

**DEDICATION:**

**To Felix and Herine Odongo, my parents.**

ii

**TITLE:**

**A STUDY OF URINARY TRACT  
INFECTION AMONG PRIMARY  
SCHOOL GIRLS IN NAIROBI, KENYA.**

**BY**

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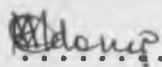


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DECLARATION:

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This thesis is my original work and has not been presented for a degree in any other University.

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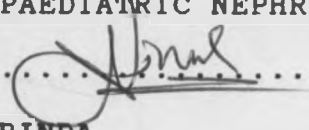
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Summary:

There were 639 girls studied in 3 primary schools in Nairobi from October, 1989 to February, 1990. Significant bacteriuria (SBU) was found in 37 out of the 639 girls (5.8%). Of these 37 girls, 3 (8.1%) had symptomatic bacteriuria and 34 (92%) had asymptomatic bacteriuria (92%).

The peak prevalence occurred in the age group 5-6 years which accounted for 8 out of the 37 cases of SBU (21.6%). On dipstix examination Leucocyteuria occurred in 102 (16%) out of the 639 girls. Of these 102 girls 23 (22.6%) had SBU. Nitrites were found in the urine of 19 out of the 639 (3%) 14 (73%) of whom had SBU.

Bacteriological Studies indicated that *Escherichia Coli* was the commonest organism and accounted for 23 (62.2%) of the 37 cases of SBU; *Klebsiella* accounted for 9(24.3%); *Strep. fecalis* accounted for 3(8.1%) and *Staph. albus* 2(5.4%).

Antibiotic sensitivity patterns done in the 37 SBU cases showed that Tetracycline was most effective with 35 (94.6%) of the 37 being sensitive in Vitro; Nalidixic acid and nitrofurantoin both had 27 (73%) sensitive out of the 37; while Ampicillin and co-trimoxazole both had sensitivities below 50%.

Introduction :

The contribution of significant bacteriuria to the pathogenesis of pyelonephritis in childhood and in adult life has been intensely investigated by many groups (1) (2), Urinary tract infections contribute to a large proportion of bacterial infections in any society ranging from those who remain asymptomatic in the presence of SBU to those who suffer frequent symptomatic attacks. This difference in response may be explained by differences in the characteristics of the invading organism - (see discussion).

The importance of massive bacteriuria screening studies has been that a certain group of patients with asymptomatic bacteriuria and Vesico Ureteric Reflux (V.U.R.) has been identified. They are at risk from serial scarring and therefore require prophylactic antibiotics to arrest progression of their renal disease (3,4).

The era of the study of bacteriuria was started by Kass (7) in the U.S.A. in 1956 when he read a paper entitled "Asymptomatic infections of the urinary tract". Kunin (6,7) et al in the nineteen sixties in Virginia U.S.A. did extensive studies looking into the epidemiology and natural history of UTI in school girls. Winberg et al in Goteborg, Sweden, carried out extensive studies in 1960-1966 on children aged 0-16 years having their first attack of urinary tract infection. In the same city, Lindberg et al in 1970 did prospective studies in school girls who screened positive for bacteriuria by the nitrite test and who

were subsequently found to have SBU. They looked out for urinary white cell excretion and checked Intravenous Urograms and Micturating Cystourethrograms among other things (8,9,10,14,15). Locally Kinuthia, Opondo and Ndinya-Achola (13) retrospectively studied 60 children, presenting with their first non-obstructive UTI at Kenyatta National Hospital. Of these, 32% had fever, 20% had hematuria and 20% dysuria. 60% were aged 0-5 years. E.Coli was the commonest causative agent (58%). Kirei (18) in Dar-es-Salaam studied 250 non-pregnant sexually active women to determine the prevalence rate of asymptomatic bacteriuria which he found to be 6.4%. However, studies involving the screening of school girls are unavailable in Kenya and probably in most regions of Africa. This study was done to improve the paucity of data on this subject and to give a preliminary report on what the situation of UTI might be in our set up with the aim, especially, of studying the clinical and laboratory features as seen in primary school girls having UTI both symptomatic and asymptomatic.

**Objectives:**

- (1) To determine the prevalence of SBU in a population of Nairobi primary school girls.
- (2) To categorize girls with SBU into asymptomatic and symptomatic UTI according to clinical and laboratory findings.
- (3) To identify the causative organisms and their antibiotic sensitivity.
- (4) To relate the presence of SBU to various laboratory parameters.



## MATERIALS AND METHODS

### Study Area:

The study was done in Nairobi, Kenya, which is a city having a rapidly growing population currently standing at approximately 1 million. Towards the end of 1989, the city had 176 primary schools each having an average population of about 1000 students half of whom are girls - giving a source population of about 88,000 girls.

The schools visited were Shadrack Kimalel - bordering the Laini Saba slums and Golf Course Estate; Uhuru Garden situated within the middle-class estates of Langata, and Baba-Dogo, within the vicinity of the Kariobangi slums.

### Ethical Consideration:

The author first obtained clearance from the Ethical Committee of Kenyatta National Hospital. With this in hand clearance was then serially obtained from the Medical Officer of Health, the City Education Officer and finally from The Office of the President, where a permit to carry out research was granted. With this permit, the Headmasters were approached and full explanations given. Co-operation was then sought from teachers and pupils.

### Study Period:

The study was done from October, 1989 to February, 1990.

### Study Design and Study Factor:

It was a cross sectional study to determine the point prevalence of SBU and to look at the associated features both clinically and in the laboratory. The study factor was

**Sampling Method:**

Using the prevalence rate of about 1% found by Kunin (19) and the formula

$$n = \frac{z_1^2 - \alpha^2 P (1-P)}{\delta}$$

Where P is the estimated prevalence (1%);  $\alpha$  = 5% (in the 95% confidence interval); Z = the standard deviation (1.96); and  $\delta$  = the absolute precision where difference of the estimated prevalence of no more than 1% (0.01) was expected; a sample size of 384 was worked out. However 639 girls were studied in order to provide a larger pool of data.

Three schools were randomly selected from a list of city schools and from each 27± 3 girls who met the criteria were recruited from each class beginning with whoever presented herself first.

**Inclusion Criteria:**

- (i) Age 5 - 16 years
- (ii) Not attending hospital/clinics regularly for a chronic illness such as asthma, TB or diabetes etc.
- (iii) Not on any treatment for the previous one week.
- (iv) Not having menstruation.
- (v) Not having cardiac or respiratory or CNS abnormalities on examination.

**METHODS:****(1) History and Clinical Examination:**

The name, age, class and symptoms were recorded. A physical examination was done to determine the presence of periorbital edema, ankle edema, temperature, abdominal swelling or tenderness, cardiovascular, respiratory or CNS anomalies. Any child found to have the later three anomalies was excluded forthwith.

**(2) The Urine Collection:**

Each child was then provided with a sterile wide mouthed bottle and sterile swab with which she was advised to give her vulvo-perineal region one swipe from the front backwards. She was then told to pass a small amount of urine in the toilet and then to pass the rest into the bottle. Girls under 8 were supervised more closely - by the author and 2 teachers.

**(3) The Laboratory:**

The bottle of urine was labelled and transferred to the laboratory within the hour where urinalysis with a dipstix was done followed by spinning and microscopy of sediment.

The specimens were then plated on CLED (Cystine-Lactose-Electrolyte deficient) agar using a platinum loop calibrated to deliver 0.0001 ml. of urine, and incubated for 24 hours 37°C. A colony count was then done to determine specimens with significant bacteriuria (that is >/ 100 colonies which is equivalent to 10<sup>5</sup> organisms).

The typing of bacteria was done by observation of the colonies and gram staining, then the colonies were further sub-cultured in Mueller-Hinton Agar with addition of antibiotic sensitivity discs

to determine antibiotic sensitivity. These were further incubated for 24 hours and the results determined by macroscopic inspection of bacterial growth around the discs - those that had no growth around the discs were read as sensitive to the particular antibiotic.

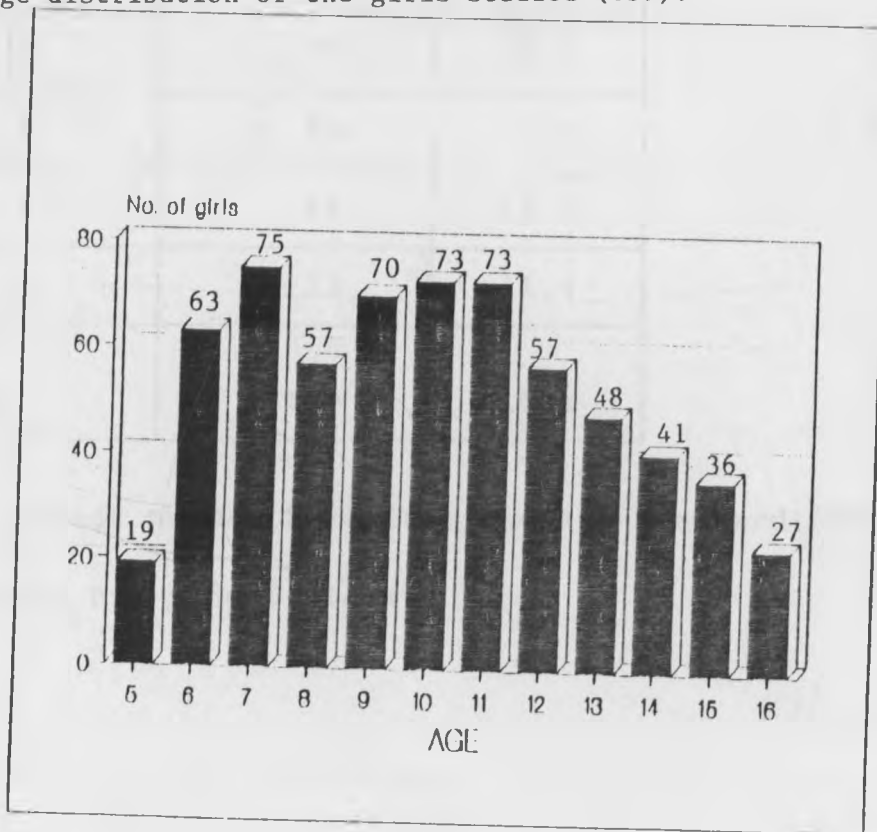
R E S U L T S

A) Description of the population:

Six hundred and thirty nine (639) girls from 3 city schools were recruited into the study. 200 were from the Uhuru Gardens Primary School; 210 from Baba Dogo and 229 from Shadrack Kimalael Primary School.

The age of each girl was confirmed by the school records and rounded off to age at the last birthday. There were only a few pre-schoolers aged 5 and after age 14 the numbers dwindled again due to completion of primary education at around that age.

Fig. 1: Age distribution of the girls studied (639).



The mean age of girls studied was 10 years

Only one school had a pre-school class with 35 girls, 30 of whom were studied.

Table I: Class distribution of the 639 girls:

Class	No.	%
Pre-School	30	4.7%
STD. 1	75	11.7
STD. 2	75	11.7
STD. 3	78	12.2
STD. 4	80	12.5
STD. 5	77	12.1
STD. 6	76	11.9
STD. 7	75	11.7
STD. 8	73	11.4
TOTAL	639	100%

The largest number were from the 4th Standard; the least from the Pre-school class.

B. CLINICAL FEATURES:

Only 17 out of the 639 girls had clinical features suggestive of UTI, and the distribution was as below:

Table II:

Prevalence of various signs and symptoms

(Clinical features) which occurred in the

17 out of 639 girls.

Clinical Features	Frequency	Prevalence
Dysuria	14	$14 / 639 = 2.2\%$
Hematuria	1	$1 / 639 = 0.16\%$
Periorbital edema	1	$1 / 639 = 0.16\%$
Ankle edema	0	$0 / 639 = 0\%$
Fever $>/ 38^{\circ}c$	1	$1 / 639 = 0.16\%$
Lower abd. Tenderness	0	$0 / 639 = 0\%$
TOTAL	17	2.68%

Dysuria was the most frequent occurrence.

The prevalence of SBU was noted to be higher in the symptomatic than the asymptomatic and this difference was tested for significance.

TABLE III:

A comparison of the prevalence of SBU in symptomatic and non-symptomatic girls.

Classification	Girls with SBU	Girls without SBU	Total
Symptomatic	3(21.4%)	11(78.6%)	14
Asymptomatic	34(5.4%)	591(94.6%)	625
Total	37	602	639

$$X^2 = 3.82 \quad P = 0.051$$

95% confidence limits= 0.996 and 19.6

The prevalence of SBU is greater in the symptomatic than in the asymptomatic but the difference is not significant.



The table below compares the prevalence of SBU in those having dysuria and the asymptomatic.

TABLE IV:

A comparison of the prevalence of Leucocyteuria in the dysuric and non-dysuric girls.

Classification	Leucocyteuria >85/ $\mu$ l of urine	No leuc.	Total
Symptomatic (Dysuric)	5 (35.7%)	9	14
Non-dysuric	97 (11.2%)	528	625
Total	102	537	639

$$\chi^2 = 2.72 ; P = 0.095$$

95% confidence limits= 0.86 and 10.1

The prevalence of Leucocyteuria in those having dysuria is higher than in the non dysuric but the difference is not significant.

C. URINALYSIS

The abnormalities looked for during urinalysis included significant leucocyteuria (> 85/ $\mu$ l), hematuria (RBCs) in urine), Nitrates , and albumin using uristix SG 10 variety of dipstix. Sometimes several abnormalities occurred in the same sample.

Table V:

Prevalence of various urinary abnormalities in the  
639 girls studied:

Abnormality	Frequency	Prevalence
Significant leucocyteuria >85/ $\mu$ l	102	16%
Hematuria (RBCs)	42	6.6%
Nitrites	19	3%
Albumin	14	2.2

Significant leucocyteuria was the commonest dipstix abnormality.

The table below aims to establish the relationship between SBU and various urinary abnormalities.

Table VI

The prevalence of SBU relative to various urinary abnormalities found on dipstix examination

Urinary abnormality	Prevalence of SBU	No.SBU	Total
Significant Leucocyteuria >85/ $\mu$ l	23(22.6%)	79	102
Hematuria	17(40.5%)	25	42
Nitrites	14(73.7%)	5	19
Albumin	3(21.4%)	11	14
Total	57	120	177

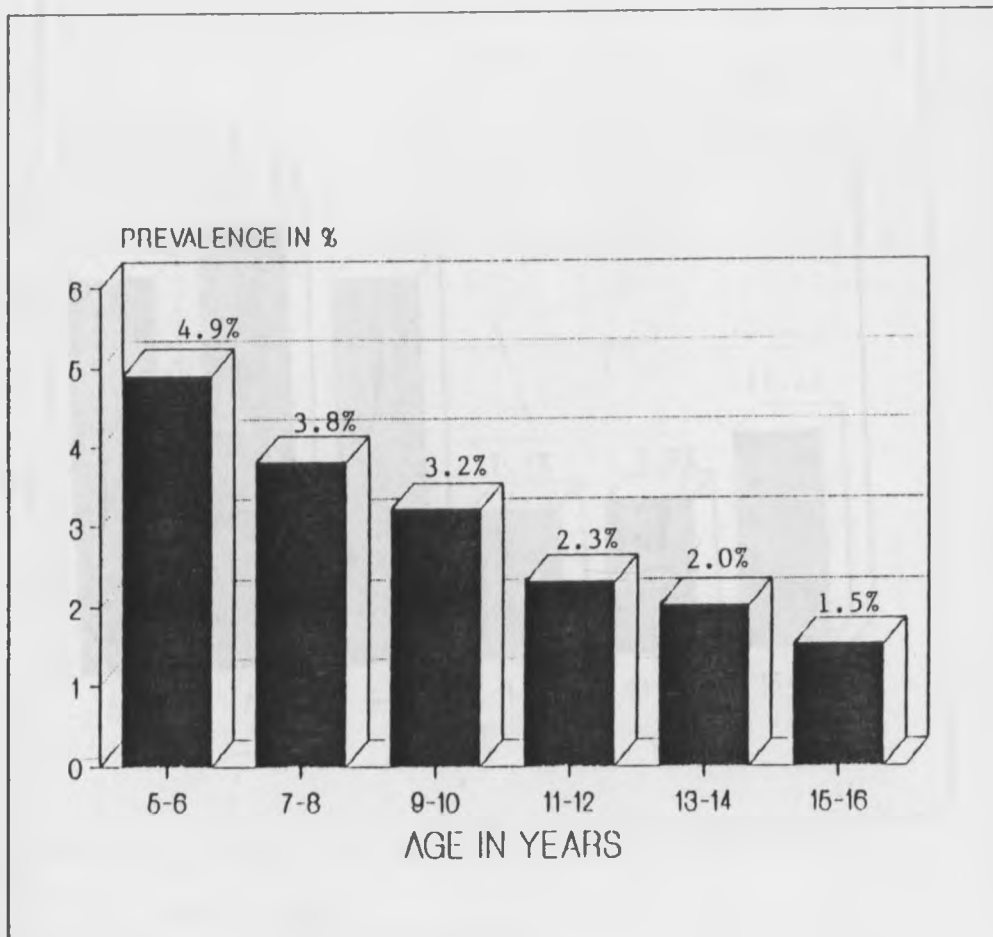
$$X^2 = 21.38 \quad DF = 3 \quad P = 0.0000087$$

The  $X^2$  trends are quite significantly different and on splitting the various  $X^2$  values, the  $\bar{X}$  value due to nitrites (13.2) is much larger than the other 3 combined (8.7). It thus appears that the presence of nitrites is the best indicator of SBU.

In view of the aforementioned importance of nitrites as an indicator of the presence of significant bacteriuria, the figure below aims to establish the age pattern of occurrence of nitrites.

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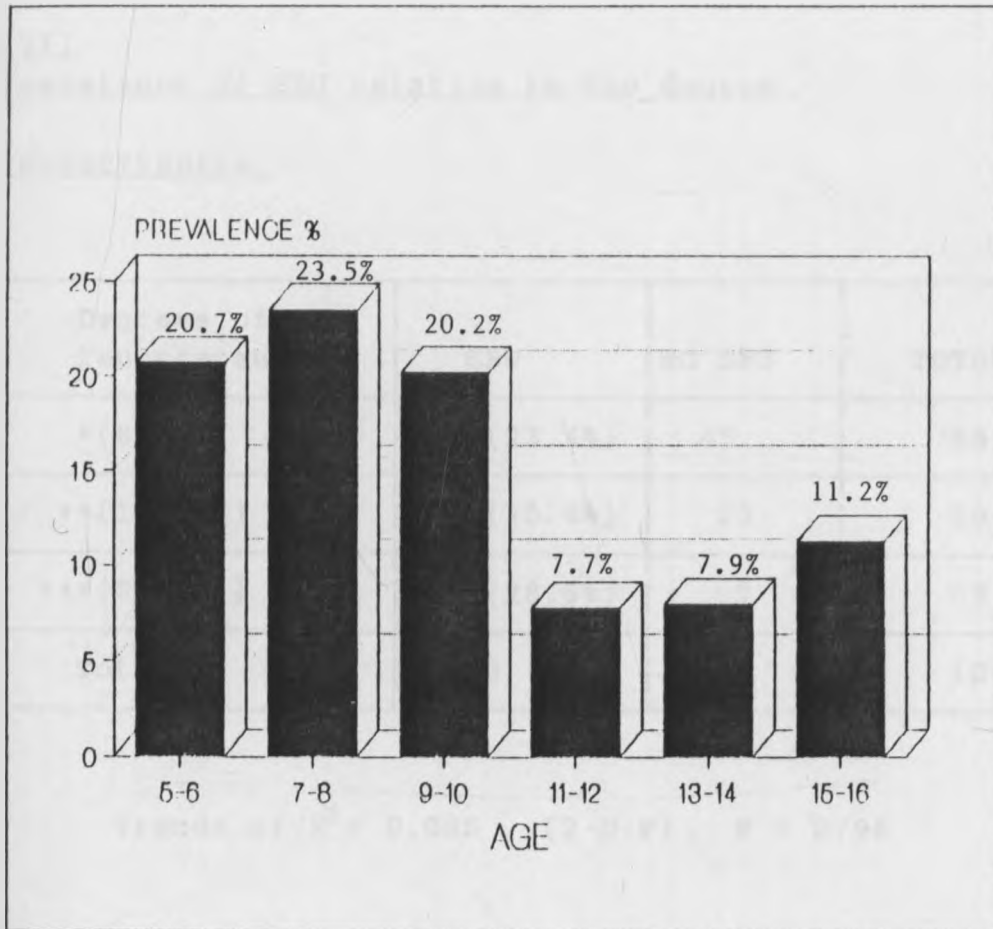
Fig. II : Age Prevalence of nitrites in the urine of the 639 girls.



The prevalence of nitrites is highest before age nine which compares well with the prevalence of SBU. (See Fig.IV)

In the figure below the relationship between age and the presence of leucocyteuria is examined in the 102 girls who had it.

Fig. III : Age prevalence of leucocyteuria in 102 girls:



Significant leucocyteuria appears to be commoner below the age of 11 years and apparently starts to rise again at puberty.

Leucocyteuria was measured in 3 intensities i.e 1+ which is equivalent to 85 leucocytes / $\mu$ l of urine; 2+ - equivalent to 125/ $\mu$ l. and 3+ - equivalent to 500/ $\mu$ l. The table below relates the prevalence of SBU to the degree of leucocyteuria.

Table VII

Prevalence of SBU relative to the degree  
leucocyteuria

Degrees of leucocyteuria	SBU	NO SBU	TOTAL
+(85/ $\mu$ l)	15(23.4%)	49	64
++(125/ $\mu$ l)	6(20.6%)	23	29
+++ (500/ $\mu$ l)	2(28.6%)	7	9
Total	23	79	102

Trends of  $\chi^2 = 0.085$  (2 D.F) P = 0.96

There is no significant difference in the prevalence of SBU in the 3 categories of leucocyteuria.

D. MICROSCOPY.

significant pyuria (here taken to mean 5 or more WBCs per High power Field) was the commonest Microscopic finding; followed by the presence of bacteria, Red blood cells, Crystals and casts in that order.

Table VIII

prevalence of various urinary abnormalities on  
Microscopy of all the 639 samples.

Abnormality	Frequency	Prevalence
WBCs > 5 PHPF	42/639	6.6%
Bacteria	31/639	4.9%
RBCs	25/639	3.9%
Crystals	12/639	2.9%
Casts	7/639	1.1%

Significant pyuria through the commonest finding occurred in only 42 (6.60%) compared to the number (of leucocyteuria) picked up by dipstix which occurred in 102 girls (16%)

The prevalence of SBU was compared in the various categories of microscopic urinary abnormalities studied.

Table IX.

Prevalence of SBU relative to various urinary abnormalities found on microscopy.

Abnormality	SBU (prevalence)	No SBU	Total
WBCs > 5 PHPF	17 (40.5%)	25	42
Bacteria	12 (38.7%)	19	31
RBCs	9 (36%)	16	25
Crystals	2 (20%)	10	12
Casts	1 (16.6%)	6	7

A larger proportion of patients with significant pyuria (> 5 PHPF) on microscopy i.e 17 (40.5%) had SBU, compared to 23 (22.5%) of the 102 patients having leucocyturia.



The table below compares the prevalence of various abnormalities of urine found on microscopy and dipstix examination in the symptomatic (i.e the 17 girls who complained of dysuria (14), hematuria (1) Periorbital edema (1) and fever (1) and the non-symptomatic ( i.e the rest of the 639 girls who had no complaint numbering 622).

Table X:

A comparison of the main microscopic and dipstix findings in the symptomatic (17) and the asymptomatic girls (622)

Urinary abnormality	Asymptomatic n=625	Symptomatic n=14	total
Leucocyteuri >85/ $\mu$ l (dipstix)	97(15.5%)	5(35.7%)	102
Hematuria	39(6.2%)	3(21.3%)	42
Nitrites (Dipstix)	17(2.7%)	2(14.2%)	19
Albumin (dipstix)	13(2.0%)	1(7.1%)	14
Pyuria>5PPF (Microscopy)	39(6.2%)	3(21.3%)	42
Hematuria (Microscopy)	23(3.7%)	1(7.1%)	25
Bacteria (Microscopy)	27(4.3%)	4(28.4%)	31

The prevalence of urinary abnormalities are uniformly higher in the symptomatic than the asymptomatic.

E. Culture Results (SBU)

The prevalence of SBU in the 3 schools visited was compared to determine whether there was any difference.

Table XI:

Prevalence of SBU according to schools.

School	SBU (Prevalence)	NO SBU	Total
1. Uhuru Garden	9(4.5%)	191	200
2. Baba Dogo	13(6.2%)	197	210
3. Shadrack Kimalel	15(6.6%)	214	229
Total	37(5.8%)	602	639

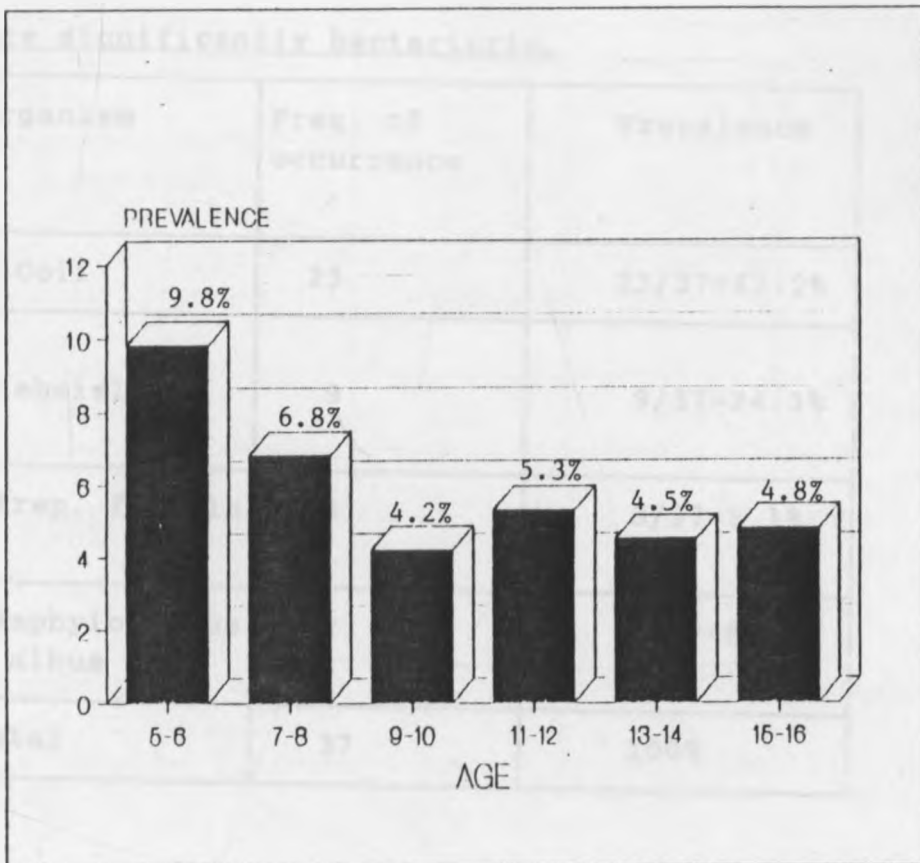
$$X^2 = 0.914 \quad DF = 2 \quad P = 0.633$$

The difference is not significant though the prevalence of SBU in school 1 is much lower than the other 2 (see discussion).

The figure below is a diagrammatic representation of the prevalence of SBU in various age groups.

Figure IV:

Age Prevalence of SBU:



SBU is more prevalent prior to the age of 9 years and even more so before the age of seven years.

The table below shows the various types of bacteria grown in significantly bacteriuric specimens.

Table XII

The type of bacteria found in the 37 specimens  
that were significantly bacteriuric.

Organism	Freq. of occurrence	Prevalence
E.Coli	23	23/37=62.2%
Klebsiella	9	9/37=24.3%
Strep. fecalis	3	3/37=8.1%
Staphylococcus albus	2	2/37=5.4%
Total	37	100%

E.Coli was the commonest cause of SBU

The table below compares the prevalence of SBU in symptomatic 17 girls, and the non symptomatic 622 girls.

Table XIII

A comparison of SBU in the symptomatic and non-symptomatic girls.

Classification	SBU	No SBU	Total
Symptomatic	3(17.6%)	14	17
Non symptomatic	34(5.5%)	588	622
Total	37	602	639

$$X^2 = 2.5 \quad DF = 2 \quad P = 0.11$$

SBU is more prevalent in symptomatic than in the asymptomatic patients but the difference is not significant.

Various antibiotics were tested to determine the *in vitro* sensitivity of the organisms grown.

Table XIV.

The pattern and prevalence of antibiotic sensitivity in the 37 specimens having SBU

Organism	E.Coli		Klebs.		Strep.f.		Staphyl.		Prevalence n=37
	S	R	S	R	S	R	S	R	
Cotrim.	9	14	3	6	1	2	1	1	14(37.8 )
Nalid. acid	17	6	8	1	1	2	1	1	27(73%)
Nitro.F.	17	6	7	2	2	1	1	1	27(73%)
Tetra.	21	2	9	0	3	0	2	0	35(94.6%)
Ampicillin	11	12	2	7	2	1	2	0	17(46%)

The organisms most sensitive tetracycline *in vitro* followed by Nalidixic acid and Nitrofurantoinat par.

The table below seeks to compare the sensitivity; specificity and predictive values of the various laboratory and clinical findings.

Table XV:

A comparison of specificity, sensitivity and predictive values of various parameters.

Lab/Clinical Findings	Sens. %	Spec. %	+ve Pred. value %	-ve Pred value %
Nitrites	37.8	99.3	73.7	96.3
leucocy teuria	62.2	86.9	22.5	97.4
Hematuria (dipstix)	46	96	40.5	96.6
Albumin	8.1	98.2	21.4	94.6
Casts	2.7	99	16.7	94.3
RBCs (Microscopy)	24.3	97.3	36	95.4
WBCs (Microscopy)	45.9	95.8	40.5	96.6
Crystals	5.4	98.3	40.5	96.6
Bacteria (Microscopy)	32.4	96.8	38.7	95.9
Dysuria	8.1	98.2	21.4	94.6

The presence of Leucocyteuria is the most sensitive test while presence of nitrites is the most specific and most positively predictive.

### DISCUSSION:

The problem of UTI in school girls has been recognised in developed countries where massive screening programmes are frequently carried out. However due to the disparity in financial ability similar programmes are not possible in many third world countries and therefore data for comparison is generally unavailable. For this reason most of the findings in this study will be compared to similar studies in developed countries.

#### A: Symptoms:

The author found 17(2.7%) girls out of 639 who had various complaints suggestive of UTI. Of these 14(2.2%) that is the great majority of the 17 complained of dysuria. On the other hand Kunin (6,11)in Virginia found markedly high prevalences. He found 34.8% of the girls age 5-9 years, 53.1% of those aged 10-14 years: 29.4% of these aged 15-19 years had symptoms suggestive of UTI.

The author attributes her low figures to reluctance to divulge information on the part of the school girls she studied.

It was also shown that the prevalence of leucocyteuria was significantly higher in the symptomatic girls (35.7%) compared to the non symptomatic (11.2%). However this did not hold true for prevalence of SBU which though higher in the symptomatic (21.4%) compared to the non symptomatic (5.4%) was not significantly



different.

B: Urinalysis (by dipstix):

Significant leucocyteuria was the commonest dipstix abnormality and occurred in 16% of the girls studied. The prevalence was 20.7% in the age group 5-6; 23.5% in the age group 7-8 and 20.2% in the age group 9-10 years: it then dropped markedly to 7.7% in the age group 11-12 years; 7.9% in the age group 13-14 years; and rose slightly to 12.7% in the age group 15-16 years.

Kunin et al (19) found a higher prevalence of significant pyuria of 39.1% in the age group 5-9 years; 25% in the age group 10-14 years and 41% in the age group 15-19 years. The reason for this difference is not understood especially in view of the fact that the author found a much high prevalence of SBU compared to Kunin. The difference may be due to the differing degree of incidental antibiotic use by the two groups of school girls.

It was also shown in the study that the presence of Nitrites is the most sensitive indicator of the presence of significant bacteriuria (SBU); as 73.7% of the girls who had nitrites in their urine had SBU compared to 40.5% of those who had RBCs; 22.6% of those who had significant leucocyteuria and 21.4% of those who had albuminuria. The author found that 2.9% of her school girls had albuminuria compared to Kunin's 1.4%. It was also noted that the degree of leucocyteuria had no bearing upon the prevalence of SBU.

### C. Microscopy:

The commonest microscopic finding was a significant Pyuria (WBCs >/ 5 per high power field) which occurred in on 6.6% of the 639 girls compared to 16% (102) found to have significant Pyuria 40.5% had SBU compared to only 22.5% of those having significant leucocyteuria. It could therefore be said that presence of WBCs on microscopy correlated better to the occurrence of SBU than does the presence of leucocytes on dipstix examination.

In Goteborg Lindeberg et al found a significant white cell count in 25.8% of their school girls (8, 14). They used a sophisticated method of counting (fuchs-Rosenthal Chamber).

### E. Culture Results:

The difference of SBU prevalence between Uhuru Garden School and the other two schools may be due to the differences in their catchment areas. Uhuru Gardens is situated within a mainly middle class neighbour hood while Baba Dogo and Shadrack Kimalel have proximity to slums. This fact may lead to hygienic constraints due to unavailability of basics such as water which in turn may lead to infrequent baths and change of underclothing, thus theoretically increasing the chances of infection.

The investigator also found that the prevalence of SBU was much higher before the age of 7 years and stood at 9.8% compared to the mean prevalence of 5.8%. Kunin on the other hand found a mean prevalence of 1.1% with little variability in the different age groups which was surprising considering the great variability of his other findings such as Pyuria and symptoms of UTI (11).

Escherichia Coli has been found to be the leading cause of UTI in many studies (6,8,14,19) and the investigator has merely confirmed this. But why do some patients have troublesome and symptomatic UTI while others remain asymptomatic in the presence of SBU ?

Various properties of E Coli have been studied to try and explain this puzzle; for example it has been shown that the polysaccharide capsules of E. Coli were important virulence factors with only 5 different K-antigens accounting for about 70% of E. Coli causing acute pyelonephritis in children (16); that the bacteria causing acute pyelonephritis were more resistant to the bactericidal activity of normal serum than those causing asymptomatic bacteriuria (10,16,17); and that E. Coli causing acute pyelonephritis attached more efficiently to the epithelial cells from the urinary tract in contrast to those causing asymptomatic bacteriuria the majority of which attached poorly or not at all (10); This has been found to be due to ligands (adhesins) on the surface of bacteria interacting specifically with epithelial receptors.

As far as antibiotic sensitivity is concerned sensitivity to Tetracycline was highest with only 2 out of 37 specimens being resistant in Vitro; it had a sensitivity prevalence of 94.6% followed by Nalidixic acid and Nitrofurantoin both of which had a sensitivity prevalence of 73%. Ampicillin and cotrimoxazole only had a sensitivity prevalence of 45.9% and 37.8% respectively.

The higher sensitivity to tetracycline was felt by the author to be possibly related to its limited use in general paediatric practice.

CONCLUSIONS:

- (1) The study shows that the prevalence of SBU is 5.8% among school girls in Nairobi which is much higher than has been found in other countries.
- (2) That dipstix examination is a reliable, easy and quick method of mass screening of urine.
- (3) That the presence of Nitrites is a good indicator of coexistent bacterial invasion of the urinary tract in significant numbers - 73.7% of all the girls with nitrites in their urine had SBU with a positive predictive value of 73.7%.
- (4) Nalidixic Acid and Nitrofurantoin are excellent first line antibiotic for the under 9 girls. Tetracycline although giving high sensitivity patterns should be preserved for older girls.

RECOMMENDATIONS

- (1) School health programmes should include an inexpensive dipstix examination of the urine of school girls.
- (2) Girls found to have nitrites in the urine should have further medical attention as this group is likely to have SBU. Those who are symptomatic as well should not only be treated but followed up as well.
- (3) A child having leucocyteuria and/or hematuria may need further investigation and medical attention.
- (4) Nalidixic acid or Nitrofurantoin are the recommended first line antibiotic especially for the younger girls in our setting.

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QUESTIONNAIRE : (OCTOBER , 1989 - FEBRUARY, 1990)UTI IN URBAN SCHOOL GIRLS.

Serial No. ....

Name : .....

Age : .....

Class: .....

School: .....

SYMPTOMS (TICK) [YES] or [NO]

Passing blood stained urine ..... [ ] [ ]

Pain while passing urine ..... [ ] [ ]

Abdominal pain ..... [ ] [ ]

PHYSICAL EXAMINATION:Fever  $>/38^{\circ}\text{C}$  ..... [ ] [ ]

Puffiness of the face ..... [ ] [ ]

Ankle edema ..... [ ] [ ]

PA : Tenderness ..... [ ] [ ]

Palpable Kidneys ..... [ ] [ ]

URINE : Analysis (Multistix (10))

Red Blood Cells ..... [ ] [ ]

Leucocytes ..... [ ] [ ]

Albumin ..... [ ] [ ]

Nitrites ..... [ ] [ ]

URINE : Microscopy

Casts ..... [ ] [ ]

RBCs ..... [ ] [ ]

WBCs ..... [ ] [ ]

Crystals ..... [ ] [ ]



CULTURE:

Significant ( $10^5$ /ml) .....	[ ]	[ ]
Bacteria Present .....	[ ]	[ ]
No growth .....	[ ]	[ ]

ANTIBIOTIC SENSITIVITY (LIST)

(1) COTRIMOXAZOLE .....	[ ]	[ ]
(2) NALIDIXIC ACID.....	[ ]	[ ]
(3) NITROFURANTOIN .....	[ ]	[ ]
(4) TETRACYCLINE .....	[ ]	[ ]
(5) AMPICILLIN .....	[ ]	[ ]

TERMINOLOGY AND ABBREVIATIONS:

- (1) SBU: Significant Bacteriuria: A count of 100,000 organisms per ml of urine cultured. Most methods in ordinary use are semi-quantitative e.g. dip slide; and calibrated loop (used here). The concept of significant bacteriuria was introduced to differentiate contaminants from infective pathogens.
  
- (2) UTI: Urinary Tract Infection : In this study this has been taken to mean SBU in the presence of signs and symptoms.
  
- (3) Asymptomatic Bacteriuria:
  - Significant bacteriuria in the absence of any signs and symptoms.
  
- (4) Acute Pyelonephritis:
  - Bacteriuria with or without signs of lower urinary tract affection but with chills, fever, flank pain and/or tenderness.

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