited at home by the investigator. Pupil's name, date of birth, parents name and phone number were filled into the questionnaire by the investigator.

The Vanderbilt assessment scale; parent Informant is a frequency-based instrument that rates the subscale items according to the frequency of occurrence. Listed on the left column of each subscale are 47 symptoms, and 8 academic and behavioural performance ratings. On the right side of the scale, against each of the 47 symptoms are the four specified types of rating (scored 0-3) depending on the frequency of occurrence of the symptom assessed corresponding to symptoms never

observed (0), occasionally observed (1), often observed (2) and very often observed (3). The academic and behavioural performance scale rates the pupil's performance from 1-5 with 1 corresponding to excellent, 2 to above average, 3 to average, 4 to being somewhat of a problem and 5 to being problematic. The corresponding scores were circled by the symptom or behaviour being assessed and the total number of symptoms with scores of 2-3 in the inattention, hyperactivity, oppositional deviant and depression sub-categories were computed as well as the number of questions with scores of 4-5 in the academic performance and classroom behaviour rating scales. The average performance score was then calculated. Data analysis was performed using SPSS version 20. Frequencies and percentages were calculated for categorical data and chi square for comparison of proportions with $p < 0.05$ considered as significant.

RESULTS

One thousand one hundred and seventy-four (1174) children aged 6-12 years were recruited into this study. The mean age was 9.32 ± 1.75 years. About 69% of the children were in the 8-11 years age groups, 34% in the age bracket 8-9 years, while 34.6% were in the 10-11 years age bracket. Males made up 53.7% and 46.3% were females, giving a male to female ratio of 1.2:1. The age and gender distribution of pupils in the study population is shown in (Figure 1 and 2).

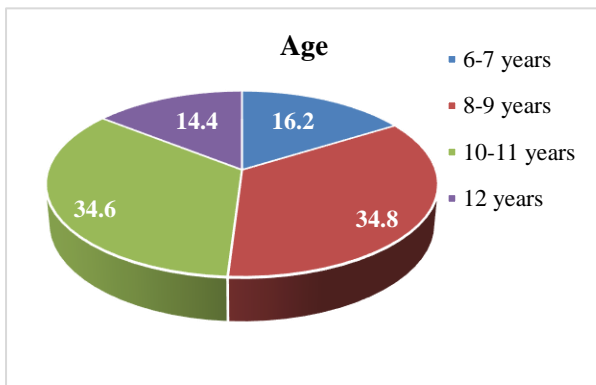


Figure 1: Age distribution of the study population.

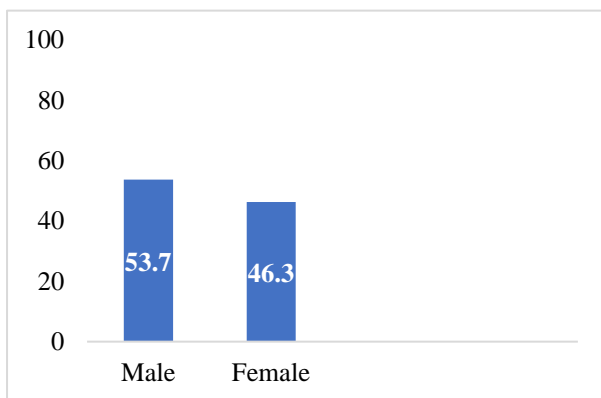


Figure 2: Gender distribution of the study population.

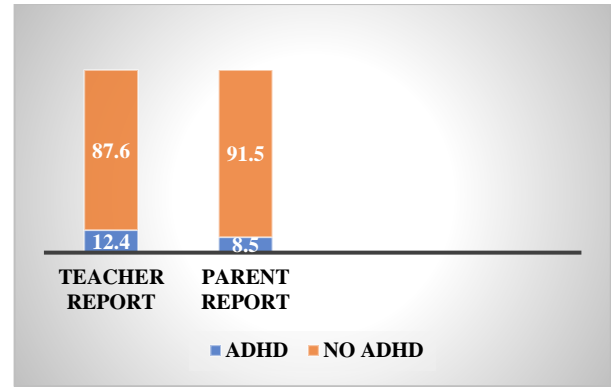


Figure 3: Prevalence of attention deficit hyperactive disorder in the study population.

Of the 1174 participants, 146 met the criteria for ADHD giving a prevalence rate of 12.4% using the Teacher's Scale and 8.5% using the Parent's scale. This is illustrated in Figure 3. The mean age of the pupils with ADHD was $9.3 \text{ years} \pm 1.7 \text{ years}$ and males constituted 56.2% of the pupils with ADHD on teacher's scale. Using the parent's scale, the mean age of the pupils with ADHD was $9.8 \pm 1.7 \text{ years}$. Males consisted 56% of the pupils with ADHD using the teacher's scale and 55% using the parent's scale. However, this finding was not significant ($p = 0.73$) (Table 1-2). Frequency distribution of the different subtypes of ADHD using the teachers and the parent's scales is depicted in (Figure 3 and 4).

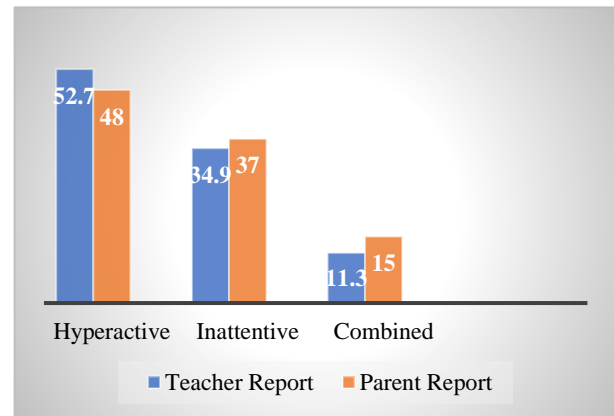


Figure 4: Distribution of ADHD subtypes using parent and teacher scales.

On the teacher's scale, about 53% of the pupils with ADHD had the hyperactive subtype, 34.9% had the inattentive subtype and 11.3% had the combined subtype. On the parent's scale, 48% of the pupils with ADHD had the hyperactive subtype, 37% had the inattentive subtype and 15% had the combined subtype.

DISCUSSION

This study was carried among primary school children in Ikot Ekpene a large semi-urban area in southern Nigeria to determine the prevalence of ADHD. The study showed

the prevalence of ADHD symptoms among school-aged children in Ikot Ekpene using both the teacher's and parent's scale to be 12.4% and 8.5% respectively. This finding is comparable with other studies in Nigeria.^{15,16} The prevalence rate of ADHD using the teacher's scale was 12.4% which is within the worldwide prevalence rate of 1-20%.⁵ It is higher than that reported by Frank-Briggs et al in Port Harcourt, Nigeria, though reason for disparity is not clear as both studies made use of the

Vanderbilt scale.¹⁷ However, it could be because the present study used a larger sample size (1174) with the recruitment of pupils from twelve schools while the study by Frank-Briggs involved only four schools. The prevalence rate in this study is also higher than that obtained in Benin City, Nigeria, by Ofovwue et al and lower than that obtained in Ilorin (15.8%) and 23.15% in Benin.¹⁷⁻²⁰ The disparities may be due to the difference in tools used for assessment and diagnosis.

Table 1: Age, sex, and the prevalence of ADHD in the study population using teacher's scale.

Variables	ADHD status		Total (n=1174)	Statistical indices
	Yes (n=146)	No (n=1028)		
Age (years)				
Mean (SD)	9.3 (1.7)	9.3 (1.8)	9.3 (1.8)	Tt=-0.0308, Df=1, p=0.96
Sex, N (%)				
Male	82 (56.2)	544 (52.9)	626 (53.3)	Df=1, $\chi^2=0.5412$, p=0.46
Female	64 (43.8)	484 (47.1)	548 (46.7)	

Table 2: Age, sex, and prevalence of ADHD among pupils in the study population using parent's scale.

Variables	ADHD status		Total (n=1174)	Statistical indices
	Yes (n=100)	No (n=1074)		
Age (years)				
Mean (SD)	9.8 (1.7)	9.3 (1.8)	9.3 (1.8)	Tt=2.5721, Df=1, p=0.010
Sex, N (%)				
Male	55 (55)	571 (53.2)	626 (53.3)	Df=1, $\chi^2=0.1237$, p=0.73
Female	45 (45)	503 (46.8)	548 (46.7)	

It could also be attributed to the sample size used and the setting of the study, home or school. Also, the environmental and other factors (such as single parenthood) peculiar to the study area which had been reported to influence childhood behaviour may account for the disparity in the prevalence rates.²¹⁻²³ This finding was higher than the reported rate in Qatar but lower than that reported in United Arab Emirate probably due to the difference in diagnostic instrument used.²⁵ A prevalence rate of 8.5% observed in this study using the parent's scale falls within the 3%-12% reported by the American academy of paediatrics.²⁶ This also compared well with other studies.²⁷⁻²⁹ A study in Turkey by Ersan et al reported a prevalence rate of 8.1% similar to that found in this study.^{27,29} Wamulga in Uganda however reported a prevalence rate of 11% which was slightly higher than what was obtained in this study. This disparity may be due to the study setting and the fact that the author in Uganda used the disruptive behavior parent scale as the only instrument for the study. A prevalence rate of 4.8% was obtained in Germany which was lower than the rate in this study and the difference may be due to the difference in the instrument used and cultural differences. However, only a few studies reported the prevalence of ADHD using the parent's scale.²⁷⁻²⁹

The most prevalent subtype of ADHD found in this study was the hyperactive subtype on both the teacher's and the

parent's scales. This was similar to findings reported by Egbochukwu in Nigeria.¹⁰ A study in Ghana also reported the hyperactive subtype as the most prevalent subtype. Other studies in Turkey by Gul et al and Ersan et al reported the hyperactive subtype as the most prevalent subtype, similar to the findings in this study.³⁰⁻³² In contrast to our findings, most Nigerian studies have reported the inattentive subtype as the most prevalent.^{16-18,33-35} A study by Frank-Briggs et al reported Inattentive subtype as the commonest subtype followed by the hyperactive subtype.¹⁷ Though this study by Frank-Briggs et al used the Vanderbilt scale and was also conducted in the same geopolitical region as this present study (South south geo-political region of Nigeria, the reason for the difference was not clear.⁹ Ofovwue et al also reported the Inattentive subtype as the most prevalent.¹⁸ They however used a different diagnostic instrument. Adewuya et al Umar et al in Jos and Offiong et al in the Federal capital territory reported inattentive as the commonest subtype, this difference could be due to the different diagnostic instruments used in their studies.³³⁻³⁵ ADHD was noted to be slightly commoner in males on both the teacher's and parent's scales although this difference would not prove to be statistically significant. Earlier reports on the gender differences in ADHD have shown a male preponderance.^{15,18,28,30} The reason for this high prevalence among males could be because males are naturally more active than females and symptoms of

ADHD may be more pronounced on them. Scitutto, Nolfi, and Bluhm found that teachers more often refer boys than girls for treatment for ADHD even when showing equal levels of impairment.³⁶

Limitations

A proper diagnosis of ADHD would require an interview with a paediatric neurologist, a psychiatric evaluation all of which could not be carried out within the ambits of the current study. In current study only rating scales were used and the children so identified as having ADHD symptoms or “probable ADHD” were referred for further evaluation. Thus the true prevalence of clinical ADHD is probably lower in the study population.

CONCLUSION

This study showed that ADHD occurs in South-South Nigeria and although the rates vary between regions, the prevalence rate in our environment is within the global range. The pattern of ADHD subtypes from this study is similar to what is obtained in other parts of the world.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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