4. RESULTS

4.1 Demographic Profile

Table 4.1 below summarizes the demographic profile of the 21,029 patients admitted into the medical wards of the hospital in the two years under study.

Table 4.1: Demographic features of patients admitted into the medical wards of Leratong Hospital in 2001 and 2004 (n=21,029)

	Year	2001		2004		P value
		n	%	n	%	
Sex	Female	5,607	51.6	5,041	49.6	0.005
	Male	5,268	48.4	5,117	50.4	0.005
	Total	10,871	100	10,158	100	
Age-group	<21 years	806	7.4	762	7.5	0.81
	21-40 years	5,726	52.7	5,202	51.2	0.03
	41-65 years	3,595	33.1	3,538	34.8	0.007
	>65 years	744	6.8	656	6.5	0.26
	Total	10,871	100	10,158	100	

The annual total number of admissions to the medical wards decreased by 6.6% from 10,871 in 2001 to 10,158 in 2004 (Table 4.2) (p=0.13). This decrease was more pronounced in the female wards where the number of patients admitted declined by more than 10% from 5,607 (51.6% of all admissions) in 2001 to 5,041 (49.6% of all admissions) in 2004. The number of male patients admitted decreased by 2.8% from 5,264 in 2001 to 5,117 in 2004

Table 4.2: Trend in admission by sex and year

Year	Females		Males		All	
	No	% Admissions	No	% Admissions	No	%
2001	5607	51.6	5264	48.4	10871	100
2004	5041	49.6	5117	50.4	10158	100
Difference	566	10.1	147	2.8	713	6.6

Over both years the mean and median ages of the patients were 39.8 and 37 years respectively. The mean age of the females was 39.1 years which was significantly lower than the mean age of males (40.6 years) ($p<0.001$).

Figure 4.1 below shows the age-sex distribution of the patients. More than half (52%) of the patients were aged 21 to 40 years. This group accounted for 53.4% of the females and 50.5% of the males. About 60% of the patients were aged 40 years or less.

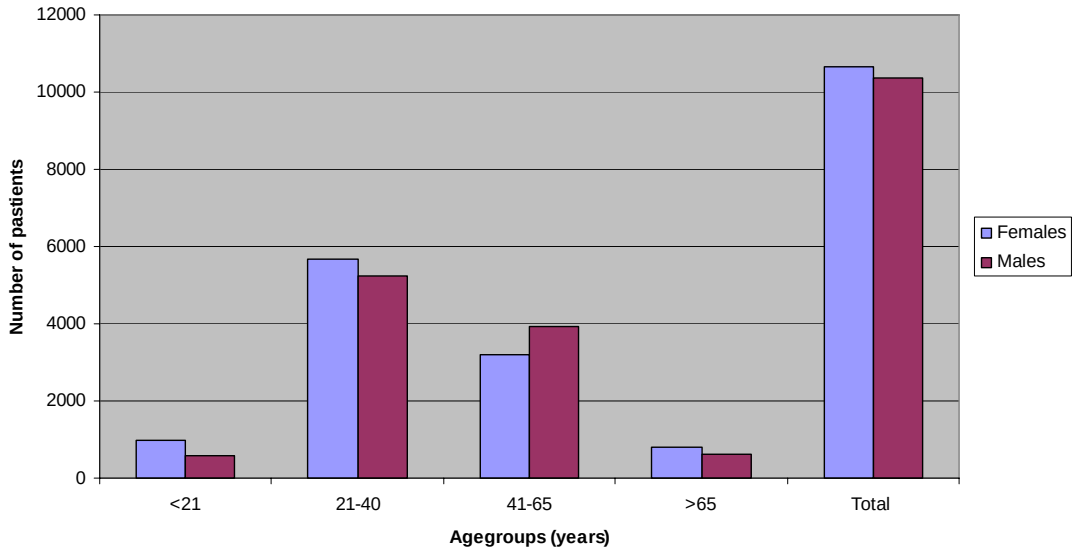


Figure 4.1: Distribution of patients admitted into the medical wards of Leratong Hospital in 2001 and 2004 by age group and sex (n=21,029).

4.2 Discharge diagnoses

Table 4.3 below shows the top ten discharge diagnoses for both years studied. These accounted for more than 76% of all patients admitted into the wards. HIV-associated diseases accounted for four out of the top five diseases in all patients.

Table 4.3: Top ten discharge diagnoses in both years (n=21,029)

Rank	Disease	Number	%
1	Tuberculosis*	4390	20.9
2	Pneumonia	4038	19.2
3	Epilepsy	1589	7.6
4	Gastroenteritis	1397	6.6
5	Meningitis**	1068	5.1
6	Overdose	977	4.7
7	Cardiovascular accident (CVA)	885	4.2
8	Cardiac Failure	828	3.9
9	Diabetes Mellitus	755	3.6
10	Hypertension	643	3.1
	Total	16570	78.1

* Includes diagnosis of pleural effusion
** Meningitis includes all forms of meningitis (viral, bacterial and tuberculous).

Over the time periods the proportion of admissions due to key chronic diseases of lifestyle (cerebrovascular accident [CVA], hypertension, cardiac failure and diabetes) decreased slightly from 15.3% in 2001 to 14.3% in 2004. Meningitis shifted from the tenth rank in 2001 to the fourth rank in 2004 (Table 4.4).

Table 4.4: Most common discharge diagnoses by year

	2001			2004		
Rank	**Disease**	**No**	**%**	**Disease**	**No**	**%**
1	Tuberculosis*	2441	22.5	Pneumonia	2275	22.4
2	Pneumonia	1763	16.2	Tuberculosis*	1949	19.2
3	Epilepsy	785	7.2	Epilepsy	804	7.9
4	Gastroenteritis	776	7.1	Meningitis	702	6.9
5	Overdose	529	4.9	Gastroenteritis	621	6.1
6	CVA	450	4.1	Overdose	448	4.4
7	Cardiac failures	436	4.0	CVA	435	4.3
8	Diabetes	412	3.8	Cardiac failure	392	3.9
9	Hypertension	372	3.4	Diabetes	343	3.4
10	Meningitis	366	3.4	Hypertension	271	2.7
	Total	**8330**	**76.6**	**Total**	**8253**	**81.2**

* Includes diagnosis of pleural effusion

Pneumonia and tuberculosis were the two most common admissions in both males and females (Table 4.5). Parasuicides through drug overdose was more common in females than males, where it was the fourth commonest cause of admission. Malaria was the ninth commonest cause of admission in males.

Table 4.5: Discharge diagnoses for both years by sex

	Female			Male		
Rank	**Disease**	**No**	**%**	**Disease**	**No**	**%**
1	Pneumonia	2038	19.1	Tuberculosis	2405	23.2
2	Tuberculosis	1985	18.6	Pneumonia	2000	19.3
3	Gastroenteritis	830	7.8	Epilepsy	1008	9.7
4	Overdose	632	5.9	Gastroenteritis	567	5.5
5	Epilepsy	581	5.5	Meningitis	505	4.9
6	Meningitis	563	5.3	Cardiac failure	382	3.7
7	CVA	512	4.8	CVA	373	3.6
8	Diabetes	458	4.3	Overdose	345	3.3
9	Cardiac failure	446	4.2	Malaria	311	3.0
10	Hypertension	387	3.6	Diabetes	297	2.9
	Total	**8432**	**79.2**	**Total**	**8193**	**78.9**

Table 4.6 below shows the sex-specific changes in the proportion of admissions due to the top ten discharge diagnoses over the two years studied. The proportion of admissions due to tuberculosis in both sexes decreased slightly from 2001 to 2004 (statistically significant in males but not females). On the other hand the proportion of admissions due to pneumonia and meningitis in both sexes increased significantly over the same period.

Table 4.6: Top ten discharge diagnosis by sex and year (2001 & 2004).

Disease	Females (%)			Males (%)		
	2001	2004	P value	2001	2004	P value
Tuberculosis	19.9	17.3	0.14	25.2	21.1	0.03
Pneumonia	16.7	21.9	0.03	15.7	22.9	<0.001
Gastroenteritis	8.3	7.3	0.40	5.9	5.0	0.38
Meningitis	3.5	7.3	<0.001	3.3	6.5	<0.001
Epilepsy	5.7	5.2	0.62	8.8	10.6	0.17
Overdose	6.2	5.6	0.57	3.4	3.2	0.80
Cardiac failure, CVA, diabetes & Hypertension	18.2	16.0	0.19	11.2	12.6	0.33

4.3 Bed Occupancy

The average bed occupancy rate for all the wards in both years studied was 82% (table 4.7). The rates for the male wards increased from 81.9% in 2001 to 84.8% in 2004, though this was not statistically significant (p=0.08). The increase in the female wards was also not statistically significant (p=0.73). The bed occupancy rate for ward 10, a male ward, increased significantly (p=0.04) over the period, while occupancy rate of ward 14 (a female ward) decreased from 81.8% in 2001 to 79% in 2004, although this was not statistically significant (p=0.12).

Table 4.7: Average annual bed occupancy rates for the medical wards of Leratong Hospital

Ward	Bed Occupancy Rate		
	2001	2004	P value
10	79.5	83.1	0.04
14	81.8	79.0	0.12
16	80.4	81.3	0.61
19	84.3	86.7	0.13
Female	81.1	81.7	0.73
Male	81.9	84.8	0.08
All	81.5	82.5	0.56

4.4 Length of Stay

The average length of stay for all patients was 4.1 days. This increased significantly from 3.7 days in 2001 to 4.4 days in 2004 ($p<0.001$). The average length of stay for female patients was 4.2 days, and this was significantly different ($p<0.001$) from that of male patients, which was about 4.0 days. Patients who were admitted with HIV/AIDS associated infections stayed significantly longer (4.3 days) than those that had diseases not associated with HIV/AIDS (3.8 days) ($p<0.001$).

The average length of stay for each of the four medical wards varied from 3.9 days to 4.4 days. Table 4.8 below shows the top ten discharge diagnoses ranked by their average lengths of stay.

Table 4.8: Top ten discharge diagnoses by their average length of stay (ALOS).

Rank	Disease	ALOS (Days)		
		Both years	2001	2004
1	Meningitis	6.7	5.9	7.2
2	CVA	5.5	4.8	5.1
3	Diabetes	4.8	4.3	5.4
4	Cardiac failures	4.8	4.4	5.2
5	Tuberculosis	4.3	4.1	4.6
6	Hypertension	3.8	3.5	4.3
7	Gastroenteritis	3.8	3.5	4.1
8	Pneumonia	3.7	3.5	3.9
9	Epilepsy	3.1	3.0	3.2
10	Overdose	2.0	2.0	2.1

The ALOS for these top ten diseases, except overdose, epilepsy and cardiovascular accident, increased significantly between 2001 and 2004.

4.5 HIV prevalence

Based on the ward records, only 14% of all patients were tested for HIV while admitted during these periods. There are no records of those who refused HIV testing after being counseled. Of those tested, more than 90% (12.8% of all patients) tested positive to HIV infection. The HIV infection rates were not significantly different in the male and female sub-groups (p=0.35) (Table 4.9).

Table 4.9: HIV testing in 2001 and 2004 by sex

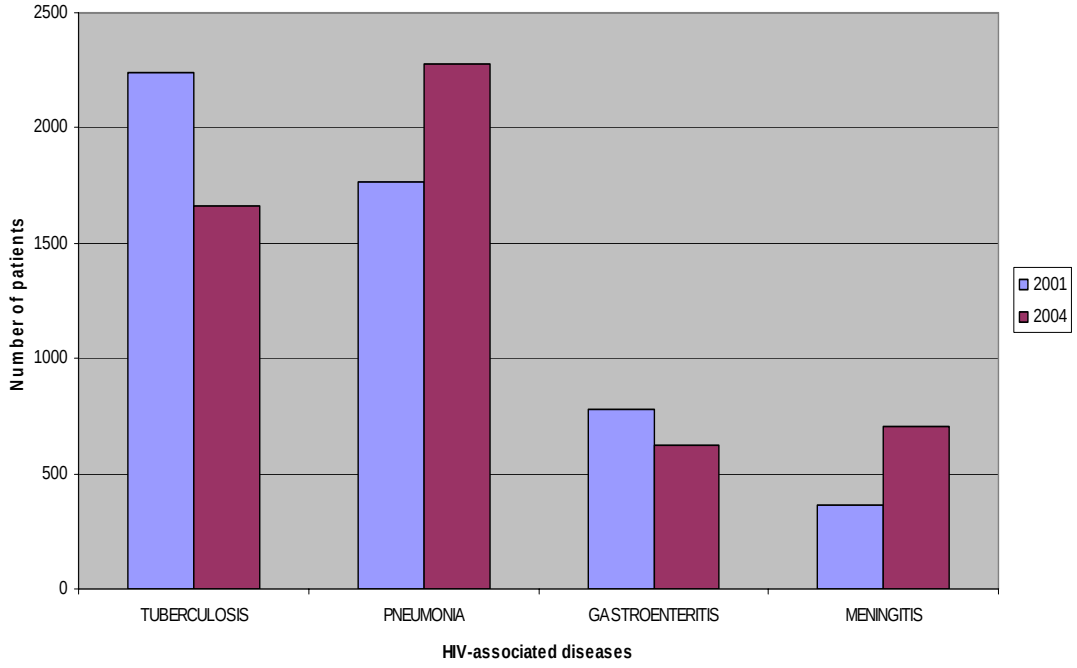
	2001			2004			Both years		
	Female	Male	All	Female	Male	All	Female	Male	All
HIV tested (%)	962 (17.2)	871 (16.6)	1833 (16.9)	691 (13.7)	460 (9.0)	1151 (11.3)	1654 (15.5)	1331 (12.8)	2984 (14.2)
HIV+ (% HIV)	873 (90.8)	760 (87.3)	1633 (89.1)	653 (94.5)	410 (89.1)	1063 (92.4)	1527 (92%)	1170 (88%)	2694 (91%)
HIV-	89	111	200	38	50	88	127	161	288

The proportion of patients who had HIV tests done decreased significantly from 16.9% in 2001 to 11% in 2004 ($p<0.001$). Among these patients, the HIV positive rate increased significantly from 89.1% in 2001 to 92.4% in 2004 ($p=0.003$). The mean age of those patients who were HIV positive was about 35 years compared to 41 years in those whose results were negative ($p<0.001$).

Overall, 55% of the admissions were due to diseases that could be related to HIV/AIDS. These included opportunistic infections such as cryptococcal meningitis, tuberculosis, pneumonia and gastroenteritis. The proportion of admissions with HIV-associated illnesses was not significantly higher among females (54.7%) than males (55.2%) ($p=0.44$). Those patients who were admitted with HIV-associated diseases were significantly younger (mean age = 37.3 years) than those patients who were admitted with diseases not associated with HIV/AIDS (mean age = 43 years) ($p<0.001$). The proportion of patients who were admitted with HIV/AIDS associated diseases increased significantly from 52% in 2001 to 58% in 2004 ($p<0.001$).

Figure 4.2 below shows the annual trend for the four common diseases associated with HIV/AIDS. The number of admissions due to pneumonia and meningitis increased significantly from 2001 to 2004 ($p<0.001$). The number of patients admitted with tuberculosis and gastro-enteritis decreased significantly over the same period.

Figure 4.2: Admission numbers for the four HIV-associated infections by year.



The four opportunistic diseases accounted for about 51.8% of all admissions. This proportion increased from 49.2% in 2001 to 54.6% in 2004 (table 4.10).

Table 4.10: Four HIV-associated infections by year

Disease	Admissions			P value (2001 vs 2004)
	All	2001	2004	
Tuberculosis	4,390	2,441	1,949	<0.001
Pneumonia	4,038	1,763	2,275	<0.001
Gastroenteritis	1,397	776	621	0.03
Meningitis	10,68	366	702	<0.001
All Four	10,893	5,346	5,548	<0.001
% of All	51.8	49.2	54.6	0.48

All patients admitted with HIV-associated diseases should have ideally received voluntary counselling and testing (VCT) services in order to ascertain their HIV status. Only 22.5% of those who were admitted with HIV associated diseases had HIV tests done. Of these more than 94% tested positive to HIV tests. The proportion of patients admitted with the four HIV-associated infections that had HIV tests decreased significantly from 25.4% in 2001 to 14.2% in 2004 for the four diseases ($p<0.001$) (Table 4.11). Conversely the HIV positivity rate among those patients that had HIV tests increased significantly for all the four diseases, except meningitis.

Table 4.11: HIV test and HIV positivity rates in four HIV-associated infections by year

Disease	% HIV test done			P value	% HIV positivity rate			P value
	All	2001	2004		All	2001	2004	
Tuberculosis	25.2	30.9	18.0	<0.001	94.5	93.4	96.9	<0.001
Pneumonia	13.2	17.3	10.0	<0.001	90.6	88.5	93.4	<0.001
Gastroenteritis	26.1	30.3	20.8	<0.001	95.1	93.2	98.5	<0.001
Meningitis	13.5	17.5	11.4	<0.001	92.4	92.2	92.5	0.8
Average	19.7	25.4	14.2	<0.001	93.5	92.2	95.7	<0.001

4.6 Mortality Profile

The overall crude mortality rate of all patients during the two years studied was 13.6% (table 4.12). Among the female patients the crude mortality rate was 13.3% and for the males it was 13.9%. There was no significant difference in the mortality rate between the females and males (p=0.2). The mortality rate of all patients increased significantly from 12% in 2001 to more than 15% in 2004 (p<0.001).

The mortality rates increased significantly among female patients from 11.5% in 2001 to 15.3% in 2004 (p=0.01). Among the male patients the increase was not significant over the same period, but may indicate a trend towards significance (p=0.05). In those with documented test results, the mortality rate was significantly higher among HIV/AIDS patients (22.3%) than in HIV negative patients (8.3%) (p<0.001). It was also significantly higher (17.3%) in those patients who presented with HIV/AIDS-associated infections such as tuberculosis and gastroenteritis irrespective of their sero-status, than in those

patients admitted with diseases not associated with HIV/AIDS (9.1%) (p<0.001).

The mortality rate for those patients with documented negative HIV results decreased over the same period (p<0.001) (table 4.12). In those patients who did not receive HIV tests the mortality rate increased significantly from 10% in 2001 to 14.6% in 2004 (p=0.002).

Table 4.12: Mortality rate (%) among patients admitted into the medical wards of Leratong Hospital in 2001 and 2004 (n=21029)

	Variable	Both years	2001	2004	P value
	All	13.6	11.9	15.3	<0.001
Sex	Female	13.3	11.5	15.3	0.01
	Male	13.9	12.4	15.4	0.05
HIV Status	Positive	22.3	22.4	22.2	0.9
	Negative	8.3	10.0	4.6	<0.001
	Not done	12.4	10.1	14.6	0.002
HIV Associated Diagnosis	Yes	17.3	15.1	19.4	0.01
	No	9.1	8.4	9.9	0.24

Table 4.14 below shows the top ten causes of mortality. The top ten diseases in terms of mortality accounted for 75% of all admissions and 83.1% of all in-hospital deaths. The mortality rate due to the top ten diseases increased significantly from 13.3% in 2001 to 16.8% in 2004 (p=0.03).

Cause specific mortality rates due to HIV-associated diseases such as gastro-enteritis and pneumonia increased significantly from the year 2001 to 2004. The mortality rate for the four common HIV-associated infections increased significantly from 14.5% in 2001 to 19.1% in 2004 (p=0.006).

While the mortality rates due to meningitis and cardiovascular accident remained high, and did not show any significant change over the period of study, those due to hypertension and cardiac failure had remained relatively low. Mortality rate due to diabetes mellitus decreased significantly over the same period.

Table 4.13: Top ten causes of mortality by year of admission

Rank	Disease	Mortality rate (%)			P value
		Both years	2001	2004	
1	Meningitis	26.3	26.2	26.4	0.95
2	Hypoglycaemia	23.0	14.8	39.0	<0.001
3	Cardiovascular accident	21.8	21.8	21.8	0.84
4	Gastroenteritis	20.7	15.5	27.2	<0.001
5	Tuberculosis	17.2	16.5	18.2	0.08
6	Cardiac failures	15.9	15.4	16.6	0.63
7	Pneumonia	12.5	8.8	15.4	<0.001
8	Diabetes	8.6	10.0	7.0	0.02
9	Hypertension	5.1	5.1	5.2	0.97
10	Epilepsy	5.0	4.7	5.2	0.62
	Total Top 10 (75.0% of All)	**15.1**	**13.3**	**16.8**	**0.03**

4.7 Factors Associated with in-patient mortality and length of stay

To determine the factors associated with mortality and length of stay in the wards bivariate analyses were done using the chi-squared tests. The results are shown in tables 4.15 and 4.16. There were statistically significant differences in the mortality rates of patients by their age group, HIV status, diagnosis and year of admission.

Those patients aged more than 35 years were more likely to die in the ward than those less than 35 years. HIV/AIDS patients were about three times more likely to die in the ward than HIV negative patients were. Those patients who did not receive HIV tests (including those who were not offered VCT services and those who refused the tests) were about 1.5 times more likely to die during admission than HIV negative patients.

Table 4.14: Factors associated with outcome (discharge/death). Bi-variate analysis (X^2 test).

	Variables	Outcome n(%)		OR	95% CI of OR	p-value
		Discharged	Died			
Sex	Female	9234 (86.7)	1414 (13.3)	1.05	0.81-1.37	0.196
	Male	8939 (86.1)	1442 (13.9)			
Age group	</=35 years	8651 (89.2)	1043 (10.8)	1.57	1.20-2.06	<0.001
	>35 years	9522 (84.0)	1813 (16.0)			
HIV Status	Negative	264 (91.7)	24 (8.3)	1.000	-	
	Positive	2094 (77.7)	602 (22.3)	3.17	2.40-4.19	<0.001
	Not done	15814 (87.6)	2230 (12.4)	1.56	1.16-2.12	0.003
Diagnosis	Not HIV associated	8620 (90.9)	862 (9.1)	2.09	1.58-2.76	<0.001
	HIV associated	9553 (82.7)	1994 (17.3)			
Year	2001	9573 (88.1)	1298 (11.9)	1.34	1.03-1.74	<0.001
	2004	8600 (84.7)	1558 (15.3)			

There were statistically significant differences in the length of stay of patients by their sex, age group, HIV status, discharge diagnosis and year of admission. Female patients and those older than 35 years were more likely to stay longer in the hospital than males and those patients younger than 35 years respectively. Patients who did not have HIV tests were about 1.7 times more likely to stay longer in the wards than sero-negative patients.

Patients admitted with HIV-associated diseases were more likely to stay in the wards longer than 7 days than the others. Those patients admitted in 2004 were twice as likely to stay longer in the wards than those admitted in 2001.

Table 4.15: Factors associated with length of stay. Bivariate analysis (X^2 test).

	Variables	Length of stay n (%)		OR	95% CI of OR	p-value
		</= 7 days	>7days			
Sex	Female	9405 (88.3)	1242 (11.7)	0.77	0.71-0.85	<0.001
	Male	9418 (90.7)	962 (9.3)			
Age group	</=35 years	8771 (90.5)	921 (9.5)	1.21	1.11-1.33	<0.001
	>35 years	10052 (88.7)	1283 (11.3)			
HIV Status	Negative	2294 (85.1)	401 (14.9)	1.000	-	
	Positive	244 (84.7)	44 (15.3)	1.03	0.73-1.47	0.85
	Not done	16284 (90.3)	1759 (9.7)	1.67	1.19-2.34	0.002
Diagnosis	Not HIV-associated	8639 (91.1)	843 (8.9)	1.37	1.25-1.5	<0.001
	HIV-associated	10184 (88.2)	1361 (11.8)			
Year	2001	10110 (93.0)	760 (7.0)	2.2	2.01-2.42	<0.001
	2004	8713 (85.8)	1444 (14.2)			