PROTEINURIA IN CHILDREN ADMITTED TO THE PAEDIATRIC DEPARTMENT OF THE UNIVERSITY TEACHING HOSPITAL

BY

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DEDICATION

To my creator (father and mother) – I am very grateful for this life and for making me realize that you are in me and I am in you. Therefore, I am here to praise and glorify you through the works mandated to me in my daily living.

To my teachers and mentors, the great grandmasters of medicine past and present. All my respect and reverence goes to you all. I am greatly indebted to you for the double-edged sword bestowed on me. They say that iron sharpens iron.

To my wife (Sydella Mwamba Mwela) and children (Chibwe, Chewe and Mwewa) – thank you for your inspiration to soldier on and the joy and laughter you bring in my times of despair.

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Dr. Thomas Mwewa Kapakala

DECLARATION

I hereby declare that this dissertation represents my own work and has not been presented even in part to any forum or University other than the University of Zambia.

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APPROVAL

This dissertation of Thomas Mwewa Kapakala is approved as partial fulfillment of the requirement for the award of the Masters of Medicine in Paediatrics and Child Health by the University of Zambia.

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All the night duty nursing staff that assisted in the collection of the early morning urine samples.

ACRONYMS

a. ASOT	=	*anti-streptolysin O titers*
b. HBsAg	=	*hepatitis surface antigen*
c. VDRL	=	*Venereal Disease Research Lab. test*
d. HIV	=	*human immunodeficiency virus*
e. HBV	=	*Hepatitis B virus*
f. UTH	=	*University Teaching Hospital*
g. UTI	=	*Urinary tract infection*
h. MP	=	*Malaria parasite*
i. VCT	=	*Voluntary Counseling and Testing*
UPr/Cr	=	*urine (U) protein (Pr) -to-creatinine (C) ratio*

ABSTRACT

Background: Proteinuria is a non-specific and common laboratory finding in children that occur in a variety of kidney diseases. The causative factors of proteinuria are varied and may include infections such as Hepatitis B (HBV), HIV or malaria. In this study, we attempt to ascertain the prevalence of proteinuria in children admitted to UTH. **Aim:** To identify clinical conditions or diseases that may be associated with proteinuria in Zambian children admitted to UTH. **Methodology:** The study was cross-sectional involving a total of 123 children aged 0 – 14 years. Informed consent was obtained from the children's parent or guardian before participation. The following activities were conducted; filling in of the questionnaire; clinical physical examination; collection of blood and urine samples; blood laboratory testing for ASOT, VDRL, HbsAg, HIV, malaria, ESR and FBC; urinalysis; counseling for HIV test; data analysis using Epi-Info version and Microsoft Excel softwares. **Results:** 98% of the study subjects resided in Lusaka. 88 (71.5%) of the children were under the age of five years. Of the 123 subjects tested for proteinuria, 82 (66.7 %) were males and 41 (33.3 %) were females giving an approximate male to female ratio of 2:1. Proteinuria was high in subjects from a high density residential area (71.5 %) of which significant proteinuria was 26.8 % (33). There were many variables (conditions) that were significantly associated with proteinuria as indicated by p values. This strongly supports the study hypothesis that proteinuria is a common clinical presentation in children admitted to UTH. Almost half of the subjects were HIV positivie. In this study, 44 (35.8%) out of 123 children had significant proteinuria results and this reflected the prevalence of proteinuria in children admitted to UTH. This is quite high if compared to that of isolated assymptomatic proteinuria in children as seen in the western studies (0.6 - 6.3 %). Significant proteinuria was highest in the under-five age group (33 = 26.8%). **Conclusion:** The conclusion of this study is that proteinuria is a non-specific and common laboratory finding in children and can be a benign condition or a serious disease. **Recommendations:** The recommendations are that: urinalysis and other base line investigations should be done routinely on all children admitted to UTH. In addition, HIV testing should be done routinely and the stigmata associated with HIV infection should be fought against by educating the population. Finally, further studies on proteinuria, especially in relation to other disease entities should be done and advocated.

CHAPTER ONE - BACKGROUND

1.1.0 INTRODUCTION

Proteinuria is a non-specific and common laboratory finding in children that occurs in a variety of kidney diseases. A nephrology evaluation is necessary to rule out common local clinical conditions that are associated with nephropathies presenting with proteinuria. It can be identified as -either a transient or a persistent finding and can represent a benign condition or a serious disease. [1]

The aetiological or causative factors of proteinuria are varied and diverse. Some research studies have implicated infections such as hepatitis B virus (HBV), plasmodium malariae and human immuno-deficiency virus (HIV) to cause nephropathy that present with proteinuria. [2–4, 33, 35, 36] In this study, an attempt to find out the prevalence of proteinuria in children admitted to the Paediatric department of the University Teaching Hospital (UTH) was done. The common local clinical conditions that may present with proteinuria together with the demographic features of the participants were determined.

1.2.0 STATEMENT OF THE PROBLEM (STUDY RATIONALE)

The rationale of this study arose from the premise that no study addressing the problem of proteinuria in children at the UTH has been conducted. In addition, routine urinalysis by the dipstick method in admitted children at UTH is not usually done unless there is a specific indication.

In the past, most nephrologists considered the amount of protein found in the urine simply as a marker of the severity of renal lesions. Today the results of many studies indicate that protein filtered through the glomerular capillary may have intrinsic renal toxicity, which together with other independent risk factors such as hypertension can play a contributory role in the progression of renal damage. [5,6]

There is an important need for further evaluation of patients found with mild or asymptomatic proteinuria to ascertain the cause and institute measures to prevent progressive renal damage. [7,8]

1.3.0 OBJECTIVES OF THE STUDY

1.3.1 Main objective:

To identify clinical conditions or diseases that may be associated with proteinuria in children admitted at the Paediatric Department of the UTH.

1.3.2 Specific objectives:

a. To determine the prevalence of proteinuria in children admitted at the department.

b. To describe the clinical and demographic features associated with children presenting with proteinuria at the department.

c. To determine associations of some common conditions or diseases (HIV, malaria, upper respiratory tract infection, pneumonias, tuberculosis, nephrotic syndrome, nephritic syndrome, urinary tract infection, syphilis and hepatitis),with proteinuria in children.

1.4.0 STATEMENT OF HYPOTHESIS

1.4.1 Introduction:

Proteinuria can either be physiological or pathological. [9] Among the various known pathological causes of proteinuria are infectious diseases like those due to HIV, urinary tract infection (UTI), HBV, streptococcus, tuberculosis and malaria all of which are also common in children seen at the Pediatric Department of the UTH. [2]

1.4.2 Hypothesis:

Proteinuria is a common clinical presentation in children admitted to Pediatric Department of the UTH and represents diverse etiological factors associated with it.

1.5.0 DEFINITION OF TERMS

Proteinuria: The term describes the presence of protein in urine.

Alternative names: Urine protein; Albumin - urine; Urine albumin; Proteinuria; Albuminuria

In this study, proteinuria will be determined by the semi-quantitative dipstick method. The results of proteinuria will be graded as follows:

- **Negative** ---------- (less than 10 mg per dL),
- **Trace** ---------- (10 to 20 mg per dL),
- **1+** ---------- (30 mg per dL),
- **2+** ---------- (100 mg per dL),
- **3+** ---------- (300 mg per dL) or
- **4+** ---------- (1,000 mg per dL).

The normal value for a spot check is approximately 0 to 8 mg/dL, or less than 30 mg/dL of albumin (the major circulating serum protein). The normal adult value for a 24-hour urine protein excretion is 150mg/24 hours.

Note: mg/dL = milligrams per deciliter, mg/24 hr = milligrams per 24 hours, mg/d = milligrams per day, g/m2/day = grams per meter squared per day.

CHAPTER TWO - LITERATURE REVIEW

2.1.0 BACKGROUND TO PROTEINURIA

Proteinuria is a non-specific manifestation of glomerular or tubular damage that occurs in a variety of kidney diseases. It is a common laboratory finding in children and is identified either as a transient or as a persistent finding. It can represent a benign condition or a serious disease. Therefore its degree and persistence should be ascertained and associated renal abnormalities like haematuria should be looked for. [1]

A search on the Internet has shown that in Africa and the world over, most of the studies done relating to Proteinuria usually include or involve the clinico-histopathological studies. Most research studies done on Proteinuria in Africa are school-based and they relate to diseases like schistosomiasis (Egypt, Senegal and Kenya), Malaria (Nigeria, Uganda and Kenya) and Hepatitis (South Africa), just to mention a few. [2,3] As there is not much information on the subject of proteinuria in African children, there is need for more detailed research studies. In Zambia, there has not been any research study conducted on proteinuria in children.

2.1.1 Epidemiology of Proteinuria

Most healthy children excrete small amounts of protein in their urine, representing so-called physiological proteinuria. [10] When corrected for body surface area, the protein excretion is highest in newborn infants, decreasing with age until late adolescence, when adult levels are reached. The relatively high protein excretion observed in newborns represents tubular proteinuria, reflecting the immaturity of their renal function. [11] As many as 30 to 50 percent of children with proteinuria may have transient, non-repetitive proteinuria. [12]

Asymptomatic or isolated proteinuria is defined as proteinuria not associated with any signs or symptoms of renal disease. [10] The prevalence of isolated asymptomatic proteinuria in children has been estimated to be between 0.6 and

6.3 percent. [13 - 16] Orthostatic (postural) proteinuria accounts for up to 60 percent of all cases of asymptomatic proteinuria reported in children, with an even higher incidence in adolescents. [17] Most children who test positive for proteinuria on initial evaluation "lose" the proteinuria at follow-up. Only about 10 percent of children have persistent proteinuria after 6 to 12 months. [18]

2.1.2 Aetiological classification of Proteinuria in children and adolescent.

Proteinuria can be classified as listed below: [19,20]

(a) Transient Proteinuria

- Fever
- Strenuous exercise
- Extreme cold exposure
- Epinephrine administration
- Emotional stress
- Congestive heart failure
- Abdominal surgery
- Seizures

(b) Isolated asymptomatic Proteinuria

- Orthostatic proteinuria
- Persistent fixed proteinuria

(c) Proteinuria secondary to renal diseases

- Minimal change nephrotic syndrome
- Acute post infectious glomerulonephritis
- Focal segmental glomerulonephritis
- Membranous glomerulonephropathy
- Membranoproliferative glomerulonephritis
- Lupus glomerulonephritis
- Henoch-Schönlein purpura nephritis
- HIV-associated nephropathy
- Chronic interstitial nephritis

(d) Congenital and acquired urinary tract abnormalities

- Hydronephrosis
- Polycystic kidney disease
- Reflux nephropathy
- Renal dysplasia

2.1.3 Mechanisms of Proteinuria

The glomerular capillary wall and its adjacent structures constitute the main barriers to the passage of macromolecules, including globulins and albumin. The barriers consist of the endothelial cells lining the capillary loops, the glomerular basement membrane and the visceral epithelial cells. The passage of macromolecules across the glomerular capillary wall is inversely proportional to their size. [21]

In addition to the size barrier, the glomerular capillary wall also contains negative charges due to the presence of heparan sulphate proteoglycans. [22] The negative charges repel negatively charged macromolecules, such as albumin (molecular weight: 69,000 Daltons). [18,22] Most inflammatory glomerular diseases result in alterations of the size barrier and loss of anionic charges, leading to proteinuria.

Low-molecular-weight proteins (molecular weight: less than 40,000 Daltons) are freely filtered through the glomerulus and subsequently absorbed and catabolized by the proximal tubule. [23] They include ß2 microglobulin, retinol binding protein, alpha1 microglobulin and hormones such as vasopressin, insulin and parathyroid hormone. [12,23] Injury to the proximal tubular epithelium leads to inability of the tubule to reabsorb low-molecular-weight proteins and thus to their loss in urine. [23]

Haemodynamic alterations in glomerular blood flow can also result in proteinuria. A reduced number of functioning nephrons, as occurs in chronic renal failure, lead to increased filtration of proteins in the remaining nephrons and to

proteinuria. Other conditions that cause proteinuria by altering glomerular haemodynamics include exercise, fever, seizures, epinephrine use and emotional stress. [24]

Overflow proteinuria occurs when the plasma concentration of certain small proteins exceeds the capacity of the tubules to reabsorb the filtered protein. Examples include the presence of immunoglobulin light chains in the urine in multiple myeloma, myoglobulinuria in rhabdomyolysis, hemoglobinuria in intravascular haemolysis and amylasuria in acute pancreatitis. [25]

2.1.4 Measurement of Proteinuria

(a) Qualitative Methods.

A rapid but qualitative assessment of proteinuria can be made using the dipstick (e.g. Albustix, Multistix) or the sulphosalicylic acid methods. Using the dipstick method, false-positive results can be obtained when the urine is alkaline (pH greater than 7) or when it contains heavy mucus, blood, pus, semen or vaginal secretions. The strips react preferentially with albumin and are relatively insensitive to other proteins such as gamma globulins. The amount of protein in the urine is assessed as absent (less than 10 mg per dL), trace (10 to 20 mg per dL), 1+ (30 mg per dL), 2+ (100 mg per dL), 3+ (300 mg per dL) or 4+ (1,000 mg per dL). [10,20]

The results of a positive dipstick test can be verified using sulphosalicylic acid turbidometry. This test is more accurate than the dipstick method because all classes of proteins are detected. False-positive results can occur in the presence of radiographic contrast material and in samples from children receiving high dosages of penicillin, cephalosporins or sulphonamides. Because both dipstick and sulphosalicylic acid tests are sensitive to the concentration of protein in the urine, they can underestimate proteinuria or give false-negative results in the presence of a dilute urine (i.e., specific gravity less than 1.010). Urine with a specific gravity greater than 1.015 is necessary for reliable results. [19]

(b) Quantitative Methods

Several colorimetric laboratory methods are available to quantify protein concentration in urine. [26] The benzethonium chloride, the Ponceau-S and the Coomassie Brilliant Blue dye-binding methods are the most commonly used. Urinary protein electrophoresis and direct measurements of low-molecular-weight proteins such as ß2 microglobulin may be performed in special circumstances but are not part of the routine evaluation of a child with proteinuria. Similarly, the determination of microalbuminuria in diabetic children requires the use of more sensitive methods such as radio-immunoassay or enzyme-linked immuno-sorbent assay. [19]

More precise quantitation is obtained by measuring protein excretion in 24-hour urine samples or by calculating the protein/creatinine ratio in random urine samples. [27] In adults, a protein excretion of less than
150 mg/24 hr is considered normal. In children, however, physiologic proteinuria varies with age and the size of the child. After the first year of life, daily protein excretion in children, expressed in milligrams per meter squared per 24 hours, is relatively constant. [11] In practice, however, the collection of 24-hour urine samples is fraught with error, and the collection often has to be repeated. Furthermore, timed urine collections are impractical in young children and impossible in infants without subjecting them to bladder catheterization. [19]

Determining the amount of excreted creatinine in the same 24-hour urine sample may be helpful in evaluating the accuracy of the collection. Steady-state daily creatinine excretion is 20 mg per kg in children from one to 12 years of age and 22 to 25 mg per kg in older children, with the lower value corresponding with creatinine excretion in girls. [19]

In a study of adults, a strong correlation was found between the urine protein-to-creatinine ratio (UPr/Cr), obtained in random urine samples, and the 24-hour urinary protein excretion, corrected for body-surface

area. [28] Other studies have confirmed this observation. [29] The usefulness of urinary protein-to-creatinine ratios has been documented in normal children and in children with renal disease. [20,27]

In adults and children over two years of age, a UPr/Cr of less than 0.2 on a random urine specimen obtained during the day is considered normal. In children aged six months to two years, the upper limit of normal should be extended to 0.5. A UPr/Cr above 3.0 is consistent with nephrotic-range proteinuria. [19]

Because serum and urine creatinine levels depend on muscle mass, the ratio is not valid in children with severe malnutrition. Moreover, in the presence of significant reductions in the glomerular filtration rate, tubular secretion of creatinine increases, and this may result in artificially low UPr/Cr values. [20] Nevertheless, the UPr/Cr ratio is more reliable than
24-hour urinary protein measurements. In one study, a collection error was found in 57 percent of 24-hour urine samples, as assessed by high or low urinary creatinine content. [29] The actual 24-hour protein excretion can be calculated from the UPr/Cr ratio at all levels of proteinuria, using a simple formula derived by log-log regression analysis: [20]

Urine protein (grams per meter squared per day)=0.63 × (UPr/Cr)

This ratio circumvents the need for urine collection, allowing the results to be obtained more expeditiously. Furthermore, serial UPr/Cr ratios can be obtained over time to monitor the progression of proteinuria. [19]

CHAPTER THREE - RESEARCH METHODOLOGY

3.1.0 RESEARCH SITE

The study site was at Paediatric Department of the University Teaching Hospital (UTH), situated in Lusaka, the capital city of Zambia. UTH acts as a national referral hospital and receives patients and specimens from eight of the nine provinces of the country. In addition to this, UTH also receives referral cases from the primary health facilities of the urban and rural areas of Lusaka.

3.2.0 RESEARCH DESIGN

The design of this research study was a hospital-based cross-sectional study or survey of proteinuria in children admitted to the Paediatric Department at the UTH from 7th March to 10th April 2004, a period of thirty days.

3.3.0 STUDY POPULATION

The estimation of the size of the study population was based on the admission of children to the Paediatric Department at the UTH during the year 2002. In the year 2002, a total number of 21,216 paediatric patients were admitted [UTH annual statistics report]. It should be mentioned that there is a seasonal variation of the number of patient admitted to UTH and month chosen for the study generally is a low peak season. Nonetheless, this gave an average of 1,768 patients per month. The prevalence of isolated asymptomatic proteinuria in children from developed countries is at a range of 0.3 to 6.3 percent. It is possible that there are higher rates in developing countries.

3.3.1 Sample size

The sample size was calculated to be 107 using Statcalc (population survey) of the Epi-Info version 6 software. This was at a confidence level of 95.00 percent, a population size of 1,768 patients, expected frequency of 5.00 percent and the worst or least acceptable frequency of 1.00 percent. From the population size of

1,768, it is expected that there would be an average of 63 patients admitted to the Paediatric Department per day. From the expected daily admission, a number of at least four patients will be recruited per day over a period of four weeks.

3.3.2 Sampling method

Based on the expected daily recruitments of four patients per day, the simple random sampling method was used. For example, if a total number of about sixty patients were admitted per day, then simple random sampling method was used to pick four patients during that day. In the eventuality of any refusal to consent to the study, early discharge or death of the patient picked by simple random selection or sampling for recruitment, the simple random sampling method was repeated to ensure that the four patients or study subjects were obtained each day.

3.3.3 Inclusion criteria

This included: -

- Admission to the paediatric Department – UTH
- Consenting to the study
- Age 0 -14 years.

3.3.4 Exclusion criteria

The following was the criteria for exclusion from the study: -

- Age above 14 years
- Refusal to participate in the study at any time

3.4.0 RESEARCH PERSONNEL AND MATERIALS

3.4.1 Personnel

- Supervisor x2
- Principal investigator x1
- Project assistants x2
- Laboratory technician x1
- Data analyst x1

3.4.2 Materials

- Multistix dipsticks
- Universal containers (Urine collection)
- Urine collection bags
- Blood slide (MP)
- Lancets
- Blood specimen bottle
- **Test kits for HIV, ASOT and HBsAg**
- Needles
- Syringes
- Stationery (Printing paper, ink/toner for printer)

(See the budget breakdown on page 24)

3.5.0 RESEARCH PROCEDURES

Due to financial constraints, the principle investigator conducted the following procedures: -

- Filling in of the questionnaire
- Collection of blood and urine samples (occasionally helped by the night duty staff nurses)
- Conduction of the blood and urine laboratory tests
- Counseling for HIV test
- Data entry in consultation with
- Data analysis in consultation with the Data Analysts or biostaticians

3.5.1 Data collection:

a. Filling of Questionnaire:

This was conducted on all patients recruited in the study. A trial run of this instrument was conducted on ten patients or subjects to determine its feasibility.

b. Urine collection and testing for protein:

The early morning urine samples were collected and tested for protein using the dipstick method (Multistix) in order to avoid the effect of activity and posture. Urine bags were used for younger children who could not communicate to their parents when they needed to pass urine. Urine containers were used for older children with the ability to communicate. Urinary microscopy was done in those patients who were found with significant positive proteinuria. Urine collection was done after the necessary cleaning of the genitalia. Urine results that showed absent or trace proteinuria were considered as insignificant (negative) while those that showed +1 to +4 were considered as significant (positive).

c. Blood collection for HBsAg, HIV, ASOT testing:

Before blood collection by veno-puncture, an informed consent was obtained from the parent or guardian to the patient. The meaning of Proteinuria and its association with malaria, hepatitis, HIV and other clinical conditions were explained to the parent or guardian of the patient using simple lay terms. Voluntary Counseling and Testing (VCT) was offered to those who wanted to know the HIV status because the information obtained by questionnaire method was to be non-linked. An amount of five milliliter of blood specimen was collected by veno-puncture in a plain specimen bottle. Other blood specimens were also collected for the purpose of routine tests not really related to the study of proteinuria.

The tests were conducted within 24 hours of collecting the sample by the principal investigator.

d. Preparation of blood slide for malaria parasite (MP) examination (Thin and thick films)

This was done on all patients recruited to the study. After puncturing the patient's thumb with a lancet, a drop or two of blood were placed on a clean slide and was then spread evenly . For each patient, two slides were made (that is the thin and thick films) The slides was then dried and sent to the laboratory for staining and examination under the microscope.

.5.2 Data analysis

This was done using Epi-Info version software. A data analyst was engaged both as a consultant and tutor. Tables were created using Microsoft Excel software.

.5.3 Time frame

The study was conducted over a period of thirty days from the 7th of March to the 10th of April.

.6.0 ETHICAL CONSIDERATION AND APPROVAL

The Research Ethics Committee School of Medicine, Graduate Studies Committee and Directorate of Graduate Studies of the University of Zambia approved this study. The parents or guardians of the child or subject had to take an informed consent prior recruitment into the study.

.7.0 STUDY CONSTRAINTS

The main constraints to this study were the finances. Due to limited funds, the study was time framed to a period of one month, a sample size of 107 and few clinical conditions associated with proteinuria were included. Otherwise it would

have been a better representation if the sample size and the study period were large and long respectively, as there are seasonal variations in the presentation or manifestation of some conditions. The other constraint was the lack of a fully equipped laboratory (microbiology, haematology, biochemistry).

CHAPTER FOUR – RESULTS

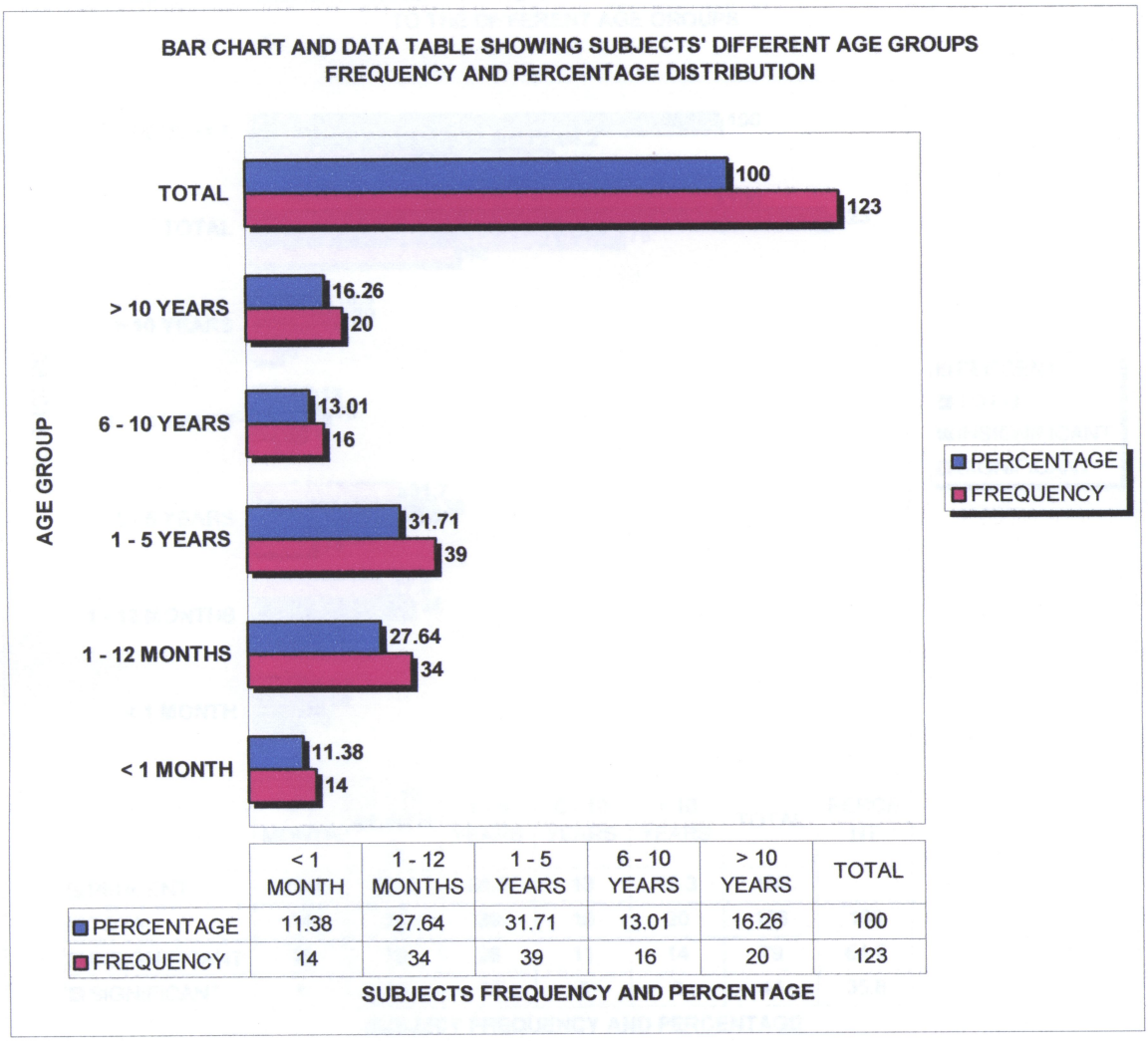
1.0 DEMOGRAPHICAL RESULTS

One hundred and thirty eight (138) Zambian Paediatric patients were initially sampled or picked for the study. Of these ten, (10) refused to give consent to be included in the study and five (5) of them later withdrew from the study. This left a total number of only 123 study subjects who met the inclusion criteria. The patients got recruited using a simple random sampling method. The following were the main reasons for exclusion from the study: -

- Lack of power to make a decision by the mother (Had to consult or wait for the husband to come and make a decision) - 1
- Fearfulness or anxiety state associated with the voluntary counseling and testing for HIV - 10
- Poor understanding of issues related to the study by the father when consulted by the mother to the patient - 2
- Not to be used like a guinea pig for scientific experiments - 1
- Leaving hospital against medical advice or simply running away from hospital - 1

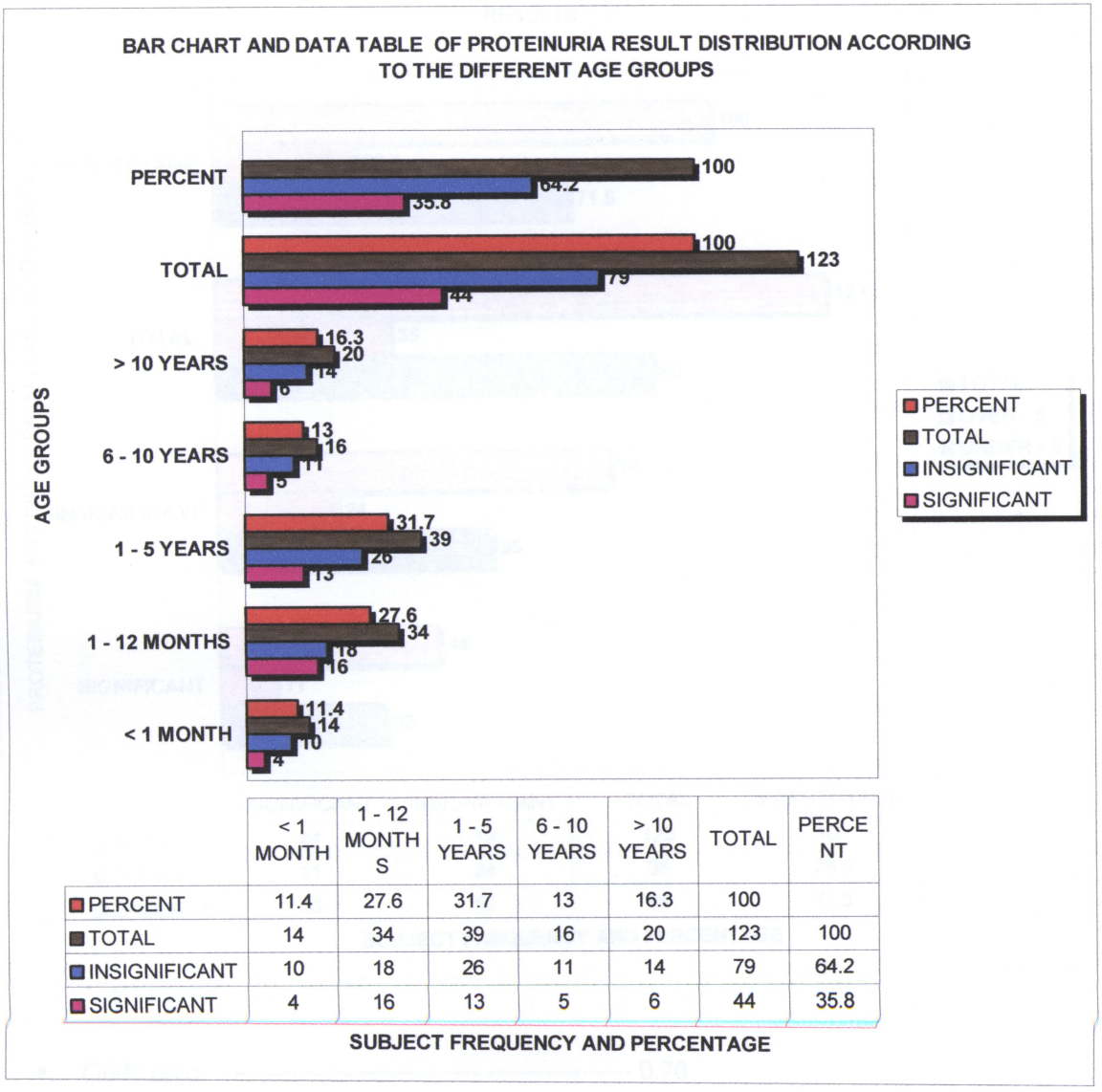
4.1.1 AGE GROUP DISTRIBUTION OF THE PATIENTS

FIGURE – 1



A total of one hundred and twenty three (123) children admitted to the Paediatrics Department were recruited and tested for proteinuria by the dipstick method. Figure 1 above shows the frequencies and percentages according to the different age groups. The age groups 1 – 12 months and 1 – 5 years had higher percentages (27.64 % and 31.71 % respectively) compared to the rest of the age groups.

FIGURE – 2

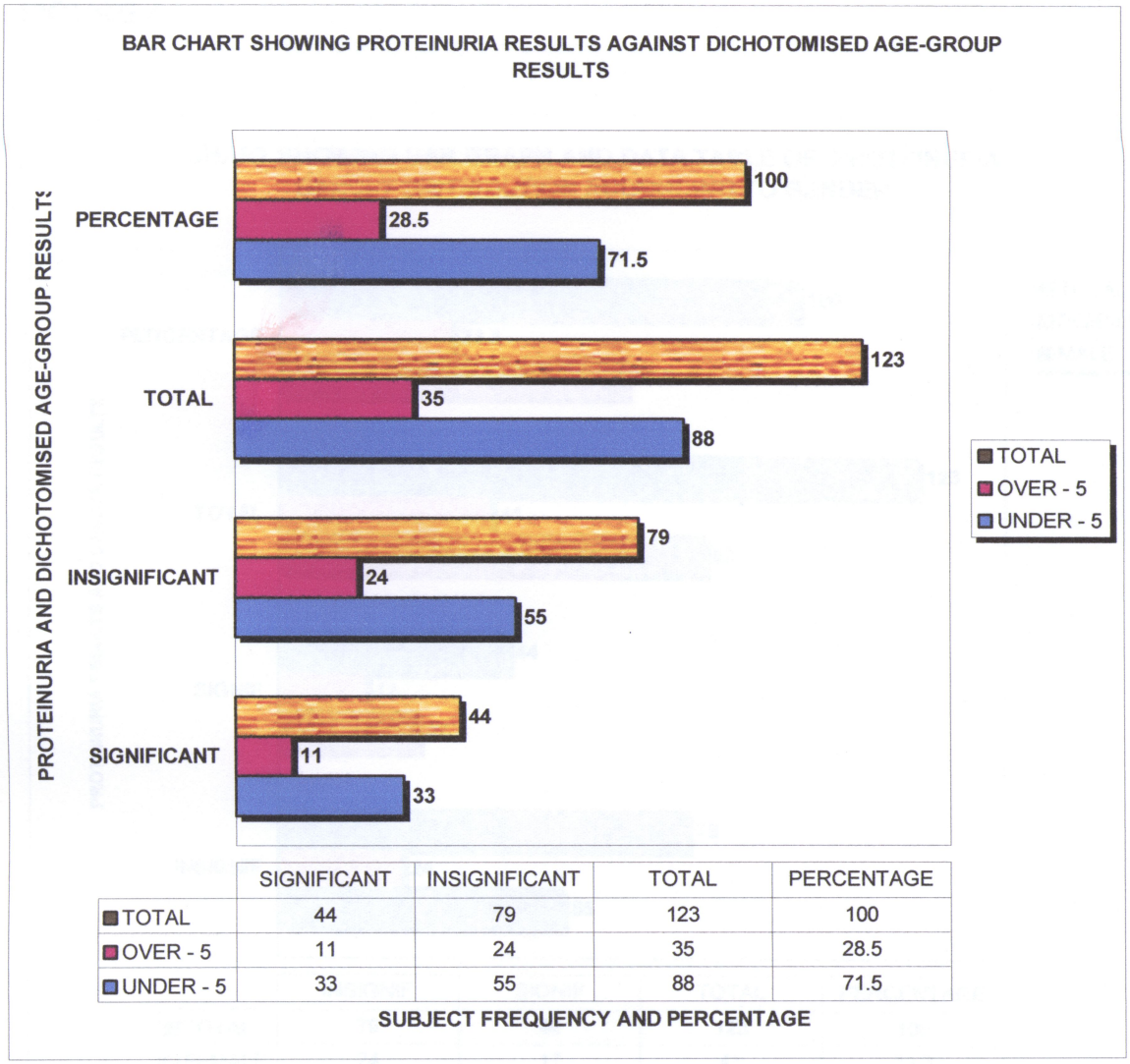


	< 1 MONTH	1 - 12 MONTHS	1 - 5 YEARS	6 - 10 YEARS	> 10 YEARS	TOTAL	PERCENT
PERCENT	11.4	27.6	31.7	13	16.3	100	
TOTAL	14	34	39	16	20	123	100
INSIGNIFICANT	10	18	26	11	14	79	64.2
SIGNIFICANT	4	16	13	5	6	44	35.8

- Chi square = 2.73
- Degree of freedom = 4
- P value = 0.60319637

Figure 2 above is bar chart showing proteinuria results according to the study subjects' different age groups. Out of 123 subjects tested for proteinuria, 44 had significant proteinuria and this gives a proteinuria prevalence of 0.36 (36 %). There was a tendency of increased proteinuria in the age groups 1 – 12 months (27.6 %) and 1 – 5 years (31.7).

FIGURE – 3



	SIGNIFICANT	INSIGNIFICANT	TOTAL	PERCENTAGE
TOTAL	44	79	123	100
OVER - 5	11	24	35	28.5
UNDER - 5	33	55	88	71.5

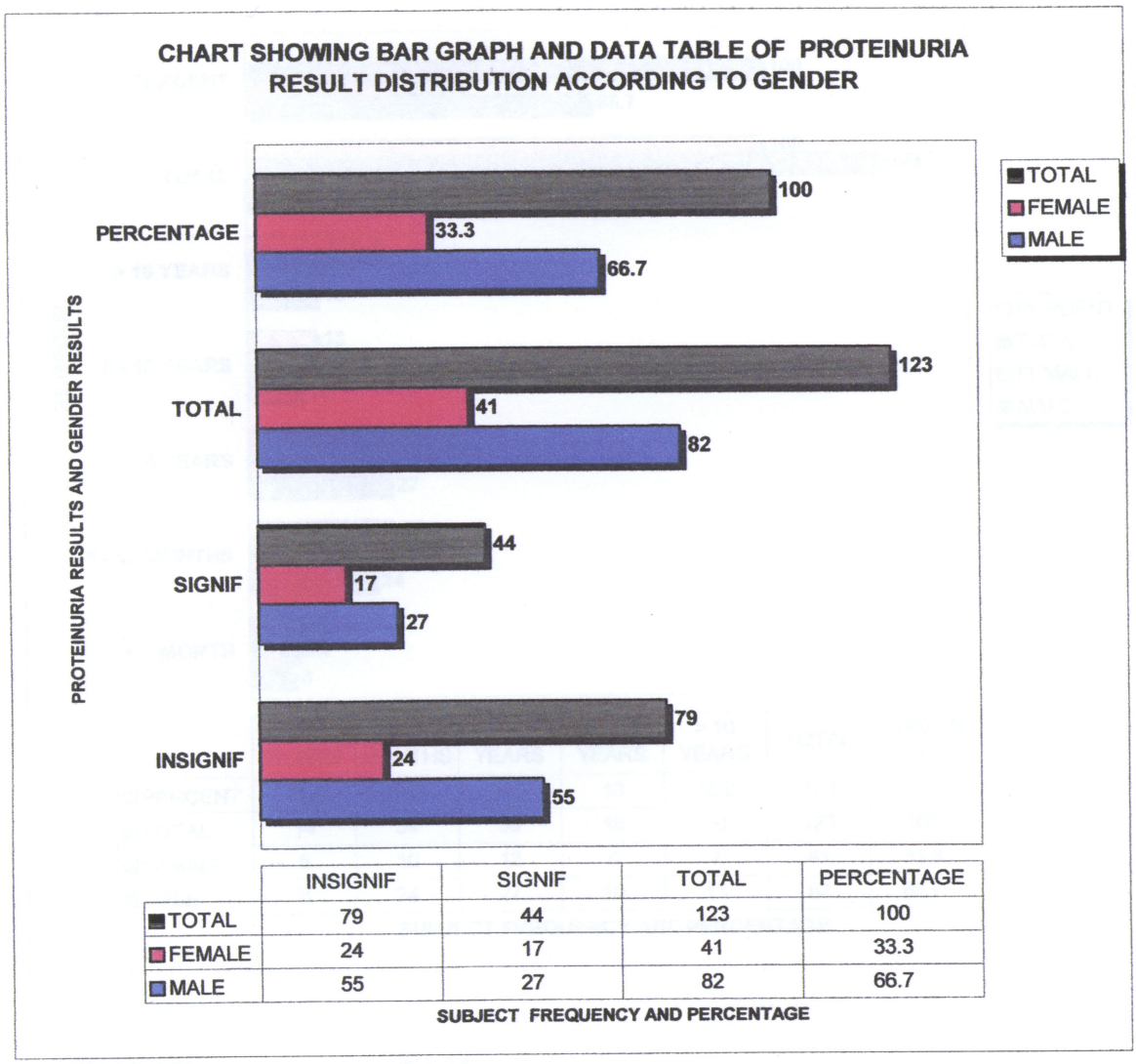
- Odds ratio ---------- 0.76
- Relatiive Risk (RR) ---------- 0.84

	Chi-Squares	P-values
Uncorrected:	0.40	0.52618593

Figure 3 above is a bar chart showing proteinuria result against the two age groups (under – 5 and over – 5 years). Out of the 88 under-five age group and the 35 over-five age group, 33 (37.5 %) and 11 (31.4 %) had significant proteinuria respectively. The under-five age group showed a greater tendency to proteinuria though p value is not significant.

4.1.2 GENDER (SEX) DISTRIBUTION OF THE PATIENTS

FIGURE 4



	INSIGNIF	SIGNIF	TOTAL	PERCENTAGE
TOTAL	79	44	123	100
FEMALE	24	17	41	33.3
MALE	55	27	82	66.7

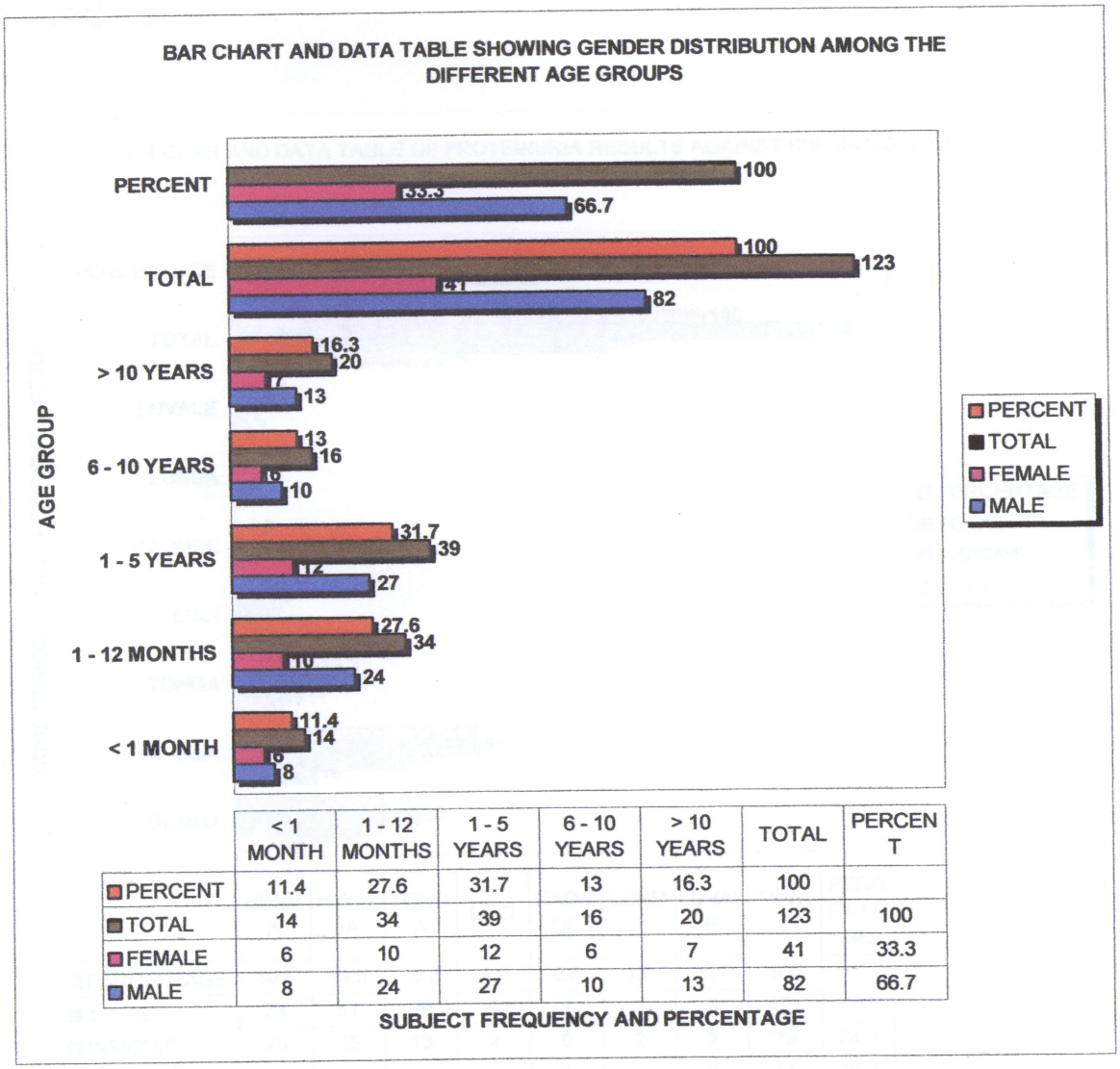
Odds ratio ---------- 0.76

Relative Risk (RR) ---------- 0.84

	Chi-Squares	P-values
Uncorrected:	0.40	0.52618593

Figure 4 above is a bar chart showing proteinuria result distribution according to gender. Out of the 82 males and 41 females tested for proteinuria, 27 (32.9 %) and 17 (41.5 %) had significant proteinuria respectively. The prevalence of significant proteinuria tended to be more in the female subjects (41.5 %) though the p value was insignificant.

FIGURE – 5



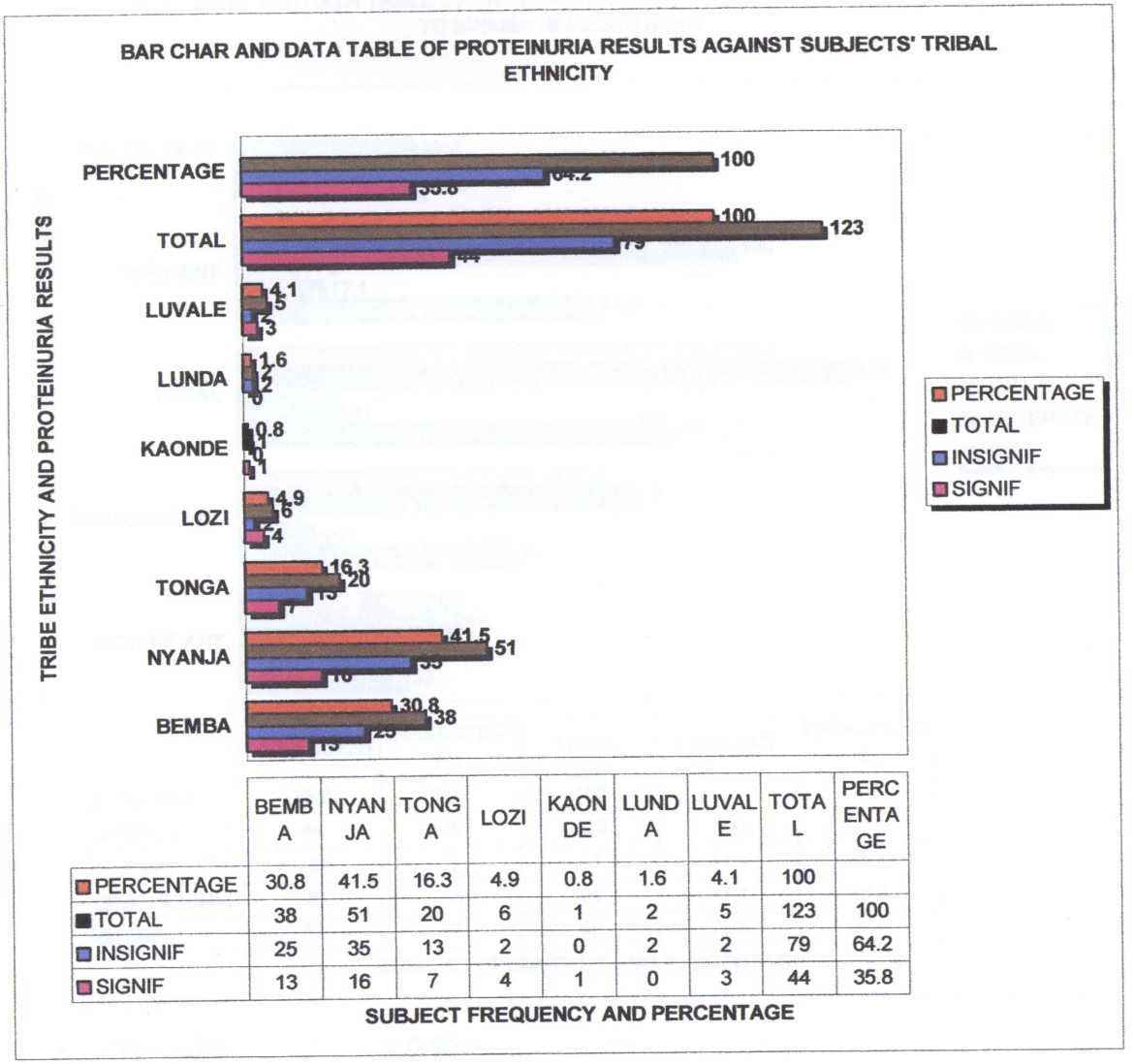
	< 1 MONTH	1 - 12 MONTHS	1 - 5 YEARS	6 - 10 YEARS	> 10 YEARS	TOTAL	PERCENT
PERCENT	11.4	27.6	31.7	13	16.3	100	
TOTAL	14	34	39	16	20	123	100
FEMALE	6	10	12	6	7	41	33.3
MALE	8	24	27	10	13	82	66.7

- Chi square = 1.14
- Degree of freedom = 4
- P value = 0.88729052

Figure 5 above is a bar chart showing gender distribution among the different age groups. . Relatively more males are more affected than females as seen by the male to female ratio of 2:1. There was a tendency of increased subject frequency or numbers in the age groups 1 – 12 months (27.6 %) and 1 – 5 years (31.7 %).

4.1.3 TRIBAL DISTRIBUTION OF THE STUDY PATIENTS

FIGURE – 6



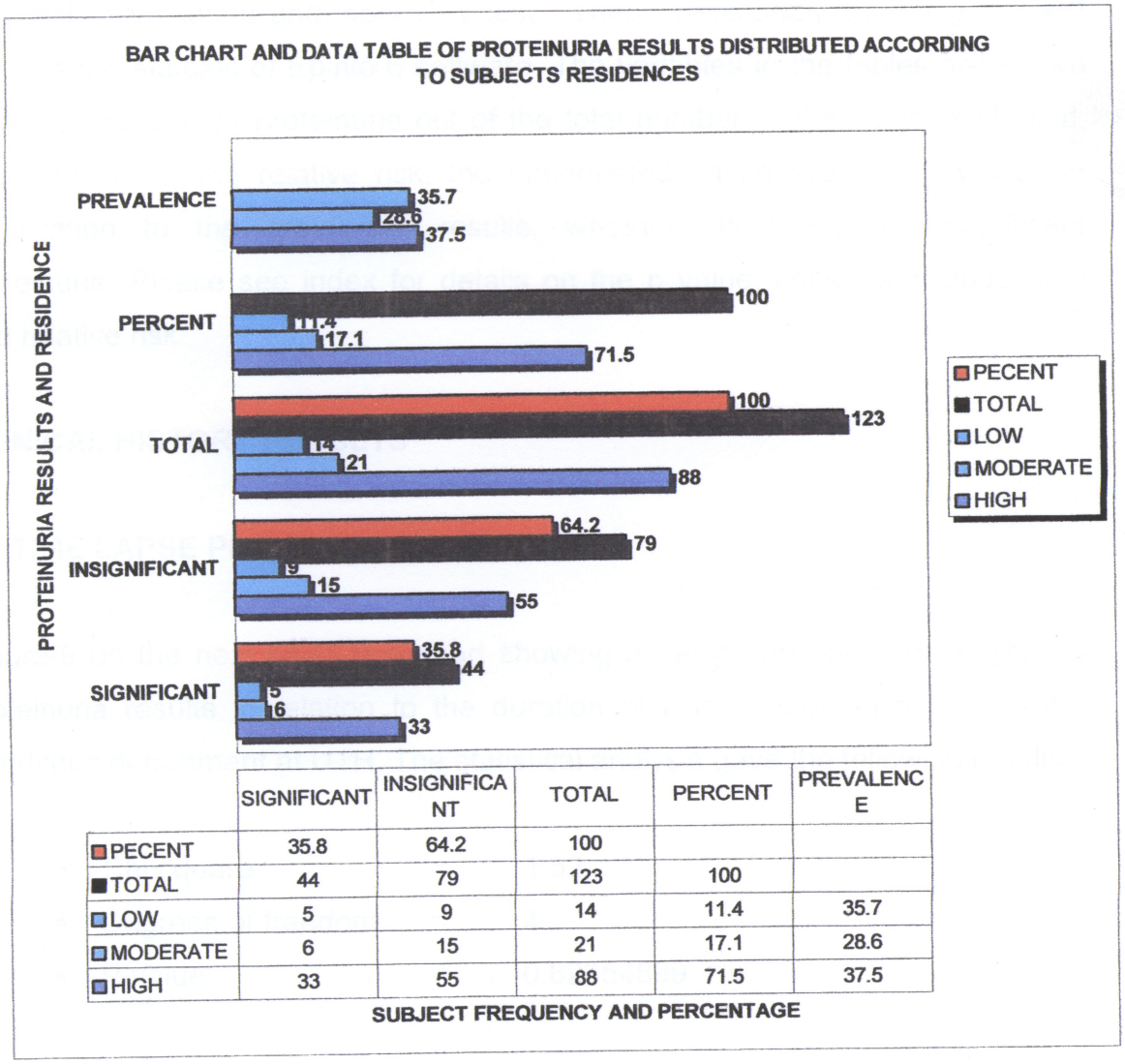
	BEMBA	NYANJA	TONGA	LOZI	KAONDE	LUNDA	LUVALE	TOTAL	PERCENTAGE
PERCENTAGE	30.8	41.5	16.3	4.9	0.8	1.6	4.1	100	
TOTAL	38	51	20	6	1	2	5	123	100
INSIGNIF	25	35	13	2	0	2	2	79	64.2
SIGNIF	13	16	7	4	1	0	3	44	35.8

- Chi square = 7.48
- Degree of freedom = 6
- P value = 0.27831684

Figure 6 above is showing bar chart and data table of proteinuria result distribution according to the subjects' ethnic tribe or language. This reflects the relative ethnic groupings in Lusaka, with the Nyanja, Bemba and Tonga being the largest groupings

4.1.4 RESIDENTIAL DISTRIBUTION

FIGURE – 7



	SIGNIFICANT	INSIGNIFICANT	TOTAL	PERCENT	PREVALENCE
PECENT	35.8	64.2	100		
TOTAL	44	79	123	100	
LOW	5	9	14	11.4	35.7
MODERATE	6	15	21	17.1	28.6
HIGH	33	55	88	71.5	37.5

- Chi square = 0.50
- Degrees of freedom = 2
- P value = 0.77835491

Figure-7 above shows bar chart and data table of dichotomized proteinuria results distribution according to the subject's residential area (i.e. High, Moderate and Low density residential areas). Children from high-density area had a higher prevalence of proteinuria (37.5 %) as compared to moderate (28.5 %) or low (35.7 %) density area though not statistically significant on as evident by the p value of 0.7783. In this, 88 (71.5 %) of patients were from the high-density residential area, 21 (17.1 %) were from the medium density area and 14 (11.4 %) were from the low-density residential area.

4.2.0 CLINICAL RESULTS

The following tables and charts, show variables obtained in the clinical history, physical examination and laboratory test. These were analyzed using a 2 x 2 table of the statcalc of Epinfo-6 software. The variables in the tables are shown with the percentage proteinuria out of the total number of the subjects studied; the Odds ratio; the relative risk; the uncorrected chi-square and p values in association to the proteinuria results, whether significant or insignificant proteinuria. Please see index for details on the p value, chi-square, odds ratio and relative risk.

4.2.1 CLINICAL HISTORY RESULTS

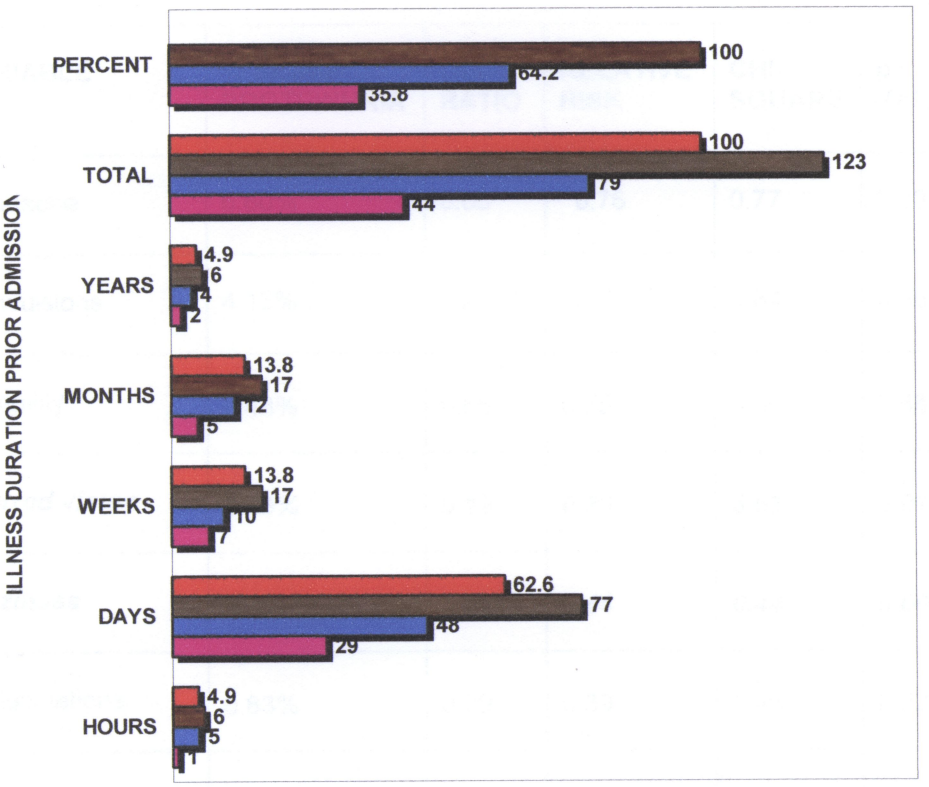
A. TIME LAPSE PRIOR TO ADMISSION

Figure-9 on the next page is a chart showing a bar graph and a data table of proteinuria results in relation to the duration of illness prior admission to the Paediatric department at UTH. The statistical analysis gave the following results:-

- Chi square = 1.52
- Degrees of freedom = 4
- P value = 0.82354899

FIGURE – 8

BAR CHART AND DATA TABLE SHOWING PROTEINURIA RESULTS IN RELATION TO ILLNESS DURATION BEFORE ADMISSION



	HOURS	DAYS	WEEKS	MONTHS	YEARS	TOTAL	PERCENT
PERCENT	4.9	62.6	13.8	13.8	4.9	100	
TOTAL	6	77	17	17	6	123	100
INSIGNIF	5	48	10	12	4	79	64.2
SIGNIF	1	29	7	5	2	44	35.8

NUMBER OF STUDY SUBJECTS

- Chi square = 1.52
- Degrees of freedom = 4
- P value = 0.82354899

Overall, most cases (62.6%) presented to hospital between day one to day six after the onset of the illness. This correlated with the proteinuria results whether significant or insignificant. Statistically there was no significant association between time lapse before admission and proteinuria.

B. SYSTEMIC REVIEW RESULTS

TABLE – 1 SYSTEMIC REVIEW VARIABLES – CENTRAL NERVOUS SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Headache	6.60%	0.66	0.76	0.77	0.380
Convulsions	4.13%	0.6	0.71	0.84	0.360
Irritability	2.48%	0.66	0.75	0.36	0.548
Blurred vision	***2.48%***	***0.19***	***0.39***	***6.58***	***0.010***
Dizziness	***4.13%***	***0.22***	***0.44***	***0.44***	***0.005***
Hallucinations	0.83%	0.29	0.39	1.46	0.226
Abnormal behavior	2.48%	0.32	0.43	3.29	0.07

Table-1 above shows variables (symptoms) asked for during the review of the central nervous system. The results show that only two variables (blurred vision and dizziness) had significant statistical association with proteinuria (p-values 0.01 and 0.005 respectively).

TABLE–2 SYSTEMIC REVIEW VARIABLES - RESPIRATORY SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Sore throat	***13.22%***	***0.4***	***0.68***	***5.02***	***0.025***
Ear discharge	3.31%	1.9	1.45	0.78	0.3765
Cough	26.45%	1.37	1.23	0.56	0.4562
Dyspnoea	***23.14%***	***0.28***	***0.56***	***10.98***	***0.0009***
Sneezing	12.40%	1.01	1.01	0	0.9763
Wheezing	***0.83%***	***0.11***	***0.17***	***6.23***	***0.0130***
Chest pain	12.40%	2.08	1.56	3	0.0831
Haemoptysis	0%	0	?	1.12	0.2897

Table-2 above shows variables (symptoms) asked for during the review of the respiratory system. The results show that three variables (sore throat, dyspnoea and wheezing) had significant statistical association with proteinuria (p-values0.0250, 0.0009 and 0.0130 respectively).

TABLE-3: SYSTEMIC REVIEW VARIABLES – CARDIOVASCULAR SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Heart palpitation	18.18%	1.16	1.1	0.15	0.6946
Orthopnoea	0.83%	0.21	0.3	2.53	0.1115
Parosxysmal nocturnal	0.83%	0.6	0.7	0.2	0.6543
Oedema	4.96%	0.81	0.87	0.15	0.6946
Dyspnoea	4.96%	0.86	0.91	0.14	0.7119

Table-3 above shows variables (symptoms) asked for during the review of the cardiovascular system. The results show that all the variables had no significant statistical association with proteinuria.

TABLE-4: SYSTEMIC REVIEW VARIABLES – GASTRO-INTESTINAL SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Anorexia	***28.10%***	***0.21***	***0.54***	***13.34***	***0.0003***
Vomiting	***19.83%***	***2.68***	***0.54***	***6.5***	***0.0108***
Emetemesis	0%	0	?	1.74	0.1870
Diarrhoea	***18.18%***	***4.06***	***2.29***	***12.09***	***0.0005***
Frank blood / anus	3.31%	2.56	1.67	1.51	0.2185
Oral sore	9.10%	1.44	1.26	0.66	0.4156
Anal sore	4.13%	1.92	1.46	1	0.3184
Weight loss	***28.10%***	***2.63***	***1.94***	***5***	***0.0254***
Maleana	1.65%	0.9	0.93	0.01	0.9079

Table-4 above shows variables (symptoms) asked for during the review of the gastro-intestinal system. The results show that four variables (anorexia, vomiting, diarrhoea and weight loss) had significant statistical association with proteinuria (p-values 0.0003, 0.0108, 0.0005 and 0.0254 respectively).

TABLE-5: SYSTEMIC REVIEW VARIABLES – GENITO-URINARY SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Genital discharge	0%	?	?	?	?
Poor urine stream	0%	?	?	?	?
Facial puffiness	6.61%	0.76	0.84	0.33	0.5665
Dysuria	***7.43%***	***10.06***	***2.65***	***11.31***	***0.0008***
Haematuria	0.83%	0.9	0.94	0.01	0.9356
Frothy urine	0.83%	?	1.54	0.54	0.4641
Polyuria	4.13%	1.58	1.32	0.52	0.4711
Oliguria	0.83%	1.83	1.42	0.19	0.6665
Anuria	0%	?	?	?	?
Genital sores	4.13%	2.43	1.64	1.7	0.1922

Table-5 above shows variables (symptoms) asked for during the review of the genito-urinary system. The results show that only dysuria had significant statistical association with proteinuria (p-value 0.0008).

TABLE-6 SYSTEMIC REVIEW VARIABLES – MUSCULO-SKELETAL SYSTEM

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Skin lesions/rash	9.84%	0.6	0.71	1.57	0.2106
Joint pains	5.74%	0.9	0.94	0.04	0.8402
Joint effusion	1.65%	1.88	1.44	0.39	0.5300
Lumps/masses	0%	0	?	2.84	0.0921
Bone fracture	0%	?	?	?	?
Bone pains	3.31%	2.7	1.73	1.7	0.1923
Body/limb edema	4.13%	0.61	0.71	0.79	0.3752

Table-6 above shows variables (symptoms) that were asked for during the review of the musculoskeletal system. The results show that all the variables were not statistically significant for proteinuria.

C. PAST MEDICAL HISTORY

TABLES-7: PAST MEDICAL HISTORY VARIABLE

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Sore throat	0.66%	1.2	1.12	0.18	0.6675
Skin rash or sores	22.95%	1.14	1.09	0.11	0.7353
Measles	4.96%	1	1	0	0.9964
Asthma	0.83%	0.6	0.7	0.19	0.6627
SicKle cell	2.48%	2.89	1.75	1.4	0.2368
Diabetes	0%	0	?	0.55	0.2368
Tuberculosis	2.48%	0.91	0.94	0.02	0.9007
Cancer	0%	0	?	0.55	0.4588
Protein energy malnutrition	0.83%	0.35	0.46	0.95	0.3286
Hepatitis	9.02%	1.01	1.01	0	0.9744
Malaria positive slide	27.87%	1.65	1.4	1.26	0.2617
Failure to thrive	***13.11%***	***2.53***	***1.74***	***4.88***	***0.0270***

Table-7 above shows variables or (conditions) asked for in the past medical history of the study subjects. The result shows that only failure to thrive had significant statistical association with proteinuria (p -value 0.0270).

TABLES-8: PAST MEDICAL HISTORY VARIABLE (PAST 12 MONTHS)

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Recurrent diarrhoea > one month in last 12 month	5.74%	1.51	1.29	0.58	0.4449
Recurrent fever > one month in last 12 month	4.13%	0.67	0.76	0.52	0.4449
Recurrent cough >one month in last 12 month	7.38%	0.97	0.98	0.01	.9395
Recurrent or chronic ear discharge	4.13%	1.95	1.47	1.04	0.3081
Skin rash or sores	18.85%	1.88	1.5	2.73	0.0986
Enlarged lymphnodes	3.31%	0.71	0.79	0.31	0.5785
Recurrent oral thrush	7.38%	0.78	0.85	0.3	0.5866
Herpes zoster	0.83%	5.43	2.11	2.58	0.1082
Weight loss	***22.13%***	***3.46***	***2.45***	***8.9***	***0.0028***
Enlarged parotids	2.48%	0.94	0.96	0.01	0.9281
Antibiotic treatment in last 12 months	30.33%	1.69	1.43	1.04	0.3074
Chemotharepy in last 12 months	0%	0	?	1.11	0.2928
Intravenous or intramuscular injections last 12 months	9.51%	1.41	1.26	0.48	0.4867
Anovaginal herbal insertion (treatment)	***13.11%***	***2.53***	***1.74***	***4.88***	***0.027***
Anti-TB treatment	4.13%	1.35	1.21	0.24	0.6239
Traditional medication (sclarification)	14.75%	1.99	1.53	2.99	0.0839
Haematenic use in last 12 months	***23.77%***	***2.6***	***1.88***	***5.98***	***0.014***
Multivitamin use in last 12 months	25.41%	1.95	1.56	2.71	0.0995
Blood transfusion in last 12 months	3.31%	2.6	1.68	1.56	0.2117

Table-8 above shows variables (conditions or signs) asked for in the past medical history (last 12 months) of the study subjects. The results show that only three variables (weight loss, anal herbal insertion and haematenic use) had significant statistical association with proteinuria (p –value 0.0028, 0.0270 and 0.0140 respectively).

D. ANTENATAL AND PERINATAL HISTORY

TABLES – 9

VARIABLE	*% SIGNIF PROTEINURIA*	*ODDS RATIO*	*RELATIVE RISK*	*CHI-SQUARE*	*p VALUE*
Maternal antenatal registration	12.40%	1.66	1.37	1.52	0.2177
Maternal antenatal illness	10.74%	1.56	1.37	0.8	0.3726
Materanl antenatal visits	33.06%	0.91	0.94	0.01	0.9045
Mode of delivery	43.71%	2.27	1.81	0.55	0.4585
Birth weight	9.09%	0.54	0.66	2.2	0.1384
Perinatal birth trauma	0%	0	0	1.7	0.1928
Prerinatal septicemia	3.31%	1.04	1.03	0	0.9521
Perinatal asphyxia	1.65%	3.46	1.82	1.13	0.9521
Perinatal neonatal anemia	Undefined	Undef	Undefined	Undefind	Undef
Perinatal neonatal aspiration	0.00%	Undef	2.86	1.83	0.1762
Prematurity	***0.00%***	***Undef***	***2.95***	***5.58***	***0.018***
Oher perinatal complication	0.00%	0	Undefined	1.7	0.1928
No perinatal complication	25.61%	0.89	0.93	0.07	0.7868

Table-9 above shows variables (conditions) asked for in the antenatal and perinatal history of the study subjects. The results show that only prematurity had significant statistical association with proteinuria (p –value 0.018) though paradoxically the incidence of significant proteinuria was zero.

E. BREAST FEEDING HISTORY

TABLE-10: BREAST FEEDING HISTORY VARIABLES

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Exclusive breast feeding	33.90%	0.54	0.7	0.38	0.5388
Duration of exclusive breast feeding	28.30%	0.56	0.71	1.31	0.2531
Age @ introduction of new feeds	30.80%	0.43	0.62	1.84	0.1745
Age @ stopping breast feeding	***10.20%***	***0.21***	***0.36***	***15.03***	***0.0001***
Number of meals/feeds	15.70%	0.88	0.92	0.12	0.7315

Table-10 above shows variables (conditions) inquired for in the breast-feeding history of the study subjects. The results show that only one variable (Age at stopping breast ffeeding) had significant statistical association with proteinuria (p –value 0.0001).

F. FAMILY AND SOCIAL ECONOMIC HISTORY

TABLE-11: FAMILY AND SOCIAL ECONOMIC HISTORY VARIABLES

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Sickle cell disease	1.65%	0.59	0.7	0.39	0.5303
Diabetes	3.31%	1.52	1.29	0.36	0.5484
Asthma	8.20%	1.29	1.18	0.31	0.5768
Hypertension	12.95%	1.03	1.02	0.01	0.9375
Epilepsy	3.31%	1.05	0.57	0.01	0.9352
Bleeding disorders	4.95%	0.45	0.57	2.58	0.1084
Cancer	0%	0	?	1.11	0.2928
Same illness/family	9.84%	1.79	1.41	1.63	0.2014
TB contact	4.10%	0.61	0.71	0.79	0.3752
TB treatment	3.31%	0	0.22	2.96	0.0856
Paternal Health	31.14%	1.64	1.4	0.79	0.3752
Paretal education	***0%***	***0***	***?***	***5.08***	***0.0242***
Maternal Health	6.56%	0.94	0.96	0.01	0.9035
Family income	29.17%	0.67	0.76	0.68	0.4095
Number of rooms	29.50%	1.41	1.26	0.48	0.4867
Number occupants	23.70%	0.86	0.86	0.35	0.5517
Paediatric deaths	8.20%	0.59	0.59	3.31	0.0688

Table-11 above shows variables (conditions) asked for in the family and socio-economical history of the study subject. The results show that one variable (parental education) had significant statistical association with proteinuria (p – value 0.0242) though paradoxically the incidence of significant proteinuria was zero. The classification of parental education level was dependent on whether the parents have been to school or not. Otherwise, the parental education levels inquired into were the primary, secondary and tertiary.

4.2.2 CLINICAL EXAMINATION RESULTS

TABLE-12: GENERAL EXAMINATION VARIABLES

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Nutritional status	4.92%	1.99	1.54	3.14	0.0763
Consciousness	4.10%	0.41	0.61	1.76	0.1851
Orientation	4.10%	0.51	0.68	1.04	0.3081
Hair status	8.20%	0.73	0.82	0.44	0.5052
Pallor	13.93%	0.89	0.93	0.09	0.7583
Cyanosis	4.10%	0.41	0.61	1.76	0.1851
Lymphadenopahty	11.46%	0.53	0.65	0.95	0.3295
Oedema	4.92%	1.33	1.21	0.29	0.5912
Finger clubbing	6.56%	0.63	0.76	0.78	0.8164
Nail changes	5.74%	1.13	1.08	0.05	0.8164
Skin lesions or rash	9.84%	1.67	1.41	1.57	0.2106
Eye abnormalities	5.74%	0.58	0.72	0.98	0.3228
Ear abnormalities	3.28%	0.52	0.68	0.82	0.3662
Oral cavity disease	7.38%	0.74	0.83	0.38	0.5391
Nasal diseases	1.65%	1.39	1.25	0.14	0.7034
Weight	21.31%	1.83	1.48	2.47	0.1159
Diastolic pressure	1.65%	1.24	1.14	0.05	0.8202
Systolic pressure	2.44%	1.9	1.45	0.6	0.4379
Pulse rate	2.44%	1.9	1.45	0.6	0.4379
Respiratory rate	9.02%	1.6	1.33	1.06	0.3042
Temperature	23.77%	1.34	1.21	0.53	0.4649

Table-12 above shows variables (sign or conditions) considered in the general examination of the study subjects. The results show that none of the variables had significant statistical association with proteinuria. Inquiry into these variables was general and not specifically for proteinuria.

TABLES-13: SYSTEMIC EXAMINATION VARIABLES

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Central nervous system disease	9.76%	1.22	1.14	0.22	0.6402
Respiratory system disease	19.51%	1.51	1.31	1.17	0.2796
Cardiovascular system disease	3.25%	0.63	0.73	0.55	0.4577
Gastro-intestinal disease	17.89%	1.19	1.12	0.21	0.6477
Genito-urinary system disease	2.44%	0.77	0.84	0.13	0.7170
Musculo-skeletal system disease	8.94%	1.31	1.19	0.37	0.5421

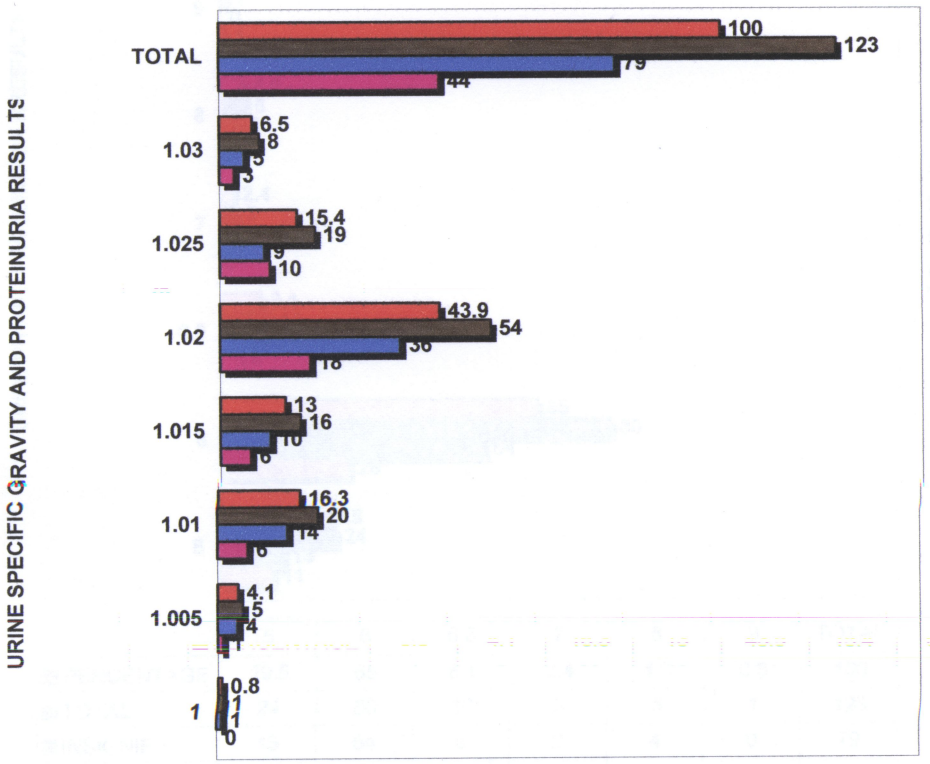
Table-13 above shows systemic examination variables (body system abnormalities) analyzed with a 2x2 table against dichotomized proteinuria results (i.e. significant and insignificant proteinuria). The results show that none of the variables (body system abnormalities) had significant statistical association with proteinuria. All variables from the preceding tables, together demonstrate that proteinuria is found in many conditions.

4.2.3 CLINCAL LABORATORY RESULTS

URINALYSIS RESULTS

FIGURE – 9

FIGURE SHOWING BAR CHART AND DATA TABLE OF PROTEINURIA RESULTS AGAINST URINE SPECIFIC GRAVITY



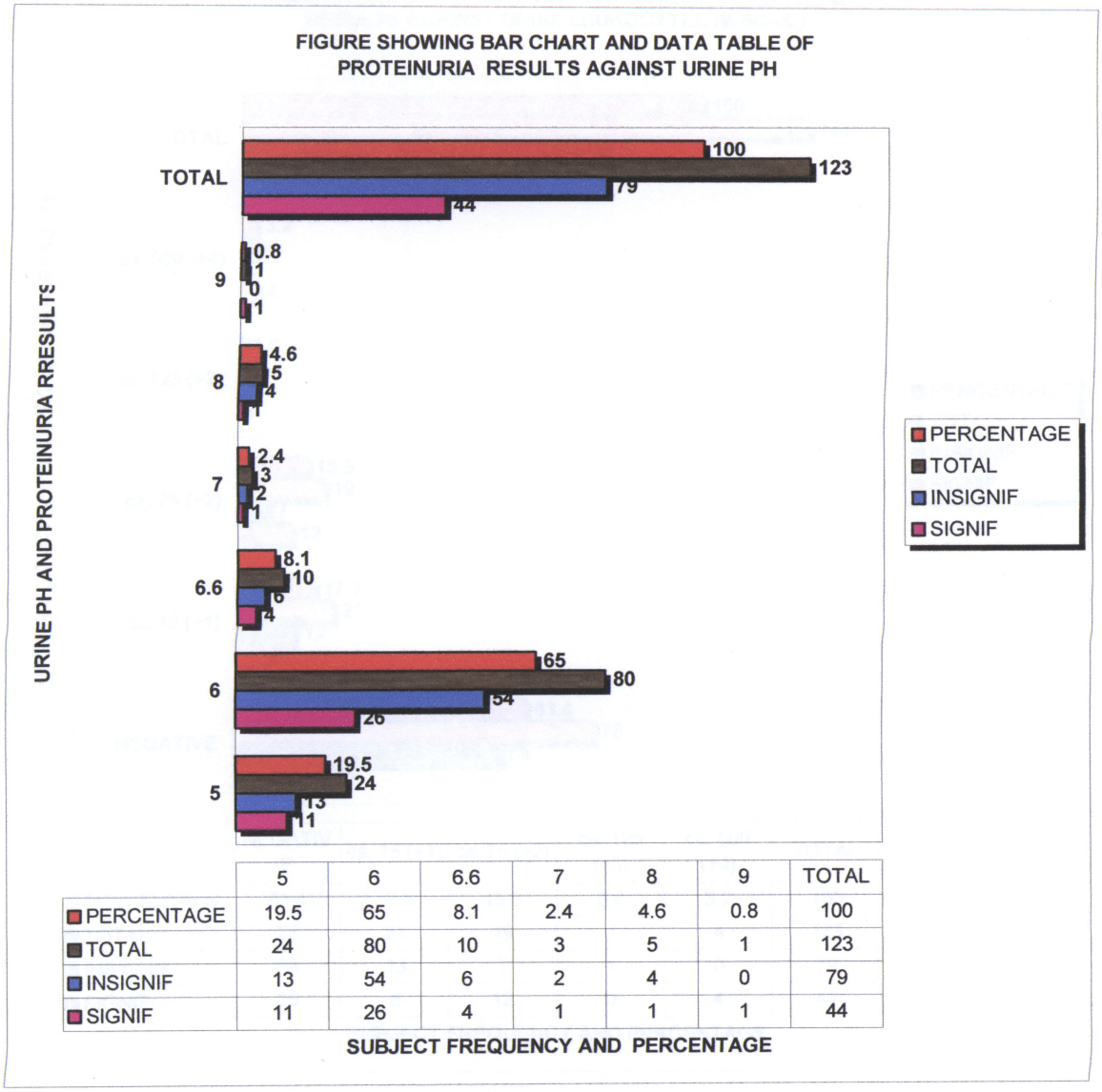
	1	1.005	1.01	1.015	1.02	1.025	1.03	TOTAL
PERCENTAGE	0.8	4.1	16.3	13	43.9	15.4	6.5	100
TOTAL	1	5	20	16	54	19	8	123
INSIGNIF	1	4	14	10	36	9	5	79
SIGNIF	0	1	6	6	18	10	3	44

SUBJECT FREQUENCY AND PERCENTAGE

- Chi square = 3.91
- Degrees of freedom = 6
- P value = 0.68887277

Most subjects' ability to concentrate urine was good as shown by their increased frequency at specific gravity of between 1.010 and 1.025. This correlated well with high proteinuria frequency or percentage though there was no statistical association.

FIGURE – 10



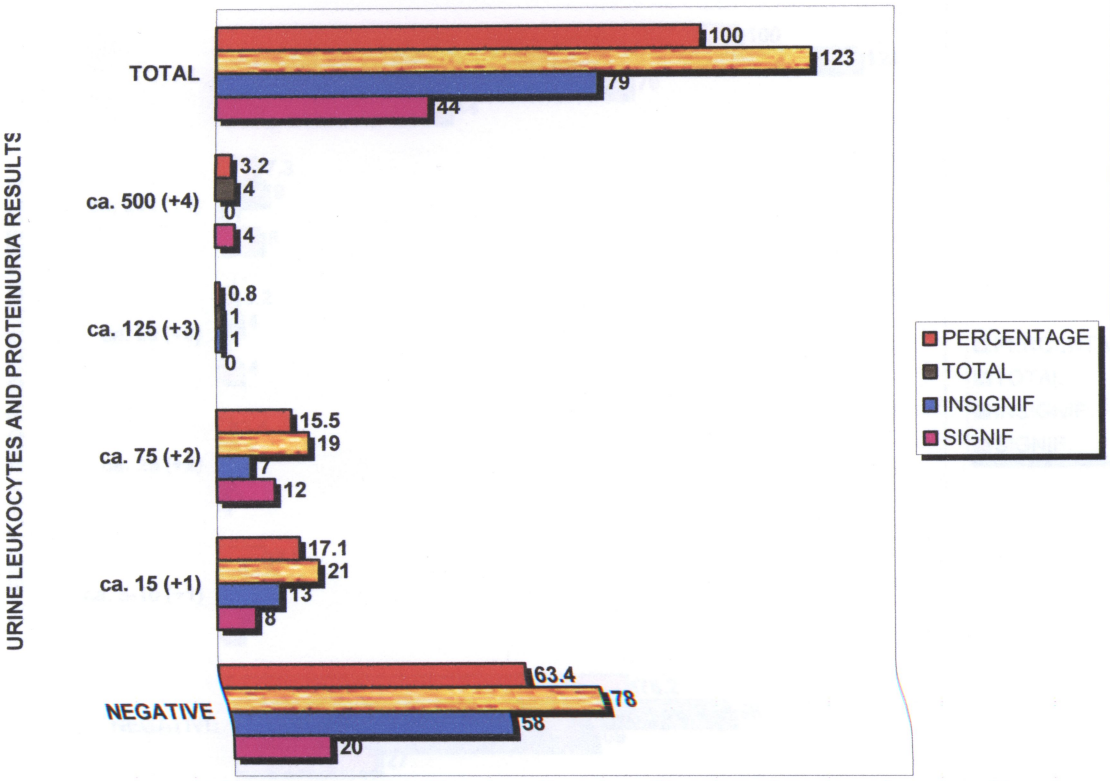
	5	6	6.6	7	8	9	TOTAL
PERCENTAGE	19.5	65	8.1	2.4	4.6	0.8	100
TOTAL	24	80	10	3	5	1	123
INSIGNIF	13	54	6	2	4	0	79
SIGNIF	11	26	4	1	1	1	44

- Chi square = 3.85
- Degrees of freedom = 5
- P value = 0.57082781

Most of the patients (65 %) had a urine PH of 6. Relatively, the higher the urine PH, the less likely is the frequency of patients with significant proteinuria. Extremes of urinary PH may give rise to both false positive and/or false negative proteinuria results by the dipstick method.

FIGURE - 11

FIGURESHOWING BAR CHART AND DATA TABLE OF PROTEINURIA RESULTS AGAINST URINE LEUKOCYTES (WBC/uL)



	NEGATIVE	ca. 15 (+1)	ca. 75 (+2)	ca. 125 (+3)	ca. 500 (+4)	TOTAL
PERCENTAGE	63.4	17.1	15.5	0.8	3.2	100
TOTAL	78	21	19	1	4	123
INSIGNIF	58	13	7	1	0	79
SIGNIF	20	8	12	0	4	44

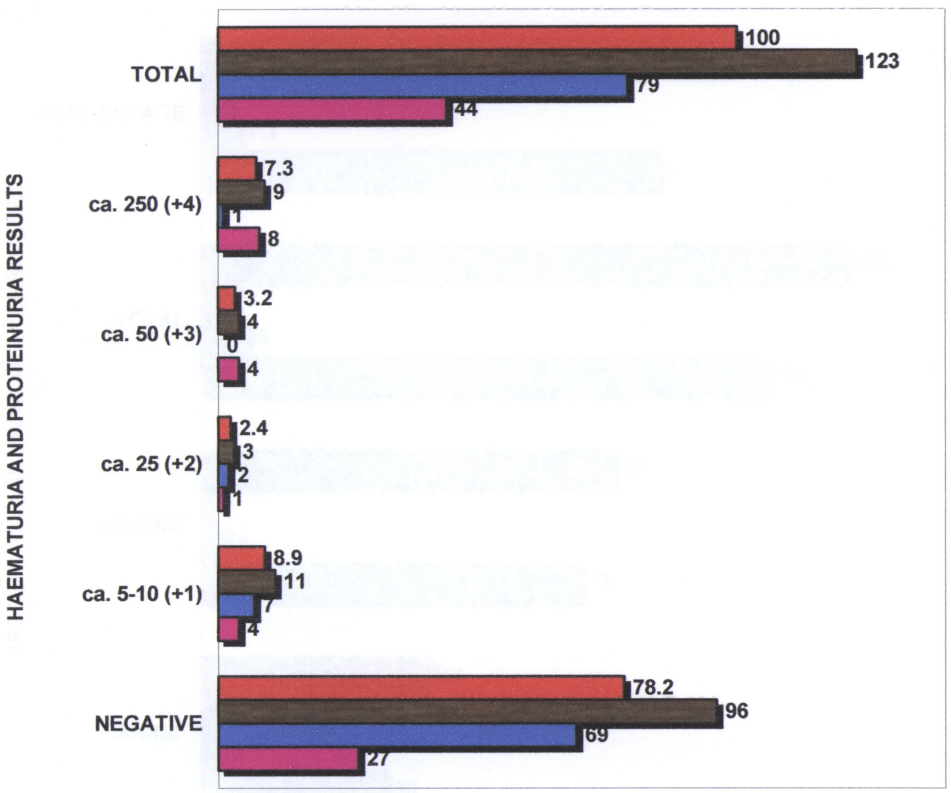
SUBJECT FREQUENCY AND PERCENTAGE

- Chi square = 17.47 (significant)
- Degrees of freedom = 4
- P value = 0.00156266 (significant)

Urine pus cells were found in 36.6 % of the patients and this was significantly associated with proteinuria (p value = 0.0016). Pus cell indicate the likelihood of an infection of the genito-urinary system.

FIGURE - 12

FIGURE SHOWING BAR CHART AND DATA TABLE OF PROTEINURIA RESULTS AGAINST HAEMATURIA



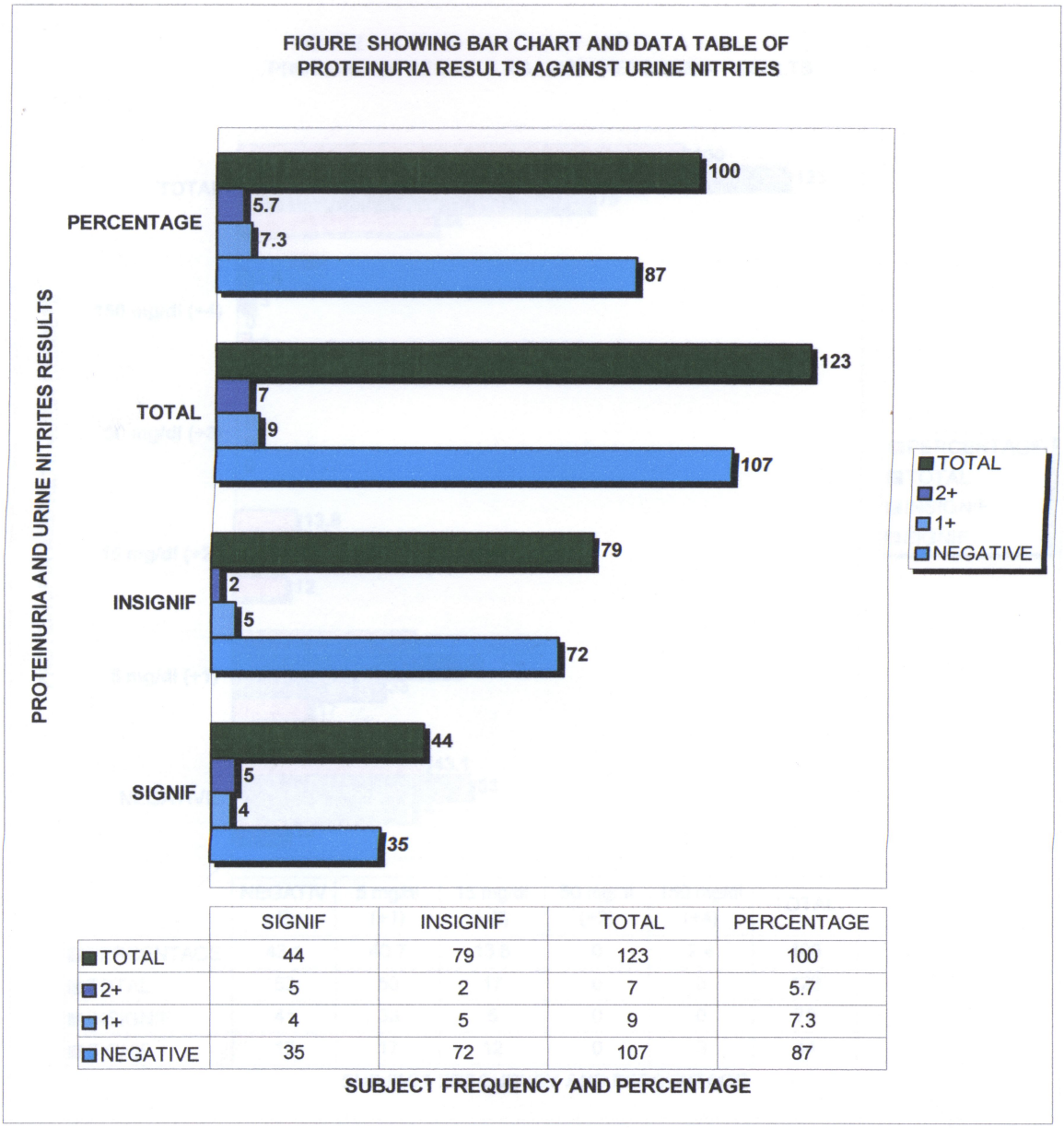
	NEGATIVE	ca. 5-10 (+1)	ca. 25 (+2)	ca. 50 (+3)	ca. 250 (+4)	TOTAL
PERCENTAGE	78.2	8.9	2.4	3.2	7.3	100
TOTAL	96	11	3	4	9	123
INSIGNIF	69	7	2	0	1	79
SIGNIF	27	4	1	4	8	44

SUBJECT FREQUENCY AND PERCENTAGE

- Chi square = 20.69 (significant)
- Degrees of freedom = 4
- P value = 0.00036534 (significant)

Haematuria was found in 22.8 % of the patients and this was significantly associated with proteinuria (p value = 0.0004). Haematuria indicates the likelihood of infection, damage or haemorrhage to genito-urinary system.

FIGURE - 13

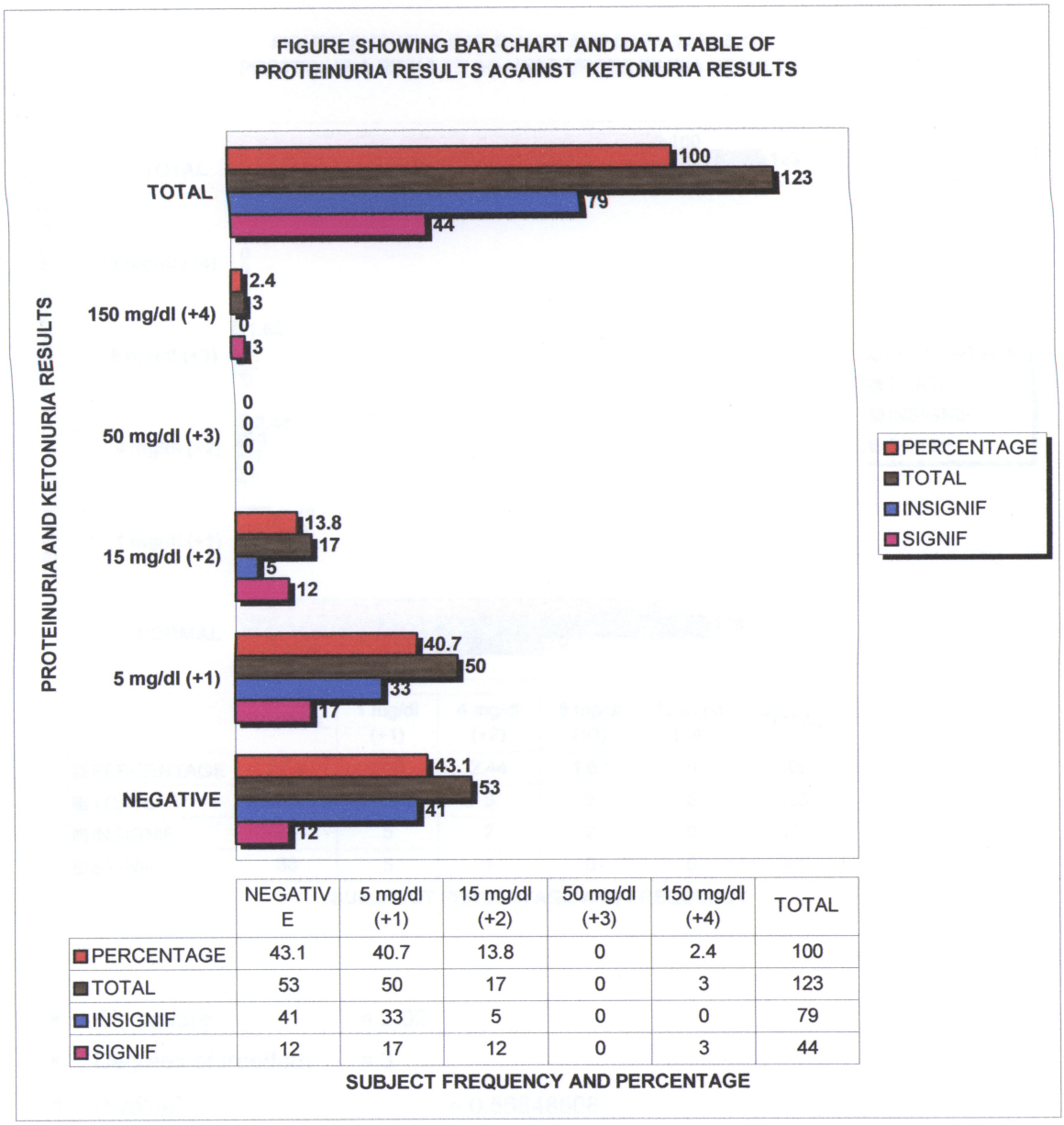


	SIGNIF	INSIGNIF	TOTAL	PERCENTAGE
TOTAL	44	79	123	100
2+	5	2	7	5.7
1+	4	5	9	7.3
NEGATIVE	35	72	107	87

- Chi square = 4.60
- Degrees of freedom = 2
- P value = 0.10002284

Urine nitrites were found 13 % of the patients and this was not significantly associated with proteinuria (p value = 0.1). 0f the 107 (87 %) patients negative for urine nitrites, 35 (32.7%) had significant proteinuria though not statistically significant. Presence of nitrites in urine usually indicates urinary tract infection.

FIGURE - 14



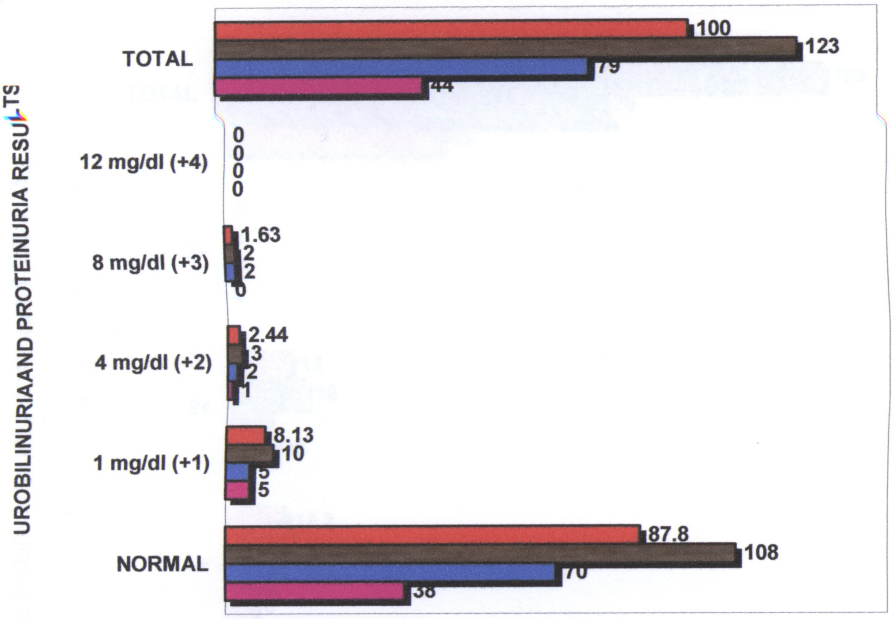
	NEGATIVE	5 mg/dl (+1)	15 mg/dl (+2)	50 mg/dl (+3)	150 mg/dl (+4)	TOTAL
PERCENTAGE	43.1	40.7	13.8	0	2.4	100
TOTAL	53	50	17	0	3	123
INSIGNIF	41	33	5	0	0	79
SIGNIF	12	17	12	0	3	44

- Chi square = 18.40
- Degrees of freedom = 3
- P value = 0.00036357 (significant)

Ketonuria was found in 56.9 % of the patients and this was significantly associated with proteinuria as shown by the p value of approximately 0.0004. Ketonuria may indicate a high catabolic state especially if pyrexia is present.

FIGURE - 15

FIGURE SHOWING BAR CHART AND DATA TABLE OF PROTEINURIA RESULTS AGAINST UROBILINURIA RESULTS



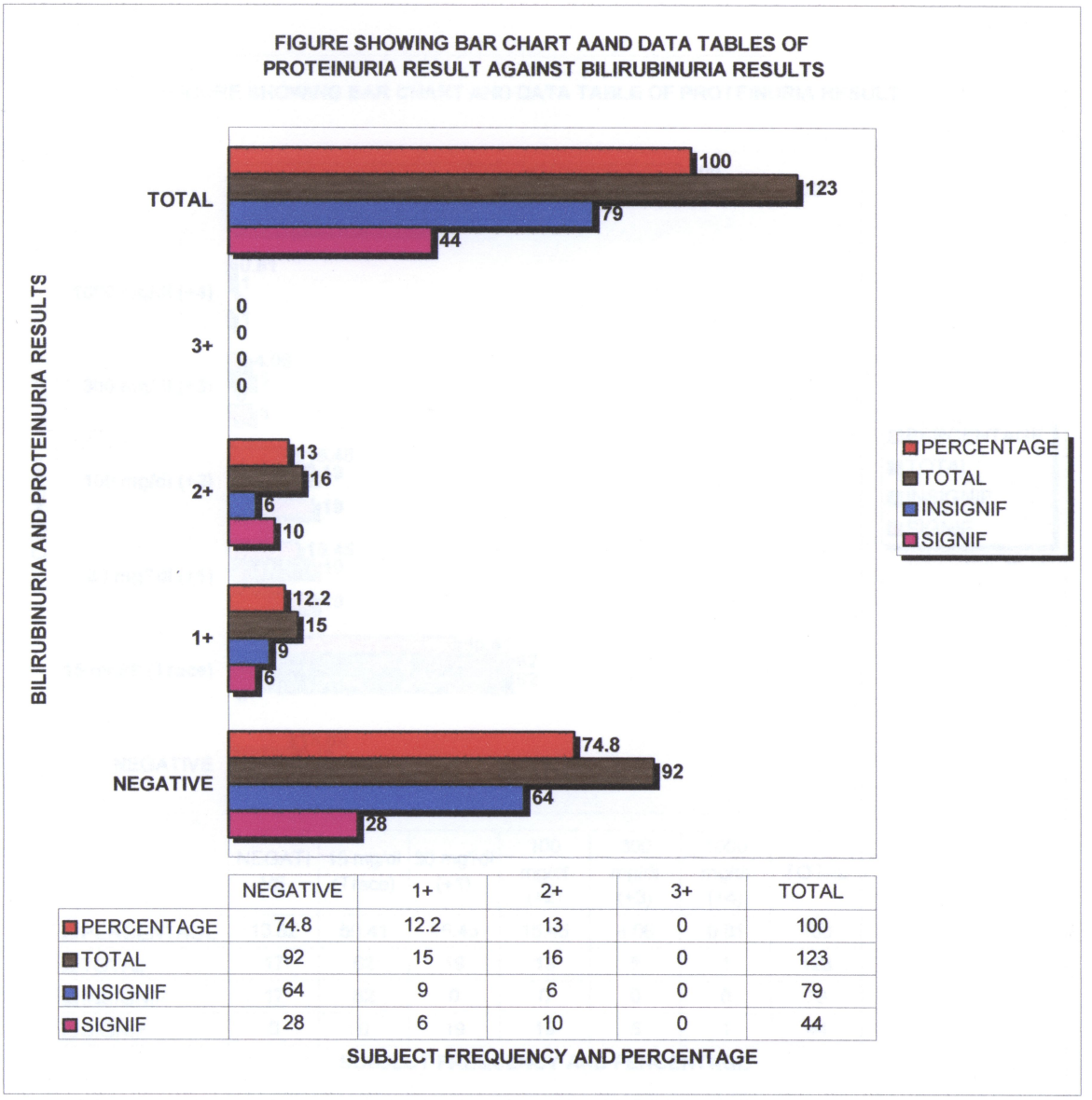
	NORMAL	1 mg/dl (+1)	4 mg/dl (+2)	8 mg/dl (+3)	12 mg/dl (+4)	TOTAL
PERCENTAGE	87.8	8.13	2.44	1.63	0	100
TOATL	108	10	3	2	0	123
INSIGNIF	70	5	2	2	0	79
SIGNIF	38	5	1	0	0	44

SUBJECCT PERCENTAGE AND FREQUENCY

- Chi square = 2.02
- Degrees of freedom = 3
- P value = 0.56848508

Only 15 (12.2 %) of the patients had urobilinuria and this was not significantly associated with proteinuria. Urobilinuria is usually associated with clinical condition where there is increased destruction of the red blood cells.

FIGURE - 16

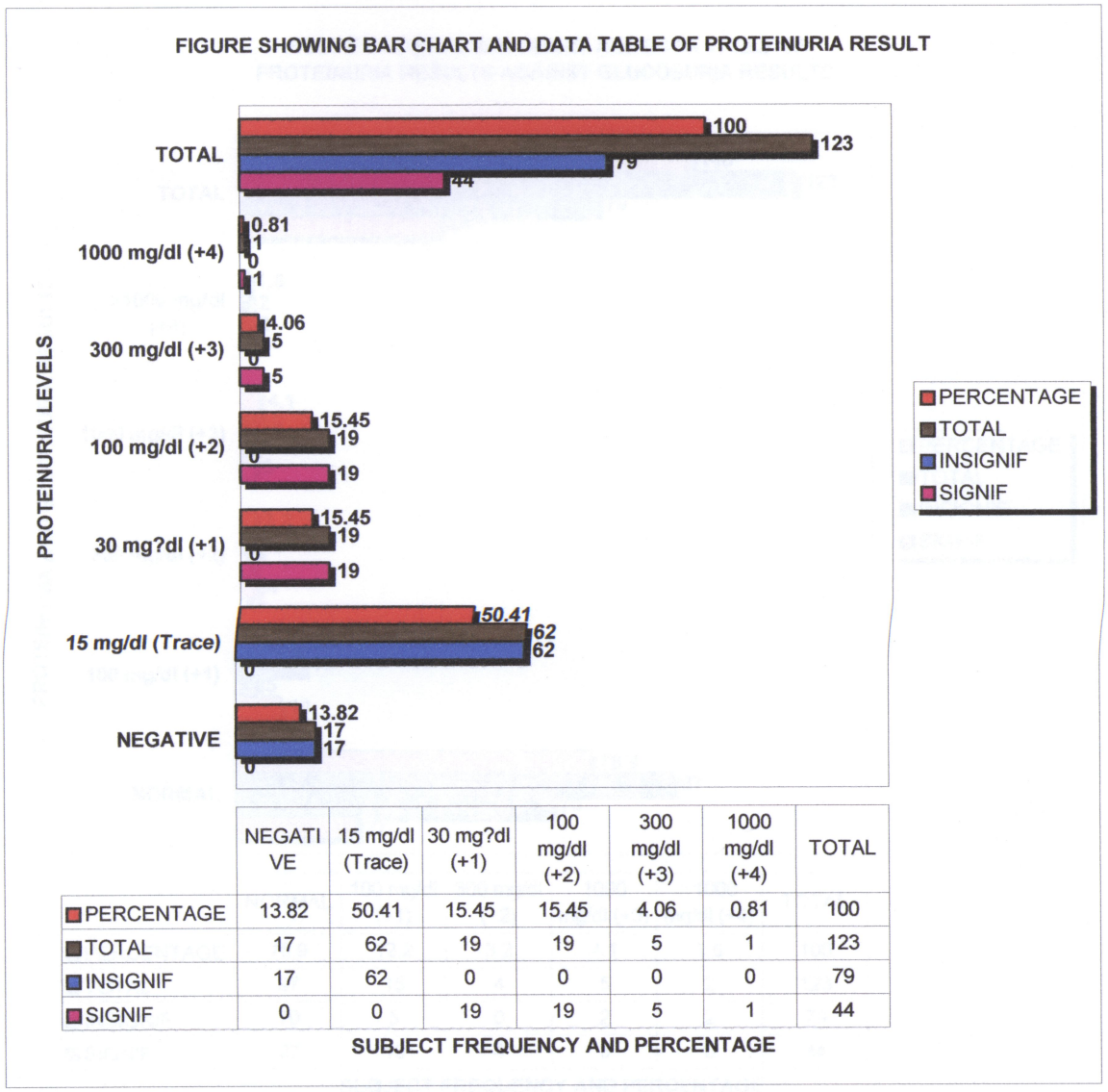


	NEGATIVE	1+	2+	3+	TOTAL
PERCENTAGE	74.8	12.2	13	0	100
TOTAL	92	15	16	0	123
INSIGNIF	64	9	6	0	79
SIGNIF	28	6	10	0	44

- Chi square = 6.23
- Degrees of freedom = 2
- P value = 0.04432899

Patients with bilirubinuria were likely to have proteinuria though only 31 (25.2 %) were positive. Bilirubinuria is usually associated with clinical condition where there is increased destruction of the red blood cells, hepatic dysfunction and biliary obstruction.

FIGURE – 17

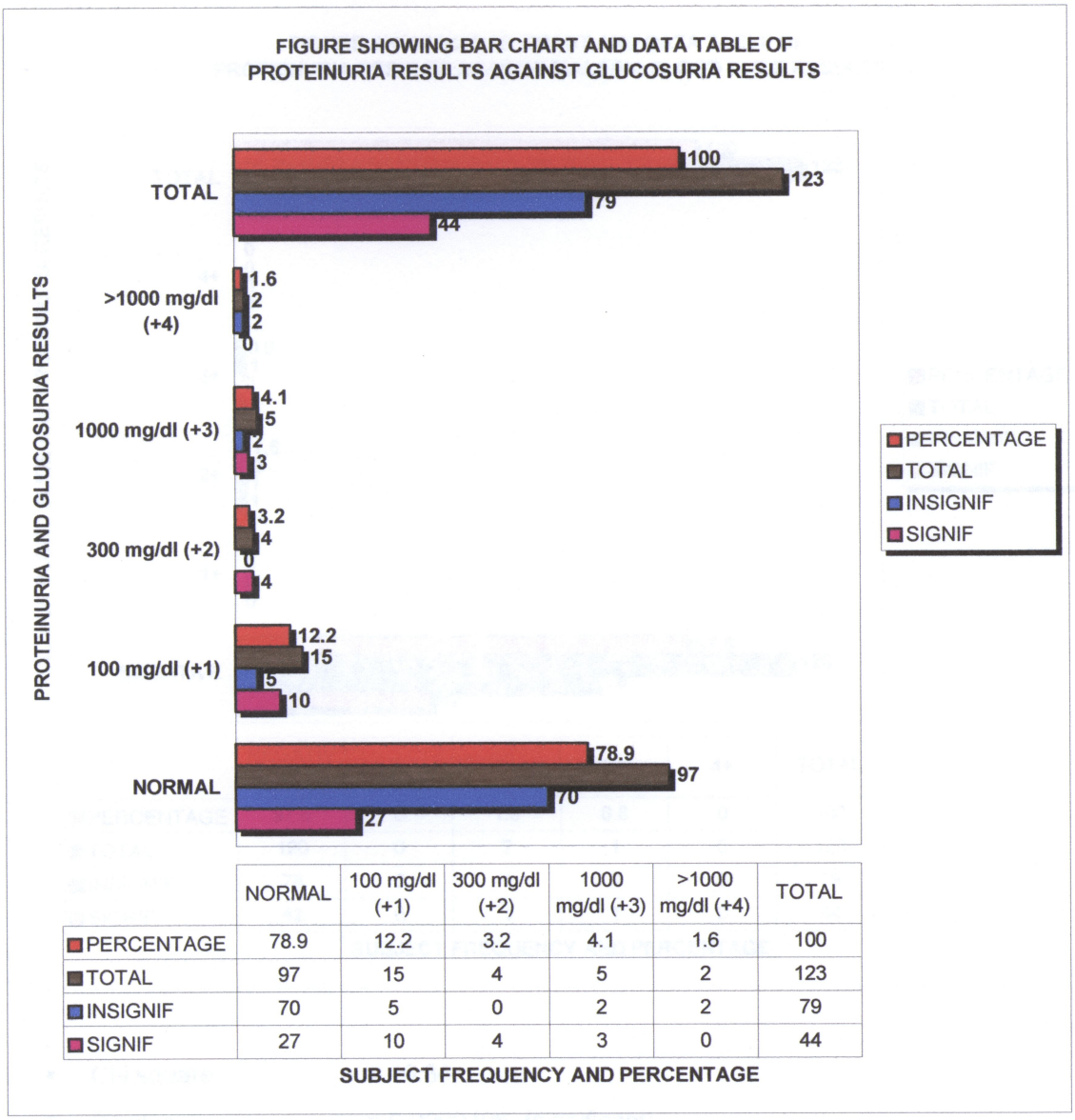


	NEGATIVE	15 mg/dl (Trace)	30 mg?dl (+1)	100 mg/dl (+2)	300 mg/dl (+3)	1000 mg/dl (+4)	TOTAL
PERCENTAGE	13.82	50.41	15.45	15.45	4.06	0.81	100
TOTAL	17	62	19	19	5	1	123
INSIGNIF	17	62	0	0	0	0	79
SIGNIF	0	0	19	19	5	1	44

- Chi square = 123.00
- Degrees of freedom = 5
- P value = 0.00000000

Forty four (35.8 %) of the patients had significant proteinuria while 79 (64.2 %) had no proteinuria. Insignificant proteinuria included negative and trace proteinuria results. Of the patients with insignificant proteinuria, approximately half (50.41 %) of them had trace amounts of proteinuria.

FIGURE – 18



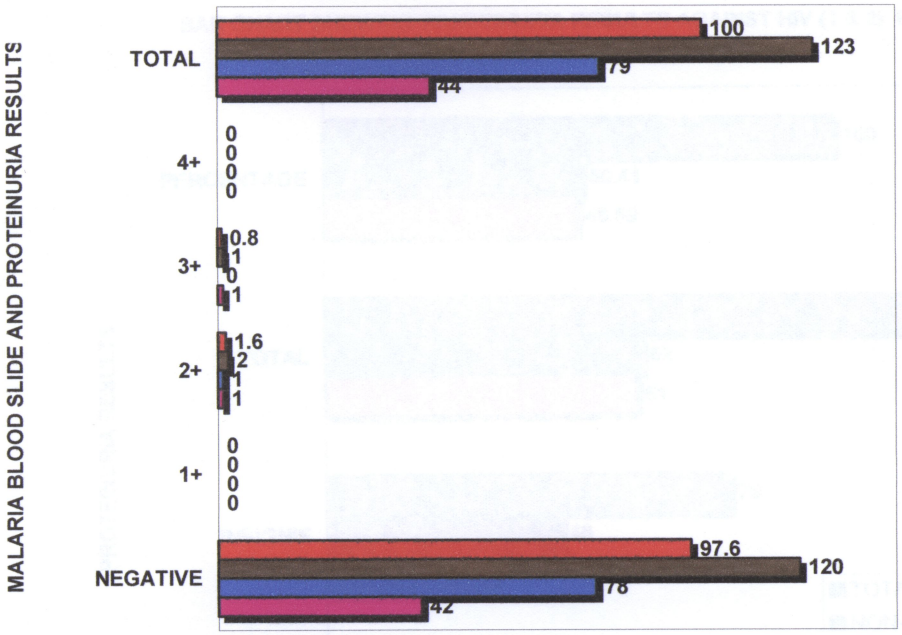
	NORMAL	100 mg/dl (+1)	300 mg/dl (+2)	1000 mg/dl (+3)	>1000 mg/dl (+4)	TOTAL
PERCENTAGE	78.9	12.2	3.2	4.1	1.6	100
TOTAL	97	15	4	5	2	123
INSIGNIF	70	5	0	2	2	79
SIGNIF	27	10	4	3	0	44

- Chi square = 18.46
- Degrees of freedom = 4
- P value = 0.00100117

Glycosuria was found in 21.14 % of the patients and this was significantly associated with proteinuria. Glucosuria may be associated with proteinuria in the sense that renal glomerular or tubular damage may result in increased protein or glucose loss as well as decreased absorption of protein or glucose respectively.

FIGURE – 19

FIGURE SHOWING BAR CHART AND DATA TABLE OF
PROTEINURIA RESULTS AGAINST MALARIA BLOOD SLIDE RESULTS



	NEGATIVE	1+	2+	3+	4+	TOTAL
PERCENTAGE	97.6	0	1.6	0.8	0	100
TOTAL	120	0	2	1	0	123
INSIGNIF	78	0	1	0	0	79
SIGNIF	42	0	1	1	0	44

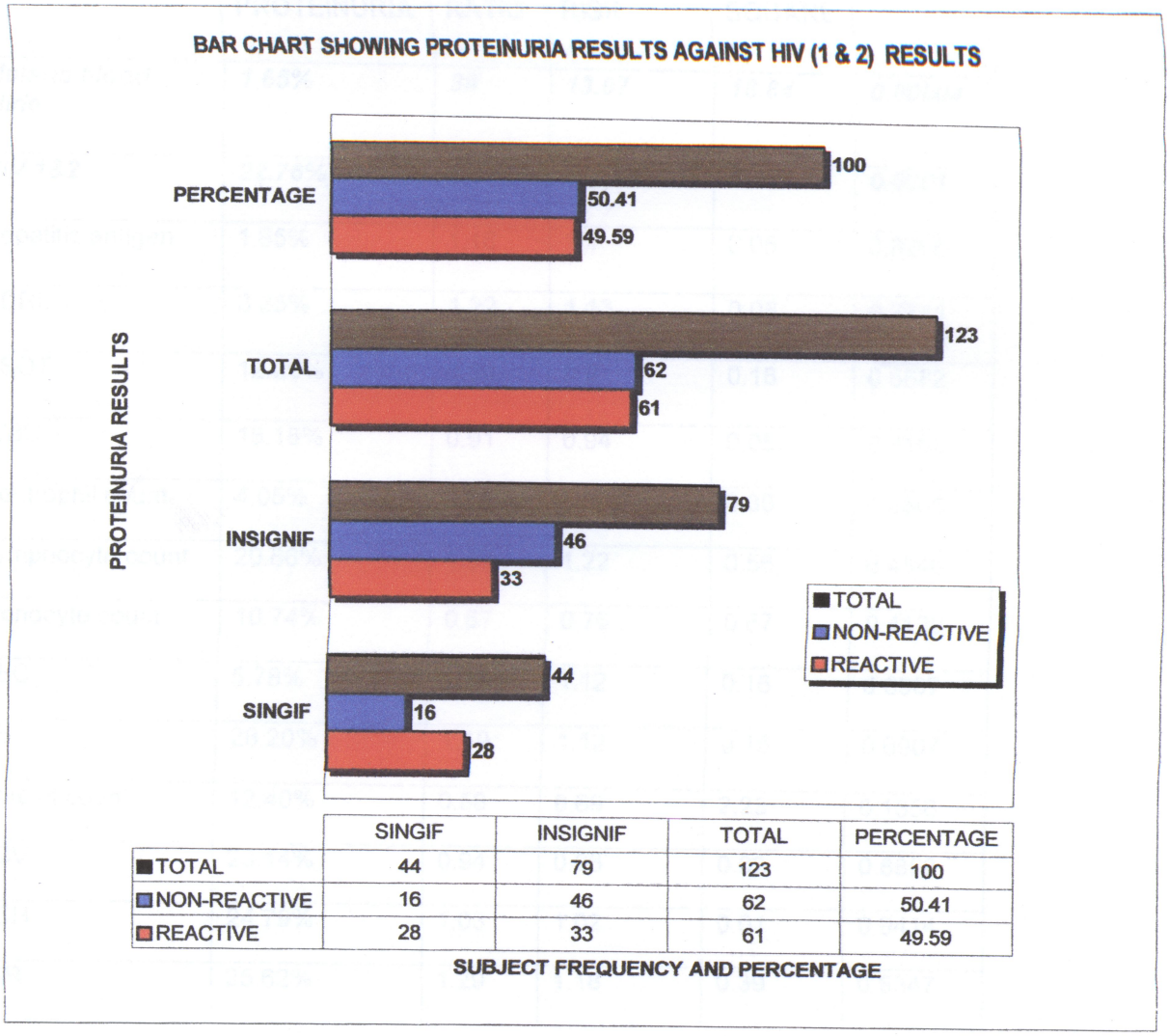
SUBJECT FREQUENCY AND PERCENTAGE

- Chi square = 16.84
- P value = 0.0000406 (significant)

Only three (2.4 %) of the patients had positive blood slide for malaria parasite and there was a significant statistical association between malaria parasite and proteinuria. Malaria is commonly complicated with renal pathology and as such, it may clinically present with proteinuria. In this study the odds ratio suggests that proteinuria is 39 times more likely to occur in patients with malaria

SEROLOGICAL RESULTS

FIGURE – 20



	SINGIF	INSIGNIF	TOTAL	PERCENTAGE
TOTAL	44	79	123	100
NON-REACTIVE	16	46	62	50.41
REACTIVE	28	33	61	49.59

- Chi square = 5.40
- P value = 0.02008841

Sixty one (49.59 %) of the patients were HIV positive and this was significantly associated with proteinuria. In this study, the odds ratio indicate that proteinuria is 2.44 times more likely to occur in patients who are positive for HIV. 63.6 % of children with significant proteinuria were HIV positive as opposed to 41.8 % with insignificant proteinuria. Recent studies have suggested that HIV may have direct damage to the renal parenchyma. [2-4, 35]

TABLE-14: LABORATORY TEST RESULT VARIABLES

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Malaria blood slide	***1.65%***	***39***	***13.67***	***16.84***	***0.00004***
HIV 1&2	***22.76%***	***2.44***	***1.78***	***5.4***	***0.0201***
Hepatitis antigen	1.65%	1.16	1.1	0.05	0.8268
VDRL	3.25%	1.22	1.13	0.08	0.7711
ASOT	12.20%	0.84	0.9	0.18	0.6682
WBC	18.18%	0.91	0.94	0.05	0.8165
Neutrophil count	4.05%	0.79	0.87	0.36	0.5505
Lymphocyte count	20.66%	1.37	1.22	0.56	0.4546
Monocyte count	10.74%	0.67	0.76	0.67	0.4130
RBC	5.78%	1.19	1.12	0.16	0.6907
HB	28.20%	1.19	1.12	0.16	0.6907
Platelet count	12.40%	0.56	0.69	2.23	0.1356
MCV	23.14%	0.94	0.96	0.02	0.8858
MCH	24.79%	1.03	1.02	0.01	0.9414
ESR	25.62%	1.29	1.18	0.39	0.5347

Table - 14 above show variables (parameters or tests) conducted in the laboratory. The results show that only two variables (HIV 1 & 2 and positive Malaria on blood slide) had statistical significant association with proteinuria (p-values 0.0201 and 0.0004 respectively).

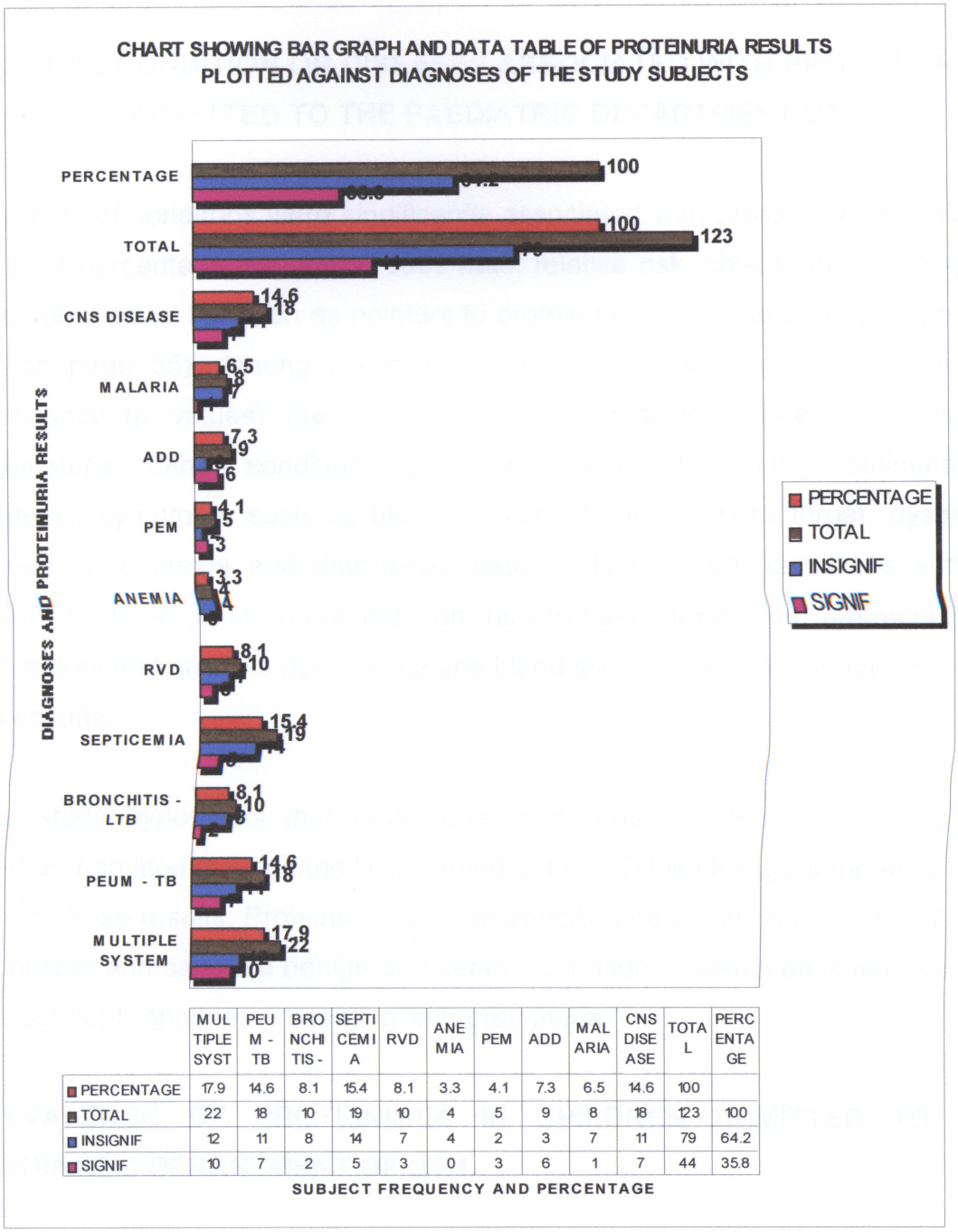
4.2.4 CLINICAL DIAGNOSES RESULTS

TABLE-15: Summary – Clinical conditions or diseases associated with proteinuria.

VARIABLE	% SIGNIF PROTEINURIA	ODDS RATIO	RELATIVE RISK	CHI-SQUARE	p VALUE
Blurred vision	0.19%	0.19	0.39	6.58	0.0103
Dizziness	0.22%	0.22	0.44	7.84	0.0051
Sore throat	0.40%	0.4	0.68	5.02	0.0250
Dyspnoea	0.28%	0.28	0.56	10.98	0.0009
Wheezing	0.11%	0.11	0.17	6.23	0.0126
Anorexia	0.21%	0.21	0.54	13.34	0.0003
Diarrhoea	4.06%	4.06	2.29	12.09	0.0005
Dysuria	10.00%	10.06	2.65	11.31	0.0008
Failure to thrive	2.53%	2.53	1.74	4.88	0.0272
Anal herbs	2.53%	2.53	1.74	4.88	0.0272
Haematenic use	2.60%	2.6	1.88	5.98	0.0145
Prematurity	Undefined	Undef	2.95	5.58	0.0182
Age at stopping breast feeding	0.21%	0.21	0.36	15.03	0.0001
Parent education	0.00%	0	?	5.08	0.0242
Pos Malaria BS	2.2 %	39	13.67	16.84	0.00005
HIV type 1 & 2	22.76%	2.44	1.78	5.4	0.0201
Urine leukocytes	19.51%	?	?	17.47	0.0015
Haeamaturia	13.80%	?	?	20.69	0.0004
Ketonuria	26.02%	?	?	18.4	0.0004
Bilirubinaemia	13.00%	?	?	6.23	0.0443
Glucosuria	13.80%	?	?	18.46	0.0010

All variables in the table-15 above demonstrate that proteinuria is found in a diversity of conditions or diseases.

FIGURE – 21



	MULTIPLE SYST	PEUM - TB	BRONCHITIS -	SEPTICEMIA	RVD	ANEMIA	PEM	ADD	MALARIA	CNS DISEASE	TOTAL	PERCENTAGE
PERCENTAGE	17.9	14.6	8.1	15.4	8.1	3.3	4.1	7.3	6.5	14.6	100	
TOTAL	22	18	10	19	10	4	5	9	8	18	123	100
INSIGNIF	12	11	8	14	7	4	2	3	7	11	79	64.2
SIGNIF	10	7	2	5	3	0	3	6	1	7	44	35.8

- Chi square = 0.50
- P value = 0.77835491

The results show the diversity of diagnoses observed during the study. Absolute numbers were more with multiple system disease, septicaemia, respiratory system disease and central nervous system disease.

CHAPTER FIVE – DISCUSSION

.1.0 CLINICAL CONDITION OR DISEASES ASSOCIATED WITH PROTEINURIA IN CHILDREN ADMITTED TO THE PAEDIATRIC DEPARTMENT OF UTH.

A variety of conditons were significantly associated with proteinuria as indicated by their percentage frequency, odds ratio, relative risk, chi-square and p values and some could be taken as pointers to proteinuria in clinical practice (see table 15 on page 55). Among the most important conditions in the oder of their sigificancy (p values) are dysuria,, HIV seropositivity, urine pus cells and haematuria. Other conditions significantly associated with proteinuria are systemic symptoms such as blurred vision, dizziness, sore throat, dyspnoea, wheezing, anorexia and diarrhoea); past medical history conditions such as failure to thrive, anal herbal insertion, use of haematenics and prematurity and laboratory test such as positive malaria blood slide, ketonuria, bilirubinaemia and glucosuria.

The study hypothesis that proteinuria is a common clinical presentation in children admitted to Pediatric Department of the UTH is strongly supported in the light of these results. Proteinuria is a non-specific and common laboratory finding in children and can be a benign or a serious conditon. Evaluation is necessary to rule out nephropathies presenting with proteinuria. [1]

5.2.0 PREVALENCE OF PROTEINURIA IN CHILDREN ADMITTED TO THE PAEDIATRIC DEPARTMENT OF UTH.

In this study, proteinuria results showed that 44 (35.8%) had significant proteinuria results and 79 (64.2%) had insignificant porteinuria. From these results, the conclusion is that the prevalence of proteinuria is 35.8%. This is a *much larger figure or number than found in literature from developed countries.* The younger age groups (1 – 12 months and 1 – 5 years) had an increased tendency of proeinuria (27.6 % and 31.7 % respectively) as compared to the rest of the age groups.

This is in agreement with literature that states protein excretion is highest in the newborn infants and decreases with age until late adolescent. [10] As many as 30 to 50 percent of children with proteinuria may have transient, non-repetitive proteinuria. [12] The prevalence of isolated asymptomatic proteinuria in children is estimated to be between 0.6 and 6.3 percent. [13 – 16] Orthostatic (postural) proteinuria accounts for up to 60 percent of all cases of asymptomatic proteinuria reported in children, with an even higher incidence in adolescents. [17]

The prevalence of proteinuria in this study is much higher (35.8 %), compared with that of isolated assymptomatic proteinuria in children as seen in the western studies (0.6 - 6.3 %). Unlike the other studies done elsewhere which are community based involving normal school children, this was hospital based and thus being a selection of unwell children of whom the majority (71.5 %) were under the age of five and in addition, they could have had presented with fever. Hence the prevalence of proteinuria is expected to be higher. [33, 34]

5.3.0 DEMOGRAPHIC FEATURES ASSOCIATED WITH CHILDREN PRESENTING WITH PROTEINURIA AT THE PAEDIATRIC DEPARTMENT OF UTH.

The majority of the study subjects (almost 98%) resided in Lusaka except three who were referred from outside. Results of this study therefore could not to be representative of this country and besides it was a cross section study for a period of thirty days.

5.3.1 Age

The frequencies and percentages of the study subjects' distribution according to different age groups showed that more children were under the age of five years (88 = 71.5%). These included neonates, infants and toddlers who largely contributed to age group. The rest were over five years of age (35 = 28.5%). The prevalence of significant proteinuria was higher in age group under five

years (37.5 %) compared to the age group over five years (31.4 %) though this was not significantly associated with proteinuria.

5.3.2 Sex

Of the 123 paients tested for proteinuria, 82 (66.7 %) were males and 41 (33.3 %) were females giving an approximate male to female ratio of 2:1. Out of the 82 males and 41 females tested for proteinuria, 27 (32.9 %) and 17 (41.5 %) had significant proteinuria respectively. The prevalence of significant proteinuria tended to be more in the female subjects (41.5 %) though the p value was not significant. This could be explained by the fact that there is a progressive increase in the female to male ratio of UTI from 4:1 in neonates to 1.5:1 at two to six months and 10:1 after two years of life. [38]

5.3.3 Ethnicity

There were more study subjects of the Nyanja (41.5 %), the Bemba (30.8%) and the Tonga (16.3 %) ethnic groupings, probably indicating that the Nyanja, Bemba and Tonga represent the largest grouping in Lusaka the Capital City of Zambia. This observation is most likely as the result of urbanization, or could it be that the tribes mentioned afore are among the majors ones in the country.

5.3.4 Residence

There was a linear decrease of proteinuria in patients from high density residential area (71.5 %) to a low density residential area (11.4 %). Children from high-density area had a higher prevalence of proteinuria (37.5 %) as compared to medium (28.5 %) and low (35.7 %) density areas though not statistically significant on as evident by the p value of 0.7783. This finding compares to a survey of asymptomatic proteinuria and haematuria in school pupils from peri-urban and urban areas in Nigerian in which no significant difference in the prevalence rate of asymptomatic proteinuria or haematuria between the two residential areas. [34]

5.4.0 DISEASE ENTITIES ASSOCIATED WITH PROTEINURIA.

One of the specific objectives of this study was to determine the association of some of the common conditions or diseases associated with proteinuria in children. Among these diseases are HIV infections, malaria, upper respiratory track infection, pneumonias, tuberculosis, nephritic syndrome, nephritic syndrome, urinary tract infection, syphilis and hepatitis just to mention but a few. This study has shown that the etiological factors associated proteinurias in children are varied and diverse. A few of these diseases or conditions are further discussed below as they are more prevalent at the UTH.

5.5.1 Malaria

Only three (2.4 %) of the patients had positive blood slide for malaria parasite and this significantly associated with proteinuria (p value = 0.00004). The odds ratio suggests that proteinuria is 39 times more likely to occur in patients with malaria. Some studies have shown that plasmodium falciparum Malaria is commonly complicated with renal pathology and as such, it may clinically present with proteinuria. [33]

5.5.2 HIV infection

Sixty-one patient (49.59 %) were positive for HIV infection serologically and this was significantly associated with proteinuria (p value = 0.0201). Of the 61 patient with HIV seropositivity,28 (45.9 %) had significant proteinuria and the odds ratio suggests that proteinuria is 2.44 times more likely to occur in patients serologically positive for HIV type 1 and 2. Recent studies have shown that HIV directly damages the renal parenchyma and the most common histopathologic abnormalities found in HIV associated nephropathy include collapsing focal segmental glomerulosclerosis, microcystic dilation of renal tubules, lymphocytic interstitial infiltrates, and interstitial fibrosis. It has also been revealed that HIV associated nephropathy is more strongly associated with the black race and that

more than half of the world HIV infected population lives in the Sub-Saharan Africa. [2–4, 35] In the near future it is more likely that quite a number of patients will be presenting with HIV associated nephropathy with the introduction highly active antiretroviral therapy.

5.3 Failure to thrive

Failure to thrive is a nonspecific clinical condition with a wide aetiological diversity. Recently, it has been included in the list of AIDS defining conditions more so in children (World Health Organization). This condition or variable was asked for in the past medical history and results of the analysis showed that 13.1 % (16) of the patients had significant proteinuria and that failure to thrive had a significant association with proteinuria (p value = 0.0270). The odds ratio indicates that patients with failure to thrive have a 2.53 likelihood of presenting with proteinuria and it is now being postulated that the HIV infection may have a tropism for the kidneys and that the kidneys may serve as a resevir for HIV infection. [2-4, 35]

.4 Acute Diarrhoea Disease.

In the review of symptoms in the gastro-intestinal system it was shown that 38 (31.4 %) patient had some acute diarrhoeal disease of which 7 (18.4 %) had statistically significant proteinuria (p value = 0.0270). The odds ratio indicates that patients with acute diarrhoea disease had a 4.06 likelihood of presenting with proteinuria.

Acute Diarrhoea Disease is a very common presentation to the Paediatric Department of UTH. Some patients admitted to UTH usually have moderate to severe dehydration complicated with shock and herbal toxicity. This is so because parents are eager to stop the diarrhoea and so they use traditional herbal medication before seeking medical help at their local clinics. *Hypovolaemia due to dehydration has been implicated in pre-renal failure* resulting in ischaemic damage to renal tubules. [19, 20]

5.5 Prematurity

A total of 3 patients had their birth history complicated with prematurity of which tha analysis showed an undefined association with proteinuria though the p-value of 0.0182 was statistically significantly associated with proteinuria.. The relative risk suggests that patients with birth history of prematurity had a 2.95 likelihood of presenting with proteinuria. Premature patients may present with physiologic proteinuria which varies with age and the size of the child and besides their kidneys are immature. [11]

5.6 Hepatitis

Hepatitis surface antigen test for hepatitis was found positive in 8 (6.5 %) patients of which 1 (12.5 %) had significant proeinuria and this was not statistically significant (p value = 0.8268). The odds ratio suggests that patients with positive hepatitis surface antigen had a 1.16 likelihood of presenting with proteinuria. Worldwide, hepatitis B (HBV) infection is an important cause of nephrotic syndrome. The typical histological renal lesion in nephritic syndrome caused by HBV is membranous glomerulonephropathy. [36]

5.7 Syphilis

There were 10 (8.1 %) patients with positive VDRL reaction results of which 3 (2.0 %) had significant proteinuria though this was not statistically significant (p value = 0.7711). The odds ratio suggests that patients with positive hepatitis surface antigen had a 1.22 likelihood of presenting with proteinuria. It is not known whether syphilis is associated with any nephropathy presenting with proeinuria. VDRL test is non-specific for syphilis and hence the result thereof in this study can not solely be attributed to it though the association with nephritic syndrome presenting proteinuria is known.

5.8 Streptococcal infection

Group A streptococcus is a common pathogen of associated with skin, throat and other specific infections. Some of these infections may be mild and of short duration but others are fulminating and life threatening. The dangers resulting from group A streptococcal infections are delayed, non-suppurative complications of the kidneys and the heart manifesting as an acute nephritis and acute rheumatic fever respectively. [37]

ASOT test analysis of streptococcal infectionwas positive in 45 (36.6 %) patient of which 5 (11.1 %) had significant proteinuria and this was not statistically significantly associated (p value = 0.6682). However, a history of sore throat as inquired in the patients' review of the respiratory system could suggest the possibility of streptococcal infection. In this study 34 (28.1 %) patients had a history of sore throat of which 5 (14.7 %) had statistically significant proteinuria (p value = 0.0250). there were also 43 (35.2 %) who had significant proteinuria and this was not a statistically significant association (p value = 0.2106).

5.9 Urinary tract infection

UTI is a common cause of hospitalization and morbidity in children and its incidence varies with sex and age. Surveys of children attending outpatient services have reported the frequencies of UTI ranging from 0.4 to 5 percent. In neonates, there is a male predominance with a female to male of 4:1. There is a progressive increase in this ratio to 1.5:1 at two to six months and 10:1 after two years of life. [38]

The diagnosis of UTI was made in three patients (2.4 %) during the study. Dysuria in the review of the genito-urinary system indirectly suggests UTI and it was found in 11 (9.1 %) patients of which 1 (7.43 %) had statistically significant proteinuria (p value = 0.0008). The odds ratio indicates that patients with dysuria have a 10.06 likelihood of presenting with proteinuria.

5.0 LESSON LEARNED FROM THIS STUDY.

6.1 Voluntary Counseling and Testing

Voluntary Counseling and Test (VCT) for HIV infection induced fear and anxiety states in the parents of sick children. VCT needs time, patience and tolerance because it is a process for people involved and can not rushed.

5.6.2 Decision on consent for HIV test

A large number mothers or caregivers consented to have their child tested for HIV infection. However, there were some who did not have the power to make decisions on HIV Counseling and Testing. Their husbands had to be consulted and in addition, there were cases where grandparents interfered in the decision-*making.*

CHAPTER SIX – CONCLUSIONS AND RECOMMENDATION

6.1.0 CONCLUSIONS

6.1.1 Proteinuria is common finding in children admitted to the Department of Paediatric at the UTH. This is as reflected by the 35.8 % prevalence of proteinuria in patients during the thirty days study period and is much higher compared to the figures from studies done in the developed countries.

6.1.2 Proteinuria is found in variety of conditions in patients admitted to the Department of Paediatric at the UTH. The most important ones being malariaq, abnormal urine findings associates with renal disease, prematurity, HIV infectionrespiratory tract infection and failure to thrive to mention just but a few.

6.1.3 Children under the age five years are more likely to present with significant proteinuria.

6.1.4 Female patients tended to have a high prevalence of significant proteinuria compared to male patients even though the male to female ratio is 2:1.

6.1.5 Children from low social economic background tend to have a higher prevalence of proteinuria.

6.2.0 RECOMMENDATIONS

6.2.1 Routine urinalysis should be to be done on all children admitted to the Department of Paediatric at UTH.

6.2.2 Children with proteinuria need to have voluntary counseling and testing for HIV infection.

6.2.3 There is need of a bigger research study of proteinuria because the power of this study is small and to focus on specific disease entities like malaria, HIV infection and many others just to mention but a few.

REFERENCES.

1. Srivastava RN. Isolated asymptomatic proteinuria. Indian J Paediatr 2002 Dec; **69** (12): 1055-8.
2. Awunor-Renner C, Lawande R, Subbuswany SG. Glomerular disease in Adults in the Savannah region of Nigeria. Ann Trop Med Parasitol 1984 Jun; **78** (3): 287-93
3. Strauss J, Abitbol C, Zilleruelo G, Scott G, Paredes A, Malaga S, Montane B, Mitchell C, Parks W, pardo V. Renal disease in children with the acquired immunodeficiency syndrome. N Engl J Med 1989 Sept 7; **321** (10): 625 - 30.
4. Zilleruelo G, Abitbol C, Montane B, Pardo V. Human immunodeficiency virus nephropathy. Paediatr Nephrol 1993; **7**: 220-5.
5. Remuzzil G, Bertani T: Patho-physiology of progressive nephropathies. N Engl J Med 1998; **339**:1448-1456.
6. Remuzzi G, Ruggenenti P, Benigini A: Understanding the nature of renal disease progression. Kidney Int 1997, **51**:2-15.
7. Ikee R, Hemmi N, Saigusa T, Namkoshi T, Yamada M, Imakire T, Kikuchi Y, Suzuki S, Moriya H, Kobayashi S, Miura S: Pathological analysis of renal diseases with mild proteinuria. Nippon Jinzo Gakkai Shi 2002 Dec; **44**(8): 786 - 91.
8. Ojogwu LI: Persistent proteinuria in asymptomatic individuals: Renal biopsy studies. Trop Geogr Med 1985 Mar; **37**(1): 69 - 73.
9. Springberg PD, Farrett LE Jr, Thompson AL Jr, Collins NF, Lordon RE, Robinson RR. Fixed and reproducible orthostatic proteinuria: results of a 20-year follow-up study. Ann Intern Med 1982; **97**: 516-9.
10. Miltényi M. Urinary protein excretion in healthy children. Clin Nephrol 1979; **12**: 216-21.
11. Arant BS Jr. Developmental patterns of renal functional maturation compared in the human neonate. J Paediatr 1978;**92**: 705-12.
12. Feld LG, Schoeneman MJ, Kaskel FJ. Evaluation of the child with asymptomatic proteinuria. Paediatr Rev 1984; **5**: 248-54.

13. Dodge WF, West EF, Smith EH, Bruce Harvey 3d. Proteinuria and hematuria in school children: epidemiology and early natural history. J Paediatr 1976; **88**: 327-47.

14. Vehaskari VM, Rapola J. Isolated Proteinuria: analysis of a school-age population. J Paediatr 1982; **101:** 661-8.

15. Randolph MF, Greenfield M. Proteinuria: a six-year study of normal infants, pre-school, and school-age populations previously screened for urinary tract disease. Am J Dis Child 1967; **114**: 631-8.

16. Wagner MG, Smith FG Jr, Tinglof BO Jr, Cornberg E. Epidemiology of Proteinuria. A study of 4,807 school children. J Paediatr 1968; **73**:825-32.

17. Norman ME. An office approach to haematuria and proteinuria. Paediatr Clin North Am 1987; **34**:545-60.

18. Ettenger RB. The evaluation of the child with Proteinuria. Paediatr Ann 1994; **23**: 486- 94.

19. Mahmoud LA: Evaluating Proteinuria in Children. Copyright (C) 1998 by the American Academy of Family Physicians; http://www.aafp.org/afp/981001ap/981001b.html.

20. Abitbol C, Zilleruelo G, Freundlich M, Strauss J. Quantitation of Proteinuria with urinary protein/creatinine ratios and random testing with dipsticks in nephrotic children. J Paediatr 1990; **116**: 243-7.

21. Heptinstall RH, Ed. Pathology of the Kidney. 4th Ed. Boston: Little, Brown. 1992: 35.

22. Kanwar YS. Biophysiology of glomerular filtration and proteinuria. Lab Invest 1984; **51**: 7-21.Tomlinson PA.

23. Low molecular weight proteins in children with renal disease. Paediatr Nephrol 1992; **6**: 565-71.

24. Houser MT, Jahn MF, Kobayashi A, Walburn J. Assessment of urinary protein excretion in the adolescent: effect of body position and exercise. J Paediatr 1986; **109**: 556-61.

25. Kelly NR, Ellis EN. Proteinuria in children. J Ark Med Soc 1991; **88**:219-23.

26. McElderry LA, Tarbit IF, Cassells-Smith AJ. Six methods for urinary protein compared. Clin Chem 1982; **28**: 356-60.

27. Houser M. Assessment of Proteinuria using random urine samples. J Paediatr 1984; **104**: 845-8.

28. Ginsberg JM, Chang BS, Matarese RA, Garella S. Use of single voided urine samples to estimate quantitative proteinuria. N Engl J Med 1983; **309**:1543-6.

29. Schwab SJ, Christensen RL, Dougherty K, Klahr S. Quantitation of Proteinuria by the use of protein-to-creatinine ratios in single urine samples. Arch Intern Med 1987; **147**: 943-4.

30. Sundar Rao P.P.S. and Richard J. An introduction to bistatics (Manual for students in health sciences). Prentice-Hall of India, New Delhi. **Third edition © 1996**, page 204

31. Kenneth J. Rothman. An introduction – Epidemiollogy. Oxford University Press - USA. **First edition © 2002**: Chapter 6 and 7, page 113 – 143.

32. Pagano M. and Gauvreau K. Principles of Biostatics: Duxbury (Thomson learning) **Second edition © 2000**, Chapter 15, pages 342 – 357.

33. M. W. Weber, U. Zimmermann, M. B. van Hensbroek, J. frenkel, A. Palmer, J. H. H. Ehrich and B. M> Greenwood - Renal involvement in Gambian children with cerebral or mild malaria. Tropical Medicine and International Health **1999; 4: number 5:** 390 - 394

34. FE Ikimalo, FU Eke, KEO Nkanginieme, J Ikimalo - Urinary Screening for Detection of Asymptomatic Haematuria and Proteinuria in Children in Urban and Periurban Schools in Port Harcourt. Nigerian Journal of Paediatrics 2003; **30:** number 1.

35. Michael J. Ross and Paul E. Klotman - Recent Progress in HIV-Associated Nephropathy. J Am Soc Nephrol 2002; **13:** 2997-3004.

36. F L Connor, A R Rosenberg, S E Kennedy and T D Bohane - HBV associated nephrotic syndrome: resolution with oral lamivudine. Archives of Disease in Childhood 2003; 88:446-449.

37. P. Stanfied, M. Brueton, M. Chan, M. Parkin and T. Waterson – Diseases of Children in the Subtropics and Tropics. Butler & Turner Ltd, Frome and London, 4th Edition © 1991, Chapter 4, page 514.

38. P. Stanfied, M. Brueton, M. Chan, M. Parkin and T. Waterson – Diseases of Children in the Subtropics and Tropics. Butler & Turner Ltd, Frome and London, 4th Edition © 1991, Chapter 6, page 786

APPENDIX

P VALUE

The *p* value is used to determine the presence or absence of *statistical signifince.* This tells whether the p value is less than some arbitrary value, almost always 0.05. Statistical hypothesis testing is predicated on statistical significance as determined from the *p* value. Typically if an analysis gives a result that is statistically significant, the null hypothesis is reject as false. If a result is not statistically significant, it means that the null hypothesis cannot be rejected. It does not mean that the null hypothesis is correct. No data analysis can determine definitely whether the null hypothesis, or any hypothesis, is true or false. [30]

ODDS RATIO AND RELATIVE RISK

The ***Relative Risk*** (RR), is the chance that a member of a group receiving some exposure will develop disease relative to the chance that a member of the unexposed group will develop the same disease. It is defined as the probability of the disease in the exposed group divided by the probability of the disease in the unexposed group. The ***odds ratio*** (OR), is defined as the odds of disease among exposed individual divided by the odds among the unexposed. The RR and the OR are two different measure that attempt to explain the same phenomenon. In both measures a value of 1.0 indicates that the exposure does not have an effect on the probability of the disease. [31]

THE CHI-SQUARE

The ***Chi-square*** is the statistic, which measures the 'divergence' of the fact from the hypothesis in the sample at hand. It is used to test whether two variables or attributes are independent or unrelated. The larger the divergence between the observed and theoretical frequency, the larger the chi-square. Chi-square value less than 5 are considered statistically insignificant. [32]

BUDGET

ITEM	QUANTITY	COST (KWACHA)
- Payments for resource personnel		
1. Biostatician	x1	K5, 000,000.00
(@ K125, 000.00 per hr x8 hrs x5 days)		
2. Research assistant	x2	K3, 000,000.00
(@ K50, 000.00 per day x30 days)		
- Multistix dipsticks (100 sticks per container)	x2 @ K150, 000.00	K300, 000.00
- Sterile Universal containers	x100 @ K1, 600.00	K160, 000.00
- Paediatric Urine collection bags	x200 @ K4, 500.00 each	K450, 000.00
- Blood slides (100/pack)	x2 pack @ K45, 000.00	K90, 000.00
- Lancets (200/pack)	x1 @ K50, 000.00	K50, 000.00
- Blood specimen bottle (plain)	x200 @ K1, 000.00 each	K200, 000.00
- Blood specimen bottle (EDTA)	x150 @ K2, 000.00 each	K300, 000.00
- Test kits for HIV-1, 2 (100 per pack)	x1 @ K600, 000.00	K600, 000.00
- Test kits for ASOT (100/pack)	x1 @ K250, 000.00	K250, 000.00
- Test kits for HbsAg (100/pack)	x1 @ K600, 000.00	K600, 000.00
- Test kit for VDRL (100/pack)	x1 @ K250, 000.00	K150, 000.00
- Needles	x200 @ K200.00 each	K40, 000.00
- 10 ml syringes	x200 @ K500.00 each	K100, 000.00
- Plain paper rims A4)	x6 @ K30, 000.00	K180, 000.00
- Printing dissertation	x4 copies @ K80, 000.00 each	K320, 000.00
- Binding dissertation	x4 copies @ K100, 000.00 each	K400, 000.00
- Incidentals (Miscellaneous)		K500, 000.00
	TOTAL	**K12, 690, 000.00**

INFORMATION SHEET

A. Participant (Parent or Guardian)

I voluntarily consent to my child and I taking part in the research study. If we do meet the criteria, we would like to be enrolled in the study. I may decide to withdraw my child from the study at any time without penalty or loss of benefits or treatment to which the child is entitled. I may be withdrawn from the study without my consent by the doctor conducting the research study.

I have been informed that Proteinuria is a term that describes the presence of protein in urine. It is tested by a simple method of dipping a special paper coated with special chemical that detect protein in urine. Its presence in urine can signify either a normal finding or a very serious disease. Conditions that cause or result with protein in urine are many and varied. It can happen in normal conditions like physical exercises, anxiety and in disease conditions like malaria, HIV infection or infected sores on the skin to mention just but a few.

I have had the opportunity to ask the Doctor/Nurse/Counselor questions about this study and have received satisfactory answers to all my questions in a language that I can understand. I will have the opportunity to have all my future questions answered satisfactorily. I will be given a signed copy of the consent form. I understand the conditions and procedures involved, and I know what the possible risks and benefits are from taking part in this study. I do not give up my legal rights by signing this form. I give my voluntary informed consent for the child and I to take part in the research study.

_____ _____

Name of Parent/Guardian (Print) Signature or thumbprint of Parent/Guardian

Date _____

Name of Witness (Print) _____ Signature or thumbprint of Witness _____

Date _____

B. Official (Principal Investigator)

I have explained the purpose of this study to the volunteer. To the best of my knowledge, the parent/guardian understands the purpose, procedures, risks and benefits of the study.

Name of Physician _____ Signature or thumbprint of Physician _____

Date _____

Principal Investigator: Dr. Kapakala Mwewa Thomas
Department of Paediatrics and Child health
University Teaching Hospital
P.O. Box R.W. 1X
Lusaka, Zambia.

PARENT/QUARDIAN CONSENT FORM

I _____, consent to my child taking in the Proteinuria research study. The study has been explained to me in a language that I understand and I have had an opportunity to ask questions about the study and I have received satisfactory answers.

I agree that samples of my child's urine (5mls), blood slide and blood (5mls) be taken and tested for the presence of proteins, Plasmodium falciparum malaria parasite, the human immunodeficiency virus (HIV), the anti-streptolysin O titer (ASOT) and the hepatitis B virus. I have been given an option for voluntary counseling and testing for HIV in case I want to know the HIV status of my child. The potential use of the tests, their limitation and the meaning of the results have been explained to me.

I understand that the test results will become part of my child's permanent medical records, and I have the right to confidential treatment of its contents. Nonetheless, the hospital may release my records to: Hospital staff participating in the administration and provision of the care for my child at the hospital; those undertaking appropriate research, who have need to know my child's HIV test's result; or those persons to whom the hospital by law may disclose my child's medical records.

_____ _____

Name of Parent/Guardian (Print) Signature or thumbprint of Parent/Guardian

Date _____

_____ _____

Name of Witness (Print) Signature or thumbprint of Witness

Date _____

Department of Paediatrics and Child health
University Teaching Hospital
P.O. Box R.W. 1X
Lusaka, Zambia.

QUESTIONAIRE.

A SURVEY OF PROTEINURIA IN CHILDREN ADMITTED AT THE UNIVERSITY TEACHING HOSPITAL

SOCIO-DEMOGRAPHICS:

1. Date of study entry: __ /__ /__.

2. UTH file number_____

3. Study ID number_____

4. Sex: M / F

5. Age (years)____

6. Date of birth: __ / __ /____ Unknown [ ]

7. Nationality: i) Zambian [ ] ii) Others [ ] (specify)_____

8. Tribe i) Bemba [ ] ii) Nyanja [ ] iii) Tonga [ ]
   iv) Lozi [ ] v) Kaonde [ ] vi) Lunda [ ]
   vii) Luvale [ ] viii) Others [ ]

9. Religion: i) Traditional [ ] ii) Christian [ ] iii) Hindu [ ]
   iv) Islam [ ] v) Others [ ] Specify _____

10. Residential address

_____

_____

_____

11. Postal Address

_____

_____

_____

12. Telephone: _____ Fax: _____

13. Relationship with guardian: _____

HISTORY OF ILLNESS:

1. PRESENTING COMPLAINTS

(a) _____

(b) _____

(c) _____

(d) _____

(e) _____

2. DURATION OF ILLNESS:

(a) Days [ ] (b) Weeks [ ] (c) Months [ ] (d) Years [ ]

3. DEVELOPMENT OF ILLNESS:

_____

_____

_____

_____

_____

_____

4. SYSTEMIC INVOLVEMENT:

(i) Central nervous system

a. Headache [ ]
b. Fits [ ]
c. Blurred vision [ ]
d. Dizziness [ ]
e. Hallucinations [ ]
f. Abnormal behavior [ ]
g. Others [ ]

(ii) Respiratory system

a. Sore throat [ ]
b. Ear discharge [ ]
c. Cough [ ]
d. Dyspnoea [ ]
e. Sneezing [ ]
f. Wheezing [ ]
g. Chest pain [ ]
h. Haemoptysis [ ]
i. Others [ ]

(iii) Cardiovascular System

a. Heart palpitation [ ]
b. Edema [ ]
c. dyspnoea [ ]
d. Orthopnoea [ ]
e. Paroxysmal nocturnal dyspnoea [ ]
f. Other [ ]

(iv) Gastro-intestinal system

a. Anorexia [ ]
b. Vomiting [ ]
c. Emetemisis [ ]

d. Diarrhoea [ ]
e. Malaena [ ]
f. Blood per anus [ ]
g. Oral sores [ ]
h. Anal sores [ ]
i. Weight loss [ ]
j. Others [ ]

(v) Genito-urinary System

a. Facial puffiness [ ]
b. Dysuria [ ]
c. Haematuria (gross) [ ]
d. Frothiness of urine [ ]
e. Polyuria [ ]
f. Oliguria [ ]
g. Anuria [ ]
h. Genital sores [ ]
i. Poor urine stream [ ]
j. Penile or vaginal discharge[ ]
k. Other [ ]

(vi) Musculo-skeletal system

a. Skin lesions/rash [ ]
b. Joint pains [ ]
c. Joint effusion [ ]
d. Lumps/masses [ ]
e. Bone fracture [ ]
f. Bone pains [ ]
g. Body or limb oedema [ ]
h. Others [ ]

5. PAST MEDICAL HISTORY -

A. Has the child ever had or is he/she having any of the following illness: -

- Sore throat Y / N / D
- Skin rash/sores Y / N / D
- Measles Y / N / D
- Asthma Y / N / D
- Sickle cell Disease Y / N / D
- Diabetes Y / N / D
- Tuberculosis Y / N / D
- Cancer Y / N / D
- PEM Y / N / D
- Failure to Thrive Y / N / D
- Falciparum Malaria Y / N / D
- Hepatitis (yellow eyes) Y / N / D
- Others Y / N / D

Specify (If yes) _____

B. In the last 12 months has the child had any of the following conditions: -

- Recurrent or diarrhoea for > one monthY / N / D
- Recurrent or fever for > one month Y / N / D
- Recurrent or cough for > one month Y / N / D
- Recurrent or ear discharge for > one month Y / N / D
- Skin lesion or sores Y / N / D
- Enlarged lymph nodes Y / N / D
- Recurrent oral thrush Y / N / D
- Herpes zoster Y / N / D
- Weight loss Y / N / D
- Enlarged parotid glands Y / N / D

C. How many times has the child had the following symptoms in the past 2 years?

- Painful micturation _____

- Penile or vaginal discharge _____
- Genital ulcer or sores _____
- Haematuria (macro or micro) _____
- Puffiness of face _____
- Skin rash or sores _____
- Others (_____) _____

D. Treatment received within the past one year.

- Antibiotics Y / N / D
- Chemotherapy Y / N / D
- IV or IM injections Y / N / D
- Anal or vaginal herbs Y / N / D
- Anti - TB drugs Y / N / D
- Traditional scarifications Y / N / D
- Haematenics Y / N / D
- Multivitamin Y / N / D
- Blood transfusion Y / N / D

6. BIRTH HISTORY -

(i) Maternal antenatal registration

a) Early (within 12 weeks) [ ] b) Late (After 12 weeks) [ ]

(ii) Maternal antenatal illness a) Yes [ ] b) No [ ]

If yes, specify : _____

_____

(iii) Maternal antenatal visits:

a) Regular (attended all or missed one visit) [ ]

b) Irregular (missed two or more visits consecutively) [ ]

c) None (did not attend at all) [ ]

(iv) Mode of birth:

a) SVD [ ] b) C/S [ ] c) Vac. [ ] d) Forceps [ ]

(v) Birth weight (KG)

a) >3.0 [ ] b) 2.6 - 3.0 [ ] c) 2.1 - 2.5 [ ] d) 1.6 - 2.0 [ ]

e) < or 1.5 [ ]

(vi) Complications

- Birth trauma ____
- Septicaemia ____
- Asphyxia ____
- Anaemia ____
- Aspiration ____
- Prematurity ____
- Others ____
- None ____

7. DEVELOPMENTAL HISTORY -

(i) Milestones:

1. Age in months at first social smile ____
2. Age in months at sitting without support ____
3. Age in months at crawling ____
4. Age in months at standing ____
5. Age in months at walking ____
6. Age in months at talking ____

Comment on the milestones:

(a) Normal [ ] (b) Arrested [ ] (c) Delayed [ ]

(Specify if (b) or (c)_____)

(ii) School:

(a) Nursery [ ] (b) Primary [ ] (c) Secondary [ ] d) None [ ]

(iii) Performance at school (? Class position at examinations):

(a) Above average [ ] (b) Average [ ] c) Below average [ ]

9. NUTRITIONAL HISTORY (If child less than 2 years of age) -

i. Exclusive Breast feeding: - a) Yes [ ] b) No [ ]

Duration in months of exclusive breast-feeding: _____

ii. Age in months when other food were introduced or supplemented _____

iii. Age in months when patient stopped breast-feeding _____

iv. What foods does the patient eat at home?

_____

_____

_____

v. How often or frequent does the patient eat? _____

10. FAMILY / SOCIO-ECONOMIC HISTORY -

(i) Family size: (a) Number of sisters_____

(b) Number of brothers_____

(ii) Position in Family: _____

(iii) Number of rooms in the house: _____

(iv) Number of occupants in the house including dependants: _____

(v) Any Paediatric deaths? Y / N

If yes, specify who, when, age and cause of death:

_____

_____

_____

(vi) Any of the following illnesses in the family?

- Sickle cell disease Y / N
- Diabetes Y / N
- Asthma Y / N
- Hypertension Y / N
- Epilepsy Y / N
- Bleeding disorders Y / N
- Cancers Y / N
- Other Y / N

(Specify_____)

(vii) Similar illness in any member of the family? Y / N

(viii) TB contact? Y / N Treatment? Y / N

(ix) Father: (a) Healthy [ ] (b) Sick [ ] (c) Deceased [ ]

Specify illness or cause of death_____

- Occupation: _____

- Education:

a) None [ ] b) Primary [ ] c) Secondary [ ] d) College [ ]

(x) Mother: (a) Healthy [ ] (b) Sick [ ] (c) Deceased [ ]

(If sickly or dead, specify: _____)

- Occupation: _____

- Education:

a) None [ ] b) Primary [ ] c) Secondary [ ] d) College [ ]

- Family income per month: -

> K 1,000,000 [ ]

K 500,000 - K 1,000,000 [ ]

K 250,000 - K 500,000 [ ]

K 100,000 - K 250,000 [ ]
< K 100,000 [ ]
None [ ]
Don't know [ ]

YSICAL EXAMINATION:

GENERAL:

a) Consciousness – 1. Full [ ] 2. Semi [ ] 3. Coma [ ]

b) Orientation in time, place and person: 1. Good [ ] 2. Poor [ ].

c) Hair– 1. Normal [ ] 2. Abnormal [ ]
Specify if abnormal _____
_____

d) Pallor – 1. Absent [ ] 2 Present [ ]

e) Cyanosis - 1. Absent [ ] 2. Present [ ]
(If present - Is it Peripheral [ ] or Central [ ])

f) Lymphadenopathy – 1. Absent [ ] 2. Present [ ]
(Specify size, nature and site if present _____
_____
_____)

g) Oedema – 1. Absent [ ] 2. Present [ ]
(Specify nature and site if Present_____
_____)

h) Clubbing – 1. Absent [ ] 2. Present [ ]
(Specify degree -_____
_____)

i) Nail Changes – 1. Absent [ ] 2. Present [ ]
(Specify degree -_____
_____)

j) Skin Rashes – 1. Absent [ ] 2. Present [ ]
(Specify site, size and nature_____
_____
_____)

k) Eyes (Comment_____
_____
_____)

m) Ears (Comment_____
_____
_____)

n) Oral cavity (Comment_____
_____
_____)

o) Nose (Comment_____
_____
_____)

p) Weight in Kg ____ (Comment_____)

q) Blood Pressure in mm Hg _____ (Comment_____
_____)

r) Pulse rate____

(Comment_____

_____)

s) Respiratory rate ____ (Comment_____)

t) Temperature ____ (Comment _____)

SYSTEMIC EXAMINATION: (Specify if any abnormality)

a) Central nervous system:

_____

_____

_____

_____

b) Respiratory system:

_____

_____

_____

_____

c) Cardiovascular System:

_____

_____

_____

_____

d) Gastro-intestinal System:

_____

_____

_____

_____

e) Genito-urinary System:

_____

_____

_____

_____

f) Musculo-skeletal System:

_____

_____

_____

_____

3. RESULTS OF THE LABORATORY TESTS:

a. Multistix Urinalysis

	Neg.	**Trace**	**+1**	**+2**	**+3**	**+4**
Proteins						
Blood						
Haemoglobin						
Urobillinogen						
Bilirubin						
Leukocytes						
Nitrites						
Glucose						
Ketones						
Specific gravity						
PH						

b. Blood slide for Plasmodium Falciparum malaria parasite:

i. Nil [ ] **ii.** MP +1 [ ] **ii.** MP +2 [ ] **iv.** MP +3 [ ] **v.** MP +4 [ ]

c. HIV 1 and 2: i. Non - reactive [ ] **ii.** Reactive [ ]

d. **HBsAg:** **i.** Non - reactive [ ] **ii.** Reactive [ ]

e. **Urine Culture results:** _____

f. **Full blood Count:**

WBC

RBC

HB

Platelets

MCV

MCH

g. **ESR (mm/hr);** _____