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Prevalence, causative factors and management of nocturnal enuresis in South African children

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2009-05-19T07:18:57Z
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1.0 Introduction

Enuresis (bed-wetting) has long been seen as a psychological problem by parents and it is not discussed, nor is treatment sought. Nocturnal enuresis (NE) can be defined as involuntary voiding of urine during sleep, with a severity of at least three times per week, in children over 5 years of age, in the absence of congenital or acquired defects of the central nervous system (CNS) (1).

At present, there are no data available about the prevalence and associated factors of enuresis in South Africa. We have to rely on data from other countries, where studies in first world settings are difficult to extrapolate due to diverse conditions in South Africa. Another problem is that NE is under-reported and the definitions used for NE in different studies vary considerably.

1.1 Literature review

1.1.1 Definition

There seems to be no consensus about what the correct definition of NE is. Varying definitions are used, with the criteria differing widely (Table 1.1). It dramatically affects inclusion criteria to determine prevalence. It is therefore essential that when comparing prevalence rates, the same inclusion criteria are used. In recent years several epidemiological studies have been published with prevalence rates that vary from 2.3 to 25% (2).

Table 1.1 Definitions of NE

Diagnostic and Statistical Manual of Mental disorders, Third Edition (DSM III)	Involuntary voiding of urine during sleep, with a severity of at least once a month in children aged 6 years or more in the absence of congenital or acquired defects of the CNS. (3)
Diagnostic and Statistical Manual of Mental disorders, Fourth Edition (DSM IV)	Involuntary voiding of urine during sleep, with a severity of at least twice a week in children aged 5 years or more in the absence of congenital or acquired defects of the CNS.(3)
International Classification of Diseases and Related Health Problems 10th revised version (2007) (ICD 10)	Involuntary voiding of urine during sleep, with a severity of at least one night per month in children aged 5 years or more for a duration of at least 3 months (3)
International Children's Continence Society (ICCS)	Incontinence characterized by complete bladder emptying during sleep without any symptoms of bladder dysfunction in children aged 5 years or more (1)
International Continence Society (ICS)	Involuntary voiding of urine during sleep, with a severity of at least three times a week in children aged 5 years or more in the absence of congenital or acquired defects of the CNS (1)

It has been argued that parental concern and child distress should also play a part in determining the clinical significance of the problem (4). Most definitions refer to an age of 5 years and older, but occasionally a child's mental age has been taken into consideration (1). It is also noted that definitions differ according to how many episodes of NE per week or month should be included. These differences present a problem when comparing data as seen in Table 1.2, where prevalence is compared in 7 year old children with enuresis and where definitions differ (3).

Table 1.2 The prevalence of NE at 7 years old of age (adapted from Reference 3)

Country	**Definition of NE**	**Sample**	**Prevalence (%)**
Holland	>2/months	156	12.5% (boys); 5.9% (girls)
Finland	>1/last 6 months	3206	6.4% (boys); 3.9% (girls)
Sweden	>1/3 months >1/week	3607	11.9% (boys);7.1%(girls) 3.8% (boys); 2.9% (girls)
Japan	No definition	2033	15.0% (boys); 5.0% (girls)
Saudi Arabia	No definition	740	10.0% (boys); 14.0% (girls)
Italy	DSM III and DSM IV	674	8.1% (boys); 5.6% (girls)
South Korea	>1 in last year	1325	13.7%

The terminology can also be confusing. According to the ICCS, NE is a strictly defined type of incontinence, characterized by complete bladder emptying during sleep without any symptoms pointing to bladder dysfunction (5). NE, without bladder dysfunction, should be referred to as mono-symptomatic nocturnal enuresis (MNE). If NE is combined with other

daytime bladder symptoms, such as urinary tract infections or daytime urinary incontinence, it should be referred to as poly-symptomatic nocturnal enuresis (PNE) (5). In this dissertation, the above-mentioned definitions for PNE and MNE will be used. Primary NE refers to MNE where a child has not been dry for six months, and secondary NE refers to PNE, where the child has NE after a dry period lasting for more than six months (5).

1.1.2 Prevalence

It has been stated that NE is the most prevalent of all childhood problems (1). Reported prevalence varies from 0.5% - 25.0% (Table 1.3, 1.4) (1-3, 6-14). Some of the epidemiological studies have lenient criteria and do not report frequency, and include all episodes of NE, including the daytime urinary incontinence, making comparison between studies difficult. This accounts for the variation in the reported prevalence rates.

Although there is general consensus about the core descriptors of NE, divergent opinions exist about many specific aspects of the definition. Age is one such issue. Most definitions refer to 5 years as the age of onset, although the child's mental age should be taken into account (1). The range of ages included in NE studies varies, but generally, children between the ages of 5-16 years of age have been used in studies (1-3, 6-14). Longitudinal cohort studies should be the ideal when analyzing epidemiology in childhood NE, as there is a successive reduction in prevalence with age, as seen in Table 1.3 (5). The inclusion criteria for these studies were similar and included children who had a frequency of NE of once a month or more, except Hellström (once / 3 months) and Järvelin (once in 6 months or more) (5). These studies included children with MNE as well as PNE (Table 1.3) and show a decrease in prevalence as children get older. These data are consistent with a review of studies from Western countries,

which also show a prevalence rate of 8.0% for 7 year olds, decreasing to 3.0% for 11-12 year olds and to 0.8% for 16 year olds (1).

Table 1.3 Prevalence of NE according to age (adapted from reference 5)

Author and year	**Prevalence**		
	Age 7 years (%)	Age 11-12 years ((%)	Age 16-17 years (%)
Chiozza (1998)	6.8 %	2.0%	-
Järvelin (1988)	8.0%		-
Spee-v/d Wekke (1998)	8.0%	4.6%	-
Cher (2002)	9.3%	1.7%	-
Hellström (1990)	9.5%	-	0.5%
Ferguson (1986)	10.3%	3.3%	-
Kanaheswari (2003)	10.3%	4.0%	-
Serel (1997)	15.1%	4.5%	-
Lee (2000)	16.4%	4.5%	-
Switjinbank (1998)	-	4.7%	1.1%

Under the auspices of the Enuresis Academy of South Africa, the candidate undertook a pilot study to determine the prevalence of NE in 4 schools from different socio-economic backgrounds in the Gauteng area. Children (n=200) between the ages of 4-10 years were

included. The response rate to questionnaires handed out was 96.0%. A prevalence of 34.0% (3 or more episodes per week) was found, which was considerably higher than the average prevalence reported from other countries (Table 1.4). This small pilot study suggested that there was a definite problem of NE in the South African community (unpublished observations presented at an informal Enuresis Academy Meeting May 2005).

1.1.3 Severity

The frequency of NE varies in children. A study in the USA showed 15.0 % of children with NE have enuretic episodes every night, although most children have enuretic episodes more than once per week (15). A study undertaken in the UK showed that 8.2% of children have enuretic episodes every night (3). A Malaysian study showed a prevalence of 20.0% of children having NE every night (2). However, these studies have not provided prevalence rates in single age groups.

Epidemiological surveys usually include data where the child has NE once a month or more, but trials of treatment usually use more stringent criteria for inclusion (1). In clinical practice the child and parents' concern seems to be the relevant issue (1). Clinical severity can be defined as: infrequent (1-2 times per week), moderately severe (3-5 times per week) or severe (6-7 times per week) (1).

1.1.4 Gender differences

In most studies the prevalence rate in boys is slightly higher than in girls (1), with one study from Thailand showing a higher prevalence in girls (9). Historically girls have been reported to have a higher prevalence of secondary NE associated with symptoms of daytime urinary

incontinence, urinary frequency, urinary tract infections and behavioural problems (1). Depending on the publication, the female to male ratio varies from 1:4.1 (16) to 1.2:1 (9). There does, however, seem to be consensus that the prevalence rate in boys is greater than in girls.

1.1.5 Heredity

NE is associated with a positive family history, and the mode of inheritance is autosomal dominant (1, 5). With linking analysis, loci have been found on chromosomes 8, 12, 13 and 22 (1). Molecular studies have shown that NE is a complex disease with locus heterogeneity and clear genotype-phenotype association. Studies have shown that if both parents suffered from NE, 77% of the children had NE and if only one parent suffered from NE, 44% of the children had NE. If neither of the parents suffered from NE, 15% of the children had NE (5, 17). The hereditary trait leads to a delay in maturation of the mechanisms responsible for urinary continence during sleep (1, 5). Patients with a positive family history seem to have a better response to treatment with antidiuretic hormone (17). There is also a delay in presentation of children with a positive family history, probably due to the fact that the parents are less anxious about the condition (17).

1.1.6 Low self-esteem, psychological problems and poor school performance

NE is a condition that may result in low self-esteem, psychological problems and poor school performance (6, 7, 14). Epidemiological studies have shown that a third of children with NE manifest behavioural disorders and the behavioural disorders cause poor school performance.

Associations between NE, poor school performance, as well as learning problems have been reported (1).

Thiedke (7) suggests that whereas it was previously thought that NE was caused by psychological problems, it is now believed that NE causes psychological problems. When children were treated for NE, there was an improvement in self-esteem and other psychological factors.

Psychological explanations of NE have been especially popular with psychoanalytical orientated theorists, as discussed by Bond et al. (18). However, the evidence presented in support of the psychoanalytic explanation of NE is largely based on clinical impressions derived from case studies. The consensus of the current literature is that psychopathology is not a causal variable for primary NE (18). Emotional or psychological problems are infrequently the cause of primary NE, but may be the result of the parental response to NE, leading to shame, guilt and avoidance of peer contact (18). In summary, children with primary NE are psychologically normal and psychological treatment is ineffective in treating primary NE (18).

1.1.7 Socio-economic factors

Some studies in Turkey, the United Arab Emirates and Italy have shown a higher prevalence of NE among children from lower socio-economic backgrounds (6,8,9,11,14), with a study from Thailand showing no differences in socio-economic status (2). Some studies have shown that there is a direct relationship between NE and lower socio economic status in a clinic population, but not in the general population (19). There are no conclusive studies proving a direct relationship between socio-economic status and the prevalence of primary NE. Comparison of prevalence rates in different socio-economic groups is shown in Table 1.4.

Table 1.4 Prevalence rates from various regions and socio-economic groups

Region	**Age in years**	**Socio-economic group**	**Prevalence %**
Thailand (9)	5-15	High ,middle, low	3.9%
Europe (ICS study)(1)	7-16	High	5.0-22.0%
Europe (7)	5-12	High	8.0-25.0%
Malaysia (2)	7-12	Middle, low	8.0%
United Arab Emirates(14)	6-16	High, middle, low	8.0%
Turkey (Istanbul)(13)	6-16	Middle, low	12.4%
Turkey (Anatolia)(6)	6-11	Middle, low	12.9%
England(3)	7.5	Middle	15.5%
Nigeria(8)	6-12	Low	17.6%
Australia(10)	5-15	Middle, low	18.9%

1.1.8 Stressful events

Stressful events are often regarded as the cause of the NE, when they probably have nothing to do with the problem (7). The child's experience of what is stressful and worrisome seems to be an important factor in the possible aetiology of NE (11). A study done in Turkey showed that death and divorce had no effect on the prevalence of NE and that the prevalence of recent physical or psychological trauma was not different between enuretic and non-enuretic children (6).

1.1.9 Other associated factors

Constipation and encopresis are often associated with NE and studies have shown a relationship between these conditions (1, 9). Constipation is also often the cause for failed treatment of NE (6). In a Turkish study, it was found that 12.4% of all children suffered from constipation and there was an overall prevalence rate of 21.6% of children with NE suffering from constipation (20).

Daytime urinary incontinence is associated with NE, but could be an indicator of a more serious problem (1). Various studies show prevalence of daytime urinary incontinence between 0.5% and 21% in children with NE (2, 6, 21).

1.1.10 Perceptions of parents

The majority of children are not treated at all for NE or may often be treated with alternative medicine. This is partly due to the fact that the condition often resolves spontaneously, or that parents are unaware of treatment modalities (8). This has long-term effects, considering the fact that 3.0% of adults over the age of 20 years still suffer from NE (1). Parental concern is not high. As seen in Figure 1.1, the percentage of study subjects visiting a health care worker

confirms this. There is a strong tendency for families to self-treat their children with behavioral strategies (10). A study in Nigeria showed that parents believed NE was caused by urinary tract infections, deep sleep and excessive play (8). Direct comparison of these studies is difficult because of the different definitions of the term NE. The graph in Figure 1.1 serves to illustrate, excluding Australia and Italy, the low percentage of parents seeking advice from health care workers.

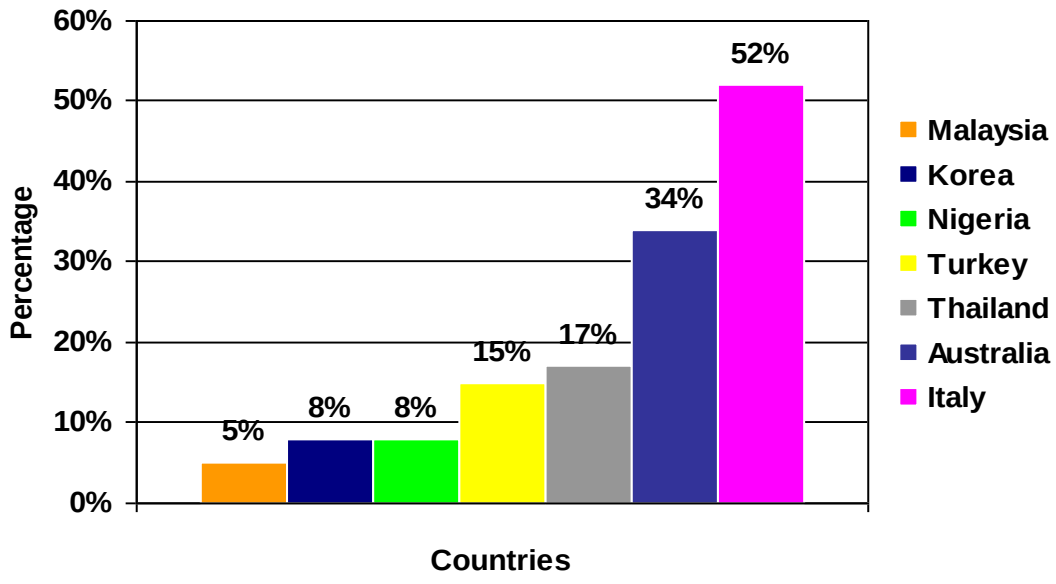

Figure 1.1 Percentage of study subjects with NE who visited a health care worker

1.2 Summary

In summary, the literature indicates that the prevalence of NE decreases with age. NE is associated with a positive family history, with the mode of inheritance being autosomal dominant (1). Children with NE may also report daytime incontinence and constipation, and may have had a stressful event. Epidemiological studies have shown that a third of children with NE manifest behavioural disorders associated with poorer school performance and learning problems (1). Some studies have also shown that the prevalence of NE is higher in certain socio-economic groups. NE may be treated by several treatment modalities.

The prevalence of NE, causative factors and the management of NE in South Africa children is unknown. Without such data, we are unable to put effective strategies of treatment in place and we have to rely on data from other countries. It would therefore be particularly useful to know the extent of NE in South Africa and how it is managed.

2. Methods

A cross-sectional study using a questionnaire was set up to determine in South Africa:

- the prevalence of NE in the different genders and age groups of children;
- age of onset and cessation of NE;
- the association with a positive family history and prevalence in siblings;
- associated factors such as daytime urinary incontinence, constipation and stressful events;
- the perceived effect of NE on school work;
- whether treatment was used and its effectiveness;
- possible regional socio-economic differences in South Africa; and to
- compare the prevalence of NE in South Africa to other parts of the world.

2.1 Study questionnaire

A study questionnaire (Annexure 1) was designed to record:

- age, gender, race, size of family and if the child has a problem with incontinence (Questions 2-8). If the child did not have incontinence, the parent was not required to fill out the rest of the questionnaire, as these children would not form part of the study group of children suffering from NE.
- the age of onset of NE, gender and the frequency of NE and day-time incontinence, (Questions 9-13). This provides both the total NE and allows differentiation between MNE and PNE. Thus children with secondary NE can be determined and excluded.

The study of secondary NE in South Africa was not part of the present study and requires further investigation.

- how many children come from families with a history of NE and the prevalence amongst siblings and parents (Questions 14-18);
- whether constipation and stressful events are present. It also establishes the parent's perception regarding stressful events (Questions 19, 20, 21). These questions are to determine possible causal factors of NE;
- the parents' perception whether their child had a problem with their school work and if there is a possible association with NE (Question 22);
- what treatments are being used in South Africa and the perceived success of these different treatment modalities (Questions 23-28);
- to record socio-economic status (Question 29) and to determine if socio- economic status is related to NE.

2.1.1 Sample size calculation

The literature reports the prevalence of NE as between 0.5% and 25.0% depending on the definition of NE and how the particular study was conducted (Table 1.3, 1.4) (1-3,5-10,13,14). For this study, it was assumed that the prevalence of NE from a finite population of 1 000 000 is 15.0%. The alternative hypothesis would be that the prevalence is not 15.0%. Using a study power of 0.95, the minimum sample size to show a prevalence of NE of 15.0% was 4700 respondents.

2.1.2 Selection of study sites

According to the Department of Education of South Africa, there are 12 million learners, 366 000 teachers and approximately 28 000 schools - including 390 special needs schools and 1 000 registered private schools in the country. Of all the schools, 6 000 are high schools (grade 7 to grade 12) and the rest are primary schools (grade 0 to 7) with children aged between 5-10 years old, required for the study in the foundation phase (grades 0-3).

Gauteng, the Western Cape and KwaZulu- Natal were selected to conduct the study, as these areas were convenient and easily accessible. Permission to do this study was received from the Department of Education. Where permission was granted, schools listed in these areas, and schools from different socio-economic areas (suburbs differing in affluence) were contacted telephonically. Those willing to participate were included in the study.

2.2 Procedure

If the school was willing to participate, the headmaster was contacted and asked for permission to hand out questionnaires to all the participating classes. The participating schools indicated the number of children in the Grades 0-3 and the number of classes.

A total of 4700 questionnaires were distributed to the selected schools in Gauteng (n=21), the Western Cape (n=6) and KwaZulu-Natal (n=10). The questionnaires were handed out to children at the schools. An accompanying letter to the parents (annexure 2) requested that the parents fill out the questionnaire and return it to school. Instructions were provided as to how these should be completed and returned in an anonymous way as follows:

- Envelopes with a cover letter and questionnaires were delivered to the headmaster;
- The teachers received the envelopes, from the headmaster;
- The teachers handed out an envelope to each child in the class. A covering letter assured the parents and the children of confidentiality;
- The teacher entered the date and number of questionnaires handed out on the appropriate column on the checklist;
- When the children returned the sealed envelopes, they posted them into a pre-sealed box with a slit. The teacher entered the date and number of questionnaires returned on the check list;
- The envelopes and checklists were then collected from the school;
- The sealed envelopes and checklists were then returned for analysis.

2.2.1 Data recording and statistical analysis

Returned questionnaires from each province and school were checked twice for children with and without NE. Data of each reply, to each question from completed questionnaires reporting children with NE, were recorded in an EXCEL spreadsheet (Microsoft Corporation). The numbers of recorded replies (observations) to each question (variables) were totaled, as was the number of answers for each returned questionnaire. This served as a cross-check to ensure all data from each question had been completed for each questionnaire and that the number of observations totalled to the number of questionnaires returned.

2.2.2 Socio-economic status

Socio-economic groupings were determined from the reply to the questions as to residence being in the city, suburb or township, whether the residence had electricity, and if a motor vehicle was owned (Annexure 1, question 29). If a residence was in a township without electricity and no motor vehicle was owned, then the child was deemed to be of poor socio-economic background. Children from suburban, owned homes with electricity and where a vehicle was owned were deemed as being of high socio-economic background. Between these two definitions the remaining children were grouped as having middle income status. These criteria were subjective and served to group the children broadly into low, middle or high socio-economic grouping.

2.2.3 Statistical analysis

Data were reported as frequency and percentages in tables and graphs. The Chi-square test was used to compare proportions between groups, with Fisher's Exact test used to correct for small numbers of observations ($n \leq 5$). Age differences were determined using Student's t-test. A p value of less than 0.05 was considered to be statistically significant.

2.2.4 Study limitations

The study was to extend the small pilot study undertaken. With limited resources and manpower, the schools were chosen as being relatively accessible. Schools in remote areas were excluded.

The study was designed to investigate NE in the 5-10 years age group, as the prevalence rates in these age groups are reportedly the highest. In the questionnaire, the questions after

Question 8 were aimed at determining factors which may influence or cause NE. Parents of children unaffected by enuresis were not asked to complete questions after Question 8. The study therefore could not determine the influence of these same factors in the non-enuretic group.

3. Results

3.1 Prevalence

Four thousand seven hundred questionnaires were handed out and 3389 were returned, giving a response rate of 72.1%. Although the total number of questionnaires handed out was known, the numbers handed out per each age group was not reported by the schools, as the questionnaires were distributed to grades and not to age groups.

3.1.1 Overall prevalence of MNE and PNE in different age groups

Of the children, 541 reported NE, giving an overall prevalence of 16.0%, 487 children reported MNE (14.4% prevalence) and 54 children reported PNE (1.6% prevalence). These children aged from 5 to 10 years (median 6 years), had average ages of 6.5±1.4 years, 6.6±1.5 years and 6.1±1.3 years for NE children, the MNE alone group, and the PNE alone group, respectively. The PNE alone group was significantly younger than the MNE alone group (t-test p=0.011). The prevalence decreased with age (χ^2 test for trend p<0.0001; Table 3.1).

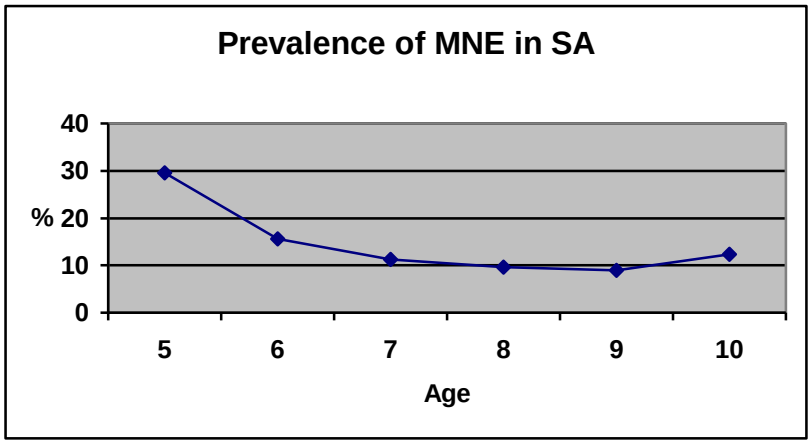

Figure 3.1 Overall prevalence of MNE in South Africa

Table 3.1 Overall prevalence of NE according to age

		PNE+MNE		MNE Only		PNE Only	
Age	**Total children n**	**Total n=541**	**Total Prevalence (%)**	**Total n**	**Prevalence (%)**	**Total n**	**Prevalence (%)**
5 years	461	162	35.0%	136	29.5%	26	5.6%
6 years	847	143	16.8%	132	15.6%	11	1.3%
7 years	933	115	12.3%	105	11.3%	10	1.1%
8 years	553	57	10.3%	53	9.6%	4	0.7%
9 years	378	35	9.3%	34	9.0%	1	0.3%
10 years	217	29	13.5%	27	12.4%	2	0.9%
Totals:	**3389**	**541**	**16.0%**	**487**	**14.4%**	**54**	**1.6%**
χ^2 test for trend (p)			**<0.0001**		**<0.0001**		**<0.0001**

3.1.2. Overall prevalence of MNE according to Province

Table 3.2 Prevalence rates of MNE in different provinces.

Total questionnaires	**Overall**	**Gauteng**	**KwaZulu-Natal**	**Western Cape**
Handed out (n)	4700	3000	1100	600
Total returned (n)	3389	2159	759	471
Percentage of study subjects per province (%)		63.7%	22.4%	13.9%
Response rate (%)	72.1%	72.0%	69.0%	78.5%
MNE (n)	**487**	**280**	**137**	**70**
MNE (%)	**14.4%**	**13.0%**	**18.1%**	**14.8%**

A χ^2 test showed overall difference in MNE prevalence between provinces (p=0.0026) with the prevalence for MNE being significantly higher in KwaZulu-Natal than Gauteng (χ^2 test p=0.0.001). There was no significant difference between the prevalence rates for KwaZulu-Natal and the Western Cape (χ^2 test p=0.15) or between Gauteng and the Western Cape (χ^2 test p=0.27).

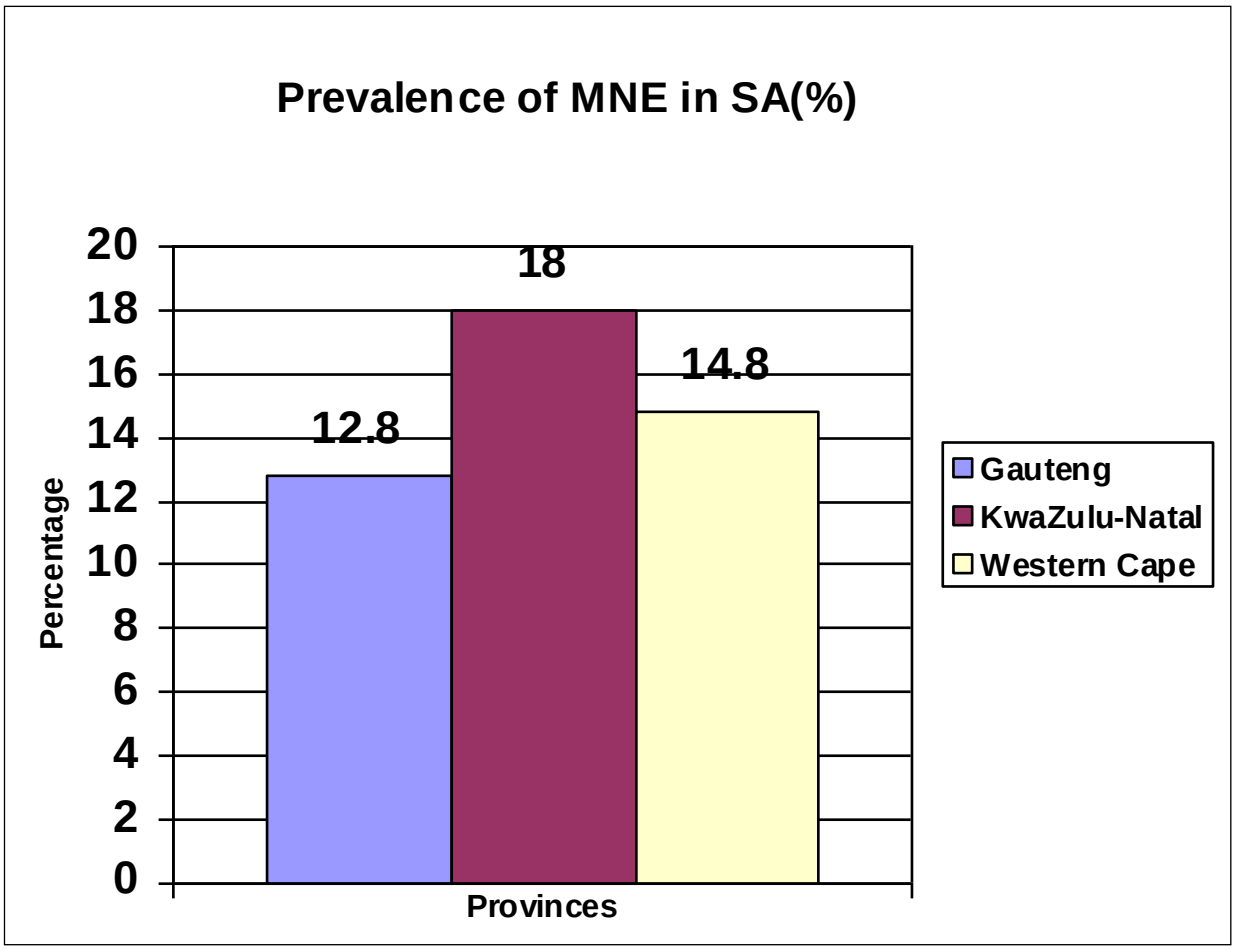

Figure 3.2 Overall prevalence rates in different provinces

3.1.2.1 Prevalence of children with MNE in the Western Cape

Table 3.3 Prevalence of MNE in the Western Cape according to age

Age	Total n	Total with MNE n	Prevalence (%)
5 years	40	16	40.0%
6 years	167	24	14.4%
7 years	152	20	13.2%
8 years	74	5	6.8%
9 years	33	1	3.0%
10 years	5	4	80.0%
Total	**471**	**70**	**14.8%**

A decline in the prevalence was noted with increasing age (χ^2 for trend $p<0.0001$). The small number of 10 year olds, with an increased prevalence of MNE, did not influence this trend.

3.1.2.2 Prevalence of children with MNE in KwaZulu-Natal

Table 3.4 Prevalence of MNE in KwaZulu-Natal according to age

Age	Total n	Total with MNE n	Prevalence (%)
5 years	63	30	47.6%
6 years	183	32	17.5%
7 years	196	32	16.3%
8 years	160	22	13.8%
9 years	106	13	12.3%
10 years	51	8	15.7%
Total	**759**	**137**	**18.1%**

A decline in the prevalence was noted with increasing age (χ^2 for trend $p<0.0001$), with a slight increase at 10 years of age which was not significant.

3.1.2.3 Prevalence of children with MNE in Gauteng

Table 3.5 Prevalence of MNE in Gauteng according to age

Age	Total n	Total with MNE n	Prevalence (%)
5 years	358	90	25.1%
6 years	497	76	15.2%
7 years	585	53	9.1%
8 years	319	26	8.2%
9 years	239	20	8.4%
10 years	161	15	9.3%
Total	**2159**	**280**	**13.0%**

The overall prevalence rate for MNE in Gauteng was 13.0%. A decline in the prevalence was noted with increasing age (χ^2 for trend $p<0.0001$), with a slight increase at 10 years of age, which was not significant.

3.1.3 Prevalence of daytime urinary incontinence

Table 3.6 Prevalence of daytime urinary incontinence

Age	Total n	Children with daytime incontinence	Percentage (%)
5 years	136	26	19.1%
6 years	132	11	8.3%
7 years	105	10	9.5%
8 years	53	4	7.5%
9 years	34	1	2.9%
10 years	27	2	7.4%
Total	**487**	**54**	**11.0%**
Percentage overall	**14.4%**	**1.6%**	

The prevalence of the children suffering from daytime incontinence was 1.6%.

There was a decrease in the prevalence rate as children got older ($\chi 2$ for trend p=0.019), with a slight increase at age 10 years, that was not significant.

3.1.4 Prevalence according to gender

Table 3.7 Prevalence according to gender

Age Years	Total N	Male		Female		Proportion
		n	%	n	%	F: M
5	136	85	62.5%	51	37.5%	1: 1.7
6	132	89	68.1%	43	33.3%	1: 2.1
7	105	79	75.7%	26	24.3%	1: 3.0
8	53	36	67.9%	17	32%	1: 2.1
9	34	19	55.8%	15	44.1%	1: 1.3
10	27	15	55.5%	12	44.4%	1: 1.3
Total	**487**	**323**		**164**		**1: 2.0**

There was a higher prevalence of NE amongst boys than girls with an overall ratio of approximately 1: 2.0(F: M).Although this gender difference appeared to diminish with increased age this was not significant (χ^2 for trend p=0.17).

3.2 Frequency of NE

Table 3.8 Frequency of NE episodes according to age

Age	Every Night n	3x or >/ week n	Once a week n	Once a month n	Occasionally n	Total with MNE n
5 years	41	40	18	14	23	**136**
6 years	37	39	28	12	16	**132**
7 years	20	31	17	11	26	**105**
8 years	9	13	7	1	23	**53**
9 years	8	10	4	1	11	**34**
10 years	6	5	4	4	8	**27**
Total	**121**	**138**	**78**	**43**	**107**	**487**
Percentage (%)	**24.8%**	**28.3%**	**16.0%**	**8.8%**	**21.9%**	**99.8%***

*Due to rounding off the sum of the percentages is 99.8% (=100%)

Table 3.9 Frequency of NE episodes according to various definitions

Frequency of NE episodes according to various definitions							
Age in years	**Definitions**						
	n	**ICS**		**DSM III* and ICD 10***		**ICCS**	
	n	n	%	N	%	n	%
5	461	99	21.5%	113	24.5%	136	29.5%
6	847	104	12.2%	116	13.7%	132	15.6%
7	933	68	7.2%	79	8.5%	105	11.3%
8	553	29	5.2%	30	5.4%	53	9.6%
9	378	22	5.8%	23	6.1%	34	9.0%
10	217	15	6.9%	19	8.8%	27	12.4%
Total	**3389**	**337**	**9.9%**	**380**	**11.2%**	**487**	**14.4%**

*DSM III definition excludes 5 year old children whereas ICD 10 definition includes 5 year old children

This table shows the prevalence rates according to different definitions used to define NE. However there is no statistically significant difference, between the definitions with regards to the age of the children (χ^2 test p=0.90).

3.3 Potential risk factors for NE

3.3.1 Heredity

Of the children with NE, the number with a family history of NE (parent or sibling) was 246 (50.5%). The proportion of NE children only with parents with a history of NE was 31.1% (n=109/350) , similar to those with only siblings having a history of NE (n=86/327 = 26.2%) and 51 children had both parents and siblings with a history of NE (n=51/487=10.5%).

Table 3.10 Number and percentage of parents and siblings of study subjects with MNE

		Number of parents who had NE		
Number of siblings with NE		**None**	**One Parent**	**Both Parents**
	No siblings	241 (49.5%)	89 (18.3%)	20 (4.1%)
	1 or more siblings	86 (17.7%)	41 (8.4%)	10 (2.1%)

Overall, the Chi-square test showed no significant difference between enuretic children with siblings or parents with or without a history of NE (χ^2 test p=0.429). There was no statistical difference in the proportion (χ^2 test p=0.51) when children of parents without a history of NE were combined with those having one parent with a history of NE, and comparing these to children having both parents with NE (the apparent 'high risk' group). Similarly, no difference was apparent when children of parents without a history of NE were compared to the combined group where one or both parent(s) had a history of NE (χ^2 test p=0.20).

3.3.2 Constipation

The overall prevalence of children with MNE suffering from constipation was 16.0%. There was no apparent trend with age (χ^2 test p=0.82).

Table 3.11 Children with MNE suffering from constipation

Age	Total MNE	Number with Constipation (n)	Prevalence (%)
5 years	136	25	18.0%
6 years	132	15	11.0%
7 years	105	17	16.0%
8 years	53	9	17.0%
9 years	34	6	18.0%
10 years	27	5	20.0%
Total	**487**	**77**	
Percentage		**16.0%**	**100%**

3.3.3 Possible link to stress

Table 3.12 Possible links to stress

Age	Total with MNE n	Number of children with NE with possible link to stress	Percentage of children with stress %	Serious injury to child or other family member n	Illness in the family n	Violence to child or other family member n	Death in the family n	Parents separated / divorced n	Other† n	Total* n
5 years	136	40	29.4%	3	6	4	4	15	15	**47**
6 years	132	34	25.8%	2	2	3	6	12	21	**46**
7 years	105	39	37.1%	2	0	10	11	14	7	**44**
8 years	53	16	30.2%	0	1	4	2	5	11	**23**
9 years	34	8	23.5%	0	0	0	1	5	4	**10**
10 years	27	6	22.2%	1	1	1	3	1	2	**9**
Total	**487**	**143**	**29.4%**	**8**	**10**	**22**	**27**	**52**	**60**	**179**
				4.5%	**5.6%**	**12.3%**	**15.1%**	**29.1%**	**33.5%**	**100%**

† 'Other' refers to events perceived by the parents to be contributing factors and included strict teachers, strict parents, bullying at school, the birth of a sibling and moving house.
* The total is the sum of the children whose parents reported a stress factor. Some children's parents reported more than one factor and thus the total (*) does not equal the number of children with NE.

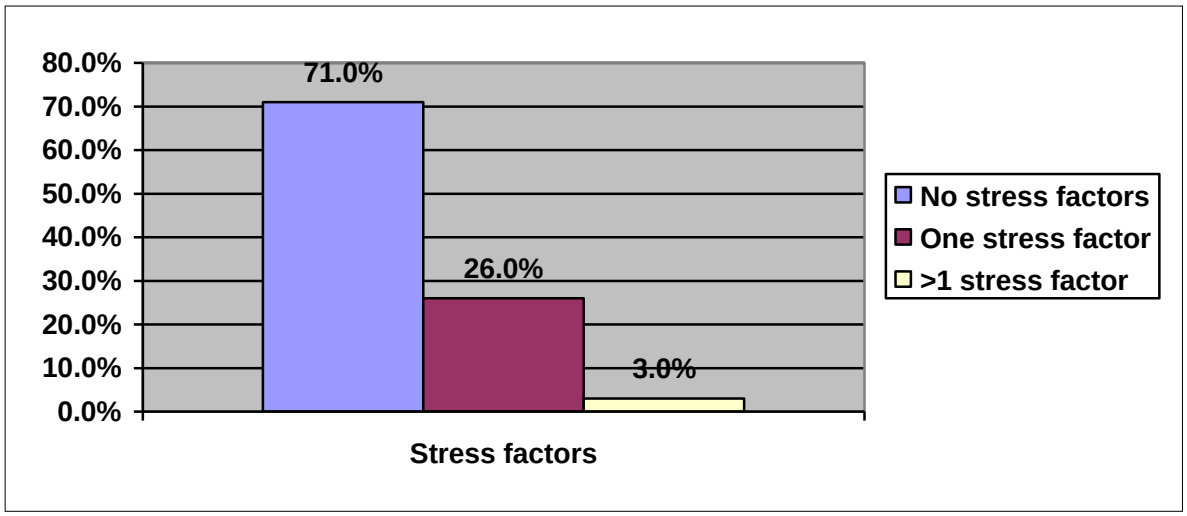

Figure 3.3 Percentage of enuretic children with stress factors

Table 3.12 records the number of children with NE whose parents reported a stress factor which may contribute to the NE. Three hundred and forty six children with NE had no stress factors, 127 had one stress factor, and 14 reported more than one stress factor (Figure 3.3).

3.3.4 Performance at school

Table 3.13 Performance at school

Age	Well in all subjects n	Well in some subjects n	Average subjects n	Poorly in most subjects n	Poor in all subjects n
5 years	57	27	39	8	5
6 years	62	24	41	6	1
7 years	42	17	33	3	10
8 years	19	14	17	1	2
9 years	12	7	11	4	0
10 years	8	6	5	3	3
Total	**200**	**95**	**146**	**25**	**21**
Percentage %	**41.0%**	**19.5%**	**30.0%**	**5.1%**	**4.3%**

Most parents felt that their children with NE were performing well and 9.4% of the parents felt their child performed poorly in most subjects (5.1%) or poorly in all subjects (4.3%).

3.4 Awareness of treatment

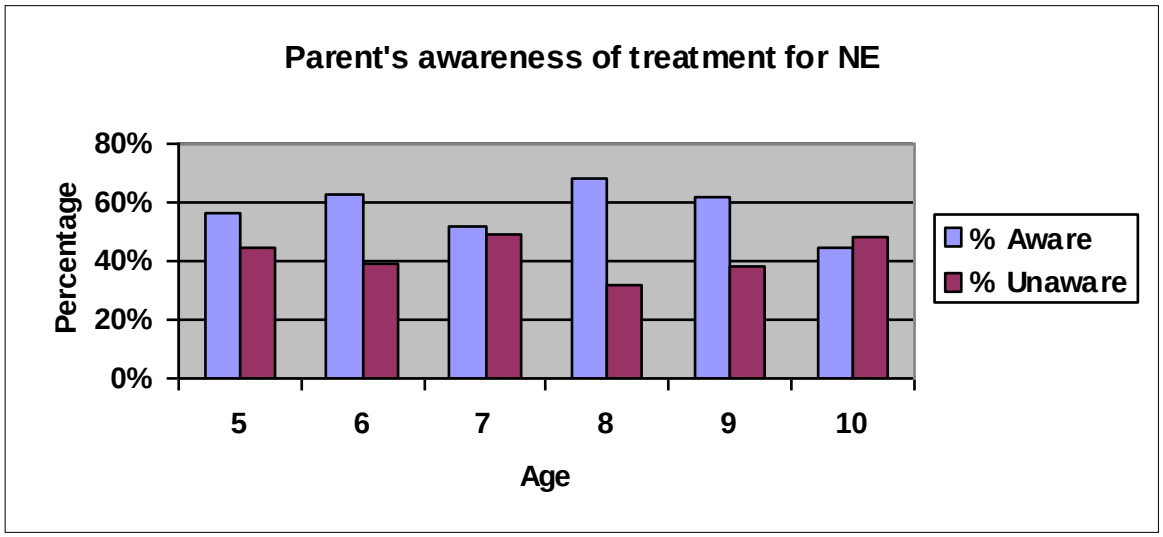

Figure 3.4 Parent's awareness of available treatment as a percentage

Overall 42% of parents of children with NE in this study were unaware that there are specific treatments available for NE.

3.4.1 Number and percentage of children that parents would take for treatment

Overall 61.3 % of parents indicated a possible willingness to take their children for treatment of some kind, if the problem did not resolve spontaneously.

Table 3.14 Percentage of parents who would take children for treatment

Possibility of treatment			
Age	**Total** **n**	**Yes to treatment** **n**	**Percentage (%)**
5 years	136	74	54.4%
6 years	132	75	56.8%
7 years	105	71	67.6%
8 years	53	37	69.8%
9 years	34	26	76.5%
10 years	27	16	59.2%
Total	**487**	**299**	**61.3%**

Table 3.14 reports parents' willingness to take their children for treatment, not the actual number of children being treated.

3.4.2 Number and percentage of children treated for NE

Table 3.15 Children with NE receiving treatment

Age	Treated n	Untreated n	Total n	% Treated
5 years	39	97	136	28.7%
6 years	24	110	134	17.9%
7 years	42	63	105	40.0%
8 years	21	32	53	39.6%
9 years	6	28	34	17.6%
10 years	6	19	25	24.0%
Total	**138**	**349**	**487**	**28.3%**

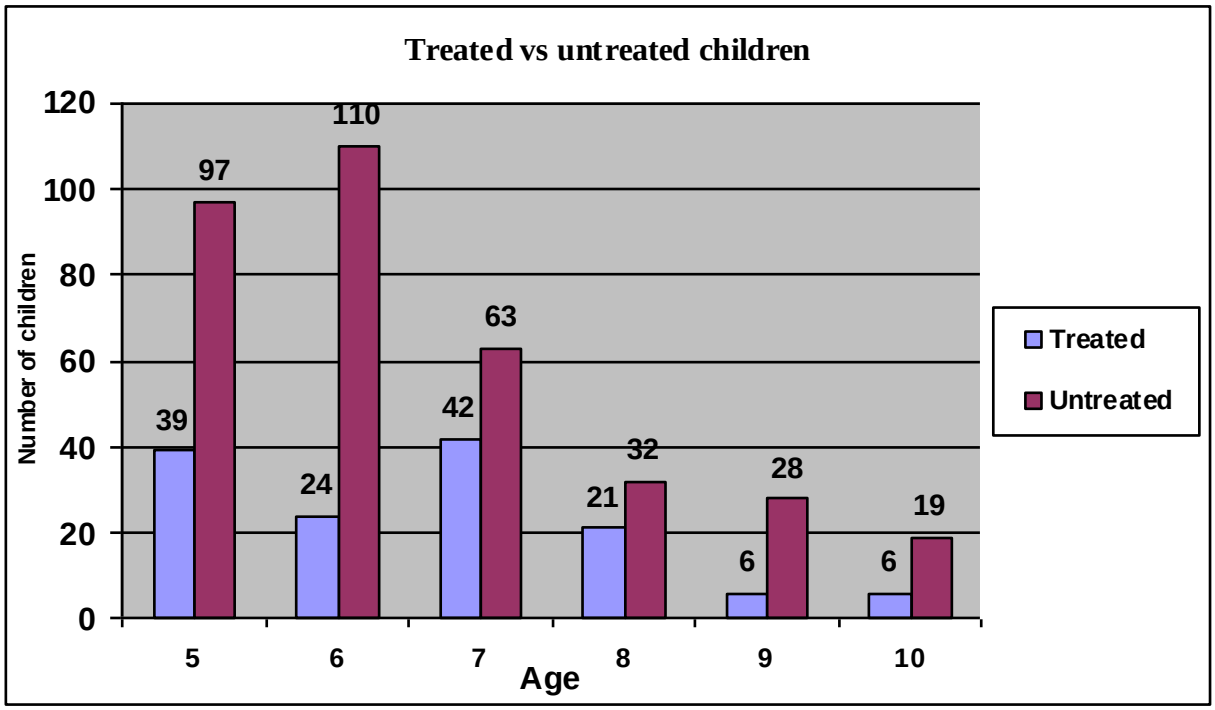

Figure 3.5 Number of children receiving treatment (from Table 3.15).

Only 28.3% of the children identified with MNE were receiving some form of treatment for NE. Overall, a significant difference was shown for the numbers of children receiving treatment with age (χ^2 test p=0.0014). In particular, fewer children age 5-6 years received treatment compared to those 7 years and older (χ^2 test p=0.0063). The sample size in the 9-10 year old age group was too small to do draw a meaningful conclusion.

3.4.3 Treatment modalities

To prevent NE, the 138 children (Table 3.15) received advice or treatment as shown in Table 3.16. Some of these children received more than one treatment modality.

Table 3.16 Treatment modalities chosen by parents of children with NE

Type of Treatment	Total* n=263	Percentage %	Successful Treatment	% successful Treatment %
Counseling	4	1.5%	1	25.0%
Alarm	5	1.9%	1	20.0%
No treatment suggested	7	2.6%	0	0%
Told you the child would outgrow the problem	8	3.0%	0	0%
Star chart	21	7.9%	6	28.5%
Wake the child at night to go to the toilet	61	23.2%	18	29.5%
Medicine	66	25.1%	30	45.5%
No fluid intake at night	91	34.6%	23	25.5%

***n= total of treatment modalities**

3.4.4 Medicine given

Table 3.17 Types of medicine given to treat NE

Medicine	Treated with medicine n	Percentage %	Successfully treated children n	Success rate %
Oxybutynin	4	6.1%	2	50%
Homeopathic	13	19.7%	3	23.1%
Imipramine	14	21.2%	10	71.4%
Desmopressin tablets	18	27.3%	13	72.2%
Desmopressin nasal spray	1	1.5%	1	(100%)
Unknown	16	24.2%	1	6.3%
Total	**66**	**100.0%**	**30**	**45.5%**

Overall, excluding the unknown group, there was a significant difference in the success rate of the medicines used to treat NE (χ^2 test p=0.0226). Desmopressin and imipramine had the highest success rates. The success rate using the anticholinergics (imipramine and oxybutynin) were not different to the success when treating with desmopressin (χ^2 test p=0.64). Conventional drugs were significantly superior to homeopathic remedies (χ^2 test with Yates correction p=0.0083).

3.5 Socio-economic status

Table 3.18 Socio-economic status* in subjects with NE

	Low	**Middle**	**High**
Total (n)	49	409	32
Percentage	10.0%	84.0%	6.6%

*See Methods

Most of the children in this study were from the middle socio-economic group

4.0 Discussion

4.1. Study outcome

Questionnaires were handed out to 4700 children and 3389 were returned, which is a response rate of 72.1%. This response rate is similar to studies from Malaysia, where the response rate was 73.8% (4), Thailand, 70.1% (6), Italy 77% (11) and Australia 74% (10). In all these studies, a self-administered questionnaire was given to parents to complete. Questionnaires were handed out to children in certain grades to take home to their parents for completion and then returned to the schools, except in the Australian study, where the questionnaires were handed out at polling booths to parents (10). In keeping with these studies, similar methods were used in the present study to hand out and retrieve the questionnaires.

The questionnaires were handed out per grade, and not according to age group, as this was easiest and most convenient for the school. The exact number handed out to each age group was not recorded and the sample size was not evenly distributed across the age groups. Of note was that fewer questionnaires were received back from children in the older age groups and thus the reported prevalence rate in the older children may not be accurate.

The study was designed to determine the prevalence and factors which may influence or cause NE in children. For convenience, parents of children unaffected by enuresis were not asked to complete all the questions. The study, therefore, could not determine the influence of these factors in the non-enuretic group. These non-enuretic subjects would have made a suitable

non-NE control population, providing comparative data on the prevalence of NE in siblings and parents, as well as the effect of socio-economic, stress and other factors impacting on NE.

The study also surveyed schools that were in convenient proximity to the cities of Johannesburg, Cape Town and Durban. Further, schools willing to participate were selected in preference to schools showing reluctance to participate. Thus the study may be biased in that it was not strictly randomly selected or inclusive in ensuring equal numbers of children from different socio-economic groups. The study was also limited by the ability of a single investigator collecting data from remote and economically depressed areas where access may have been dangerous.

4.2 Prevalence of NE

This study found an overall prevalence rate of 14.4% for MNE which decreased with age. The increase noted in the 10 year old group was not significant, due to the small number of children and, as noted, questionnaires were handed out by grade, not by age group.

It is difficult to compare these prevalence rates to other studies as many of these did not analyze age groups separately. Different definitions of NE are also used in different studies (Tables 1.1, 1.3, 3.1 and 3.9) (1, 3, 5) and in some no differentiation was made between MNE and PNE (1). Further, the literature is also complicated by the different inclusion criteria used in different studies (Table 1.1). Therefore it is difficult to compare the prevalence rate of 14.4% in South Africa with other studies.

An age at which studies can be compared is 7 years of age, as this is often cited in the literature (Table 1.3) (5). Table 4.1 (taken from Table 1.3) summarizes studies where the same inclusion criteria were used. In this age group, the prevalence of NE and MNE from the present South African study is similar to the other studies.

Table 4.1 Prevalence of NE among 7 year olds where ICD 10 definition was used (5)

Author and year	**Country**	**Prevalence of PNE+MNE (%)**	**Prevalence of MNE (%)**
Hellstrőm	Sweden	9.5%	7.4%
Kanaheswari (2003)	Malaysia	10.3%	9.0%
Lee (2000)	Korea	16.4%	13.8%
	Current SA study	12.3%	8.5%

The present study noted geographic differences in the prevalence rates, with Gauteng and the Western Cape being similar, but a significantly higher prevalence rate in Kwa-Zulu Natal, which cannot be easily explained.

4.2.1 Prevalence of daytime urinary incontinence

The overall prevalence of children with NE also suffering from daytime incontinence was 1.6%, in keeping with studies from the United Kingdom (3), Korea (21) and Australia (10). A Turkish study (6) reported a rate of 21.0%, but there is no apparent reason for this discrepancy.

4.2.2 Prevalence according to gender

The finding in this study is that the prevalence in boys is greater than in girls (M: F = 2:1), which is the same ratio reported in western countries (3). In a Nigerian study (8), the boys accounted for 60.7% and girls for 39.3% of the 117 enuretic children (1.5:1: M: F).

The gender difference in the current study diminished with age, but was not statistically significant. According to the literature, this gender difference diminishes with the increase in age (1, 9).

4.3 Frequency of NE

The frequency of enuretic episodes varies in children. According to the literature, only some 15% of children with NE have an enuretic episode every night, although most children have enuretic episodes more than once a week (1). This is less than the overall prevalence of 24% of children with enuretic episodes every night and 68% of once a week or more, found in the present study. Again, variation in the definition of severity makes comparison between studies difficult. The ALSPAC study (3) appears to be one of the few studies reporting the severity of NE that can be compared to the present study. Other than the 7 year olds, with (<1 NE episode

per week), the results seem similar (Figure 4.1). The reason for this difference in frequency is not clear, as the overall NE prevalence for the 7 year old group in the ALSPAC study (15.5%) was higher than in the present South African study group (11.3%). Possible differences in treatment and treatment rates may partly explain these differences.

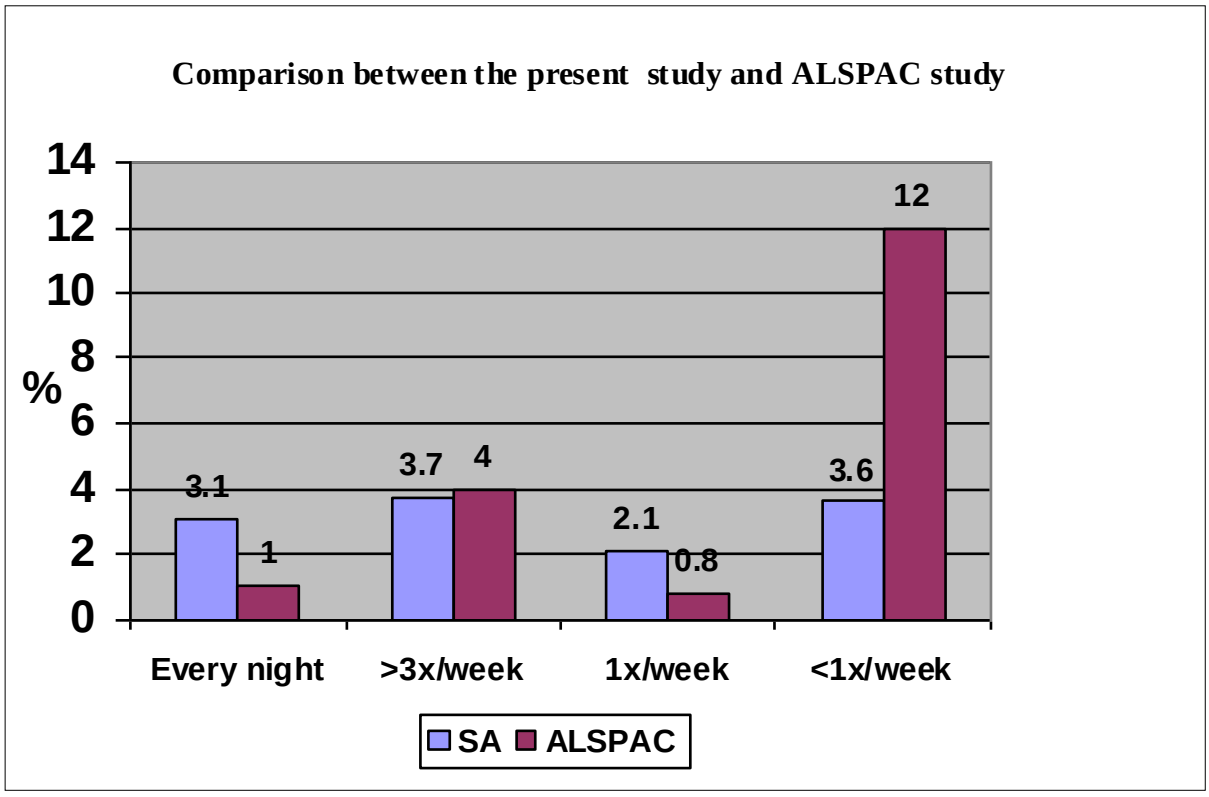

Figure 4.1 Comparison of frequency of NE between ALSPAC study and the present study

4.4 Potential risk factors for NE

4.4.1. Heredity

NE is a hereditary disorder, as demonstrated in many studies (1). The mode of inheritance appears to be autosomally dominant (1). Using molecular genetic methods, loci have been found on chromosomes 13, 12, 8 and 22 (1). A picture of pronounced heterogeneity for both genotype and phenotype emerges (1).

Although this study cannot specifically show the hereditary factors, it shows that there is a tendency that NE appears to run in families, because, 50.5% of the children had a family member, either parent or sibling, with a history of NE. With a larger sample size, a statistically significant hereditary pattern may be evident. It would have been useful to compare the data in the enuretic children and non-enuretic children, but the data for the non-NE children are not available.

A comparable study from Bangkok (Figure 4.2; 12) reported 16.0% of NE children had siblings with NE, compared to the present study finding of 28% (Table 3.10). Similarly, the prevalence of a history in parents of NE from this same study (12) is also much less (±14%) than the finding of the present study (32.9%). The Bangkok study (12) noted a lower prevalence of siblings with NE and a history of parents with NE in the non-NE group, but the statistical significance of this was not reported (12). The present study did not report data from children without NE.

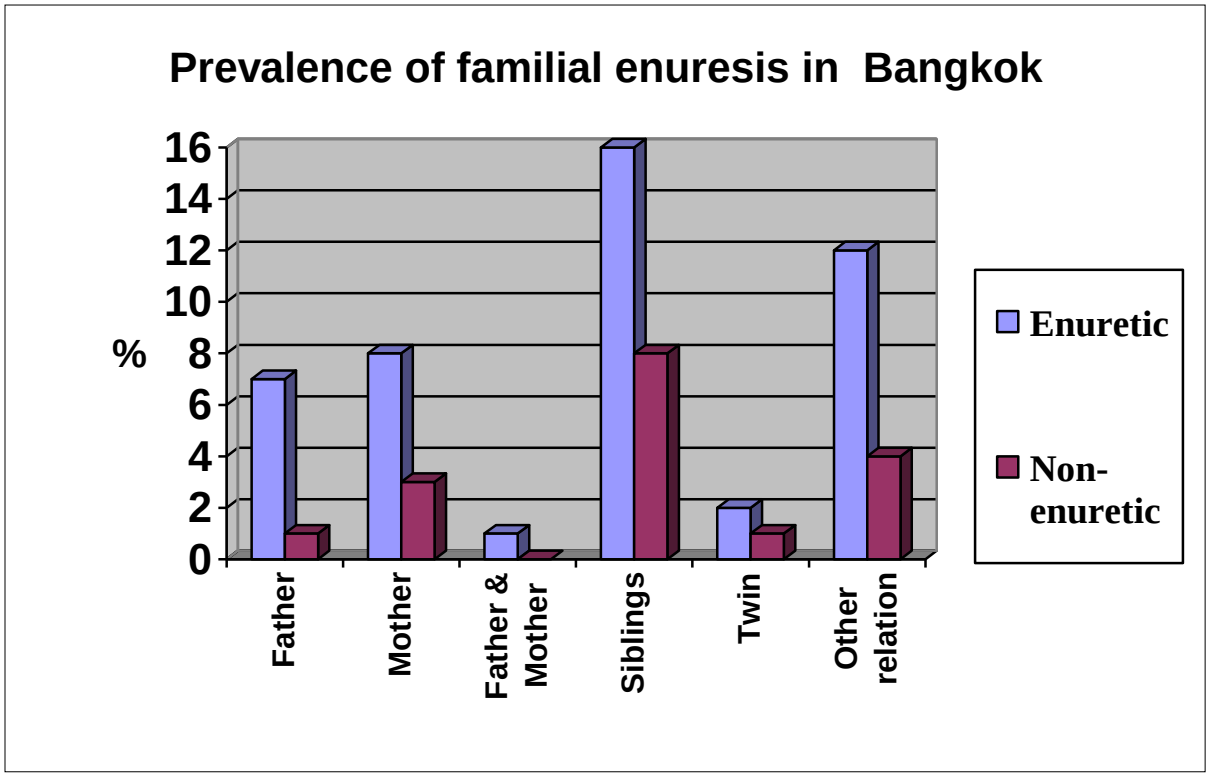

Figure 4.2 Prevalence as a percentage of familial NE in Bangkok (12)

4.4.2 Constipation

The overall prevalence of children suffering from constipation in the study group was 16.0% and was similar to other studies (20). As previously noted, the present study did not compare the enuretic and non-enuretic groups as the data for the non-NE group were not available.

Constipation is a common problem in children (20). In healthy children constipation has been reported in 16% of 22-month old children decreasing to 3% at age 3 (20). In a study done in Turkey the prevalence of constipation in children between the ages of 5-9 years was 12.4 %, with 21.6% of children with NE suffering from constipation (20). The mechanism by which

constipation leads to NE is not clear, but it is possibly due to the pressure effect of the stool on the bladder causing an uninhibited contraction of the detrusor (12). It is therefore important to detect and treat constipation in enuretic children (10), as this could be a cause of the NE.

4.4.3 Possible link to stress

Parents often perceive that NE is caused by stressful events in a child's life. Although evidence is accumulating to show that psychological problems are probably caused by NE, rather than being a cause of primary NE, parents and medical professionals still believe that NE is caused by psychological problems (5).

In this study, 29.0% of the children's parents perceived that the NE could be due to a possible stressful incident, with the highest prevalence rate being among the 7 year olds.

This is an indication that, despite evidence to the contrary, a large proportion of parents still believe that stressful events are the cause of NE. This was a very subjective observation, as opinion of parents is often not subject to statistical analysis. It is, however, important to be aware of this prejudice, as this could influence a parent's willingness to seek treatment for their child. If the parent perceives that the child has a problem due to a stressful event, they will not feel the need to seek treatment. The data for the non-NE group was not available and the influence of stressful events on NE could not be investigated further.

4.4.3.1 Possible stressful events

In the present study, possible stressful events identified by the parents differed, but divorce, death in the family and violence were the most common events linked to NE. A Turkish study, comparing NE to non-NE children, found that death and divorce had no effect on the prevalence of NE (6). This may suggest that parents, in the present study, may have overestimated the influence of divorce and a death in the family as causes of NE.

With the high divorce rate in South Africa, it was not surprising to see the high prevalence rate for this group. It must, however, be noted that 71.0% of the enuretic children had no stress factors. Further studies would be needed to address these questions.

4.4.4 Performance at school

The present study could not show any correlation between poor scholastic performance and NE. Most parents felt that their children were performing well and only 9.4% of parents of NE children felt that their children were experiencing problems at school. One study has shown that children with NE often do not perform well at school (12), contrasting another, showing no significant correlation between NE and school problems (9). Both studies were performed in Thailand (9, 12).

4.4.5 Socio-economic status

Studies in Turkey (6), Nigeria (8), Italy (11) and the United Arab Emirates (14) have shown a higher prevalence rate of NE among children from lower socio-economic backgrounds, with a study from Thailand (9) showing no difference in socio-economic status. However, this could not be demonstrated in the present study, where most children with NE were of middle socio-economic status.

Some studies have shown that there is a direct relationship to lower socio economic status and NE in a clinic population that is not seen in the general population (19). There appear to be no conclusive studies proving a direct relationship between socio-economic status and the prevalence of primary NE.

4.4.6 Ethnicity

The present study was unable to determine whether there were ethnic differences in NE prevalence in the South African population. Although a question regarding ethnic grouping was included in the questionnaire, many parents of NE and most parents of non-NE children did not answer this question.

4.5 Awareness of treatment

A large percentage of parents (42%) reported being unaware of specific treatments being available for the treatment of NE. Incontinence of any form appears to be taboo and not spoken about freely. Thus parents do not seek help and are not enlightened about treatment for NE.

4.5.1 Percentage of children that parents would take for treatment

In the present study 61.3% of parents indicated a possible willingness to take their children for treatment of some kind, if the problem did not resolve spontaneously. However 39.0% indicated that they would not seek treatment. This may be due to the perceived high failure rate of treatment of NE and that parents feel it is socially unacceptable to have this problem (1). An American study showed that parents who were worried about NE were more likely to treat NE in their children themselves, rather than take their children to a medical doctor for treatment (21). This was also reported in studies from the UK (18, 21). A Turkish study showed that over three quarters of enuretic children were not taken for treatment (6).

4.5.2 Percentage of children treated for NE

Only 28.3% of the children identified with MNE were receiving some form of treatment for NE. This included all forms of treatment (Table 3.16). However, only 13.5% of NE children were actually receiving treatment. The data can be compared to Malaysia where only 5.8% of parents had taken their child to see a medical doctor and 5.2% had seen a traditional healer, while 87.0% had not sought any consultation (2). In Nigeria, 6.8% of children received

treatment (8), in Turkey 15% of children with NE had a consultation for the management of NE (20), and in Australia 33.8% received treatment for NE (6, 10). Owing to the misconception and negative attitude to treatment, some enuretic children may have been left to suffer from NE for life (8).

4.5.3 Treatment modalities

Fluid restriction, taking medicine and waking the child at night were the most popular modes of treatment, but the most successful mode of treatment was the intake of medicine. Some children also received more than one mode of treatment. Although fluid restriction and waking the child at night do not show high success rates, parents persist with them.

Similar findings have been reported from other countries (Table 4.4) including Turkey (13), Korea (21), Thailand (9), Australia (10) and Nigeria (8) showing that behavioral modification such as fluid restriction, waking the child at night to void and counseling are the most commonly used modalities for the treatment of NE. Although these treatment modalities have not proven to be successful in many children, they are still the treatment of choice, with little evidence in the literature to recommend any of them (1).

Treatment with medicine was the most successful treatment option found in the present study, but only 13.6% of the enuretic children received medicine as a treatment option. Once again, this is not unique to South Africa and seems to be a world-wide trend. Drugs are also not readily available in many areas and this was also a contributing factor to non-treatment in Nigeria (8). Medication for the treatment of NE is often very expensive, which would also be an inhibiting factor. Only 28.3% of the children identified with MNE in this study were

receiving some form of treatment for NE. Of note was that the proportion of children receiving treatment differed significantly with age. In particular, fewer children age 5-6 years received treatment compared to those over 6 years old. It is speculated that, as children approach school going age, it becomes more important for the children, and the parents, for the children to be continent at night.

Table 4.2 Parental strategies for managing NE in different countries (6, 9, 10, 21)

Percentage of enuretic families using strategy					
Strategy	**Thailand**	**Turkey**	**Korea**	**Australia**	**South Africa**
Voiding before bedtime	72.9%	-	-	-	-
Waking to void	61.8%	69.6%	38.1%	30.0%	44.0%
Fluid restriction	28.5%	45.4%	25.7%	43.0%	66.0%
Giving Reward	21.5%	-	2.3%	16.0%	15.0%
Waiting for maturity	19.4%	14.0%	12.9%	51.0%	6.0%
Professional counseling	17.4%	3.6%	7.6%	7.8%	3.0%

4.5.4 Medicine given

Only a small percentage of children in this study were treated with medicine, which had a high success rate. Only 13.6 % of the total number of children identified with MNE were treated with medication. Conventional medications, desmopressin, imipramine and oxybutynin had similar and high success rates and were significantly more successful than homeopathic remedies.

Although the International Continence society (ICS) (1) recommended that imipramine should not be used for the treatment of NE, as it is cardiotoxic, it is still being used in South Africa and with a similar success rate as desmopressin tablets. Desmopressin nasal spray has recently been found to be not as safe as tablets, as higher concentrations of the drug have been noted in the blood stream. It is therefore pleasing to note that it is not widely used.

5.0 Conclusions

This study used a questionnaire completed by parents. It has limitations as it relies on the interpretation of NE by the parents. As limited data were collected on the non-enuretic children, comparisons between the groups could not be made.

Differences in definition of NE and inclusion criteria used in the different studies make it difficult to compare prevalence rates from different countries. It is therefore important that consensus should be reached over what the definition for NE should be when studies are done. This study shows that South African children have similar prevalence rates for MNE, which decreased with age. Regional differences were noted, which could not easily be explained. Similar to other studies the prevalence in boys was twice that in girls. Although children with NE had siblings with NE and parents with a history of NE, the study could not show a hereditary pattern. Due to the poor response in answering the question on ethnicity, no conclusion could be reached regarding possible ethnic differences in prevalence rates of NE.

Although parents of children with NE reported stress factors such as divorce, death in the family and violence being linked to the NE, due to the absence of a non-NE group possible association of these stress factors to NE could not be demonstrated. Although many studies have reported a higher prevalence rate of NE among children from lower socio-economic groups, this could not be demonstrated in this study.

There appears to be low levels of parental knowledge of treatment modalities for NE, and children may go untreated. Most parents used behavioural modification to reduce the NE episodes. Treatment modalities appeared similar to reports from other countries and when conventional medications were used, these were successful.

6.0 Recommendations

6.1 Awareness about NE

Awareness needs to be created about enuresis. This includes awareness about the condition as well as treatment options. Medical practitioners need to be made aware about current treatment regimes. Parents of children with enuresis are also mostly unaware that enuresis is a treatable condition and this perception needs to be changed. Further, treatment of the condition should be made by an informed medical practitioner or specialist in the subject.

Methods that can be utilized are the following:

- Utilizing the services of the local association, namely the Continence Association of South Africa and the Enuresis Academy of South Africa to help promote awareness
- Radio talk shows
- Television programmes
- Academic meetings
- Consumer campaigns
- Pharmaceutical companies
- Patient information leaflets

6.2 Future studies about NE

Future studies should be undertaken to confirm the findings of the present study. A similar questionnaire could be used, but designed to survey both enuretic and non-enuretic children, i.e., the order of questions could be rearranged. Depending on resources, children between the ages of 5-16 years of age should be included and a larger number of schools included in the study, also including those from remote rural areas. Such a study would need to include translators and interpreters.

Annexure 1

Bedwetting Questionnaire

Please fill in or mark the appropriate block with a cross (X)

PLEASE NOTE that you are under no obligation to complete this questionnaire

1,Do you wish to complete this questionnaire			**Yes**		**No**
2.Age of your child		**years old**			
3.Gender	**Male**	**Female**			
4.Persons living with the child at home	**Father**	**Mother**	**Relative**	**Caregiver**	
5. Child has		**Brothers**			
6. Child has		**Sisters**			
7.Race/ancestry	**Black**	**White**	**Asian**	**Coloured (mixed race)**	**Other**
8. Did your child still wet themselves after the age of 4 years?	**Yes**	**No**			
(If No, you don't need to complete the rest of the questionnaire, BUT please return the questionnaire)					
9. At what age did your child start to wet his/her bed?	**Never been dry**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**
	7 years	**8 years**	**9 years**	**10 years**		
10. Since this started has your child ever been dry for more than 6 months?	**Yes**	**No**				
11. How often does or did your child wet his/her bed?	**Every night**	**More than 3 times /week**	**Once a week**	**Once a month**	**Occasionally**	
12. At what age did your child stop wetting his/her bed?	**Before 2 years**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**
	7 years	**8 years**	**9 years**	**10 years**		

13. Does or did your child wet himself/herself during the day as well?	**Yes**	**No**				
14. Does your child have brothers or sisters who have wet their beds?	**Yes**	**No**				
15.Please indicate number of siblings who wet their beds	**Brothers**	**Sisters**				
16. At what age did the brothers stop wetting their beds?	**Before 2 years**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**
	7 years	**8 years**	**9 years**	**10 years**		
17. At what age did the sisters stop wetting their beds?	**Before 2 years**	**2 years**	**3 years**	**4 years**	**5 years**	**6 years**
	7 years	**8 years**	**9 years**	**10 years**		
18. Did the child's mother or father wet their beds?	**Yes**	**No**				
b) If so, at what age were they dry?	**Father** **Age**	**Mother** **Age**				

19. Does your child suffer from constipation?		**Yes**	**No**
20. Has there been a possible stressful event that may be linked to the bed-wetting?		**Yes**	**No**
21. What was the stressful event?	**Death in family**	**Parents separated/ divorced**	**Illness in the family**
	Serious injury to child or other family member	**Violence to child or other family member**	**Other**
22. How well does your child perform at school?	**Well in all subjects**	**Well in some subjects**	**Satisfactory/ average**
	Poorly in most subjects	**Generally has problems**	
23. Are you aware that bedwetting can be treated by a doctor?	**Yes**	**No**	
24. Would you take your child for assessment and treatment for bedwetting?	**Yes**	**No**	
25. Has your child ever been treated for bedwetting by a doctor or other person?	**Yes**	**No**	
	No treatment suggested	**Alarm**	**Star chart**
	Counseling	**Medicine**	**No fluid intake at night**
	Told you the child would out grow the problem	**Wake the child at night to go to the toilet**	**Other**

27. If medicine was it…	**Tablets?**	**Syrup?**	**Nasal spray?**
Please specify name if known.	**Other?**		
28. Was the treatment successful?	**Yes**	**No**	
29.Socio-economic:			
Your home is in a…	**Township**	**Suburb**	**City**
Type of home is a…	**House**	**Flat**	**Simplex**
	Duplex		
Number of persons living in the home			
Does the family own the home?	**Yes**	**No**	
Does the family home have electricity?	**Yes**	**No**	
Does the family own a motor vehicle?	**Yes**	**No**	

Thank you for taking the time to complete this questionnaire

CONTACT NUMBER: 011 475 9700
ENURESIS HELPLINE: 083 289 6440

Annexure 2

Dr. MW Fockema
P.O. Box 731446
Fairland 2030
Tel. nr. 011 475 9700

Dear Parents/Guardian

Hi, my name is Margaret Fockema; I am a GP in private practice and am registered at the department of Urology at the University of the Witwatersrand for a post graduate Master's degree. I would like to study bedwetting in SA. We have plenty of data from Europe and America, but none from SA.

I would greatly appreciate it, if you took the time to answer this questionnaire that has been approved by the Wits Ethics Committee. I would like to stress that participation in this study is entirely voluntary. There will be no consequence if you choose not to participate. You are free to withhold the questionnaire if you are not comfortable at any stage. If you agree to participate, there are no risks to you or your child.

In a survey done in Europe, children classified the trauma of bedwetting only second to losing a parent. This gives us an indication of how bedwetting impacts on a child.

- Bedwetting is a common problem
- It is not caused by the child being naughty or as previously believed by emotional problems.
- Emotional problems are often caused by the bedwetting.
- It is also a problem that occurs in families.
- Once the underlying cause of the bedwetting has been established, the child can be treated successfully.

Any information that we receive will be treated with total confidentiality and no personal information will be required. There are no names on the questionnaires. Questionnaires that are returned will be in sealed envelopes and teachers will have no access to the data.

Please help us to better understand this condition by filling in the questionnaire .Once we know more about bedwetting, we can educate people to understand this condition better and treatment will be more successful. Please find enclosed a pamphlet telling you more about bedwetting.

If you have any queries or need guidance for your child with respect to this questionnaire, you may contact me on 011 475 9700 or contact the enuresis helpline on 083 289 6440.
The ethics committee office may be reached on 011 717 1234

Yours sincerely

Dr. Margaret Fockema

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