

## ORIGINAL ARTICLE

## MORTALITY TRENDS AMONG INPATIENTS AT A TERTIARY PSYCHIATRIC HOSPITAL IN ETHIOPIA

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## ABSTRACT

**Introduction:** Mortality among people with mental illness is higher than the general population. Given the changes in the health service delivery in the past decade in Ethiopia, evaluating the pattern of mortality during this period may provide policy relevant information. The aim of this study was to assess the mortality pattern in a tertiary psychiatric hospital in Ethiopia.

**Method:** A case-control design was employed. Using the Health Management Information System records and clinical records kept at the tertiary hospital; data on inpatient mortality was collected respectively for a period of nine years (2006-2014). Changes in the service configuration were also tracked over the nine years period to explore the potential impact of changes in management upon mortality. Data was analyzed through simple descriptive methods and logistic regression.

**Result:** A total of 16,081 patients were admitted during the nine year period. The overall mortality rate of inpatients was 2.5/1000 admitted patients. The sex specific all-cause mortality rates were high in females (4.6/1000) than in males (1.8/1000). The mortality rate varied over the nine years between 0.5/1000 to 5.0/1000, with indications of fluctuations commensurate with changes in service organizational changes although these changes were not statistically significant. Although suicide accounted for the death of 12.5% (n=5), most died of natural causes and also primarily of infectious diseases.

**Conclusion:** Mortality occurs mainly from preventable causes including suicide. Service reconfigurations may play important role in mitigating mortality. However, further systematic studies are required to determine the impact of service configurations on mortality and general morbidity.

**Keywords:** Mortality, Pattern of Mortality, Mental Illness, Serious Mental Illness, Inpatient Service, Ethiopia

## INTRODUCTION

Mortality in people with mental illness from both natural and unnatural causes is higher than that of the general population (1), in both high and low income countries alike (1-3). In this regard, people with serious mental illness lose up to three decades of their life due premature death (4). Many factors contribute to the increased mortality in this population, especially in those who receive long term in-patient care (1,3,5,6). Most deaths occur due to natural causes, primarily cardiovascular diseases and infectious conditions such as respiratory and gastrointestinal infections (1,6,7). There are also reports of death due to seclusion and restraint related to face down physical restraint which may affect breathing (8). Sudden death accounts for around 5% of all deaths in psychiatric hospitals (9). Due to potential effect on cardiac electrophysiology, antipsychotics, especially thioridazine, are incriminated. Sudden death is particularly common in high dose therapy, rapid tranquilization and among patients with underlying medical illness, especially those with history of previous arrhythmia, hypertension and ischemic heart disease (9-11). The impact of risky health behaviors such as obesity, smoking and alcohol is also widely acknowledged (6). Though the

high mortality rates of psychiatric inpatients have mostly been due to natural causes, the underlying mechanism is still unclear and doesn't fully explain the excess mortality (1, 6). Moreover, people with mental illness also die from unnatural causes, such as suicide, homicide and accidents, and have been reported in Ethiopia (10,12).

The increased mortality among psychiatric patients could reflect a general neglect of health in this population by the health system as well as unrecognized co-morbid medical illnesses, and lifestyle factors including smoking, poor diet and sedentary life style predisposing to cardiovascular diseases (1,13). Hence, there is still a paucity of studies on mortality from low and middle income countries with the few systematic studies from Africa coming from Ethiopia (12,14). Nevertheless, mortality among inpatients and the impact of the repeated service reconfigurations on mortality have not been assessed. Such studies would provide evidence on the quality of care provision and contribute to policy.

Several service improvement initiatives have been carried out in many Federal hospitals in Ethiopia. At this tertiary psychiatric hospital where the current study was conducted, Business Process Re-engineering (BPR) was

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introduced about 10 years ago followed by the introduction of the case team system. The latter initiative introduced a dedicated medical case team responsible for patients requiring a general medical input. The BPR increased accountability and encouraged healthy competition. With the establishment of the case team system, the overall service output of the hospital was increased and reduced the waiting time of patients for outpatients. In the context of these service changes, the study of mortality may give insight into the impact of these policy initiatives albeit indirectly. This study aimed to evaluate the trend of mortality among inpatients at a tertiary hospital in Ethiopia and to explore the potential impact of service reconfigurations on mortality. The latter objective was mainly hypothesis generating and exploratory because of the historical nature of the data collected for this study.

## PATIENTS AND METHODS

**Study Design:** This was a case-control study. Cases were individuals who died over a nine-year period (2006-2014). Two controls were chosen for each deceased case from the Health Management Information System (HMIS) register.

**Study setting:** The study was conducted at Amanuel Hospital, a tertiary psychiatry hospital in Addis Ababa, Ethiopia. The hospital is the only specialist hospital for mental healthcare in Ethiopia although a decentralized and integrated service is being scaled up across the country. The inpatient service of the hospital admits around 1500 patients annually (23). Most patients admitted have psychotic disorders with limited number admitted for substance use disorders. The duration of admission is 6-8 weeks on average.

**Participants:** Cases were all deceased patients during the admission period spanning from 2006-2014. Two controls were selected for each deceased case. These controls were patients admitted within the same period of admission and in the same ward as the cases and were registered in the HMIS above and below the deceased case. There were few deceased cases that were not listed in the register but their medical records were held separately by the register office. For these cases, no controls were selected.

**Data source and data collection:** Data were collected retrospectively at the end of 2014 for the previous nine years. Data sources were the inpatient hospital records, the HMIS records and clinical notes of patients. Medical records of deceased cases were identified and retrieved using the unique identification number of patients in the registers. Relevant information was collected from these sources using data extraction form. The form was designed to document the required data from the medical records; which included demographic details, duration of hospital stay, co-morbid medical illnesses and cause of death. We encountered a number of missing data but we

did not use imputation; instead we use missing data as one of the parameters to assess quality of documentation. The total number of patients admitted during the study period was provided by the hospital admission office.

**Data analysis:** Data were entered, cleaned and analyzed using the Statistical Package for Social Sciences software, version 20. Results were tabulated using descriptive means and frequencies. The overall mortality rate of inpatient admissions at the hospital was also calculated using total number of admission over the nine years as the denominator. Logistic regression analysis was carried out to evaluate for any associations between potential determinants and mortality.

**Ethics approval:** Ethical clearance was granted by the Scientific Committee of the Department of Psychiatry, College of Health Sciences, Addis Ababa University and by the hospital where the study was carried out.

## RESULTS

Out of a total of 16,081 patients admitted to the psychiatric hospital over the study period, 40 deaths were recorded. From these, 22 (55%) were males and 18 (45%) were females (Table 1). More males were admitted, accounting for 75.9% of the total admission, over the study period. Age of the deceased ranged between 15 and 75 years; the majority (37.5%) being between 25 and 34 years followed by those aged 45 and above (32.5%). Seventeen patients (42.5%) were unemployed, 14 (35%) were employed and in nine cases (22.5%) this variable was missing from the records.

Of the patients who died, 20% (n=8) were non-literate, while the rest had up to a tertiary level education. Nineteen patients (47.5%) were single, six (15%) were married, and six were divorced or widowed (Table 1). The overall mortality rate of inpatients at the hospital over the nine years was 2.5/1000 admissions. The sex stratified all-cause mortality rates were 4.6/1000 for females and 1.8/1000 for males. The pattern of mortality seemed to fluctuate over the years. The highest number of deaths recorded was in 2006 and the lowest in the year between 2008 and 2009 (Figure 1). However, there were no statistically significant elevation or reduction of mortality despite the overall trend.

In the crude analysis, level of education showed association with mortality, with education having protective influence. This association remained significant when adjusted for age, gender & marital status (Table 2).

Table 1: Socio-demographic characteristics of study participants, Amanuel Hospital, Addis Ababa, 2006-2014

Characteristics	Deceased (Cases) (n=40)		Not deceased (Control) (n=67)	
	Number	(%)	Number	(%)
<b>Gender</b>				
Male	22	(55.0)	42	(62.7)
Female	18	(45.0)	25	(37.3)
<b>Age group</b>				
< 30	19	(47.5)	28	(41.8)
>30	21	(52.5)	39	(58.2)
<b>Occupational status</b>				
Employed	14	(35.0)	36	(37.4)
Unemployed	17	(42.5)	30	(44.8)
Missing	9	(22.5)	1	(17.9)
<b>Educational level</b>				
< Grade 9	15	(37.5)	36	(53.7)
Grade 9 and above	10	(25.0)	27	(40.3)
Missing	15	(37.5)	4	(6.0)
<b>Marital status</b>				
Married	6	(15.0)	14	(20.9)
Single	19	(47.5)	41	(61.2)
Widowed or divorced	6	(15.0)	12	(17.9)
Missing	9	(22.5)	0	(0.0)

Table 2: Socio demographic correlates of mortality in study participants, Amanuel Hospital, Addis Ababa, 2006-2014

Characteristics	Crude odds ratio (95% confidence interval)	Adjusted odds ratio* (95% confidence interval)
<b>Sex</b>		
Male	1.00	1.00
Female	1.38 (0.62,3.05)	1.24 (0.55,2.80)
<b>Age</b>		
< 30	1.00	1.00
>30	1.09 (0.50, 2.39)	1.43 (0.63,3.28)
<b>Marital status</b>		
Married	1.00	1.00
Single	1.08 (0.36,3.25)	1.30 (0.27, 6.35)
Widowed or divorced	1.17 (0.30, 4.59)	1.22 (0.31, 4.76)
<b>Education</b>		
< Grade 9	1.00	1.00
> Grade 9	0.11 (0.32, 0.39)	0.22 (0.05, 0.96)

Co-morbid medical conditions were recorded in 24 (60%) of the deceased. The major ones were infectious diseases, mainly HIV (n=5; 20.8%) and Tuberculosis (n=5; 20.8%). Over 37% (n=15) of the cases had been users of one or more substances. The substances used were alcohol (29.5%), cigarette (12.5%), khat (10%) and cannabis (2.25%). Over 70% of the deceased were on antipsychotics at the time of death: First generation antipsychotics (35%), second generation antipsychotics (6.3%) and combinations (Table 3).

In six patients (15%), sudden cardiac arrest was recorded as the cause of death. Of these patients, two were on combination of three typical antipsychotics (chlorpromazine, haloperidol & fluphenazine decanoate) & two were on fluphenazine decanoate alone. One had received par-enteral chlorpromazine prior to death.

In 80% of the deceased, there was no recorded evidence that treatment for the medical condition that led to death was given. A quarter of the deaths occurred among patients referred out for medical care but were sent back to the psychiatric hospital because they couldn't be admitted to the medical hospital they were referred to. Forty percent of the deaths occurred during non-working hours and 32.5% during working hours. There was no record of time of death for the rest.

The average length of stay of the patients who died was 17.8 days. 82.5% of the deaths occurred within 28 days of admission. The predominant diagnosis was psychotic disorder, accounting for 61.5% of the cases (n=24) from which 50% had schizophrenia. Twelve cases (30.8%) had mood disorder, with most having a diagnosis of bipolar disorder. 7.7% of the cases had delirium tremens.

Table 3: Clinical and treatment characteristics of study participants, Amanuel Hospital, Addis Ababa, 2006-2014.

Characteristics	Deceased (n=40)		Not deceased (n=67)	
	Number	(%)	Number	(%)
<b>Comorbid medical condition</b>				
Yes	24	(60.0%)	11	(16.0%)
No	16	(40.0%)	56	(84.0%)
<b>Substance use history</b>				
Alcohol	9	(22.0%)	6	(9.0%)
Others	3	(7.5%)	13	(19.4%)
Alcohol + Others	3	(7.5%)	11	(16.4%)
<b>Treatment the patient was on</b>				
Antipsychotics	45	(71.3%)	92	(86.0%)
Others	27	(47.0%)	48	(44.9%)

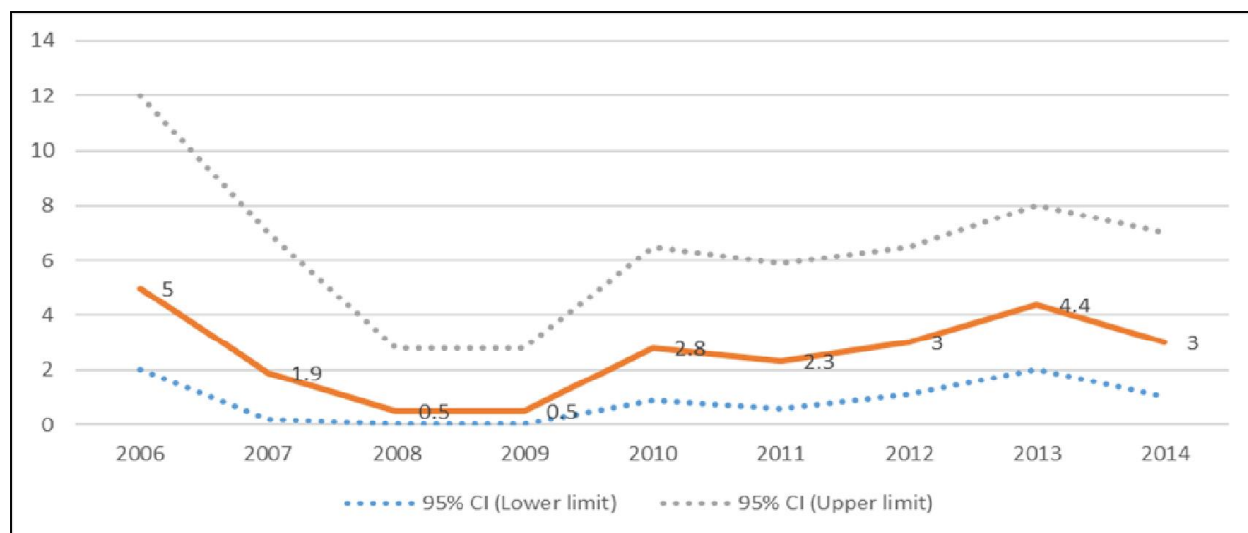


Figure 1. Mortality pattern over study period among study participants, Amanuel Hospital, Addis Ababa, 2006-2014. Numbers represent mortality per 1000 admissions with 95% confidence intervals.

## DISCUSSION

The mortality figures reported here may be considered lower than what has been reported in other studies. Yet, death in a psychiatric hospital is a very rare event. Moreover, the mortality figures we found are likely to be an underestimation of the true rate-given the retrospective nature of the data collection, it is likely that some deaths would have been missed. Nevertheless, this report provides important clues about mortality among inpatients with severe mental illness, which could inform future studies and guidelines in Ethiopia. Consistent with other studies (1,5,14), preventable natural causes accounted for most of the deaths (85.5%). Improving care of patients in hospital is likely to improve the survival of patients. A proportion of patients died from a sudden cardiac event. These patients were often on multiple antipsychotic medications, which are known to have arrhythmogenic effect. Rational prescription of psychotropic medications as well as understanding the cardiac risk profile of patients is crucial. Medications that are known to be cardio-toxic, such as thioridazine should no longer be available for prescribing, except on individual patient basis. It is vital to have regular risk assessment of patients on psychotropic medications in addition to careful evaluation before initiation of medications. Although this is still likely to be an underestimate, the proportion who died from suicide was relatively higher than reported elsewhere in Africa (1,5).

Hanging was the most accessible way of committing suicide for inpatients and there is a potential for preventing such cases. In this regards, among five patients who committed suicide, four of them have a documented suicidality. This indicates that the potential risk of these patients was recognized by the staff implying that there might have been missed opportunities for prevention. Moreover, most (three of the five) committed suicide during working hours. These provide clear opportunities for prevention, and have the potential for informing preventive strategies, for example introducing 24 hours observations. Another critical reason for mortality appears to be lack of proper care provision for psychiatric patients in medical hospitals. About a quarter of patients who died were returned from medical hospitals that would have been able to provide better medical care than a psychiatric hospital. Better referral linkage may have an important impact on the care of patients with mental illness. However, understanding the reasons behind failed referral linkages, such as knowledge about managing patients with co-morbid mental illness, and addressing such reasons, is crucial.

The additional health system issue that was explored in this study was whether mortality trends changed with the

introduction of changes in management. In the nine years of evaluation, there were trends of continuous reduction only in the three years of the follow-up. These years corresponded with structural changes in the hospital, during which staff with knowledge of these changes indicated that staff motivation to improve care delivery during these early years was very high. The increase in mortality in the subsequent years also appears to relate to changes in the hospital's care delivery. During these years, medically ill patients were cared for at the hospital in order to reduce the burden on the patients and provide compassionate care. This might have led to an artificial inflation of the mortality rate. In fact, it is possible that because of the early intervention provided, many lives might have been saved. Further carefully designed studies could address these uncertainties. The final health system issue is to do with the clinical records. Incomplete recording, even of essential facts such as time of death, was common. This is unlikely to be unique to this tertiary hospital. Although this is likely to improve with the use of electronic medical records, ensuring the completeness of medical records is essential priority for all health providing institutions.

**Limitation of the study:** The study has a number of limitations but the critical limitation relate to the incompleteness of clinical records, which have bearing on the accuracy of the interpretation of the findings. Other important limitations relate to the small sample size and the lack of standard confirmation of cause of mortality. Because of the lack of electronic copies of data on patients admitted to the hospital during the period of study, patients were counted manually from the record book at the admission office. This has the potential to introduce some error although we do not believe this would be major. This also created difficulty in identifying patients admitted more than once in a year. We took the total number of admissions as a denominator when we calculated the rate of death.

**Conclusion:** Mortality is an important and hard outcome that has the potential to serve as a benchmark for quality of care provided for people with severe mental illness. This calls a careful measurement of this outcome. Although exploratory, our findings offer relevant insights that can be used to improve the care of patients in psychiatric hospitals. Health system changes may have impact on mortality; however, there are clear uncertainties that require further evaluation. Referral linkages need to be strengthened and their functioning evaluated not only for how they are working for patients with mental illness but also for the public at large. Finally, most deaths occur due to preventable causes that require changes in service planning for patients at risk.

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