



Socio-Demographic Characteristics and Predictors of Childhood Primary Nocturnal Enuresis in Benin City, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Authors DUN and NJI contributed for conception and design. Author DUN did the data acquisition analysis and interpretation of data. Author DUN drafted the manuscript. Author NJI revised the manuscript for intellectual content. Both authors read and approved the final manuscript.

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ABSTRACT

Aim: To document the socio-demographic characteristics and predictors of primary nocturnal enuresis in children.

Study Design: A descriptive cross sectional study.

Place and Duration of Study: The study was carried out in public primary and secondary schools in Egor Local Government Area, Edo State, Nigeria from April to August 2014.

Participants and Methods: A semi-structured self-administered questionnaire was used to obtain information about nocturnal enuresis from 1221 mothers/child pair who gave consent to

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participate in the study.

Results: Prevalence of primary nocturnal enuresis in the children was 18.8% (primary monosymptomatic nocturnal enuresis 73.7% and primary non- monosymptomatic nocturnal enuresis 26.3%). Children ages 5 – 7 years (OR = 5.0, $p = 0.00$) and those from the large household (20.3%) ($p = 0.02$) significantly had primary nocturnal enuresis. Predictors of primary nocturnal enuresis in this study included difficulty to awaken child from sleep ($\beta = 0.90$, OR = 2.5, $p = 0.00$), history of soiling under-wear ($\beta = 1.56$, OR = 5.0, $p = 0.00$), urgency ($\beta = 1.0$, OR = 2.7, $p = 0.00$), and family history of enuresis ($\beta = 1.95$, OR = 7.0, $p = 0.00$).

Conclusion: This study showed that about one out of every five school children had primary nocturnal enuresis. Difficulty to awaken child from sleep, soiling of under-wears, history of urgency and family history independently predicted primary nocturnal enuresis.

Keywords: Children; enuresis; predictors; school-age; soiling; urgency.

1. INTRODUCTION

Nocturnal enuresis also known as bed wetting refers to involuntary repeatedly passage of urine into bed or clothing occurring at least two occasions in a week, in a child 5 years or older in whom there is no identifiable congenital or acquired cause [1,2]. Although involuntary passing of urine is normal in children younger than five years, nocturnal enuresis is said to occur when a child has not achieved bladder control at 5 years of age and above [2,3].

Several studies [4-6] worldwide had classified children with nocturnal enuresis on the bases of the longest duration of dryness attained. If dryness has never been attained (i.e. since birth) at night or was achieved for less than 6 months it is defined as primary nocturnal enuresis (PNE) however, if dryness has occurred for 6 months and over it is termed secondary nocturnal enuresis (SNE). Primary nocturnal enuresis is much common than secondary nocturnal enuresis [7]. Of recent nocturnal enuresis has also been further classified on the bases of the presence of lower urinary tract symptom, as monosymptomatic nocturnal enuresis (MNE) and non-monosymptomatic nocturnal enuresis (NMNE) [2,8]. MNE is bedwetting with absence of any day-time incontinence or urological symptoms. In contrast, bedwetting associated with day-time symptoms suggestive of bladder dysfunction such as urgency, frequency and holding manoeuvres is considered NMNE. Thus according to the International children's continence society (ICCS) criteria [2] a child with PNE may have primary monosymptomatic nocturnal enuresis (PMNE) or primary non-monosymptomatic nocturnal enuresis (PNMNE), while the one with SNE may have secondary monosymptomatic nocturnal enuresis (SMNE) or secondary non-monosymptomatic nocturnal enuresis (SNMNE).

The social stigmatization and psychological problems usually associated with the disease is a major challenge [9]. More often than not the child is being punished and ridiculed in the public by some parents and other family members in view of correcting him/her but such practices inadvertently have been observed to have negative effect on these children by worsening the disease condition [9,10].

There have been several reports on PNE in children with prevalence rate ranging from 6.7% to 37.0% in Nigeria [7,10-15]. This wide range of prevalence depends on geographical location of study. Although the exact mechanism of PNE is not completely understood, however, some authors have observed several socio-demographic factors in association with the disease such as age of the child, social class, parental education, family size, and family history of enuresis [7,10,11,16-22]. Despite these documentations, there have been varying contrary reports on the association between these socio-demographic factors and PNE. For example, Nwokocho et al. [12] observed weak positive correlation between PNE and social class, Chinawa et al. [11] and Imoudu et al. [13] in their studies did not find any significant association between these socio-demographic factors and PNE. Most authors in Nigeria also did not document some urinary habits such as multiple voiding at night, and increased urinary frequency.

PNE has been reported to be as low as 2.6% in the United Kingdom [18] and 1.2% in Croatian children [23]. Higher prevalence was observed in children from Yemen (17.2%) [19]. These three studies showed that there was significant association between PNE and family history. However, there were some conflicting findings in terms of some socio-demographic factors and enuresis. For example Rona et al. [18] observed

that social class was associated with enuresis only in girls and not in boys and the Yemeni study did not show any relationship between PNE and parental social class, maternal education and family size [19].

Bearing in mind these varying associations between PNE and these identified socio-demographic factors, and the fact that most of these studies were not set to identify predictors of nocturnal enuresis in Nigerian children, this present study was designed to address this pertinent gap in the knowledge of PNE in Nigeria.

2. STUDY PARTICIPANTS AND METHODS

This study was a descriptive cross-sectional study and was carried out from April to August 2014 during the third term school calendar. Subjects were mothers/ children (5 -17 years) of the selected primary and secondary schools in Egor Local Government Area (LGA), Edo State, Nigeria.

Egor LGA is one of the five LGAs in Benin City with an estimated population of 339,899 [24]. This LGA is predominantly an urban setting with nine political wards of which two are rural. Most of the inhabitants are civil servants who mainly reside in the urban setting while the rural is predominantly farmers and traders. The list of registered primary and secondary schools were obtained from the Local Government Education Authority. There were 17 registered public (government owned) primary schools and 12 secondary schools in the LGA. Thirty percent of the public schools were selected by balloting using the simple random techniques from the list of both the public primary and secondary schools respectively. These comprised of 7 primary schools (5 from urban and 2 from rural) with the identification A, B, C, D, E, F and G; and 4 secondary schools (3 from urban and 1 rural) with identification A1, A2, A3, and A4 were selected for the study.

2.1 Inclusion Criteria

All students 5 to 17 years old who have never attained dryness since birth and whose parents gave a written informed consent. These included children with monosymptomatic and non-monosymptomatic enuresis.

2.2 Exclusion Criteria

Children with history of secondary nocturnal enuresis i.e. history of attainment of dryness for 6

months or more, clinical evidence of any febrile illness, history suggestive of renal diseases or children on medication known to encourage diuresis.

The sampling technique involved training researcher assistants who participated in data collection. There was an initial visit to all the selected schools in the LGA where the procedure of the study was explained to the heads and teachers in the schools. The purpose of the study was explained to all the eligible students (5 -17 years) and their teachers in each of the selected schools. Questions and answers were entertained from the students and the teachers were instructed to assist to clarify any issue concerning the study and its procedure to the parents of the students. The researchers' contact details were also made available for further questions and answers from both students and their parents. Each student was then given a written informed consent form for their parents. These consent forms were returned to the school by the students after it has been signed by their parents. Any child whose parents signed the written informed consent was then recruited in the study. A total sample of all the students in each of the selected schools was recruited in the study which was 2500 students. Of these, 1800 (72.0%) parents gave written informed consent to participate in the study.

Ethical certificate was obtained from the Research and Ethic Committee of College of Medical Sciences, University of Benin Ref: CMS/PO/109/Vol I/100 dated 13-06-2013. Written permission was obtained from the Local Government Educational Authority and Head of each selected schools. Data collection was done by self-administered questionnaire. The questionnaire was validated through relevant literature and was administered on 20 students from schools not included in the study. Each student took the questionnaire home for their mother who self-administered the questionnaire. Retrieval of the questionnaires from the students was done within 2 – 4 days. Information on the questionnaire was augmented by history obtained from the students as included in the socio-demographic characteristics of the study participants. The content of the questionnaire included the demography of the subjects (mother's level of education and occupation, father's level of education and occupation), family size, number of siblings, and birth order in the family. Social class of the parent was determined by the process described by Olusanya et al. [25] Other information sought for

in the questionnaire included risk factors to PNE such as difficulty to awaken child from sleep, history of soiling under-wears, urgency, urinary frequency, multiple voiding at night, and family history of enuresis.

2.3 Data Analysis

Information obtained was entered into Microsoft Excel window 2010 and analysis was done by Statistical Package for Social Sciences (SPSS) version 17.0 (Inc Chicago, Illinois, USA). Quantitative variables were summarized using means and standard deviations and comparison of mean was done using Independent –T Test. Comparison of proportions was done using Chi-square and Fisher’s Exact tests where appropriate. Binary Logistic Regression Model of the variable whose P –value were ≤ 0.05 was then used to identify predictors of PNE in the children. Such variables included child’s age, household size, mother’s age, marital status of mother, family history of enuresis and history of difficulty to awaken child from sleep, and soiling under-wears, urgency, urinary frequency, multiple voiding at night as independent variables and presence of PNE as dependent variable. The level of significance of each test would be set at $P = 0.05$.

3. RESULTS

Of the 1800 questionnaires given to the study participants, 1574 returned their filled questionnaire to the investigators giving a retrieval rate of 87.4%. Three hundred and fifty-three (22.4%) questionnaires were excluded from the final analysis due to incomplete and inconsistency data and 1221 (77.6%) had analyzable data.

The mean \pm standard deviation age of the respondents (mothers of the children) was 40.8 ± 8.2 (23 – 76) years and the mean \pm standard deviation age of the children in this study was 12.2 ± 2.0 (range 5 – 17 years). There were 440 (36.0%) male and 781(64.0%) female children. The mean \pm standard deviation number of individuals living in the households was 7.0 ± 2.0 (range 1 – 32) persons; the mean \pm standard deviation number of children in the household was 5.0 ± 2.0 (range 1 – 17) children and the mean \pm standard deviation number of persons sleeping in one room with the index child was 3.0 ± 1.5 (0 – 11) persons. The socio-

demographic characteristics of the children are shown in Table 1.

Table 1. Characteristics of the study participants

Characteristics	N = 1221 (%)
Gender	
Male	440 (36.0)
Female	781 (64.0)
Age group (Years)	
5 – 7	21 (1.7)
8 – 10	223 (18.3)
11 -13	668 (54.7)
14 -17	309 (25.3)
Family social class	
Upper	81 (6.6)
Middle	665 (54.5)
Lower	475 (38.8)
Household size	
Small (≤ 5)	354 (29.0)
Large (≥ 6)	857 (70.2)
No response	10 (0.8)
Child’s position in the family	
1 st 5 positions	1009 (82.6)
> 5th	171 (14.0)
No response	41 (3.4)
Over-crowding in sleeping room	
Yes	48 (4.0)
No	1137 (93.1)
No response	36 (2.9)
Location of the respondents/ children	
Rural	370 (30.3)
Urban	851 (69.7)
Mothers	
Age group of mothers (years)	
23 – 29	37 (3.0)
30 – 36	348 (28.5)
37 – 43	337 (27.6)
44 – 50	262 (21.5)
> 50	115 (9.4)
No response	122 (10.0)
Level of education of mothers	
Tertiary	279 (22.9)
Secondary	399 (32.7)
Primary/ No formal	303 (24.8)
No response	240 (19.6)
Marital status of caregivers	
Married	1082 (88.6)
Divorced	51 (4.2)
Co-habiting	7 (0.6)
Single	6 (0.5)
No response	75 (6.1)

Most of the children (80.0%) were adolescent and majority of the children were from middle social class (54.5%), urban area (69.7%) and from large household (70.2%). Most of the parents of these children were married (88.6%).

The prevalence of PNE in this study was 228 (18.8%). Of these 228 children with PNE, 168 (73.7%) had PMNE and 60 (26.3%) had PNMNE.

The relationship between some demographic factors and PNE is shown in Table 2. PNE was statistically common in children within the ages 5 – 7 years ($\chi^2 = 57.82, p = 0.00$). There is a reduction in prevalence of PNE with increasing age. Children from large household (20.2%) significantly had PNE when compared with those from small household (14.4%) ($\chi^2 = 5.55, P = 0.02$).

Table 2. Relationship between socio-demographic factors of the study participants and primary nocturnal enuresis in the children

Socio-demographic factors	Primary nocturnal enuresis		χ^2	P-value
	Present (%)	Absent (%)		
Children				
Gender				
Male (n = 440)	85 (19.3)	355 (80.7)	0.19	0.66
Female (n = 781)	143 (18.3)	638 (81.7)		
Age group (years)				
5 – 7 (n = 21)	16 (76.2)	5 (23.8)	57.82	0.00
8 - 10 (n = 223)	57 (25.6)	166 (74.4)		
11- 13 (n = 668)	107 (16.0)	561 (84.0)		
14- 17 (n =309)	48 (15.5)	261 (84.5)		
Family social class				
Upper (n = 81)	13 (16.0)	68 (84.0)	1.76	0.42
Middle (n = 665)	133 (20.0)	532 (80.0)		
Lower (n =475)	82 (17.2)	393 (82.8)		
Household size				
Small (n = 354)	51 (14.4)	303 (85.6)	5.55	0.02
Large (n = 857)	173 (20.2)	684 (79.8)		
Child's position in the family				
1 st five position (n = 1009)	190 (18.8)	819 (81.2)	3.53	0.06
5 th and above (n = 171)	22 (12.9)	149 (87.1)		
Over-crowding in sleeping room				
Yes (n = 48)	14 (29.2)	34 (70.8)	3.65	0.06
No (n = 1137)	207 (18.2)	930 (81.8)		
Location of the study participants				
Rural (n = 370)	76 (20.5)	294 (79.5)	1.23	0.27
Urban (n = 851)	152 (17.9)	699 (82.1)		
Mothers				
Age group (years)				
23 – 29 (n= 37)	14 (37.8)	23 (62.2)	15.29	0.00
30 – 36 (n = 348)	74 (21.3)	274 (78.7)		
37 – 43 (n = 337)	62 (18.4)	275 (81.6)		
44 – 50 (n = 262)	37 (14.1)	225 (85.9)		
> 50 (n = 115)	17 (14.7)	98 (85.3)		
Level of education				
Tertiary (n = 279)	52 (18.6)	227 (81.4)	0.14	0.93
Secondary (n = 399)	71 (17.8)	328 (82.2)		
Primary/ No formal (n = 303)	57 (18.8)	246 (81.2)		
Marital status				
Married (n =1082)	188 (17.4)	894 (82.6)	2.82	0.42
Divorced (n =51)	12 (23.5)	39 (76.5)		
Co-habiting (n =7)	2 (28.6)	5 (71.4)		
Single (n = 6)	2 (33.3)	4 (66.7)		

Risk factors and their relationship with PNE are shown in Table 3. Children who had difficulty of been awoken from sleep were 3 times more likely to have PNE (OR = 3.3, 95%CL 2.42, 4.60, $P = 0.00$). The Table also showed that children who had features such as soiling of under-wears, history of urgency, urinary frequency, multiple voiding at night and family history of enuresis statistically significantly had PNE.

Logistic Regression Model showing the predictors of enuresis in the children is shown in Table 4. The age of the child ($\beta = -0.27$, OR = 0.8, $P = 0.00$) and such as difficulty to awaken child from sleep ($\beta = 0.90$, OR = 2.5, $P = 0.00$), soiling under-wear, history of urgency, and family history significantly predicted PNE in this study. Children who soil their under-wears were 5 times more likelihood to have PNE ($\beta = 1.56$, OR = 5.0,

Table 3. Relationship between some risk factors and presence of primary nocturnal enuresis in the children

Risk factors	Primary nocturnal enuresis		95% CL	OR	P-value
	Present (%)	Absent (%)			
Difficulty to awaken child from sleep					
Yes (n = 234)	84 (35.9)	150 (64.1)			
No (n = 987)	144 (14.6)	843 (85.4)	2.38, 4.52	3.3	0.00*
Soiling under-wears					
Yes (n = 74)	49 (66.2)	25 (33.8)			
No (n = 1147)	179 (15.6)	968 (84.4)	6.38, 17.61	10.5	0.00*
History of urgency					
Yes (n = 102)	57 (55.9)	45 (44.1)			
No (n = 1119)	171 (15.3)	948 (84.7)	4.60, 10.73	7.0	0.00*
History of urinary frequency					
Yes (n = 83)	44 (53.0)	39 (47.0)			
No (n = 1138)	184 (16.2)	954 (83.8)	3.70, 9.23	5.8	0.00*
Multiple voiding at night					
Yes (n = 43)	25 (58.1)	18 (41.9)			
No (n = 1178)	203 (17.2)	975 (82.8)	3.57, 12.46	6.7	0.00*
Family history of enuresis					
Yes (n = 226)	119 (52.6)	107 (47.4)			
No (n = 995)	109 (11.0)	886 (89.0)	6.51, 12.55	9.0	0.00*
1st degree relation with enuresis					
Yes (n = 156)	88 (56.4)	68 (43.6)			
No (n = 70)	32 (45.7)	38 (54.3)	0.87, 2.71	1.5	0.18

(* P value < 0.0001)

Table 4. Logistic regression models showing the predictors of primary nocturnal enuresis in the children

Factors	β	O.R	95% CL	P-value
Child's age	-0.27	0.8	0.70, 0.85	0.00*
Household size	0.06	1.1	0.98, 1.16	0.15
Child's position in family	-0.05	1.0	0.86, 1.06	0.36
Over-crowding	-0.36	0.7	0.25, 1.90	0.49
Child's mother's age	0.03	1.0	0.78, 1.30	0.84
Difficulty to awaken child from sleep	0.90	2.5	1.56, 3.86	0.00*
Soiling under-wears	1.56	5.0	2.38, 10.0	0.00*
History of urgency	1.00	2.7	1.47, 5.03	0.00*
History of urinary frequency	0.13	1.1	0.53, 2.48	0.74
Multiple voiding at night	0.88	2.4	0.89, 6.58	0.08
Family history	1.95	7.0	4.50, 10.95	0.00*

β = measure of how strongly each predictor variable influences the dependent variables, O.R = odds ratio, 95CL = confidence level of the odds ratio, P-value < 0.001, * = variables that are statistically significant

$P = 0.00$) and those with history of urgency ($\beta = 1.00$, $OR = 2.7$, $P < 0.00$) were about 3 times more likely to have PNE when compared with children who do not have these features. Family history significantly predicted 7 times likelihood of PNE in the children in this study ($\beta = 1.95$, $OR = 7.0$, $P = 0.00$) and this was independent of whether the family history was of a 1st degree relation or not.

4. DISCUSSION AND RECOMMENDATIONS

The prevalence of PNE (18.8%) observed in this study was within the range reported previously by some Nigerian authors [7,10-13,15,16]. The present finding, however, showed just a slight decrease in prevalence of PNE when compared with the report of Iduoriyekemwen et al. [7] in Ehor Benin City, a decade preceding this study. This finding is comparable with that observed by Yousef et al. [19].

The presence of positive family history showed that there may be genetic predisposition to enuresis. Family history has been documented widely in literature as a major factor of PNE. This factor significantly predicted 7.0 times likelihood (95CL = 4.50, 10.95) of enuresis in the children in this study and this was independent of whether the family history was of a 1st degree relation or not. This finding may explain the role of heredity and familial clustering in enuresis. Recently, some authors have demonstrated the inheritance of enuresis following the Mendelian pattern of both the autosomal dominant and recessive mode of inheritance respectively [26]. This finding therefore, is important in evaluation and counselling program for an enuretic child.

The epidemiology of PNE in terms of gender (male preponderance) and age (decreased prevalence with increasing age) observed in this study is in keeping with the findings observed by previous authors [3,7,11-13]. It has been observed by some authors, that the cut-off age for achievement of dryness is not clearly understood and it varies from one country or geographical location to another [3,4,16]. Oge et al. [22] documented that the average age of achieving dryness in Turkish children is 2.9 ± 1.9 years. Although the age cut-off for achievement of dryness in Nigerian children has not been fully studied, Senbanjo et al. [16] in the southwest Nigeria observed that 28.9% of children achieves dryness by the age of 5 years and this prevalence increases with increasing age thus

supporting the finding that enuresis decreases with increasing age. The male preponderance of PNE reported in this study is in keeping with the reports documented by most authors world-wide. It could be postulated that male preponderance in PNE is due to the subtle and undetectable congenital anomalies of the urinary system or delayed functional maturation especially of the central nervous system in males than observed in females. Again it has been documented that boys usually show a developmental lag, making them more resilient to toilet training than the girls with antecedent poor bladder control [3,27].

Primary nocturnal enuresis was significantly common in children from large household (household members' ≥ 6) than in children from small household. The number of children cared for in the households may pose some stress on the caregivers with antecedent poor care of most of the children in the household. Some socio-demographic characteristics such as low social class, low educational status, and large family size have been found to be associated with PNE [17,22]. These aforementioned factors have been observed to have stressor effect to the child and the family hence delaying toilet/ bladder training and inadvertently delay achievement of dryness. [3,16].

Concerning risk factors of PNE, difficulty to awaken child from sleep significantly was associated with PNE in this study. This is in consonance with the works of Chang et al in Taiwan [4] and Ozden et al. in Turkey [28]. This finding supports the documented fact that difficulty to awaken child from sleep is one of the underlying pathophysiological factor of PNE [29]. The clinical important of identifying risk factors in our setting is that it would aid clinicians in early identification and diagnosis of PNE which is not sought for routinely in our clinical practice. Routine evaluation of children to ascertain if they have PNE and subsequent counseling of the family and child would increase the knowledge that PNE is benign and that it would spontaneously resolve in most children. This would prevent the punishment and ridicule [11] some children with PNE are subjected to, due to failure of parents to recognize that PNE is a health problem. With improved community awareness of this disease, low self-esteem and social stigmatization of both the patient and his parents would be minimized.

In addition the risk factors such as soiling of under-wears and history of urgency, identified as independent predictors of PNE in this study

would aid in distinguishing the enuretic children that requires further urological evaluation as these group of children would require more intensive management.

5. LIMITATION OF STUDY

Children with asymptomatic urinary system diseases without laboratory test would not have been identified in this study and may have contributed to the high prevalence of enuresis in the study. The final size of sample of this study was another limitation in that 700 of the 2500 recruited study participants declined and another 32% of 1800 participants (579) that gave consent were excluded due to incomplete data. External validity of the questionnaire on 20 study participants was another limitation. Also a 48 hours daytime frequency and volume chart was not employed in this study, thus only history was relied on to determine the lower urinary tract symptoms.

6. CONCLUSION

This study showed that nearly one out of every five school children had PNE. Difficulty to awaken child from sleep, soiling of under-wears, history of urgency and family history independently predicted enuresis.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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