CORRELATES OF ATTENTION DEFICIT/ HYPERACTIVITY DISORDER (ADHD) AMONG CHILDREN AND ADOLESCENTS IN NORTHERN NIGERIA

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This research report is based on original work performed by me and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree to any other university. It has not been published any where *prior to registration* for the abovementioned degree.

PART A

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(Submitted as partial requirement for the M.Phil Degree in Child and Adolescent Psychiatry)

SURVEY PROTOCOL

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DECLARATION

I, …DR SHEHU SALE (*SLXSHE001*)……, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Signature: … Signed by candidate

Date: ……..16TH November, 2011……..

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PURPOSE OF THE STUDY

This study primarily aims at determining the correlates of Attention Deficit Hyperactivity Disorder (ADHD) among children and adolescents in Northern Nigeria. The secondary aims of the study include a comparison of the identified correlates with results from other developing countries and the developed nations. The results would also provide a rational basis for advocating preventive measures for targeted problems associated with ADHD in the study.

HYPOTHESIS

The correlates of ADHD among children and adolescents in Northern Nigeria would sbe similar to reports from other developing and developed parts of the world.

BACKGROUND

Nigeria has a predominantly youthful population with about 44% of her 140 million people aged 15 years and below (World Health Organization [WHO], 2005). It is a very diverse country with about 250 different ethnicities and languages, the largest being: the Hausa/Fulani in the North, Yoruba in the Southwest, Igbo in the South East and the Ijaws in the Niger Delta. The major religions are Islam in the North and Christianity in the South, while a sizeable number still adhere to traditional religious beliefs. The country is classified as low income by the World Bank and the literacy rate is 74.4% for men and 59.4% for women (WHO, 2005).

This study was conducted in the capital city of Kano, which is the commercial hub of Northern Nigeria (Gingerich, Turrock, Litfin, *et al.,* 1998). Kano state is the most populous state in Nigeria with a population of some 9.38 million people, (National Population

Commission [NPC], 2006). The rural urban component of the population indicates that 60% of inhabitants live in the rural outskirts while 40% resides in urban areas.

The study was conducted in Aminu Kano Teaching Hospital (AKTH) which is a Federal tertiary health institution in Nigeria (www.akth.org). The Hospital is located in Tarauni local government area of Kano metropolis. It is easily accessible via various tarred roads and several transport systems operating within the metropolis. The Hospital provides specialist and general medical services to patients from Kano metropolis and the neighbouring various Local Government Areas. It is one of the main referral hospitals in the Northern part of Nigeria and provides training facilities for medical students, nurses, laboratory technologists, physiotherapy students, health record students and post graduate doctors. It is run by a hospital management and has several clinical departments including the departments of psychiatry, internal medicine, community medicine, paediatrics, surgery, anaesthesia, obstetrics & gynaecology and radiology, among others. Patients utilizing the hospital services are of diverse ethnic groups and backgrounds with most of them being Hausas.

The mental health needs of the country's children and adolescents are often forgotten and neglected with greater attention being paid to infectious diseases such as HIV/AIDS and Malaria. This neglect is even more acutely felt in Northern Nigeria because the majority of the few psychiatrists working in the country are located in the Southern parts of the country and there have been very few studies reporting on the mental health needs and problems of children in Northern Nigeria.

Attention deficient hyperactivity disorder (ADHD) is the most common neurobehavioral condition of childhood (Rowland *et al.,* 2002)), and it is a disabling condition which often persists into adulthood (Barkley *et al.,* 2002). The American Psychiatric Association's (2000) Diagnostic and Statistical manual of mental Disorder (DSM-IV-TR; American Psychiatry

Association 2000**),** defines ADHD as consisting of at least six symptoms of inattention or six symptoms of hyperactive/impulsivity for six or more months, and present before the age of seven years. There must also be observed impairment in two or more settings (typically the home and school) and symptoms should not be caused by other conditions (Carey, 1999; American Association of Psychiatry 2000**).**

The International classification of diseases (*10th edition)* ICD-10, uses the term Hyperkinetic disorder (HD) often referring to the severe form of ADHD owing to its use of more restrictive criteria. Three different subtypes of ADHD arer ecognized: ADHD Predominantly Inattentive Type, ADHD Predominately Hyperactive Type, and ADHD Combined Type. ADHD is generally characterized by inattention, hyperactivity and impulsivity, in addition to a range of emotional, cognitive, and behavioral deficits (Chae et a*l.,* 2001).

Research has clearly demonstrated that ADHD is a disabling condition which often persists into adulthood (Barkley *et al.,* 2002). A 13-year longitudinal study of hyperactive children into young adulthood, by Russel *et al.,* (2002) reported that between 46% and 66% of the hyperactive group could be considered to have ADHD in young adulthood.

The prevalence of ADHD among school age children in developed countries ranges between 2% to 14% (Scahil *et al.,* 1999**;** Anderson et al, 1987; Wolraich *et al.,* 1996). A systemic review and meta-analysis carried out by Polanczyk *et al*., (2007) reported a worldwide-pooled prevalence of ADHD/HD of 5.29%. This finding indicated that the variability of the reported prevalences could be due to methodological differences rather than geography (Polanczyk *et a.,l* (2007).

Studies on the prevalence of ADHD from the African continent are scanty, but reports from Ethiopia and the Democratic Republic of Congo have indicated rates of 1.5% and 6%

respectively (Ashanafi, 2000; Kashala *et al.,* 2005). The available findings from various parts of southern Nigeria have reported rates ranging from 1.1% to 8.7% (Gureje *et al*., 1994; Adewuya and Famuyiwa, 2007).

There is a high rate of co-morbidity (up to 70%) with ADHD diagnosis, and the commonly associated disorders include oppositional defiant disorder, conduct disorder, anxiety disorder, tic disorder and mood disorders (Posner *et al.,* 2007). A hospital-based study by Busch, Bierderman, Cohen, *et al* (2002) reported that children with ADHD had high levels of co-morbidity with mood, anxiety and disruptive behavior disorders. They postulated that these disorders impair various domains such as the cognitive, interpersonal, and academic functioning of the affected individuals. The presence of co-morbid psychiatric disorders were also found to be significant predictor for both the persistence of ADHD into adulthood and a more complicated course with poorer outcomes (Biederman J, Faraone SV, Milberger S *et al.,* 1996).

Children with ADHD have a higher risk of developing antisocial personality disorder and substance use disorder in adulthood (Flory, Kate, and Milich *et a.l,* 2003). In Nigeria, Adewuya and Famuyiwa (2007) reported, the rates of co-morbid conditions with ADHD at 25.8% for oppositional defiant disorder (ODD), 9.3% for conduct disorder (CD) and 20.6% for anxiety/depression.

The correlates associated with ADHD include a 5 – 10 times higher prevalence in males (Holborow, Berry, & Elkins, 1984). Cuffe *et al*., (2005) in their study of the prevalence and correlates of ADHD symptoms in the National Health Interview Survey reported a ratio of 4:1 in favour of males. This finding is also supported by Umaporn (2008) who reported from Thailand, a preponderance of males in his cohort of children and adolescents with ADHD. The high prevalence of ADHD reported in boys could be attributed to the facts that boys

present with more externalising features which make them more easily recognised and referred for treatment than girls.

Other correlates associated with ADHD include; families living in urban areas (Ashanti *et al.,* 2000) and families that are not very cohesive or that indicated a positive family history of ADHD (Biederman *et al.,* 2002). Youngsters diagnosed with ADHD were 1.5 times more likely to live in an urban area than their rural counterparts (Scahill, L., Schwab-Stone, M., Merikangas, K. R. *et al.,* 1999). Rutter *et al.,* (1975) also identified six indexes of adversity namely severe marital discord, low social class, large family size, parental criminality, maternal mental disorder, and foster placement.

It has also been shown, that prematurity or low birth weight is often a significant correlate of ADHD (Thapar A, Langley K, Asherson P *et al.,* (2007**).** The report is consistent with various studies implicating premature birth in the aetiology of ADHD (Canino *et al.,* 2004, Scahill *et al.,* 1999), while others have considered both prematurity or Low Birth weight as significant correlates of ADHD (Thapar A, Langley K, Asherson P *et al.,* (2007**).**

A study by Amor *et al* (2005) suggested that neonatal complications are more frequent in children with ADHD compared with their unaffected relatives. Mick, Biedeman; Prince et al (2002) in a study of the impact of low birth weight (LBW) on Attention-Deficit Hyperactivity Disorder reported that children with birth weight less than 2500g had a threefold increased risk for ADHD, independent of confounding factors like parental ADHD or antisocial behaviour, prenatal exposure to substance, IQ in offspring, or co-morbid conduct disorder in offspring. In agreement with the previous study, Szatmari *et al*., (1993) reported a 3.8-fold increased risk for ADHD in their sample of extremely low birth weight (ELBW) and very low birth weight (VLBW) children, while Botting *et al.,* (1997) reported a 3.7-fold increased risk for ADHD in their study cohort. Maternal smoking during pregnancy has also been

established as an associated risk factor for the development of ADHD in children (Milberger *et al.,* 2002).

The association between ADHD and both nutritional status and academic performance is controversial and currently unresolved; as conflicting findings have been reported in the literature (Busch *et al*., 2002; Bauermeister et al., 2007). A study in support of this association was reported from China by Lam and Yang (2007). They suggested that adolescents who exhibit a higher tendency of ADHD are more likely to be overweight or obese (Lam and Yang (2007).

MOTIVATION FOR THE STUDY

This study hopes to advance knowledge about the correlates of ADHD among children and adolescents in the Northern Nigerian, in order to provide a rational basis for the development of appropriate preventive measures and to make advocacy towards addressing specific correlates that would be identified as being pertinent to the development of ADHD this environment.

This is important because of the disabling and devastating impact of ADHD in multiple domains of functioning among children and Adolescents (Klassen AF, Miller A, Fine S 2004) particularly in the study area where resources and manpower necessary for the management of the disorder are also limited.

METHODOLOGY

Study setting

The study was conducted in two stages at the Child Psychiatric Clinic of the Aminu Kano Teaching Hospital in Kano, Northern Nigeria. The clinic runs twice every week and caters for an average of 15 children and adolescents, both new and old cases on each clinic day. The clinic is the referral centre for all patients in northern Nigeria. Common cases seen in the clinic include ADHD, Oppositional defiant disorders, Autism, intellectual disability, Enuresis, mood disorders etc. Patients of both sexes up to the age of 18 are being attended to, at the clinic by child psychiatrist/registrars and other clinicians depending on the kind and severity of the presenting condition. Comprehensive psychiatric treatment strategy using a bio-psychosocial framework that involves psychopharmacological and psychotherapeutic intervention is employed in the management of the cases.

Sample size:

The study sample size (sample population to be screened for ADHD) was calculated based on a previous study in Ethiopia which reported ADHD risk of 2.84 among children and adolescent in urban areas compared to those living in the rural areas (Ashanafi *et a.,l* 2000).

Sample size (N) was calculated using the formula proposed by Lwanga and Lemeshow (Lwanga and Lemeshow 1991).The formula is used to estimate the minimum sample size for a prevalence study. It is derived from the hypothesis testing method and is contained in a practical manual of WHO 1991:23-41.

$$N = \frac{Z^2 P Q}{E}$$ (Lwanga and Lemeshow 1991)

Where, N= minimum sample size

Z= Standard normal deviate for 95% confidence interval level =1.96

P= Proportion of population with the condition in question;

Previous study in urban area of Ethiopia (Ashanafi *et al*., 2000) reported 2.84.

Q= Complimentary probability= 100 – P (100 – 2.84) = 97.16

E= Precision required (Tolerable sampling error); E in this study is taken as 5%).

$$N = \frac{1.96^2 \text{ X } 2.84\text{X } (100 - 2.84)}{5^2}$$

$$= \frac{3.8416 \text{ X } 2.84 \text{ X } 97.16}{25} = 42.40, \text{ which was rounded up to } 42.$$

However, in this study, the sample size was increased to 88 in other to ensure that a fairly high number of non-cases from the same population were also recruited and matched to cases and studied for correlates of ADHD.

Survey instruments

Two instruments, a socio-demographic questionnaire and a disruptive Behaviour Disorder (DBD) rating scale were utilized (see below).

A. The socio-demographic questionnaire which is a well structured interviewer administered questionnaire designed to address the following information:

- **Socio-demographic variables of the respondents**

Age of the child in months, sex of the child: male or female, and the place of residence of the Child/family whether urban or rural.

- **Family variables of the respondents**

Family size (no: of children), ordinal position of the child in the family; single child, first born, youngest, middle child, other position or no informaion, marital status of the parents;

married, separated or divorced, father's education; level of education- primary, high school level, or above high school level. mother's education; primary, high school level or above high school level, fathers occupation using the social class classification by Borofka and Olatawara (1976) which divides occupation into skilled/social class I (e.g Doctors, Engineers), intermediate/social class II (e.g. Technician, Nurses etc.), semi skilled/ social class III (e.g. Junior Clerk, Driver etc), unskilled/social class IV (Housewives, petty traders etc), and unemployed/social class V. Family history of marital discord (threat or physical violence between parents) or not, mother's history of psychiatric illness with number of episodes of illness and last episode of psychiatric illness, father's history of psychiatric illness with number of episodes of illness and last episode of psychiatric illness. Family history of psychiatric illness and the relationship of the child to the patient who has the illness (1^{0}, 2^{0} and 3^{0} relative), history of chronic illness in one or both parents, and history of excessive drinking by father (>3 drinks over the period of 6 months).

- **Nutritional variables of the respondents**

Anthropometric measurements mainly height (cm), weight in grams (g), head circumference (cm), mid upper arm circumference (cm). Parental Perception of child's nutritional status whether over nourished, well nourished or malnourished.

- **Perinatal variables of the respondents**

History of smoking by mother or not during pregnancy, history of alcohol drinking by mother or not during pregnancy, gestational age at delivery in months, birth weight in gram (g), hospital admission and the frequency of admission and history of abnormal neonatal period.

- **School variables of the respondents**

Grade level of the child such as not entered school yet, in kindergarten, in grade 1-3, in class 4-6, in class 7-9, in class 10-12 or in the College/University**.** History of class repeat with the number of repeats, history of school suspension/school expulsion with the frequency of suspension/school expulsion if any, and whether the child was receiving remedial/extra lesson or not.

B. The DBD is an easy to administer, 45-item screening tool for disruptive behaviour disorders including conduct disorder, oppositional defiant disorder and ADHD in children and adolescents aged 6 to 12. It is based on both the third revised and the fourth editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IIIR and DSM-IV); (Pelham, Gnagy & Greenslade, 1992). It has been validated and extensively utilized in research and has gained a high reputation among psychiatrists, clinical psychologists and doctors universally, including African countries such as the Democratic Republic of Congo (Kashala et al., 2006), and in South Africa (Meyer et al., 2004). However, only the 18 items which screen for ADHD were utilized in this study.

Each symptom is rated on a 4-point scale indicating the occurrence and the severity of symptoms:0 (not at all), 1 (just a little), 2 (pretty much) or 3 (very much). Scoring was done according to the symptoms counting method. According to the DSM-IV, ADHD is divided into three subtypes namely, predominantly inattentive (ADHD-I), predominantly hyperactivity/impulsive (ADHD-HI) and combined (ADHD-C) types. Based on the symptom scoring system, to meet the criteria for Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type, 6 or more of the items 9, 18, 23, 27, 29, 34, 37, 42, 44 must be endorsed as "pretty much" or "very much" by the parent. For the diagnosis of Attention-Deficit/Hyperactivity Disorder, Hyperactivity/Impulsivity Type to be met, 6 or more of the

items of the following items 1, 7, 12, 19, 22, 25, 30, 33, 35 must be endorsed as "pretty much" or very much" by the parent while a diagnosis of Attention-Deficit/Hyperactivity Disorder, Combined Type is made if 6 or more items are endorsed for Attention-Deficit/Hyperactivity Disorder, Inattentive Type and 6 or more items are endorsed for Attention- Deficit/Hyperactivity Disorder, Hyperactivity/Impulsivity Type.

Some impairment from the symptoms must be present in two or more settings (e.g., school, home).

Recruitment, Consent/Assent and Data Collection

Before the commencement of the study, permission was obtained from the consultant in charge of the Child Psychiatry Clinic and the Head of the Department of Psychiatry. Clearance and permission to conduct the study was obtained from the Ethical and Scientific Committee of Aminu Kano Teaching Hospital and subsequently ethical approval was granted by the Human Research Ethics Committee of the Faculty of Health Sciences, University of Cape Town (UCT).

The original disruptive behaviour rating scale (Pelham, Gnagy & Greenslade, 1992) is in English and is a self – administered questionnaire, but considering the low literacy level of the people in the study area, it was translated into Hausa using back-iterative translation. The instrument was translated into Hausa by a team consisting of a psychiatrist and a linguist, taking cognisance of the semantic and linguistic differences. Another team consisting of a psychiatrist and a linguist back – translated the Hausa version into English. This was then compared with the original English version, making sure the meaning remained the same.

Research assistants and Inter-rater reliability

Two research assistants were trained for the administration of the DBD and the sociodemographic questionnaire; an estimation of inter-rater reliability was calculated. This was based on the Agreement Method (Hall 1974). In this process, the two research assistants were asked to administer DBD to twenty patients who were not part of the main study subjects. Their concurrence (i.e. inter-rater reliability) scores of 75% was calculated which was acceptable.

Pilot study and procedures

A pilot survey was conducted with 10% of the sample size which was taken from a sample that was not part of the study sample; this is to ensure uniformity in the technique of administering the study questions.

In the first stage of the study, children and adolescents presenting to the clinic (aged 6 to 12 years) were approached by two trained research assistants, after they were registered and before they proceeded to the general waiting area.

The study was explained to the children and their parents/guardians in a quiet and private cubicle and some minutes allowed for deliberation or further enquiries about the study. It was clearly explained that participation was voluntary and refusal to participate would not in any way affect their clinic attendance or treatment. Comprehension and understanding of the explanations about the study was established via feedback responses from the participants. Thereafter, informed consent and assent were sought from the parents and children respectively.

Those clients who consented to participate were taken into a private cubicle for the first stage interview by the research assistants. The DBD was administered. Literate parents were encouraged to fill the DBD themselves while those who were unable to read were assisted by the research assistants who would read the questions and options aloud for them and then recorded their response. The instrument was available both in English and the local Hausa for the benefit of those who were literate in one but not the other language.

Each participant was given a coded tag and allowed to proceed to the clinical visit with the physician while the research assistants scored the DBD responses. Patients with a high DBD scores, indicating possible presence of ADHD were notified after the clinic encounter for an immediate clinical assessment by the researcher (a qualified Psychiatrist), who was a different person from those who administered the DBD rating scale.

The controls were those participants with low scores for ADHD on the first stage (DBD screen), as they were matched by age and sex with those with high scores and recruited for the second stage interview too.

The Psychiatrist evaluating the children in the second stage (those with high scores and the controls with low scores) was blinded to their initial DBD scores, in order to minimize bias, and he utilized a semi-structured clinical interview, Diagnostic and Statistical Manual, 4th Edition (DSM-IV) of the American Psychiatric Association, to arrive at a definitive diagnosis about the presence or absence of ADHD.

Inclusion and exclusion criteria

All children and adolescents within the age range of 6-12 years presenting at the child psychiatric clinic of the Aminu Kano Teaching Hospital in Kano, Nigeria and whose

parents/guardians consented to participate were included, if the child also gave assent. Children and adolescents outside the age range 6-12 years, those who were unaccompanied by a parent/guardian, or who came to clinic with a fellow minor were excluded from participating in the study for ethical reasons. Those whose parents refused consent were also excluded. Children with gross psychosis, who were very ill physically and those with autism, deafness, blindness or mental retardation were also excluded. Similarly, those with serious physical illness accompanying their psychiatric illness were excluded.

Confidentiality, data safety, handling and analysis

The questionnaires did not require names of the participants in order to protect their privacy and confidentiality was assured through private interviews. However, participants were given tags and their questionnaires tagged with their study number as well, in order to be able to provide a feedback to those parents who may be interested in finding out the outcome of the assessment afterwards, with a view to seeking treatment if necessary. Paper records were stored in a locked cabinet in a secure room, while electronic data was kept under password protection.

The data obtained was cleaned and entered into a computer. Data entry and analysis was carried out using the Statistical Package for Social Sciences, version 16.0 software (SPSS-16). Frequencies and cross-tabulation of variables were generated to check for data entry errors and missing values.

Socio-demographic variables were assessed using descriptive statistical tools, such as means with standard deviations and frequency tables. The relationship and significance of association between ADHD and socio-demographic variables was tested by calculating odds ratios. Multiple logistic regression analysis including all variables with a p value < 0.05 on

Bivariate analysis was performed to account for confounders and other independents variables. Counting symptoms system was used for the scoring of the Disruptive Behavior Disorders (DBD) ratings cale. The level of significance was set at 0.05, two-tailed.

Benefits to the participating individual and the society in the study setting

Expected benefits to the individual participants include becoming better informed about ADHD and the offer of free consultation services, for those who may require treatment subsequently, as compensation for the inconvenience of time suffered during the study process. The societal benefits in the local setting would stem from the generation of data about the condition which would thereafter serve as a basis for advocating targeted interventions in schools and the community to ensure that those children suffering from ADHD are offered treatment and they can grow up to attain their full potential instead of dropping out of school or suffering into adulthood.

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PART B

STRUCTURED LITERATURE REVIEW

- **Objectives of the literature review**:

The objectives of the literature review are as follows:

(1) To review the existing literature on prevalence and correlates of ADHD in both the developed and developing world.

(2) To describe approaches to investigating both the prevalence and associated factors.

(3) To identify needs for further study.

- **Literature search strategy**:

The literature was searched using Pub med and Medline data base, Google scholar.

The inclusion criteria of the literature review include:

(1) Literatures relevant to the subject matter – Search words used: Prevalence, ADHD, Risk factors, Correlates, Child and Adolescent.

(2) Relevant literatures from 1975 to date were included.

(3) Articles with sound methodology: (i) those with large sample sizes representative of the population studied. (ii) those that used diagnostic tools or clinical evaluation for diagnosis

The exclusion criteria of the literature review include:

(1) Literature not relevant to the subject matter: those that satisfy the search words but sampled among adults population.

(2) Very old literatures: studies that were published earlier than 1975.

(3) Articles with low methodological accuracy- (i) those with small sample sizes which could not be generalised to the study population. (ii) those that did not use diagnostic tools or clinical diagnosis.

(4) Unpublished articles.

- **Literature review**

Attention deficient hyperactivity disorder (ADHD) has been described as the most common neurobehavioral condition of childhood (Rowland *et. al.,* 2002), and one of the most researched medical condition (Goldman *et. al.,* 1998.) According to the American Psychiatric Association's (2000) Diagnostic and Statistical manual of mental Disorder (DSM-IV-TR; American Association of Psychiatry 2000**),** ADHD is defined as consisting of at least six symptoms of inattention or six symptoms of hyperactive/impulsivity for six or more months, and present before the age of seven years. In addition, there must also be observed impairment in two or more settings (typically the home and school) and symptoms should not be caused by other conditions (Carey, 1999; American Association of Psychiatry 2000**)**.

ADHD is comprised of three different subtypes: ADHD Predominantly Inattentive Type, ADHD Predominately Hyperactive Type, and ADHD Combined Type. ADHD is generally characterized by inattention, hyperactivity and impulsivity, in addition to a range of emotional, cognitive, and behavioral deficits (Chae *et al.,* 2001). The International classification of diseases (*10^{th} edition)* ICD-10 uses the term Hyperkinetic disorder (HD) often referring to the severe form of ADHD owing to its use of more restrictive criteria.

The reports in the literature show that ADHD is a disabling condition that often persists into adulthood (Barkley *et al.,* 2002). In a 13 year longitudinal study of hyperactive children into

young adulthood, Russel et al (2002) reported that between 46% and 66% of the hyperactive group could be considered to have ADHD in young adulthood.

The prevalence of ADHD among school age Children in most developed countries ranges between 2% to 14% (Scahil *et al*.,1999; Anderson *et al.,* 1987; Wolraich *et al.,* 1996). Gureje *et al* (1994) reported a prevalence of 1.1% among Primary Care Centre attendants in South- western Nigeria. Omigbodun (2004) reported a prevalence of 4.7% among clinic referred school aged Children at the University College Hospital Ibadan, Nigeria. A prevalence of 8.0% was reported in another study in Nigeria (Ofovwe *et a*l., (2006). Adewuya and Famuyiwa in 2007 found a prevalence of 8.7% for ADHD among primary school pupils aged 6-12years old in Nigeria.

The available studies done in Ethiopia (Ashanafi 2000; 2001) have found a prevalence of 1.5% among pupils, with children between 10 and 14 years of age. A study from the Democratic republic of Congo (DRC) reported DSM-IV ADHD prevalence of 6 % (Kashala *et al.,* 2005). A large systemic review and metanalysis carried out by Polanczyk *et al*., (2007) reported a worldwide-pooled prevalence of ADHD/HD of 5.29% .

The reasons for the variability in the prevalence values have been attributed primarily to methodological characteristics of the studies rather than geographical variability (Dulcan 1997; Swanson *et al*., 1998; Birds 2002; Rohde *et al.,* 2005; Polanczk *et al*., 2007).

There is need for the development of a universal standardized methodology for the determination of ADHD prevalence to allow for comparisons of results across countries.

The diagnosis and prevalence of ADHD are confounded by the high rates of co-morbid conditions. According to the Multimodal Treatment for ADHD (MTA 1999), the prevalence of co-morbid or co-occurring childhood psychiatric disorder in the study cohort (n=579) at

the end of the 24-month old study were; oppositional defiant disorder (ODD) 40%, conduct disorder (CD) 14%, anxiety disorder 34%, tic disorder 11% and mood disorder 4%. The study also reported that only 31% of the sample had no co-morbid conditions. Up to 70% of children with ADHD have co-morbid disorders. In a study by Posner *et al* (2007) on the Clinical Presentation of Attention-Deficit/Hyperactivity Disorder in preschool children it was reported that the rate of co-morbid conditions range from 52.1% for Oppositional defiant disorders, (24.7%) for Communication disorders, to (17.7%) for anxiety disorders. A more recent study conducted by Elia *et al* (2008) found that the most prevalent diagnoses co-occurring with ADHD were oppositional defiant disorder (ODD)(40.6%), minor depression/dysthymia (MDDD)(21.6%), and generalized anxiety disorder (GAD) (15.2%). They also reported that 35.5% of their sample had pure ADHD, which is in keeping with the findings of MTA (1999) study.

Children with ADHD are also at higher risk for substance use and dependence in adolescence and adulthood (Flory, Kate, and Milich *et al.,* 2003)**.** The rate of major depressive disorder (MDD) in youths with ADHD is 5.5 times higher than in youths without ADHD, with rates ranging from 12% to 50% (Angold *et al.*, 1999).

Co-morbid MDD in youths with ADHD is associated with greater levels of psychosocial impairment than youths with either ADHD or depression alone (Rohde *et al*,. 2001; Daviss *et al*., 2006b; Biederman *et al.,* 2008).

Busch, Bierderman, Cohen, *et al* (2002) in a hospital-based study reported that children with ADHD had high levels of co-morbidity with mood, anxiety and disruptive behavior disorders.They reitrated that these disoders impair cognitive, interpersonal, and academic functioning of the affected individuals. The presence of co-morbid psychiatric disorders also predicts both the persistence of ADHD into adulthood and a more complicated course with

poorer outcomes (Biederman J, Faraone SV, Milberger S et al., 1996: Jensen, P. S., Martin, D., & Cantwell, D. P. (1997). In a study by Adewuya and Famuyiwa (2007) in Nigeria, the rates of co-morbid conditions with ADHD reported are 25.8 % for oppositional defiant disorder (ODD), 9.3% for conduct disorder (CD) and 20.6% for anxiety /depression.

ADHD has a significant impact on multiple domains of health-related quality of life (HRQL) in children and adolescents. Using HRQL questionaires, Klassen et al (2004) assessed a cohort of children who had a diagnosis of ADHD.They found that compared with children without ADHD, children with the diagnosis had more parent-reported problems in terms of emotional-behavioral role function, behavior, mental health, and self-esteem. In addition, the problems of children with ADHD had a significant impact on the parents' emotional health and parents' time to meet their own needs, and they interfered with family activities and family cohesion (Klassen AF, Miller A, Fine S 2004).

The National Institute of Health (2000) described ADHD as a major health cost and reported that Public school expenditures for children diagnosed with ADHD have averaged between 3.5 to 4 billion USD annually in the united state. ADHD also exacts an enormous burden on society in terms of financial cost, stress to families, and adverse academic and vocational outcomes (Adewuya and Famuyiwa 2007).

CORRELATES OF ADHD

A number of variables have been associated with ADHD in both clinical and community samples of Children and Adolescents.

1. **Sociodemographic variables**

These include the Childs's age and Gender, and Residence of the Child and family.

2. **Childs' age**

There has been a consistent report about the most prevalent age range of children with ADHD. Studies conducted in developed world have reported ADHD as being the most prevalent between the ages 6-11 years (Bird *et al.*1988; Canino *et al.* 2004; Scahill *et al.*, 1999; Szatmari *et al.*, 1989.). A smilar age range of 6 -12 was repored by Umaporn (2008) in Thailand. Ashenafi *et al* (2000: 2001) in Ethiopia reported a higher rate among children aged between 10 and14 years, while Kashala et al (2006) in the DRC reported that early age at start of school was associated with ADHD.

3. Gender

ADHD is more prevalent among boys rather than girls across all age groups (APA, 1994). Reports indicate that 5 to 10 times as many boys suffer from ADHD than girls (Holborow, Berry, & Elkins, 1984). In agreement with the previous studies, Umaporn (2008) in Thailand found a preponderance of male in his cohort of children and adolescents with ADHD. Cuffe *et al* (2005) in their study of the prevalence and correlates of ADHD symptoms in the National Health Interview Survey reported a ratio of 4:1 in favour of males. In the same vein, a study in Nigeria reported a male to female ratio of 2:1 for all the sub-types of ADHD with the exception of hyperactive/impulsive which was 3.2:1 (Adewuya and Famuyiwa 2007).

This reported gender difference in prevalence appears because boys respond to situations through more externalizing symptoms (aggressive or acting out tendencies) than girls, who are more likely to exhibit internalizing symptoms (Sciutto, Nolfi, & Bluhm, 2004) and thus less likely to be referred for evaluation. They are however, also at risk of both learning and social problems (Berry, Shaywitz, & Shaywitz, 1985). Hyperactivity appears to be the only distinguishing behavior accounting for the more frequent diagnosis of ADHD among boys. On the other hand, Kashala *et al.*, (2006) did not find any gender difference among children with ADHD in the DRC. One possible reason for this finding may perhaps be the use of a younger age sample and the fact that the study was limited to the urban area.

4. **Residence of the family and the Child**

Youngsters diagnosed with ADHD were 1.5 times more likely to live in an urban area than their rural counterparts (Scahill, L., Schwab-Stone, M., Merikangas, K. R. *et al.*, 1999). In Ethiopia, Ashanti et al (2000) reported that children living in urban areas were 2.84 times more at risk of ADHD than those living in rural areas.

5. **Family variables**

Biederman *et al* (2002) reported a positive association between ADHD in children with Rutter' s six index of adversity namely severe marital discord, low social class, large family size, parental criminality, maternal mental disorder, and foster placement (Rutter *et al.*, 1975). Also associated with ADHD in the family, are reduced family cohesion, chronic conflict and parental psychopathology (Biederman *et al*., 1995).

A critical review of the literature by Fischer (1990) delineated these as occurring along four lines: increased stress reported by parents, parental psychopathology, parental marital discord and an interaction path that is more in the direction of child to parent rather than the reverse. Other documented family characteristics include low level of social support and family dysfunction (Keown & Woodward, 2002; Scahill *et al.*, 1999). It may however, be pertinent to consider the possibility of information recall bias as a possible confounder in these studies; whereby individuals diagnosed with the condition of ADHD may exhibit a greater propensity to recall risk factors than those individuals not found to have the condition.

Family history of ADHD, major depressive disorder or antisocial behaviours also predict increased risk of ADHD in the offspring (Barkley *et al.*, 1990), while Scahill *et al.*, (1999) reported maternal history of psychiatric illness and paternal history of excessive alcohol use as significantly associated correlates of ADHD in children and adolescents. It had been reported in earlier studies that socioeconomic correlates of ADHD included low income and

low socioeconomic class (Bird *et al.,* 1998), family's urban residence and being on welfare support (Szatmari *et al.,* 1989). However, a more recent study (Canino *et al.,* 2004) argued that urban residence and family's perception of poverty, rather than actual low income, were the significant correlates of ADHD. This latter finding was also supported by Bauermeister *et al.,* (2007).

6. **Nutritional variables**

There are mixed reports about the association between nutritional status of children and adolescents and ADHD in the literature. A study by Lam and Yang (2007) in China suggested that adolescents who exhibit a higher tendency of ADHD are more likely to be overweight or obese (Lam and Yang (2007). An increased risk for overweight or obesity of 1.4 times for those who scored high on the ADHD tendency as compared to those who scored low was reported. Other studies done in the past also reported positive association between ADHD and overweight/obesity (Altfas *et al.,* 2002; Agranat-Meged.*et al.,* 2005). Kashala *et al.,* (2006) reported a positive association between ADHD and good nutritional status in their study cohort.

The role of foods, preservatives and artificial colouring agents in ADHD still remains controversial. Feingold and colleagues (1996)) reported that food additives might have a negative effect on children with symptoms of ADHD (Feingold, 1976). Wender EH (1986) in their review of food addictive-free diets in the treatment of behavioural disorders reported that food colouring agents and other additives had little or no documented effect on the behaviour of children with ADHD, whereas a study by Boris and Mandel (1994) reported that dietary factors may play a significant role in the aetiology of majority of children with ADHD (Boris and Mandel (1994). A more recent review by Sinn (2008) showed that nutrition and dietary influence the behavour and learning in children with ADHD, with the strongest support to date reported for omega-3s and behavioral food reactions.

7. Perinatal variables

This has been consistently reported by various studies implicating premature birth in the aetiology of ADHD (Canino *et al.,* 2004, Scahill *et al.,* 1999), while others have considered both prematurity or Low Birth Weight as significant correlates of ADHD (Thapar A, Langley K, Asherson P *et al.,* (2007**).** Mick, Biedeman, Prince *et al* (2002) in a study of the impact of low birth weight (LBW) on Attention-Deficit Hyperactivity Disorder reported that children with birth weight less 2500g had a threefold increased risk for ADHD independent of confounding factors like parental ADHD or antisocial behaviour, prenatal exposure to substance, IQ in offspring, or co-morbid conduct disorder in offspring. In agreement with the previous study, Szatmari et al (1993) reported a 3.8-fold increased risk for ADHD in their sample of extremely low birth weight (ELBW) and very low birth weight (VLBW) children, while Botting *et al.,* (1997) reported a 3.7-fold increased risk for ADHD in their study cohort. Maternal alcohol consumption during pregnancy has been attributed to the development of ADHD (Auti-ramo *et al.,* 2000). A study by Amor et al (2005) suggested that neonatal complications are more frequent in children with ADHD compared with their unaffected relatives. Maternal smoking during pregnancy has also been established as an associated risk factor for the development of ADHD in children (Milberger *et al.,* 2002).

8. School variables

School impairment, as evidenced by poor grades, higher needs for special tutoring sessions, repeated classes and school suspensions or expulsions were reported by Barkley *et al.,* (1990) and Busch *et al.,* (2002). However, Bauermeister et al., (2007) did not find any evidence of increased poor grade achievement among children with ADHD as compared with other children without it.

- **Identification of gaps or needs for further research:**

The identified areas of gap in the literature includes the unavailability of reports on ADHD from the northern parts of Nigeria and the need for the development of a universal standardized methodology for the determination of ADHD prevalence to allow for comparisons of results across countries and regions.

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PART C

CORRELATES OF ATTENTION DEFICIT/ HYPERACTIVITY DISORDER (ADHD) AMONG CHILDREN AND ADOLESCENTS IN NORTHERN NIGERIA

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ABSTRACT

Aim:

The aim of the study is to determine the prevalence and correlates of Attention Deficit Hyperactivity Disorder among children and adolescents aged 6 to 12 in Northern Nigeria.

Methodology:

We conducted a case control study in two stages at Aminu KanoTeaching Hospital, Nigeria over a period of three months. A questionnaire was administered to all the participants in two stages. In the first stage of the study, 18 item of Destructive Behaviour Disorder (DBD) rating scale was administered to the participants to assess the presence or absence of ADHD. The controls were those participants with low scores for ADHD on the first stage (DBD screen), and were matched by age and sex with those with high scores and recruited for the second stage interview too. In the second stage, a rater blinded to the initial DBD scores evaluated the children (those with high scores and the controls with low scores) according to the Diagnostic and Statistical Manual, 4th Edition (DSM-IV) of the American Psychiatric Association.

Results: In univariate analysis, we found that marital status (p=0.008), mother's smoking while pregnant (p=0.003), mothers drinking while pregnant (p=0.007), modes of delivery (0.029), and age at start of school (0.013) were more frequently found in children with ADHD in this study. In multivariate analysis, the following variables marital status (p=0.017), mother drinking while pregnant (p=0.014), modes of delivery (0.018), abnormal neonatal period (0.033), and age at start of school (0.009) were significantly associated with ADHD.

Conclusion:

Correlates of ADHD identified in this study were similar to those in developed world. Knowledge of these risks factors will allow for the institution of comprehensive preventive strategies to reduce the prevalence of ADHD.

INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) appears to be the most studied of the childhood psychiatric disorders in both the psychosocial and medical literature as well as one of the most common neurobehavioral disorder of childhood[1, 2]. ADHD has significant effect on peer relationship and academic performance of the sufferer. It also has immense psychosocial impact on parents and the society at large.

The American Psychiatric Association's Diagnostic and Statistical manual of mental Disorder text revised[3] defined ADHD as consisting of at least six symptoms of inattention or six symptoms of Hyperactive/impulsivity for six or more months, and present before the age of seven years. In addition, there must also be observed impairment in two or more settings (typically the home and school) and symptoms should not be caused by other conditions.

The reports in the literature show that ADHD is a disabling condition that often persists into adulthood[4]. The National Institute of Health[5] described ADHD as a major health cost and reported that Public school expenditures for children diagnosed with ADHD have averaged between 3.5 to 4 billion USD annually in the united state. ADHD also exacts an enormous burden on society in terms of financial cost, stress to families, and adverse academic and vocational outcomes[6].

Various variables have been associated with ADHD in both clinical and community samples of Children and Adolescents. Most studies have reported cases within the age range of 6-11years[7,8]. In Ethiopia, a higher rate among children aged between 10 and14 years was reported. Kashala et al[10] in the DRC reported that early age at start of school was associated with ADHD. ADHD is more prevalent among boys rather than girls across all age groups[11]. A study in Nigeria reported a similar male to female ratio of 2:1 for all the sub-types of ADHD with the exception of hyperactive/impulsive which was 3.2:16.[6]

Family burden and stress have been well documented among families of children with

ADHD. Fischer[12] delineated these as occurring along four lines: increased stress reported by parents, parental psychopathology, parental marital discord and an interaction path that is more in the direction of child to parent rather than the reverse. Other documented family characteristics include low level of social support and family dysfunction[13], family history of ADHD, major depressive disorder or antisocial behaviours[14], low income and low socioeconomic class[7], and family's urban residence and being on welfare support[15]. However, two recent studies [8,16] argued that urban residence and family's perception of poverty, rather than actual low income, were the significant correlates of ADHD.

Contributory parental factors include: maternal alcohol consumption and/or smoking cigarette during pregnancy, [17,18] maternal history of psychiatric illness and paternal history of excessive alcohol use19. Perinatal factors like prematurity and Low Birth Weight have been shown to have significant correlates with ADHD.[20,21,22] A study by Amor and his colleagues suggested that neonatal complications are more frequent in children with ADHD compared with their counterparts without ADHD[23].

This study aims to evaluate the correlates of Attention Deficit Hyperactivity Disorder (ADHD) among children and adolescents in a clinical setting in Northern Nigeria.

METHODOLOGY

Study setting

The study was conducted in two stages at the Child Psychiatry Clinic of the Aminu Kano Teaching Hospital in Kano, Northern Nigeria. The clinic runs twice every week and caters for an average of 15 children and adolescents, both new and old cases on each clinic day. The clinic is the referral centre for all patients in northern Nigeria.

Sample size:

The study sample size (sample population to be screened for ADHD) was calculated using an appropriate formula for sample size study in case control studies with provision made for attrition and results precision. Thus a total of 88 eligible children were studied.

Survey instruments

Two instruments, a socio-demographic questionnaire and a Destructive Behaviour Disorder rating scale is utilized.

A. The socio-demographic questionnaire which is a well structured interviewer administered questionnaire was designed to provide information on socio-demographic, family, nutritional, perinatal and school variables of the respondents.

B. The DBD is an easy to administer, 45-item screening tool for disruptive behaviour disorders including conduct disorder, oppositional defiant disorder and ADHD in children and adolescents aged 6 to 12. It is based on both the third revised and the fourth editions of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IIIR and DSM-IV)[26]. It has been extensively utilized in research and has gained a high reputation among psychiatrists, clinical psychologists and doctors universally, including African countries such as the Democratic Republic of Congo (Kashala et al[26]).However, only the 18 items which screen for ADHD will be utilized in this study.

Each symptom is rated on a 4-point scale indicating the occurrence and the severity of symptoms: 0 (not at all), 1 (just a little), 2 (pretty much) or 3 (very much).Scoring was done according to the symptoms counting method.[26] In addition, case-ness was established by the first author – a trained psychiatrist – blinded to the DBD scores in the first assessment, and utilizing a semi-structured interview based on the DSM-IV criteria.

Recruitment, Consent/Assent and Data Collection

Before the commencement of the study, permission for the study was obtained from the consultant in charge of the Child Psychiatry Clinic and the Head of the Department of Psychiatry. Clearance and permission to conduct the study was obtained from the Ethical and Scientific Committee of Aminu Kano Teaching Hospital and the University of Cape Town Health Science Faculty, Research Ethics Committee.

The original disruptive behaviour rating scale[26] is in English and is a self – administered questionnaire, but considering the low literacy level of the people in the study area, it was translated into Hausa using back-iterative translation.

In the first stage of the study, each participant was given a coded tag and responded to the questionnaire. They were then allowed to proceed to the clinical visit with the physician while the research assistants score the DBD responses. Patients with a high DBD score, indicating possible presence of ADHD were notified after the clinic encounter for an immediate clinical assessment by the researcher (a qualified Psychiatrist).

The controls were those participants with low scores for ADHD on the first stage (DBD screen), as they were matched by age and sex with those with high scores and recruited for the second stage interview too. The Psychiatrist evaluating the children in the second stage (those with high scores and the controls with low scores) were blinded to their initial DBD

scores, in order to minimize bias, and utilized the Diagnostic and Statistical Manual, 4th Edition (DSM-IV) of the American Psychiatric Association, to arrive at a definitive diagnosis about the presence or absence of ADHD.

All children and adolescents within the age range of 6-12 years presenting at the child psychiatry clinic of the Aminu Kano Teaching Hospital in Kano, Nigeria and whose parents/guardians consent to participate were included, if the child also assents.

Children and adolescents outside the age range 6-12 years, those who were unaccompanied by a parent/guardian, or who came to clinic with a fellow minor were excluded from participating in the study for ethical reasons. Those whose parents refuse to consent were also excluded. Children with severe psychosis, who are very ill and those with autism, deafness, blindness or mental retardation were similarly excluded. Similarly, those with serious physical illness accompanying their psychiatric illness were also excluded.

Confidentiality, data safety, handling and analysis

Anonymity, confidentiality and secure storage of the data was ensured**.** Data entry and analysis were carried out using the Statistical Package for Social Sciences, version 16.0 software (SPSS-16). Frequencies and cross-tabulation of variables were generated to check for data entry errors and missing values. The relationship and significance of association between ADHD and socio-demographic variables were tested by calculating odds ratios. Multiple logistic regression analysis including all variables with a p value < 0.05 on univariate analysis were performed to account for confounders and other independents variables. The level of significance was set at 0.05, two-tailed.

RESULTS

The 88 participants had a mean age of 8.42 years (range 6.3 – 11.9) with a standard deviation (SD) of 1.6. Majority of them were boys (66; 75%) and within the age range 6-9 (66;75%). Majority of the respondents (64; 72.7%) were mothers. Equal proportions of the respondents (44; 50%) were resident in rural and urban community respectively. More than half of the families studied had more than 5 children (49; 55.7%) and most of the participants' birth order in the family fall into the "other" position category (78; 88.6%) (i.e. youngest, middle or last born child).

Most participants started school at 5 year-old (85.2%), with nearly half having repeated one grade (48.9%). Of those that had repeated a grade, 43.2% and 4.5% had repeated twice and thrice respectively. Thirty-eight (43.2%) of the participants had a history of school suspension or expulsion, with 25% and 4.2% of these having had two and three suspensions/expulsions respectively .More than half (56.8%) of all the subjects were receiving extra/remedial lessons.(Table 1).

More than two-thirds of the parents were married (62; 70.5%), with a high proportion of these experiencing marital discord (48.9%). About half of the subjects' father had high school education (34; 38.6%) while more than half of their mothers (51; 58%) had mainly primary education. Only a very small proportion of the fathers were social class V. With respect to the psychological context of the families, most of the parents were in good psychological health, both in the past and at the time of the study. Mothers and fathers had a 39.8% and 31.8% prevalence of past psychiatric disorder respectively. About one third of the subjects had family history of psychiatric illness (26; 29.5%), of which 59.1% occurred in first degree relation of the participants. Of the studied participants, 34.1% of their parents had history of

chronic medical illness, with 10.2% of the fathers being excessive drinkers of alcoholic beverages.

There was a high prevalence of substance use during pregnancy, with 61.4% of mothers smoking cigarettes during the index pregnancy, and 77.3% of mother using alcohol while pregnant. With respect to the nutritional status of the subjects, most of the parents (58%) believed their children were well nourished, while 26.1% said their children were obese, and 15.9% said the children were poorly nourished.

Developmental enquiry revealed that most participants were born by forms of delivery other than normal vaginal birth: caesarean section, vacuum delivery and forceps' delivery. Obstructed labour accounted for (68.2%); the remainders were born mainly by spontaneous delivery (31.8%) Thirty-nine (44.3%) of the participants were admitted in hospital after delivery, of which about halve were admitted only once (41.7%). More than half of the participants (58%) had experienced abnormal neonatal period which could be defined as medical /surgical complications occurring within the first year of life.(table 2)

The ADHD status as determined by destructive behavior disorder rating scale (DBD) and clinical assessment is as follows: The number of cases determined by clinical assessment was 20 (22.7%) which was slightly higher than the 19 (21.6%) determined by the DBD rating scale (Cohen's kappa index = 0.9012; SE = 0.1065). Out of 20 cases identified by Clinical assessment, 14 (70%) were males and six (30%) were females while DBD rating scale Identified 14 (73.7%) males and five females (26.3).

Parameters found to be protective against ADHD in this study were: (i) marital status of parents ($x^2 = 9.63$, $p = 0.008$) with participants under the care of both parents being protective and (ii) spontaneous mode of delivery ($x^2 = 4.839$, $p = 0.029$). Factors found to be

significantly associated with the presence of ADHD from this study were mothers smoking and drinking alcohol while pregnant (x^2 = 9.067, p = 0.003; & x^2 = 8.378, p = 0.007, respectively), and starting school at age 5 (x^2 = 8.719, p = 0.013). Majority of the study subjects with ADHD were in the age group 6- 9(84.2%) and the proportion of affected males to females were: 2.3:1.

The tendency for place of residence (x^2 = 3.29, p = 0.059), and ordinal position in the family (x^2 = 2.96, p = 0.564) to be contributory were not significant statistically. (Tables 3 and 4)

Multiple regression analysis of the variables revealed the similar findings with the cross tabulation outcome except for mothers smoking while pregnant which turned out to be non significant after adjusting for confounders. However, abnormal neonatal period became significant contributory factor to development of ADHD. Table 5 showed that mother smoking (p = 0.10, O.R = 25.62, 95% C.I = 2.18 – 300.88) and drinking (p = 0.014, O.R = 8.50, 95% C.I = 1.55 – 46.64) when pregnant, and age at start of school (p = 0.009, O.R = 9.17, 95% C.I = 1.72 – 48.91) contribute a factor of 25, 8 and 9 times respectively to the development of ADHD.

Table 1 – Sociodemographic Variables of Participants

	Frequency (n=88)	Percentage (n=100%)
Age group in years		
6-9	66	75
10-12	22	25
Gender		
Male	66	75
Female	22	25
Age at start of school(Yrs)		
4	8	9.1
5	75	85.2
6	5	5.7
History of class repeats		
No	45	51.1
Yes	43	48.9
History of school suspension/School expulsion		
No	50	56.8
Yes	38	43.2
Subject receiving extra or remedial lesson		
No	30	43.2
Yes	50	56.8

Table 2 – Sociodemographic Variables of Parents and family factors

	Frequency (n=88)	Percentage (n=100%)
Respondents	64	72.7
Child's mother		
Child's father	17	19.3
Both parents	7	8
Residents		
Rural	44	50
Urban	44	50
Family size		
1-2 children	10	11.4
3-5 children	29	33
>5 children	49	55.7
Marital status		
Married	62	70.5
Divorced	20	22.7
Parent dead	6	6.8
Marital discord		
No	45	51.1
Yes	43	48.9
Educational background of Father		
Primary level	27	30.7
High school level	34	38.6
Above high school level	27	30.7
Educational background of Mother		
Primary level	51	58
High school level	31	35.2
Above high school level	6	6.8
Occupational status of father *(social class)*		
Class i	10	11.4
Class ii	27	30.7
Class iii	30	34.1
Class iv	20	22.7
Class v	1	1.1
Family history of psychiatry illness *(not in parents)*		
No	62	70.5
Yes	26	29.5
History of excessive drinking by father *(>3 drinks over the period of 6 months)*		
No	79	89.8
Yes	9	10.2
History of mothers smoking during pregnancy		
No	34	38.6
Yes	54	61.4
History of mothers drinking during pregnancy		
No	20	22.7
Yes	68	77.3

Table 3 – Bivariate analysis with ADHD clinical assessment outcome of parents and family factors

	ADHD cases identified by clinical assessment [n = 19 (100%)]	**ADHD non-cases identified by clinical assessment [n=69 (100%)]**	**P value**
Residence			
Rural	6 (31.6)	38 (55.1)	0.059
Urban	13 (68.4)	31 (44.9)	
Family size			
1-2 children	1 (5.3)	9 (13)	
3-5 ,,	4 (21.1)	25 (36.2)	0.087****
>5	14 (73.7)	35 (50.7)	
Father's education			
Primary	7 (36.8)	20 (29)	
High school	8 (42.1)	26 (37.7)	0.575
>High	4 (21.1)	23 (33.3)	
Mother's education			
Primary	11 (57.9)	40 (58)	
High school	5 (26.3)	26 (37.7)	0.182
>High school	3 (15.8)	3 (4.3)	
Father's social class			
Class I	1 (5.3)	9 (13)	
Class II	4 (21.1)	23 (33.3)	
Class III	8 (42.1)	22 (31.9)	0.091****
Class IV	5 (26.3)	15 (21.7)	
Class V	1 (5.3)	0	
Marital status of the parents			
Divorced/single	11 (57.9)	15 (21.7)	0.008[a]
Married	8 (42.1)	54 (78.3)	
Marital discord			
No	7 (36.8)	38 (55.1)	0.125
Yes	12 (63.2)	31 (44.9)	
Father's psychiatric illness			
No	12 (63.2)	44 (63.8)	0.582
Yes	7 (36.8)	25 (36.2)	
Mother's psychiatric illness			
No	9 (47.4)	44 (63.8)	0.152
Yes	10 (52.6)	25 (36.2)	
Family psychiatry illness			0.302
No	12 (63.2)	50 (72.5)	
Yes	7 (36.8)	19 (27.5)	

Parent's chronic illness			
No	10 (52.6)	50 (72.5)	0.135
Yes	9 (47.4)	19 (27.5)	
Father's excessive drinking			0.821
No	17 (89.5)	62 (89.9)	
Yes	2 (10.5)	7 (10.1)	
Mother's smoking during pregnancy			
No	13 (68.4)	21 (30.4)	
Yes	6 (31.6)	48 (69.6)	0.003[a]
Mother's drinking during pregnancy			
No	9 (47.4)	11 (15.9)	
Yes	10 (52.6)	58 (84.1)	0.007[a]
Mode of delivery			
Spontaneous	9 (47.4)	51 (73.9)	
Others	10 (52.6)	18 (26.1)	0.029[a]
Hospital admittance			
No	14 (73.7)	35 (50.7)	
Yes	5 (26.3)	34 (49.3)	0.062
Abnormal neonatal period			
No	13 (68.4)	38 (55.1)	0.219
Yes	6 (31.6)	31 (44.9)	

Table 4 – Bivariate analysis with ADHD clinical assessment outcome of participants-

Gender Male Female	 14 (73.7) 5 (26.3)	 52 (75.4) 17 (24.6)	 0.548
Age 6-9 10-12	 16 (84.2) 3 (15.8)	 50 (72.5) 19 (27.5)	 0.38
Birth order* First child Others**	 2 (10.5) 17 (89.5)	 5 (7.2) 64 (92.8)	 0.589***
Age at start of school 4yrs 5yrs 6yrs	 5 (26.3) 13 (68.4) 1 (5.3)	 3 (4.3) 62 (89.9) 4 (5.8)	 0.013
School grade Primary (1-3) Primary (4-6)	 13 (68.4) 6 (31.6)	 41 (59.4) 28 (40.6)	 0.331
Patient receiving extra lesson No Yes	 6 (31.6) 6 (31.6)	 32 (46.4) 37 (53.6)	 0.187
Child nutritional status Malnourished Well nourished	 11 (57.9) 8 (42.1)	 26 (37.7) 43 (62.3)	 0.094

[a] *for variables that are significant on multivarate analysis * for families with multiple children.**children other than first child. *** fisher's exact test was used. ****chi square for trend was used.*

Table – 5. Logistic Regressions for variables showing significant outcome on bivariate analysis only.

	Unadjusted associations			Adjusted associations		
Predictor	**Odds ratio**	**95% CI (lower-upper)**	**P-value**	**Odds ratio**	**95% Cl (lower-upper)**	**P-value**
Marital status of parents	6.750	1.156 – 39.398	0.008[a]	0.37	0.16 – 0.84	0.017
Mother smoking while pregnant	0.211	0.70 – 0.631	0.003[a]	25.62	2.18 – 300.88	0.10
Mother drinking while pregnant	0.218	0.72 – 0.610	0.007[a]	8.50	1.55 – 46.64	0.014
Mode of delivery	3.189	1.081 – 9.398	0.029	0.51	0.30 – 0.89	0.018
Abnormal neonatal period	0.566	0.193 – 1.662	0.219	0.05	0.00 – 0.78	0.033
Age at start of school	0.150	0.011 – 2.055	0.013	9.17	1.72 – 48.91	0.009
Residence	0.595	0.066 – 5.361	0.059			
Father's education	0.700	0.642 -2.035	0.575			
Mother's education	3.636	0.636- 20.591	0.182			
Marital discord	0.147	0.761 – 6.192	0.125			
Father's psychiatric illness	0.872	0.720 – 9.355	0.582			
Mother's psychiatric illness	1.956	0.701 – 5. 454	0.152			
Family psychiatry illness	0.333	0.180 – 6.191	0.302			
Parent's chronic illness	0.324	0.022 – 7.201	0.135			
Father's excessive drinking	1.216	0.225 – 6.574	0.821			
Hospital admittance	0.368	0.119 – 1.132	0.062			
Gender	1.009	0.981 – 1.037	0.548			
Age	1.092	0.343 – 3.400	0.380			
School grade	0.659	0.224 - 1.944	0.331			
Patient receiving extra lesson	0.399	0.136 – 1.172	0.187			
Child nutritional status	2.700	0.633 – 11.509	0.094			

DISCUSSION

To our knowledge, this is one of the few studies that have studied the correlates of ADHD in Africa, and the only one of its kind conducted in the Northern part of Nigeria. The two significant findings of the study was the association that children with ADHD status were more likely to come from single/divorced parents, birth deliveries were by other modes other than spontaneous vertex delivery, started school by age 5, and have mothers who drink alcohol and/or smoke cigarette while carrying the index pregnancy.

Regression analysis also confirmed these correlates, with the exception of mothers smoking during pregnancy which turned out to be statistically non significant. In addition, abnormal early developmental period became statistically significant following regression analysis.

Other factors not found to be associated with DSM IV ADHD symptoms in this study were socio demographic variables like place of residence, age and gender of the child. School variables, such as child grade level and receiving extra lessons to improve academic performance. Family variables, such as family size, parental education, father's social class, marital discord, parents' psychiatric illness, family history of psychiatric illness and fathers drinking were also not found to be significantly associated with ADHD status.

The proportion of respondents with ADHD identified in this study was 22.7%, and this was less than the proposed 50% of cases and 50% of non cases to allow for a case-control matching ratio of 1:1. However, it was still high enough to allow for a credible evaluation of the correlates of ADHD, through comparison of those with ADHD and those without the condition.

The only family variable of ADHD in this study that was found to be positively correlated with

ADHD is having parents who are divorced or being a child of a single parent. This finding is in consonance with the report by Biederman *et al*[32] from a similar study who found that reduced family cohesion, chronic conflict and parental psychopathology are associated with ADHD. Reduced family cohesion, chronic conflict may adversity affect marital or partner relationship resulting in the dissolution of the marriage. Divorce is permissible in the culture and religion of majority of people in Northern Nigeria and it may explain this finding. The study did not find marital discord as a correlate of ADHD which is in contrasts with the findings of Rutter and his colleagues, in their study of the prevalence of psychiatric disorder in London, as they reported six index of adversity namely: severe marital discord, low social class, large family size, parental criminality, maternal mental disorder, and foster placement[31] as being important correlates of ADHD and other mental conditions among children and adolescents. This is further supported by findings from Fischer[12] in his study of Parenting stress and the child with attention deficit hyperactivity disorder. The reason for this may be because people in the study setting would not like to discuss issues about their marriage with strangers, even if they are medical practitioners, for cultural reasons. Similarly, this study did not find the following family variables to be correlated with ADHD; family size, parental education, father's social class, parent's psychiatric illness, family history of psychiatric illness and fathers drinking. This is again, in contrast with the findings of Rutter and his colleagues[31], earlier mentioned above. Biederman and associates[35] also reported a contrary finding to this study, as they found a positive association between ADHD in children and adolescents with Rutter's six indexes of family adversity[31]. In addition, Scahill *et al*[11], reported maternal history of psychiatric illness and paternal history of excessive alcohol use as significantly associated correlates of ADHD in children and adolescents. Lack of positive association between the above factors and ADHD in this study may possibly be

explained by the fact that the families in the study setting are characterized by extended family systems with strong family support to take care of children and adolescents from such families. This protective cultural mechanism may have masked the impact of family factors which is more striking in nuclear families such as would have been found in the studies by Biederman, Rutter and their colleagues.

Nigeria is also cited by the WHO to have very poor maternal and perinatal indices[36]. According to world health report 2005, maternal mortality rate is equal or more than 1000 per 100, 000 live births while peri-natal mortality is 58.6 per 1000 per live births. This study found maternal drinking while pregnant with index patient, the modes of delivery other than spontaneous (e.g. caesarian sections, forceps delivery, vacuum delivery etc) and adverse events during neonatal life were all associated with presence of ADHD. The adverse events during the neonatal period include birth asphyxia, which would result in hypoxia to the brain regions, especially the basal ganglia. The later is the most metabolically active brain region and is very sensitive to hypoxic insult.The protective nature of spontaneous vertex delivery may be accounted for by the fact that it carries less risk of hypoxic brain insult than other modes of delivery. Perinatal adverse events have been reported in the literature to be directly associated with a high prevalence of ADHD.[8,17,18,19,24] Therefore, the very poor state of maternal and child health indices in the country further support the association found in this study.

Smoking while pregnant with the index child was also found to be associated with ADHD in the child in this study. This is in consonance with the finding of Milberger et al.[18] After adjusting for confounders, no association was found between maternal smoking and ADHD.

Children who had started school by the age of 5 years were found to be positively correlated with ADHD in this study. This agrees with Kashala et al[10] that early age of starting school is associated with ADHD. ADHD children are sent to school early because they are difficult to manage at home. We found that age 5 at start of school carried a 9 fold increase in onset of ADHD. Other variables studied such as school grade and receiving extra lesson or not were not found to be associated with ADHD. This is also in agreement with the findings of Bauermeister et al[30] who found no evidence of increased poor grade achievement among children with ADHD as compared with other children without it. However, other studies have reported contrary findings, as the study by Barkley *et al*[4] and Busch *et al*[25] had reported that school impairment, as evidenced by poor grades, higher needs for special tutoring sessions, repeated classes and school suspensions or expulsions were all associated with ADHD. School impairment may not be accounted for by ADHD only but also by co-morbid conditions like depression, conduct disorder, intellectual disorder etc. In this study setting, children receive extra lessons not because of poor academic standard but to give the parents respite at home by keeping the children gainfully engaged.

Majority of the participants were male (14; 70%), within the age group (6-9 years; 84.2%). This finding agrees with most previous studies, indicating that the most prevalent age group for cases are within the age group (6-9 years),[7,9,19,25] , usually accounting for more than two-thirds of the cases.

The typical gender disparity in terms of male preponderance was also noted in this study. The male to female ratio of 2.3:1 in this study is lower than Cuffe, Moore & McKeown study of [29] 4:1 and higher than the study by Adewuya and Famuyiwa[6] in Nigeria that reported 2:1 from their

community sample. The reports of male preponderance may be due to referral bias as males are more likely to present with more externalizing symptoms (such as hyperactivity and aggression) than females, which makes it easier to be recognized and referred for treatmen[37]t. However, according to Beiderman et al, the risk of ADHD is the same for boys and girls[34]. The place of residence was not found to be statistically significant, but it is interesting to note that it follows a similar pattern by which most cases were actually from the urban area. The proportion of urban to rural dwellers in this study was 2.2. This agrees with Ashanti et al[9] factors of 1.5 and 2.84 respectively and in favour of urban dwellers. It further concurs with Szatmari *et al.*[15], Canino *et al.*[8], and Bauermeister *et al*[30], correlates with family's urban residence

CONCLUSION/RECOMMENDATIONS

This study has highlighted the psychosocial correlates of ADHD among children and adolescents in Northern Nigeria; in addition to the risk associated with certain perinatal, neonatal, parental and residential factors.

This study has significant implication for policy makers to initiate primary preventive measures that would be focused towards the reduction of identified risk factors in this study. Clinicians working in the area should be alerted to the possibility of ADHD among children and adolescents they treat, and where required prompt referrals should be made to centers with the required expertise and facilities, in order to prevent complications such as poor academic performance.

This work has also highlighted a need for more epidemiological studies, especially community based surveys, involving various medical specialties, psychologists, sociologists, in order to generate baseline data about ADHD and indeed, other mental health conditions in children and adolescents. This would be vital information for the planning and development of services targeted at the identified needs in this settings.

LIMITATIONS

This work is limited by the following considerations:

i. Its cross-sectional design, which does not allow for drawing any causal relationship between factors identified as significant correlates of ADHD in this study.

ii. Databases such as EMBASE and CINAHL could have been additionally searched to make the literature review more comprehensive.

iii. The use of father's occupational as a measure of socio-economic status may not be a very accurate measure, as informal traders may actually earn much more than University Professors.

iv. Information recall bias may have played a role in increased recollection of risk factors among those identified with ADHD, as compared with those without the condition.

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PART D

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27 May 2010

REC REF: 242/2010

D- S Sale
Division of Child and Adolescent Psychiatry
Psychiatry & Mental Health

Dear Dr Sale

PROJECT TITLE: CORRELATES OF ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD) IN NORTHERN NIGERIA

Thank you for submitting your study to the Research Ethics Committee for review

It is a pleasure to inform you that the Ethics Committee has **formally approved** the above-mentioned study.

Approval is granted for one year till the 28th May 2011.

Please submit a progress form, using the standardised Annual Report Form (FHS016), if the study continues beyond the approval period. Please submit a Standard Closure form (FHS010)if the study is completed within the approval period.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please quote the REC. REF in all your correspondence.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, HSF HUMAN ETHICS

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB0000 1938
Adobe

African Journal of Psychiatry (AJOP)

Material submitted for publication in the AJOP is accepted on condition that it meets the requirement of the Editor-in-Chief. The publisher reserves the copyright of the material published. All authors must give consent to publication, and the AJOP does not hold itself responsible for statements made by contributors. The Journal's primary aim is the publication of review and original articles, case reports and letters to the editor aimed at specialist mental health care and other professionals working in the neurosciences as well as primary care practitioners. All material will be sent for peer review.

Manuscript preparation

1. Copies should be neatly typewritten, with double spacing and wide margins. The manuscript should be submitted electronically. Authors are required to state that their material is original and not previously published or currently submitted elsewhere.

2. All abbreviations should be spelt out when first used in the text and thereafter used consistently.

3. Scientific measurements should be expressed in SI units throughout, with two exceptions: blood pressure should be given in mmHg and haemoglobin values in g/dl.

4. Author's full name & surname, affiliation & correspondence address (including email address) to be set out in full on title page of article.

5. All articles (review, original research etc) are to have an abstract, giving a brief succinct overview of the article. The abstract should reflect the essence of the paper and be 200 to 250 words. For Original Research articles, the abstract should be structured as follows:- Objective, Method, Results and Conclusion.

6. Authors must give a minimum of three key words, and should use the MeSH (Medical subject headings list of index medicus) cataloque.

7. A clear statement on ethical issues in clinical and animal research must be provided; conflict of interests and patient confidentiality issues must be indicated.

8. For multi authored papers, the International Committee of Medical Journal Editors (ICMJE) states that, there are three necessary conditions one must meet in order to claim (co) authorship:

    1. Substantial contributions to conception and design, or acquisition of data, or analysis and interpretations of data.

    2. Drafting the article or revising it critically for important intellectual content.

    3. Final approval of the version to be published.

Those, and only those who meet all three of the above stipulations, can be named authors, while those who meet only some of the requirements or otherwise facilitate the research by contributing to funding, data collection, editorial work, etc. should be named in the 'Acknowledged' section.
Accordingly, multi-authored papers need a declaration of relative contribution.

Illustrations

1. Figures consist of all material which cannot be set in type, such as photographs and line drawings. Photographs should be forwarded electronically.

2. Tables and legends for illustrations should be typed on separate sheets and should be clearly identified. Tables should carry Roman numerals, thus I, II, III, etc, and illustrations Arabic numerals, thus: 1, 2, 3, etc.

3. Where identification of a patient is possible from a photograph the author must submit a consent to publication signed by the patient, or by the parent or guardian in the case of a minor.

4. If any tables or illustrations submitted have been published elsewhere, written consent to republication should be obtained by the author from the copyright holder and the author(s).

References

1. References should be inserted at the end of the sentence, outside the full stop, as superior numbers, and should be listed at the end of the article in numerical order. Do not list them alphabetically.

2. It is the author's responsibility to verify references from the original sources.

3. References should be set out in the Vancouver style, and only approved abbreviations of journal titles should be used; consult the List of Journals Indexed in Index Medicus for these details. Names and initials of all authors should be given unless there are more than six, in which case the six names should be given followed by "et al". First and last page numbers should be given.

Journal references should appear as follows:

a. Peter S. Acute hamstring injuries. Am J Sports Med 1994; 12(7):395-400.

Book references should be set out as follows:

a. Williams G. Textbook of Sports Medicine. 2nd Edition: Butterworth, 1989: 101-104.

b. Vandermere P, Russel P. Biomechanics of the hip joint. In:Nordien PE. Jeffcoat A, eds, Clinical Biomechanics. Philadelphia:WB Saunders, 1990:472-479.

4. “Unpublished observations” and “personal communications” may be cited in the text, but not in the reference list. Manuscripts accepted but not yet published can be included as references followed by “(in press)”.

All manuscripts and correspondence should be emailed to:
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email: christopher.szabo@wits.ac.za

SOCIODEMOGRAPHIC QUESTIONNAIRE

PATIENT'S FILE NO:

Respondent: Child's mother [ ]

Child's father [ ]

Both parents [ ]

Others [ ]

A Socio-demographic variables

1.1. Age of the Child in months……

1.2. Sex:

Male [ ] Female [ ]

1.3. Residence:

Rural [ ] Urban [ ]

2) Family variables

2.1. Family size (no. of children):

1-2 [ ] 3-5 [ ] 6 or more [ ]

2.2. Ordinal position:

Single child [ ] First born [ ] Youngest [ ]

Middle Child [ ] Other possition [ ] No informaion [ ]

2.3. Marital status of parents:

Single parent [ ] Married [ ] Divorced [ ] Parent death [ ]

2.4. Father's education :

Primary level [ ] High school level [ ]Above high school level [ ]

2.5. Mother's education: Primary level [ ] High school level [ ]

Above high school level [ ]

2.6. Occupation Father's:

1) Skilled/Social class I Highly skill professionals e.g. Doctors, Engr., Top Government officials, Business executives.

2) Intermediate/Social class II Skilled professionals' e.g. Technician, Nurses, and senior tutors.

3) Semi skilled/Social class III Junior clerk drivers, mechanics carpenters, junior military and police men, military etc.

4) Unskilled/Social class IV petty traders, subsistent farmer, messengers.

5) Unemployed/Social class V (Barofka and Olatawura 1976).

2.7. Family history of marital discord (threat or physical violence between parents):

No [ ] or Yes [ ]

2.8. Mothers history of psychiatric illness: No [ ] or Yes [ ]

If yes no: of times ……

Last episode ……

2.9. Father's history of psychiatric illness: No [ ] or Yes [ ]

If yes no: of times ……...

Last episode ……....

2.10. Family history of psychiatric illness (except in mother and father):

No [ ] or [Yes [ ]

If yes..... 1^{0} relatives

2^{0} relatives

3^{0} relatives

2.11. History of Chronic illness in one or both parents:

No [ ] or Yes [ ]

2.12. History of excessive drinking by father (>3 drinks over the period of 6 months):

No [ ] or Yes [ ]

3) Nutritional variables

3.1. Parental perception of child's nutritional status:

a) Obese nourished [ ]

b) Well nourished [ ]

c) Poorly nourished [ ]

3.2. Anthropometric measurements mainly:

Height (cm).....

Weight in grams (g).....

Head circumference in centimeter (cm).....

Mid upper arm centimeter in rcumference(cm)...

4) Perinatal variables

4.1. History of smoking by mother during pregnancy:

No [ ] or Yes [ ]

4.2. History of alcohol drinking during pregnancy:

No [ ] or Yes [ ]

4.3. Mode of delivery:

a) Spontaneous vaginal delivery

b) Caesarean section [ ]

c) Forceps delivery [ ]

d) Vacuum delivery [ ]

e) Other (please specify).....

4.4. Reason for the mode of delivery (please specify).....

4.5. Gestational age at delivery(months).....

4.6. Birth weight in grams(g) .....

4.7. Hospital admittance:

No [ ] or Yes [ ]

If Yes No: of times.....

4.8. Abnormal neonatal period:

Yes [ ] or No [ ]

5 School variables

5.1 Age at start of school in years (yrs).....

5.2. Grade level:

a) Not entered school yet [ ]

b) Kindergarten [ ]

c) Primary 1-3 [ ]

d) Primary 4-6 [ ]

e) Jounior secondary school 1-3 [ ]

f) Senior secondary school 1-3 [ ]

g) Uuniversity [ ]

5.3. History of class repeats:

No [ ] or Yes [ ]

If yes No: of repeats.....

5.4. History of school suspension/school expulsion:

No [ ] or Yes [ ]

If yes No: of times.....

5.5. Is patient receiving remedial/extra lesson?

Yes [ ] or No [ ]

PARENT / TEACHER DBD RATING SCALE

Child's Name:_____ Form Completed by:_____

Grade:_____Date of Birth:_____Sex:_____ Date Completed:_____

Check the column that best describes your/this child. **Please write DK next to any items for which you don't know the answer.**

		Not at all	**Just a Little**	**Pretty Much**	**Very Much**
1	Often interrupts or introduces on other (e.g., butts into conversations or games)				
2	Has run away from home overnight at least twice living in parental surrogate home (or once without returning for a lengthy period)				
3	Often argues with adults				
4	Often lies to obtain goods or favours or to avoid obligations (i.e., "cons" others)				
5	Often initiates physical fights with other members of his or her household				
6	Has been physically cruel to people				
7	Often talks excessively				
8	has stolen items of nontrivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery)				
9	Is often easily distracted by extraneous stimuli				
10	Often engages in physically dangerous activities without considering possible consequences (not for				

	the purpose of thrill-seeking), e.g., runs into street without looking				
11	Often truant from school, beginning before age 13 years				
12	Of fidgets with hands or feet or squirms in seat				
13	Is often spiteful or vindictive				
14	Often swears or uses obscene language				
15	Often blames other for his or her mistakes or misbehaviour				
16	Has deliberately destroyed others' property (other than by fire setting)				
17	Often actively defies or refuses to comply with adults' requests or rules				
18	Often does not seem to listen when spoken to directly				
19	Often blurts out answers before questions have been completed				
20	Often initiates physical fights with others who do not live his or her household (e.g., peers at school or in the neighborhood)				
21	Often shifts from one uncompleted activity to another				
22	Often has difficulty playing or engaging in leisure activities quietly				
23	Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities				
24	Is often angry and resentful				
25	Often leaves seat in classroom or in other situation in which remaining seated is expected				

26	Is often touchy or easily annoyed by other				
27	Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behaviour or failure to understand instructions)				
28	Often loses temper				
29	Often has difficulty sustaining attention in tasks or play activities				
30	Often has difficulty awaiting turn				
31	Has forced someone into sexual activity				
32	Often bullies, threaten, threatens, or intimidates others				
33	Is often "on the go" or often acts as if "driven by a motor"				
34	Often loses things necessary for tasks or activities (e.g toys, school assignments, pencils, books, or tools)				
35	Often runs about or climbs excessively in situations in which it is inappropriate (in adolescents or adults, may be limited to subjective feeling of restlessness)				
36	Has been physically cruel to animals				
37	Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)				
38	Often stays out at night despite parental prohibitions, beginning before age 13 years				
39	Often deliberately annoys people				
40	Has stolen while confronting a victim (e.g mugging, purse snatching, extortion, armed robbery)				
41	Has deliberately engaged in fire setting with the				

	intention of causing serious damage				
42	Often has difficulty organizing tasks and activities				
43	Has broken into someone else's house, building, or car				
44	Is often forgetful in daily activities				
45	Has used a weapon that can cause serious physical harm to others (e.g, a bat, brick, broken bottle, knife,				

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SCORING INSTRUCTIONS FOR THE DISRUPTIVE BEHAVIOUR DISORDERER RATING SCALE

There are two ways to determine if a child meets the criteria for DSM IV diagnoses of Attention-Deficit/Hyperactivity Disorder, Oppositional Defiant Disorder, or Conduct Disorder. The first method involves counting symptoms for each disorder using the Disruptive Behavior Disorders (DBD) rating method is preferable for diagnosis of females (e.g., using a 2 SD cutoff), as the symptom counting method often results in under diagnosis of females children. Please note that items 10, 14, and 21 are from DSM-III –R and are not included in the scoring for a DSM-III-R and are not included in the scoring for a DSM-IV diagnosis.

Method 1: Counting Symptoms

To determine if a child meets the symptom criteria for DSM IV diagnoses of Attention-Deficit/Hyperactivity Disorder, Oppositional Defiant Disorder, or Conduct Disorder as measured by the DBD parent/Teacher Rating Scale, count the number of symptoms that are endorsed "pretty much" or "very much" by either parent or teacher in each of the following categories: Note that impairment and other criteria must be evaluated in addition to symptom counts.

Attention-Deficit/Hyperactivity Disorder

_____ Attention-Deficit/Hyperactivity Disorder-Inattention Symptoms

(items 9, 18, 23, 27, 29, 34, 37, 42, 44)

6 or more items must be endorsed as "pretty much" or "very much" to meet criteria for Attention-Deficit/Hyperactivity Disorder, Predominantly inattentive Type. The six items may be endorsed on the teacher DBD, the parent DBD, or can be a combination of items from both rating scales (e.g., 4 symptoms endorsed on the teacher DBD and 2 separate symptoms endorsed on the parent DBD). The same symptom should not be counted twice if it appears on both versions (parent and teacher) of the rating scale.

_____ Attention-Deficit/Hyperactivity Disorder-Hyperactivity/Impulsivity Symptoms

6 or more items must be endorsed as "pretty much" or "very much" on the parent and/or the teacher DBD to meet criteria for Attention-Deficit/Hyperactivity Disorder, Predominantly Hyperactive-Impulsive Type

If 6 or more items are endorsed for Attention-Deficit/Hyperactivity Disorder – inattention and 6 or more items are endorsed for Attention- Deficit/Hyperactivity Disorder-hyperactivity/impulsivity then criteria is met for Attention-Deficit/Hyperactivity Disorder, Combined Type.

Some impairment from the symptoms must be present in two or more setting (e.g. schools, home)

Factors:

Oppositional/Defiant	(items 3, 13, 15, 17, 24, 26, 28, 39)
Inattention	(items 9, 18, 23, 27, 29, 34, 37, 42, 44)
Impulsivity/Overactivity	(items 1, 7, 12, 19, 22, 25, 30, 33, 35)

Ma'anonin Gwajin DBD na Iyaye/Malamai

Sunan Yaro_____ Mai Cike form_____

Matsayi:_____ Ranar Haihuwa:_____ Jinsi:____ Ranar da aka Cike_____

Ka cike wajen da yafi bayyana yaronka/yaro dai-dai wanda ba'a sa amsarsa ba a rubuta "DK"

S/N	Bayanai	Babu Kwata kwata	Akwa Kadar	Akwai ba da ya waba	Akwa da yawa
1.	Yawan katsewa ko afkawa mutane (misali, katsalandan cikin Magana ko wasa).				
2.	Gudawa daga gidan iyaye ko marikan mutun akalla sau biyu a cikin dare (ko kuma sau daya Idan yaro ya jima sosai).				
3.	Yawan musu da manyan mutane.				
4.	Yawan karya don samun wani abu mai kway ko samon alfarma ko kuma gujewa aiki.				
5.	Yawan jawo fada da mutanen gida.				
6.	Yiwa mutane cutar da zata iya yi musu illa a jiki.				
7.	Yin yawan surutu.				
8.	Yin satar abinda bashi da daraja sosai amma ba gaba da gaba ba (Misali, sata a shago ko fojere).				
9.	Yawan daukar hankali idan yaro yayi abu mai kara.				
10.	Yawan shiga abubuwa masu hatsari ba tare da tunanin Sakamakonsu ba. Misali, tsallake titi ba dubawa.				
11.	Yawan gujewa makaranta, wanda yaro ka faraway kafin				

	shekara goma sha uku.				
12.	Yawan motsi da hannu ko kafa ko mutsu-mutsu a zaune.				
13.	Yawan bujirewa ko tawaye.				
14.	Yawan rantsuwa ko kalamai na sabo.				
15.	Yawan zargin mutane akan kuskurensa ko halayyens.				
16.	Lalata abubuwan mutane da gangan (amma bat a hanyar sanya wuta ba).				
17.	Yawan kaucewa ko kin bin dokar maya ko abin da suke sa ayi.				
18.	Yawan kinjin Magana idan anyi mas Magana kai tsaye.				
19.	Fadin amsa kafin a gama fadar tambaya.				
20.	Fada fada da mutanen da ba yan gidansu ba (misali, a makaranta ko makota.				
21.	Shawagi daga abin da ba'a gama ba zuwa wani abu dabam				
22.	Samun matsala wajen yin wasa ko yin raha cikin nutsuwa.				
23.	Rashin bada hankali akan abu, ko yin kuskure da bai kamata ayiba a makarant ko wajen aiki.				
24.	Yawan nuna fushi ko kunci.				
25.	Barin wajen zama a aji ko muma wajen taron da yakamata a zauna.				
26.	Saurin hasla ko yin fushi da mutane				
27.	Rashin bin umarni, kin gama aikin makaranta ko wajen aiki (Ba kuma dan tawoye bane ko rashin fahimta).				
28.	Saurin hawa samako kasa danne abu.				
29.	Matsala wjwn mai da hankali akan abubuwa ko wasanni.				
30.	Rashin hakuri wajen jiran abu				
31.	Tilasta wani saduwa da shi				
32.	Yin cin zabe, tsoratarwa ko barazana ga wasu				
33.	Yin abu da wuta-wuta ko kamar ana jansa				
34.	Batar da abubuwa muhimmai wajen aiki (Misali, Fensir,				

	Littafi, ko aikin Makaranta).				
35.	Yawan zirga-zirga ko haye-haye a inda bai dace ba				
36.	Yin mugunta ga dabbobi.				
37.	Kaucewa ko rashin san duk abin da yake bukatar tunani (Misali aikin Kakaranta).				
38.	Jimawa a waje da daddare duk da iyayen yaro sunhana shi, wanda yafara yi tun kafin shekara goma sha uku.				
39.	Bawa mutane haushi da gangan.				
40.	Yin sata gaba da gaba da wanda akayi wa satar (Misali, kwale, ko sashi).				
41.	Sanyawa waje wuta da gangan da niyyar cutarwa sosai.				
42.	Samun matsala wajen shiryawa da tsara abubuwa.				
43.	Afkawa gidan wani ko cikin motar wani.				
44.	Yin amfani da makami wanda zai iya cutar da wasu (Misali fassarshiyar kwalba, wuka, bindiga).				

University of Buffalo
Center for Children and Families
318 Diefendorf Hall
3435 Main Street
Buffalo, NY 14214
716-829-2244

Hanya ta daya – Kidaya alamun rashin lafiya

Attention Deficit/Hyperactivity Disorder

_____ Attention Deficit/Hyperactivity Disorder – Inattention Symptoms
(items 9,18,23,27,29,34,37,42,44)

Ana bukatar abubuwa shida ko fiye da haka a matakin "Pretty Much" ko "Very Much" don a cimma samon "Attention – Deficit/Hyperactivity Disorder, Predominantly inattentive type". Malami ko Iyaye su guje fadin wadannan abubuwa shida. Amma ba za'a maimata abu daya sau biyu ba akan wannan ma'auni na "DBD".

_____ Attention Deficit/Hyperactivity Disorder – Impulsivity Symptoms
(items 1, 7, 12, 19, 22, 25, 30, 33, 35)

Ana bukatar abubuwa shida a matakin "Pretty Much" ko 'Very Much" a bangaren Iyaye ko Malami don a cimma samun "Attention Deficit/Hyperactivity Disorder, Predominantly Hyperactive – Impulsive Type.

Idan an sami abubuawa shida a bangaren "In-attention" da abubuwa shida a bangaren "Impulsivity" sai a ce mata "Combined Type".

Wasu daga cikin alamumi dole su zama a waje biyu (gida da makaranta).

INFORMED CONSENT FORM

Attention Deficit Hyperactivity Disorder (ADHD) is a problematic condition in children and adolescents who may be having some problems in terms of their behaviour, level of activity and ability to remain focused on an issue or task at hand.

This problem when it is present makes it very difficult for the young person to concentrate and do well in school and he/she will also be quite difficult to manage in the home. Unfortunately, we know very little about how common this condition is, here in this environment.

We would very much appreciate your kind consideration towards answering some questions and also permitting us to interview your child/ward for a total duration of about 30 – 45 minutes please. Your answers will help us gather information about the presence or absence of ADHD and the factors associated with it, in this environment.

However, you are perfectly free to refuse to participate and your refusal will not in any way affect your clinic attendance or treatment now or in the future. You may also decide to stop participating at any point during the interview if you are no longer comfortable and you wish to discontinue.

The information collected from your interview will be completely anonymous as your names, address and/or phone numbers are not required. However, after the study, if you wish to know how your child/ward fared, you are welcome to check back after one month and you will be able to clarify his/her assessment and we will be available to provide free information services and to assist with commencing treatment if the child has ADHD.

CONSENT:

I, ... have read the above instructions/explanations and I fully understand what they mean. I am also willing to allow myself and my child/ward to be interviewed for this research.

Signature/Thumbprint: .....

Date: .....

INFORMED ASSENT FORM

We would like to ask you some questions; just the same way we are asking all the children between the ages of 6 – 12 years who come to this clinic, in order to understand a problem called Attention Deficit Hyperactivity Disorder (ADHD) which some children usually have. However, it is not all children that have it but we want to find out how many children out of those coming to this clinic suffer from this problem.

We would only ask you some questions which would take about 30 – 45 minutes of your time, but there will be no pain and you will not be given any injections/drugs. You are free to refuse to participate and there will be no problem whatsoever in terms of your usual clinic attendance or treatment. You are also free to stop answering questions and decide to leave at anytime that you so desire. Your name, address and phone numbers are not required, so your answers will be strictly confidential and no one will know what you answered.

However, this questions we wish to ask you will increase your knowledge about the condition and it will allow us help other children like you who may have the problem. We would be very happy therefore, if you will agree to participate and answer our questions please.

ASSENT

I, ... hereby agree to participate in the study and to be asked all the necessary questions.

Signature/thumbprint:.....

Date:.....

Human Science Research Ethics Committee
Groote Schuur Hospital
University of Cape Town
Health Science Faculty
Old Main Building
Observatory
Cape Town
7701
29/04/2010

RE: Change in study title

Dear Sir/Madam

I write to inform you that the study previously entitled *"Prevalence and Correlates of ADHD in Northern Nigeria"* will now be titled "*Correlates of ADHD in Northern Nigeria".* The current study will focus on Correlates of ADHD in Northern Nigeria and will not pay attention to the prevalence rates. The change in study has come after much discussion with my late supervisor, Professor Alan Flisher who suggested that a study focusing on prevalence rates was not doable.

The above is in view of the ethics approval letter granted by Aminu Kano Teaching Hospital which still carry's the title *"Prevalence and Correlates of ADHD in Northern Nigeria"*. This ethical approval was granted prior to the recommendations suggested by late Professor Alan Flisher. The changes in the study title and focus do not require substantial redrafts to the research proposal.

I thank you for your support through this research process and look forward to any contributions you may make to the proposal.

Yours truly,

Shehu Sale
Division of Child and Adolescent Psychiatry
University of Cape Town
Rondebosch
CapeTown
South Africa

AMINU KANO TEACHING HOSPITAL

P. M. B. 3452, ZARIA ROAD, KANO. (☎: 064 - 947872)
FAX (064) 663354, www.akth.org, E-mail: enquiries@akth.org, email: (akthkano@yahoo.com)

Chairman Board of Management	Chief Medical Director	Chairman M. A. C.	Director of Administration
PROF. IDRIS MUHAMMAD	DR. ABDULHAMID ISA DUTSE	DR. A. Z. MOHAMMED	ABUBAKAR S. ADAMU, mni
NNOM, OON, FAS, MD, FRCP	MBBS, FWACP, (Int. Med) DCP (Lond.)	MBBS, FMCP Path	B. Sc (HONS) M. A. (ECON) FNIM, FHAN

OUR REF: AKTH/MAC/SUB/12^A/P3/IV/690 YOUR: NHREC/21/08/2008a/AKTH/EC/207 DATE: 4th March 2010

Dr. Shehu Sale
Department of Psychiatry

Through:
The Head of Department
Department of Psychiatry
Aminu Kano Teaching Hospital,
Kano.

RE: ETHICAL APPROVAL

RE: PREVALENCE AND CORRELATES OF ADHD IN NORTHERN NIGERIA – BY SHEHU SALE

Refer to your application and your subsequent response to the Committee in respect of the above research proposal. The Committee considered your proposal and noted same as a prospective study.

In view of this, Ethical approval is hereby granted to conduct the research.

However, the proposal is subject to periodic reporting of the progress of the study and its completion to the Committee.

Best regards,

Bara'atu Kabir (Mrs)
Secretary
For: Chairman, Ethical Committee.
Email: akthirb@hotmail.com

PROPOSED BURGET FOR THE STUDY: CORRELATES OF ADHD IN NORTHERN NIGERIA.

S/No.	Item	Description	Rate	Quantity	Amount (USD)	Subtotal
1	Personnel	- Per day (2 research assistants)		2 :- 42days	$1,680 .00	$1,680 .00
2	Stationery	- Printing and photocopying questionnaires @ $ 0.08 per page :- 5 pages :- 348 copies	$0.08	348: -5 pp.	$ 139.20	
			$15.00	5	$ 75.00	
		- Bags	$ 7.00	5	$ 35.00	
		- Clip boards	$ 5.00	2	$10.00	
		- Printing / writing papers	$ 4.00	10	$ 40.00	
			$ 3.00	10	$ 30.00	
		- Pens (2 pcs :- 5 people)	$ 3.00	5	$15.00	
		- Pencils (2 pcs :- 5 people)	$ 0.08	5 :- 4 pages	$ 1.60	
		- Erasers (1 pc :- 5 people)	$ 0.08	10:- 100 pp.	$ 80.00	
		- Printing and photocopying of consent forms, and other appendages @ $ 0.08 per page :- 4 pages :- 5 copies	$ 5.00	10 copies	$ 50.00	
		- Printing of final report				

		@ $ 0.08 per page :- 100 pages :- 10 copies - Binding of final report				**$ 475.80**
3	Translations	- English to Hausa (Questionnaires & consent forms) and back translation	$ 30.00	2 persons	$ 60.00	**$ 60.00**
4	Communication	- Internet e-mailing ($ 5 per day) - Telephony /fax	$ 5.00 $ 50.00	40 days -	$ 200.00 $ 50.00	**$ 250.00**
5	Training of interviewers, questionnaire piloting and data entry assistants	- Hiring a venue for training (2 days) - Reviewing result of pilot study - Data entry assistants (2 assistants)	$ 50.00 $ 50.00 $ 2.00	2 days 1 day 348 quest.	$40.00 $ 20.00 $ 796.00	**$ 856.00**
7	Miscellaneous	Miscellaneous including refreshments, monitoring interviewers, etc.	$100.00	-	$ 100.00	**$ 100.00**
Grand Total						**$ 3,421.8**