

## Original article

# The changing pattern of diseases in the Mid 1990's: experience of a teaching hospital in North Western Ethiopia

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**Abstract:** Between October 1994 and September 1995 consecutive adult medical admissions to the Gondar College of Medical Sciences (GCMS) teaching hospital were studied prospectively. The final diagnoses made or verified by consultant physicians before discharge or death were used for analysis. The median age was 30 years (range 12-98). Those below 50 and 40 years constituted 80.6% and 66.7%, respectively. Male to female ratio was 1.05:1.00. The median duration of hospital stay was 12 days (range 1-141). Tuberculosis and Insulin dependent Diabetes Mellitus were diseases associated with prolonged hospitalization, [OR, 95% CI = 4.66 (3.46, 6.29) and 2.4 (1.51, 3.83), respectively]. Of all admissions, 458 (40.2%) were screened for human immuno deficiency virus (HIV) and 232 (50.6%) were positive. The top ten diseases responsible for admissions, in order of decreasing frequency, were as follows: tuberculosis (25.4%), anaemia (6.5%), acute gastroenteritis and colitis (6.1%), diabetes mellitus (6.0%), pneumonia (5.9%), chronic diarrhea (4.96%), falciparum malaria (4.6%), chronic liver disease (4.2%), severe hypertension (4.2%), and stroke (3.0%). The mortality rate was 19.1%, which is high in comparison with similar reports from elsewhere. Tuberculosis and central nervous system diseases were the leading causes of hospital mortality, accounting for 35% and 18% of all deaths, respectively. There is a striking change in the pattern of diseases responsible for hospitalization compared to reports in the past. There is no study that revealed a single disease to be responsible for more than 20% of hospitalization except tuberculosis in this report. In addition, anaemia, chronic diarrhea, diabetes mellitus, hypertension, stroke and intracranial space occupying lesions were increasingly encountered. This marked change in pattern is partly explained by the current pandemic of human immuno deficiency virus/acquired immuno deficiency syndrome (HIV/AIDS) but other factors remain to be explained. [*Ethiop. J. Health Dev.* 1999;13(1):1-7]

## Introduction

Analysis of hospital admissions to study the disease patterns in the community has various limitations, for example, selection of very ill patients, those who are able to pay and whose home happens to be near the hospital. However, such analyses provide valuable information about severe forms of illnesses and help to identify diseases which are common and those which are rare. It also provides basis for comparison of the pattern with other communities as well as with the past situation in the same area so that any change can be identified and reasonably discussed.

There has been reports of medical admissions from Gondar since 1950's (1,2) and from other parts of Ethiopia (3-6). Literature review reveals that there is no such report from Ethiopia in general and

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from Gondar in particular in the past one and half decades where the HIV pandemic might have significantly changed the disease pattern.

This study is therefore undertaken to describe the changing profile of diseases in the GCMS teaching hospital during one year. The results could help health workers practising in the area to know the most frequent and severe forms of illnesses. Health policy makers could also utilize the findings to undertake public health measures against common and serious diseases responsible for hospitalization in the region.

**Methods**

This prospective longitudinal study was done at the GCMS teaching hospital between October 1994 and September 1995. The hospital is located in Northwestern Ethiopia, 748 kms away from the capital, Addis Ababa. It is a referral hospital with 350 beds of which 84 are medical.

All consecutive adult medical admissions to this hospital in the study period were included. Patient care was jointly accomplished by consultant physicians (Internists), General Practitioners, and Interns.

Discharge diagnosis was established based on history, physical examination, and the various laboratory, radiologic and histopathologic investigations. It was always verified by Internists before discharge or death. Only the disease responsible for hospitalization is taken as the cause of admission when patients had more than one diagnosis. For analysis of tuberculosis, we also used patients who were primarily admitted with other diagnosis but who also have confirmed active tuberculosis.

Data on each patient were collected on discharge or death using a pre-tested questionnaire that included age, sex, duration of hospital stay in days, disease responsible for admission based on the final diagnoses, human immuno-deficiency virus (HIV) status based on the Serum Enzyme Linked Immuno Sorbant Assay (ELISA) in suspected patients and outcome. It was not possible to test all patients for ethical reason. Patients were said to be HIV suspects whenever they present with HIV related diseases such as chronic diarrhea, tuberculosis, chronic meningitis, stroke in young patients (age <50 years) and others. Some suspected patients were not tested because of the shortage of kits at the time of their admission. Pregnancy status was recorded.

The outcome was recorded as cure, improvement, no change, deterioration or death.

Comparisons were made with similar studies from 1960's and 1970's. These studies were done in a set up with similar diagnostic facilities and used a similar method of disease classification.

The data were entered in a computer using EPI Info version 5 statistical package and analysed. Odds Ratio (OR) with 95% confidence interval (CI) were used to compare proportions, when required.

**Results**

Out of the total of 1139 consecutively admitted patients in the study period, 583 (51.2%) were males and 556 (48.8%) were females. The median age was 30 years (range=12-98). The age and sex distribution is shown in Table 1.

The changing pattern of diseases in mid 1990's 3

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Table 1: **Age and sex distribution of hospitalized adult medical patients, GCMS hospital, 1994-1995.**

Age group (Years)	Male		Female		Total	
	No .	(%)	No.	(%)	No.	(%)

10-19	36	(3.2)	68	(6.0)	104	(9.2)
20-29	172	(15.1)	192	(16.8)	364	(31.9)
30-39	161	(14.1)	131	(11.5)	292	(25.6)
40-49	93	(8.2)	65	(5.7)	158	(13.9)
50-59	41	(3.6)	52	(4.6)	93	(8.2)
60-69	49	(4.3)	33	(2.9)	82	(7.2)
70-79	24	(2.1)	13	(1.1)	37	(3.2)
80+	7	(0.6)	2	(0.2)	9	(0.8)
Total	583	(51.2)	556	(48.8)	1139	(100)

The median duration of hospitalization was 12 days (range=1-141 days). Of the top ten diseases, tuberculosis and diabetes mellitus were associated with prolonged hospitalization, [OR, 95% CI = 4.66 (3.46, 6.29) and 2.41 (1.52, 3.83)], respectively. On the other hand, acute gastroenteritis and pneumonia were associated with short hospital stays, OR (95% CI) = 0.42 (0.29, 0.62) and 0.53 (0.37, 0.76), respectively. There was no significant difference among the rest.

There were no significant differences among the different months of the year regarding the total number of cases admitted. The number of malaria cases showed a seasonal variation, such that 75% of all malaria patients were seen in the months of May, June, September, October, and November. The general pattern of admission based on the systems involved is shown in Table 2.

Table 2: **Comparison of frequency of affected systems responsible for admissions in different Ethiopian studies.**

Systems Involved	Frequency (%)				
	Present	Study	According to References		
			1	2	3
TB	25.4	6.5	5.0	6.1	
GI	11.4	21.9	16.0	10.5	
RS	10.0	9.7	10.0	11.0	
CVS	8.4	5.4	9.0	8.5	
CNS	8.0	5.8	4.0	2.5	
HS	7.3	5.9	2.0	0.5	

#### 4 Ethiop.J.Health Dev.

HB	7.3	6.7	15.0	10.5
EM	6.5	3.3	5.0	4.0
AFI	5.5	17.5	19.0	7.9
GUS	4.0	4.4	6.0	6.0
Others	6.2	12.3	9.0	--

TB = tuberculosis, GI = Gastro - intestinal, RS = respiratory system,  
CVS = cardio vesicular system, CNS = central nervous system,

HS = haematologic system, HB = Hepato biliary, EM = endocrine & metabolic, AFI = acute febrile illnesses,  
GUS = genito urinary system

Tuberculosis was the commonest cause of morbidity and mortality in this series. It primarily accounted for 289 (25.4%) of all admissions and for more than a third (35%) of deaths that occurred. Out of the 355 tuberculosis patients analysed, 66 cases were primarily admitted with other diagnoses. The various forms of tuberculosis, their HIV serology results and mortality are shown in Table 3.

Out of those responsible for admission, pulmonary tuberculosis accounted for 133 (46%), disseminated disease for 136 (47%) and the remaining 20 (7%) were extra pulmonary. Out of all the 355 tuberculosis patients, 141 (40%) were positive for HIV infection, 166 (47%) were negative, and for 48 (13%) the sero-status was not known. When those patients with unknown sero-status are excluded from the denominator, the proportion increased to 46%. The over all case fatality rate of tuberculosis patients was 22.8% (Table 4), occupying fourth place, after chronic liver disease (35.6%), stroke (31.8%), and severe falciparum malaria (24.6%). Overall, four hundred and fifty eight cases (40.2%) were

Table 3: **Forms of tuberculosis, HIV serology and outcome of adult hospitalized medical patients, GCMS hospital, 1994-19945**

Forms of TB	HI V Status					
	No	(%)	+ (%)	- (%)	NS(%)	Mortality (%)
Disseminated	158	(45)	51.4	48.6	11.3	29.1
Pulmonary	150	(42)	41.7	58.3	15.3	18.6
CNS	11	(3)	5/8	3/8	3/11	5/11
Pericardial	10	(3)	6/9	3/9	1/10	--
Gastro-Intestinal	8	(2)	1/7	6/7	1/8	1/8
Pleural	7	(2)	--	5/5	2/7	1/7
Bones and Joints	7	(2)	1/7	6/7	--	--
Miliary	4	(1)	3/4	1/4	--	--
Total	355	(100)	46.0	54.0	13.5	22.8

-deficiency virus, + = positive for HIV, - = negative for HIV, NS = not screened

Note: 66 of TB patients were admitted with other diagnosis. HIV proportions are calculated out of those tested (non tested TB cases are excluded from the denominator)

screened for HIV and 232 (50.6%) were positive. One hundred and forty one (61%) of HIV patients were admitted with various forms of tuberculosis, 55 (24%) with chronic diarrhea, 22 (9%) with pneumonia, and the remaining 13 (6%) with different medical illnesses. The prevalence of HIV among tuberculosis patients tested (non-tested patients excluded from the denominator) was 141 (46%).

Table 4: **Comparison of the frequency of top ten diseases in hospitalized adult medical patients at GCMS teaching hospital (1994-1995) with similar Ethiopian studies in 1960's and 1970's.**

Diagnoses	Present Study		Other studies (References)		
	Prevalence rates (%)	CFR (%)	(1)	(2)	(3)
			Prevalence rates (%)		
TB	25.4	22.8	7.5	5.0	6.1
Anaemia	6.5	9.8	3.1	<1	<1
GE/Co.	6.1	8.2	1.3	5.5	1.6
DM	6.0	9.5	2.7	4.3	3.7
Pneumonia	5.9	12.0	5.4	7.2	5.8
Chronic d.	4.9	20.5	<1.0	<1.0	<10
F. malaria	4.6	24.6	1.7	4.0	<10
CLD	4.2	35.6	4.0	8.4	6.8
Severe HTN	3.7	3.8	<1.0	1.5	1.5
Stroke	3.0	31.8	<1.0	<1.0	2.5

Key CFR = case fatality rate, TB = tuberculosis, GE/CO = gastro-enteritis and colitis, DM = diabetes mellitus d. = diarrhea, F. = falciparum, CLD = chronic liver disease, HTN = hypertension, < = less than.

Gastro-Intestinal diseases were the second common cause of hospitalization that accounted for 129 (11.4%). Of these, 69 (54%) were cases of acute gastro-enteritis and colitis. Fifty six patients

#### The changing pattern of diseases in mid 1990's 5

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 (43%) presented with chronic diarrhea. All except one were HIV positive. The remaining four (3%) cases presented with chronic diarrhea. All except one were HIV positive. The remaining four (3%) cases were admitted with complicated peptic ulcer

## 6 Ethiop.J.Health Dev.

Table 5: Comparison of common diseases that were responsible of  $\geq 2\%$  for all adult medical admissions in GCMS Hospital (1994-1995) with similar reports in Ethiopian Inpatients in 1960's and 1970's

Author Year Town Cases	Molineaux 1966 Gondar 3508	Admassu 1968 Addis Ababa 1013	Pavlica 1970 Addis Ababa (AFH) 3922	Lainovic 1974 Dire Dawa 9330	Lester 1976 Addis Ababa 4640	Present study 1994/95 Gondar 1139
Frequency:						
$\geq 20\%$	--	--	--	--	--	TB
15-19%	--	--	--	--	--	--
10-14%	--	--	Pneumonia malaria Psychiatric	--	--	
5-9%	PTB Pneumonia	Pneumonia L.Cir	PTB L.Cir. Hepatitis i nfluenza	TB (all) L.Cir.	TB (all) Pneumonia	
2-4%	FUO Sch Amoebiasis RF Typhus Malaria Influenza L.Cir. DM Anemia	FUO Malraia TYF RF GE TB Gastritis PUD Hepatitis RHD UTI DM	FUO Malaria URTI GE PUD Asthma Hypertension HCC	RF DM	FUO RF TYF Amoebiasis Hepatitis Gastritis PUD L.Cir. HCC RHC Hypertension DM	HTN Stroke B. Asthma RHD Poisoning ICSOL P.men

Key. AFH = armed forces hospital, TB = tuberculosis, PTB = pulmonay tuberculosis, L. Cir. = liver cirrhosis, GE = gastro-enteritis, FUO = fever of unknown origin, RF = relapsing fever, Sch = schistosomiasis, Mal = malaria, DM = diabetes mellitus, Tyf = typhoid fever, URTI = upper respiratory tract infection, PUD = peptic ulcer isease, HCC = hepatocellular carcinoma, ICSOL = intracranial space occupying lesion, RHD = rheumatic heart

diseases, UTI = urinary tract infection, F. = falciparum, d. = diarrhea, DLD =chronic liver diseases, b. = bronchial asthma HTN = hypertension.

Disease and malignancies, two each.

Respiratory diseases other than tuberculosis stood as the third common disorders responsible for 114 (10.0%) of all admissions. Pneumonia of all forms accounted for 67 (59%), bronchial asthma 35 (31%), and the remaining 12 (10%) were due to lung abscess, chronic obstructive airway diseases, and others.

A total of 91 (8.0%) patients presented with central nervous system (CNS) diseases, including pyogenic meningitis. The causes were as follows: 34 (37%) cerebrovascular diseases, 23 (25%) intracranial space occupying lesions other than tuberculoma, 19 (21%) pyogenic meningitis, eight (9%) chronic meningitis and/or encephalitis and the remaining seven (8%) due to diseases such as cord compression, transverse myelitis, Parkinson's disease, polyneuropathy and others. CNS disorders were causes for 18% of all deaths.

Blood disorders accounted for 83 (7.3%) of all admissions. Anaemia was the leading syndrome, responsible for 74 (89%) of the cases. Majority of anaemic patients 51 (69%) were female of whom 26 (51%) were pregnant on admission. Repeated malarial attack was the leading cause of anaemia. The other haematological diseases were Non Hodgkin's lymphoma (three), Hodgkin's disease (two), chronic myelogenous leukaemia (two), pancytopenia of unknown cause and secondary polycythemia (one each).

Hepato-biliary, splenic, and pancreatic diseases constituted 83 (7.3%) of the cases, of which 56 (67%) were chronic liver disease cases, including six cases of hepato-cellular carcinoma. The rest include acute viral hepatitis (eleven), tropical splenomegaly syndrome (ten), obstructive jaundice (three), drug induced hepatitis (two), and liver abscess (one).

There were 74 (6.5%) cases of endocrine diseases. The majority of the cases were diabetes mellitus 68 (92%), of which 50 (74%) were insulin-dependent diabetes mellitus (IDDM) and 18 (26%) were non-insulin-dependent diabetes mellitus (NIDDM). The rest were thyroid diseases, adrenal disorders, and pituitary diseases, two each. Ninety six (8.4%) patients had cardiovascular diagnosis. Hypertension was the leading disease in this group, responsible for 42 (44%) of the

admissions, followed by rheumatic heart disease that accounted for 33 (28%) cases. The remaining were cardiomyopathy (fifteen), ischaemic heart disease (four), and cor-pulmonale, (two).

There were 63 (5.5%) cases admitted with acute febrile illnesses (AFI) of which the majority 52 (83%) were due to severe falciparum malaria. Others include typhoid fever (six), relapsing fever (three) and fever of unknown origin (two).

Genito-urinary diseases accounted for 46 (4.0%) of all admissions. The common diagnoses were acute pyelonephritis in 24 (52%) and chronic renal failure in 11 (24%). The remaining 24% were acute glomerulone-phritis (three), acute renal failure (three), nephrotic syndrome (three), nephrolithiasis and malignancy (one each).

There were 71 (6.2%) admissions due to miscellaneous causes. These included 26 cases of infection other than AFI, such as tetanus, leishmaniasis and others, 19 cases of poisoning, seven patients with multi system diseases and five cases with skin disorders.

Sixteen (1.4%) patients were undiagnosed. Comparison of the common diseases responsible for  $\geq 2\%$  of all admission in Ethiopian inpatients is shown in Table 5.

The over all mortality rate was 217 (19.1%). When terminal patients discharged, (often against medical advice), were included it increased to 269 (23.6%) (Table 6). The

Table 6: **Outcome of adult hospitalized medical patients in GCMS teaching hospital (1994-1995).**

Outcome	Frequency	(%)
Cured	125	(11.0)
Improved	687	(60.3)
No Change	58	(5.1)
Deteriorated & Discharged	52	(4.5%)
Died	217	(19.1)

majority of the deaths (35%) were due to tuberculosis, followed by central nervous system diseases that accounted for 18% of all deaths.

## Discussion

Most of the patients in this study belong to the young age group with nearly equal male to female ratio. This reflects the age and sex structure of our society (7). A similar finding was reported by others (1-6).

The commonest single disease reported in this series was tuberculosis that accounted for a fourth of all admissions. Although similar studies carried out in the 1960's and 1970's showed tuberculosis to be the commonest cause of hospitalization in Ethiopia (1, 5, 6) and other African countries (8,10), it never exceeded 10% of all admissions. This dramatic increase of cases of tuberculosis, high rate of dissemination to various organs as well as the high fatality rate reported is largely explained by the current pandemic of HIV/AIDS, because tuberculosis is the most common opportunistic infection in developing countries (11-14). These findings were in contrast to the pattern of tuberculosis on hospitalized Ethiopians in the early 1980's (15).

Tuberculosis patients were among those who stayed long in the hospital sharing the greater proportion of the limited resources. This was either for streptomycin injection or for supervised treatment of initial (intensive) phase in defaulters or relapsed diseases. Measures to reduce treatment failures by proper education of patients, use of appropriate regimens and provision of adequate antituberculosis drugs as well as arrangement of injections at nearest health institutions or substitution by a per os (po) medication could solve the problem (16). Similarly duration of



hospitalization of IDDM patients can be shortened by having diabetic nurses that could train the patients how to inject themselves at out-patient level.

In contrast to all other previous similar studies, it is interesting to note that anaemia was the second commonest cause of hospitalization. Although hospital-based studies in Addis Abeba (17), studies on pregnant ladies in South-western Ethiopia (18) and community surveys in North-western Ethiopia (19) showed high prevalence of anaemia, it was not a recognized major cause of admission in similar studies (1-10). Repeated attacks of malaria, often during pregnancy, was the major reason although multiple factors are often involved, like hookworm infection, nutritional disorders, and venesection as it had been described by others (20).

The increased number of cases with acute gastro-enteritis and colitis was due to the repeated outbreaks that occurred in the vicinity of Gondar town during the study period. The organism usually isolated in clinical practice was antibiotic resistant shigella dysenteriae type 1 (Amsel Melka, Unpublished data).

There are other notable differences among certain diseases between the present series and both the previous reports from Ethiopia (1-6, Table 5) and neighbouring African countries (8-10). These include the proportion of chronic diarrhea that accounted for about 5% of all admissions, in contrast to all other similar studies referred above. Nearly all of these cases were HIV positive.

As shown in other sub-Saharan countries (21, 22), a considerable proportion (25%) of our HIV/AIDS patients presented with chronic diarrhea. Similarly, intracranial space-occupying lesions have unusually come into the picture being responsible for 2% of all admissions while there was no mention of this diagnosis in previous similar studies (1-10). Almost all, 19/20 (95%), were HIV positive and all were below age forty- a usual finding elsewhere (23). The specific diagnoses were not reached because of lack of diagnostic facilities, hence, improvement in this regard is recommended because the treatment depends on the specific cause.

The increased rate of IDDM patients, 6% of the admissions, as compared to 1.9-4.3% in the previous Ethiopian reports (1,3,4,6), is not fully explained. It might have been related to malnutrition (24, 25) as there was repeated drought in the region, or it might have been due to the increased awareness to utilize health care facilities by the rural people.

Like wise hypertension is frequently encountered. We have no explanation for it although a similar observation was made in Addis Abeba where 4.7% of the total number of medical admissions was due to hypertension (26). These patients often developed stroke mainly due to erratic follow up and treatment of the background hypertension. A similar problem was encountered in Nigeria (27).

The in-hospital mortality rate is higher (19.1%), as compared to 10% in a similar study from Addis Abeba in the 1970's (5) and in the range of 4.3%-11% in other African countries in the 1960's and 1970's (8-10). The reasons might have been multiple but the appearance of a nontreatable disease, HIV/AIDS, with its various fatal complications, is the most likely explanation.

In conclusion: The proportion and presentation of tuberculosis has changed. There is no study that showed a single disease to be responsible for over 20% of all admissions except tuberculosis in this study. Likewise, anaemia, chronic diarrhea, diabetes mellitus, hypertension, stroke and intracranial space-occupying lesions appeared as major causes of hospitalization. These changes, together with the higher mortality rate seen, are partly explained by the current pandemic of HIV/AIDS but the role of other factors remain to be studied. Anaemia is a major clinical problem in our setting and may be mainly related to repeated attacks of malaria. Long hospital stay of tuberculosis and IDDM patients is avoidable. Although this hospital-based study might have a selection bias of reflecting only seriously ill patients and those who afford to come to the hospital, it is a valuable guide to see the changing profile of diseases in the region. This would initiate further studies to find out the factors responsible for this remarkable change so that appropriate public health measures would be taken.

## References

1. Molineaux L, Plorde J and Dagnoy J. Analysis of medical admissions to the Gandar Hospital  
Breeding & maintenance problems of laboratory animals 9  
1963-1965. *Ethiop Med J.* 1966;5:47-65.
2. Habte-Gabr E, Girma B, Mehrete M, Mehari A, Tekle A, Belachew K and Amera B. Analysis of Admissions to Gandar Hospital in north-western Ethiopia. *Ethiop Med J* 1976;14:49-59.
3. Teferra A and Abdulkadir J. Analysis of medical admissions to the Princess Tsehai Memorial Hospital from April 1966 to March 1967. *Ethiop Med J* 1963;95-102.
4. Pavlica D. Analysis of medical admission to the Armed Forces Hospital in Addis Abeba, from January 1966 to 1970. *Ethiop Med J* 1970; 8:193-200.
5. Lester FT and Tsega E. The pattern of adult medical admissions in Addis Abeba, Ethiopia *East Afr Med J* 1974;12:13-24.
6. Lainovic C. Morbidity in Dire Dawa. *Ethiop Med J* 1974;12:13-24
7. Planning and Programming Department, Ministry of Health, Ethiopia. Manual on health and health related indicators. October, 1994, PP 1-8.
8. Patel KE and Lowanga SK. A study of medical admissions to Mulago Hospital, Kampala. *East Afr Med J* 1971;48:76-84.
9. Turner PP. The pattern of diseases as seen by medical admissions to coast province General Hospital in 1960's *East Afr Med J* 1962;39:121-135.
10. Brown KGE. An analysis of admissions to the adult medical wards at Queen Elizabeth Central Hospital, Blantyre, Malawi. *East Afr Med J* 1975;52:509-611.
11. Harries AD. Tuberculosis and HIV infection in developing countries. *Lancet* 1990;335:387390.
12. Pitchenik AE. Tuberculosis control and the AIDS epidemic in developing countries. *Ann Int Med* 1990;113:89-91.
13. Barnes PF and Barrows SA. Tuberculosis in 1990's. *Ann Intern Med* 1993;119:400-410.
14. De Cock KM, Soro B, Coulibaly IM and Lukas SB. Tuberculosis and HIV infection in sub-Saharan Africa. *JAMA* 1992;268:1581-1587.
15. Hodes RM. and Seyoum B. The pattern of tuberculosis in Addis Abeba, Ethiopia. *East Afr Med J* 1989;66(12):812-818.
16. WHO. WHO guidelines for tuberculosis treatment in adults and children in national tuberculosis control programmes. Report WHO/TUB/ 91.161. Tuberculosis control Unit, WHO, Geneva, 1991.
17. Shamebo M. Pattern of haematological disease among adult hospitalized Ethiopians. *Ethiop Med J* 1987;25:113-118.
18. Solomon D. Prevalence of anaemia in pregnancy in Jimma town, south-western Ethiopia. *Ethiop Med J* 1993;31:251-8.
19. Ahmed Z.Z and Assefa M. The prevalence of anaemia among population living at different altitudes in north western Ethiopia. *Ethiop Med J* 1987;25:105-11.
20. Fleming AF. Etiology of anaemia in tropics. In: EHO (eds.) Principles of medicine in Africa. ELBS, Oxford University Press. 1987:705-726.
21. Colebunders R, Arnoux E, Guerin JM and Pirre GD. Chronic diarrhea, strongly associated with HIV infection in Kinshasa, Zaire. *Am J Gastroenterol* 1987;82:859-64.

22. Smith PD. Gastrointestinal infections in AIDS. *Ann Intern Med* 1992;116:63-77.
23. Bredesen DE. The neurology of human immuno-deficiency virus infection. *Qurt J Med* 1988;68(257):665-677.
24. Lester FT. A search for malnutrition related diabetes in an Ethiopian diabetic clinic. *LDF Bull* 1984;29:14-116.
25. Abdulkadir J and Worku Y. HLA-DR and -DQ antigens in malnutrition related diabetes mellitus in Ethiopians: a clue to its etiology? *Tissue Antigens* 1989;34:284-289.
26. Dushan V. Hypertension in poor hospitalized patients in Addis Abeba. *Ethiop Med J*

*Ethiop.J.Health Dev.*

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1970;8:129-136.

27. Smith AJ. Arterial hypertension in Lagos teaching hospital. *W Afr Med J* 1986;15:97-104.