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Economic Burden of Mental Illnesses in Pakistan

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Abstract

Background: The economic consequences of mental illnesses are much more than health consequences. In Low and Middle Income Countries (LMIC) the economic impact of mental illnesses is rarely analyzed. This paper attempts to fill the gap in research on economics of mental health in LMIC. We provide economic burden of mental illness in Pakistan that can serve as an argument for reorienting health policy, resource allocation and priority settings.

Aim: To estimate economic burden of mental illnesses in Pakistan.

Methods: The study used prevalence based cost of illnesses approach using bottom-up costing methodology. We used Aga Khan University Hospital, Psychiatry department data set (N = 1882) on admission and ambulatory care for the year 2005-06. Healthcare cost data was obtained from finance department of the hospital. Productivity losses, caregiver and travel cost were estimated using socio-economic features of patients in the data set and data of national household survey. We used stratified random sampling and methods of ordinary least square multiple linear regressions to estimate cost on medicines for ambulatory care. All estimates of cost are based on 1000 bootstrap samples by ICD-10 disease classification. Prevalence data on mental illnesses from Pakistan and regional countries was used to estimate economic burden.

Results: The economic burden of mental illnesses in Pakistan was Pakistan Rupees (PKR) 250,483 million (USD 4264.27 million) in 2006. Medical care costs and productivity losses contributed 37% and 58.97% of the economic burden respectively. Tertiary care admissions costs were 70% of total medical care costs. The average length of stay (LOS) for admissions care was around 8 days. Daily average medical care cost of admitted patients was PKR 3273 (US \$ 55.72). For ambulatory care, on average a patient visited the clinic twice a year. The estimated average yearly cost for all mental illnesses was PKR 81,922 (US \$ 1394.65) and PKR 19,592 (US \$ 333.54) for admissions and ambulatory care respectively. In the sensitivity analysis productivity losses showed high variability (from USD 1022.17 million to USD 4007.01 million). Assuming a gate keeping role of primary healthcare (PHC) demonstrated a saving of USD 1577.19 million in total economic burden.

Implications for Health Policy: This study set out to generate evidence using a low cost innovative approach relevant to many LMICs. In Pakistan, like many LMICs, patients access tertiary care directly, even for illness that can be efficiently managed at PHC level. In economic terms the non-medical consequences of mental

illnesses are far greater than medical consequences. Based on these finding we recommend, firstly, that mental illnesses should be prioritized equally as other illnesses in health policy and secondly there needs to be integration of mental health in primary health care in Pakistan.

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Introduction

Mental illness is a major contributor to disabilities and deaths in the global burden of disease. The economic consequences of mental ill-health are far greater than the general ill-health consequences.^{1,2} In high income countries mental health is included in various health policies and resources are allocated accordingly.^{3,4} In Low and Middle Income Countries (LMIC) the impact of mental illnesses on health and economy is rarely analyzed,⁵ the focus being mostly on infectious diseases and child and maternal health. Due to scarcity of resources and lack of interest by donor community mental health is usually overlooked in health policies in LMICs.⁶

The societal burden of mental disorders is exacerbated by non-detection, misdiagnosis and inappropriate treatment.⁷ Wang *et al.* used data from World Mental Health Surveys to conclude that very small proportion of people with mental disorders sought treatment, particularly in LMIC.⁸ Demyttenaere *et al.* reported unmet need of mental illnesses in LMIC in the range of 76.3% to 85.4% of the people who had any mental illness.⁹

James *et al.* studied barriers to access of mental healthcare facilities in two centers in Pakistan and found that affordability and/or cost of care was a factor in 76% and 46% of the mental health cases respectively. In one of the centers, distance was a barrier factor in 81% cases.⁷

Another key factor in LMIC is the poor distribution of available resources, which are often heavily concentrated in urban areas. The distance to be travelled to reach a community-based mental health facility and the costs incurred in this can be substantial: in one Indian study a key reason for the lack of continued use of antipsychotic medication was the need for individuals to have to travel more than 10 kilometers to their nearest outreach clinic.¹⁰

Most of the literature on economics of mental health is from high income countries. This includes health and economic consequences of mental illnesses and cost

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effectiveness of mental health interventions.^{11,12} In LMIC, with the exception of a few micro-level studies on the cost of mental illnesses or socio economic determinants of mental illness, research on the economic consequences of mental illnesses are rarely documented, and the focus is mostly on epidemiology and risk factors of mental illnesses.^{5,13,14}

Inspired by the report on global burden of non-communicable diseases published by The World Economic Forum¹⁵ and economic burden of mental illnesses studies in high income countries such as Canada, Sweden and the UK^{16,12,17} we attempted to fill the gap in research on economics of mental illnesses in LMICs. We estimated the economic burden of mental illnesses in Pakistan for the years 2005-06. We utilized the prevalence based cost of illness (COI) methodology to estimate economic burden of mental illnesses in Pakistan. We used secondary hospital data that is collected in routine clinical practice. This approach is not only feasible and practicable, but is low-cost and relatively simple, particularly for resource constrained settings of LMICs.

Prevalence based Cost of Illness (COI) studies are a popular approach to draw impact of the disease at the macro level and the relative importance of a disease.^{18,19} Our findings firstly inform the policy that mental illnesses have far reaching effect on population health, economic growth and productivity of the society. This would make a strong case for prioritizing mental health in the national health policy. Secondly we make a case for efficient management of mental illnesses at primary level of care could not only save resources of health sector but can also contribute to economic growth by enhancing productivity of the people in LMICs such as Pakistan.¹⁴

Mental Healthcare in Pakistan

Pakistan's population of 180 million makes it the world's sixth most populous country in the world. Almost 45% of its population lives below or around the poverty line.* It has a young population with approximately 50% people under the age of 25 years. A systematic review revealed mean overall prevalence of anxiety and depressive disorders in the community population was 34% (range 29-66% for women and 10-33% for men).²⁰ There are an estimated three million drug addicts in the country. Suicide rates have increased dramatically in the last few years, with an estimated 13,377 suicides in 2012, and estimated crude suicide rate of 7.5 per 100,000 population.²¹ Serious mental illnesses, like schizophrenia and bipolar disorders account for another 1-2% of the population. Child mental health problems are estimated to be around 15%.²²

Public Health spending is consistently less than 1% of the GDP.²³ Mental health does not have a separate budget. Health insurance is virtually non-existent.²³ Society safety nets are fragmented and underfunded. Public health service is mostly concentrated in secondary and tertiary care hospital

* Poverty headcount estimates of the World Bank at 3.1 dollar a day (in 2011 PPP).

sector. The rural poor rely on poorly managed primary healthcare or other types of healers for their healthcare needs. Most of healthcare costs are borne by patients themselves. Mental health services are almost nonexistent and limited to either psychiatry departments of teaching hospitals or privately run clinics. There are only 350-400 qualified psychiatrists in Pakistan,²⁴ making it an alarming ratio of one psychiatrist to half to a million people. The majority of psychiatrists are urban-based, whereas 60% of the population lives in rural and peri-urban areas.

In Pakistan mental health was highlighted in the national health policy of 1998. Mental health was placed as a component of comprehensive primary healthcare under the umbrella of 'health-for-all'. However, in the year 2000, a military coup ousted the elected civilian government. The military government shelved the health policy of 1998 and enacted a new health policy in 2001. This policy prioritized selective PHC and donor dependence for additional resources as its prime focus. Mental health has since been at the bottom of national priorities in health sector. Mental health problems on the other hand are on the rise due to the decade long war-on-terror with numerous suicide bombings and terrorist attacks in the country. The objective of this paper is to highlight the burden and economic burden of mental illnesses utilizing the available data so as to sensitize the policy makers for more attention towards mental health in resource allocation and priority setting.

Methods

We used prevalence based cost of illness approach to estimate economic burden of mental illness in Pakistan. We applied bottom-up costing methods: using facility level costing to arrive at national level estimates. Cost of illness using prevalence of disease and bottom-up methods of costing are particularly relevant to LMIC where employer and insurance data is not readily available.^{5,15,18} Cost of illness studies are potentially an important tool to attract health policy makers in LMIC, since such studies provide economic consequences which is relatively easy to comprehend than clinical features of disease. Once policy makers acknowledge the consequences of mental illnesses to national economy and productivity, a step further would be to propose cost effective management of mental health problems at an early stage for example integration of mental health in primary healthcare.

Study Setting

We used Health Information Management System (HIMS) data and data from the finance department of the Aga Khan University Hospital (AKUH), Karachi, Pakistan. AKUH is a + 500-bedded tertiary care general hospital, located centrally in Karachi, Pakistan's largest city (current population approximately 18 million) and the country's main business and commercial hub. AKUH has all major medical specialties and is a private fee-for-service hospital.

Psychiatric services were introduced in 1986 and currently consist of nearly 50 ambulatory clinics per week, an 18-bedded acute admissions unit and 24-hour cover for the general wards and emergency room of the hospital. Currently, there are approximately 15,000-16,000 ambulatory care visits and 500-600 admissions to the psychiatry service of AKUH annually. Almost a third of ambulatory care patients are initial (first presentation) patients and the remaining are the follow-up patients.

Data Analytical Procedures

We estimated the arithmetic mean of cost of mental illnesses by ICD-10 classification. Due to small number of observations in some disease classification we used bootstrapping method to overcome uncertainty surrounding average cost estimates. We used 1000 samples in each category of ICD-10 to arrive at estimated yearly costs of ambulatory care visits and admissions. We also provided standard errors and p-values of all cost estimates. Unit of cost is Pakistan Rupees (PKR) in 2006 prices and United States Dollars (USD)* (where applicable). Other methods on cost estimation are provided in the following paragraphs.

Healthcare Costs

The data we analyzed pertains to both admissions and ambulatory care visits (initial patients only) to the psychiatry department of AKUH for the years 2005-6. The finance department provided data on the hospital charges on patients undergoing treatment at AKUH. Hospital charges usually have a profit margin and over-estimate the economic burden.²⁵ However this was the only available data source for our study. We validated our estimates from published literature and state of mental healthcare provision in Pakistan in the discussion section. Data sets on ambulatory care and admissions contained information on patient's demographic characteristics and consultation features i.e. age, gender, marital status and primary diagnosis. For admissions information obtained included physician consultation fees, room/bed charges, charges for medicines, laboratory tests, any other procedures and charges for meals for patients' attendants. For ambulatory cases the information included physician consultation and laboratory charges. Data on medicine charges was not available in the ambulatory care data set.

The primary diagnoses reported in the data sets were grouped by International classification of Diseases-10th edition.²⁶

Medicines Costs

The cost of medicines was only provided for admissions data set. For ambulatory care the data set provided by finance department, AKUH contained consultation charges, laboratory and other procedures charges. Data on medicines

prescribed to the ambulatory care patients was however available in the individual patient record files of HIMS. Due to time and resource limitation it was not possible to extract medicines prescribed to all ambulatory care patients (N = 1240) and then estimate their costs. To reduce analytical burden we drew a stratified random sample of 15% (N = 182) from the ambulatory visits data.

The patient medical record files for the sampled observations were reviewed for the medicines prescribed in each visit. The retail price of the medicines prescribed according to the brand names was used to estimate the medicines costs. In the case the prescription mentioned the formula of the medicine, we used the market price of the least priced generic medicine available in the market. We assumed minimum dosage of medicines in case the dosage and duration was found missing from the prescription. The ambulatory care data set contains patient demographics and other information (age, gender, marital status, co-morbidities and profession).

We used Ordinary Least Square (OLS) linear regression model to explain variation in medicines costs due to explanatory variables mentioned above. The medicines cost regression coefficients were applied to the ambulatory care data set to estimate medicines cost in full sample.

We grouped costs into 'medical care costs', 'other costs' and 'productivity losses'. Medical care costs included costs on consultation, laboratory and other procedures, room/bed charges and medicines. Other costs included cost on traveling and food for the patient and his/her caregiver (it is very common in Pakistan for at least one caregiver to stay with the patient in the hospital). All costs are reported in 2006 prices.

Productivity Costs

Productivity costs included lost productivity of the patient and the caregiver, for visits and stay at hospital, as well as for any time off work for post-discharge recuperation of the patient.

We used Human Capital approach to estimate productivity losses. We used the patients' occupation to estimate the productivity loss for each healthcare visit (in case of ambulatory care), length of admission (for admissions) and complying with at least half of the days of bed rest advised.

We made two adjustments to estimate lost productivity in availing medical care. Firstly, we adjusted average daily income by professional categories reported in Household Integrated Economic Survey round 2005-06.²⁷ Secondly, we adjusted the income estimates for the average difference in earnings of males and females from the Pakistan Labor Force Survey.²⁸ In estimating productivity cost we excluded productivity losses of weekends and other holidays. In case of unemployed, housewives, students and retired persons we used the minimum wage to estimate productivity losses.

Transportation Charges

For transportation charges we arbitrarily assumed public transport as mode of travel for those with a daily income of

* The US\$ exchange rate in 2006 was 1US\$ = PKR58.74.

less than Pak Rupees (PKR) 500 (approximate USD 8.51).^{*} For those earning PKR 500-2000 (USD 8.39 – USD 34.04) daily we assumed private taxi fare as the mode of travel. For those with daily earnings of more than PKR 2000 (USD 34.04) we assumed patient's own vehicle as mode of travel. We assumed one person to accompany the patient during visit to hospital (although more frequently the patient is accompanied by more than one person).

Caregiver Burden and Informal Care Costs

Literature on healthcare costing recommends that the cost of informal care should be included in healthcare economic analysis in situations where such costs are important, such as mental illnesses.²⁹ Cost of time and other resources used by accompanying person is important in societies where such practices are common. We therefore included cost of time spent by the accompanying person with the patient while visiting hospital or admitted to the hospital.

Patient productivity losses were based on their occupation. However, as information on caregivers' occupation was not available in the data set, we used the minimum wage in Pakistan for the years 2005-2006 to calculate time cost of caregiver. Caregiver time was assumed to be the same as the time spent by the patient in visiting hospital for clinic visit or admission.

We added travel costs of the caregiver to the travel costs of the patient, calculating this for public transport only. We assumed no travel cost for the caregiver if the patient used his own car or hired a private taxi to commute to hospital, as the caregiver is likely to use the same car/taxi without any additional travel costs (see transportation charges in section above).

In case of admissions, we added cost of food by accompanying person in 'other costs'. For admissions and ambulatory care we assumed length of stay and half day minimum wage respectively to estimate cost of time of accompanying person. For travel cost we applied additional fare only if the patient used public transport. We added food cost for the accompanying person in case of admissions care.

Calculating the Economic Burden of Mental Ill-Health in Pakistan

To estimate the economic burden of mental illnesses in Pakistan we used average cost estimates from the above data and methods. We carried out literature search for the prevalence of mental illnesses in Pakistan (where such information was available), followed by regional countries or regional estimates and other regions or international estimates to arrive at prevalence estimates for Pakistan.

We selected one major illness in each ICD-10 classification. The prevalence data for each mental illness in ICD-10 was used to estimate number of cases by multiplying the prevalence to the relevant groups of population for the

years 2005-6. In all categories of ICD-10 we used the minimum prevalence estimates. Dementia (F00-F09),³⁰ Substance Use of adult population (F10-F19),³¹ Schizophrenia (F20-F29),³² Major Depressive Disorder (F30-F39),³³ Generalized Anxiety Disorder (F40-F48),³⁴ Obsessive Compulsive Disorder (F60-F69),³⁵ Mental Retardation (F70-F79),³⁶ Attention Deficit Hyperactivity Disorder (F90-F98),³⁷ and Psychosexual dysfunction (F99-F99).³⁸

The Pakistan Social and Living Standard Measurement (PSLM) survey 2004-05 reported that 93% of people sought care in the area of general medical illnesses.³⁹ We took the opinion of an expert panel on this finding of the national survey. The expert panel felt that the figures for 'health seeking' as listed in the PSLM survey appeared reasonable for physical illnesses, while people suffering from mental illnesses usually seek formal care at a relatively later stage and severity of the illness. We assumed that 60% of the population sought formal care while the rest either denied they had a mental health issue or used alternative medical care for their mental illnesses. This assumption was based on findings from multiple studies that mental illnesses go commonly unnoticed in many LMICs.^{8,9}

Health-Care Settings in Pakistan

We grouped health seeking into three categories: admission at tertiary/secondary care hospitals; ambulatory care at tertiary/secondary care hospitals; and visits to primary healthcare. We used patterns of utilization by type of provider reported in the nationally representative PSLM Survey of 2004-05. The survey reported that seeking care for 'unknown illnesses' were 67.4%, 20.59% and 2.2% at private hospitals and clinics, government hospitals and clinics and public primary healthcare respectively. The remaining 10% sought care from other types of alternative healthcare or self-medicated.³⁹ Based on this composition of demand for healthcare, we accounted for 90% of demand for healthcare. Other care and self-medication could not be estimated due to limitation of data.

The data in our analysis were collected from a tertiary care setting. However, in the calculation of economic burden of mental illnesses we included tertiary care as well as primary healthcare. We replaced the consultation fee charges with a psychiatrist for ambulatory care visits to AKUH with the consultation charges of PKR 346 (USD 5.89) for an ambulatory care visit at primary healthcare facility in Pakistan in 2005-06.⁴⁰

We further assumed that cost of secondary level of care for admissions and ambulatory care are the same across public and private hospitals. This was based on the following argument: in private hospitals (such as AKUH), most of the healthcare cost is borne by the patient and his/her family. In government hospitals people are not supposed to pay for consultation and other charges, yet there is strong evidence that patient and his/her family bears a significant portion of the cost of availing services at government hospitals. This may be in the form of unofficial payments for seeking healthcare and out-of-pocket payments for medicines and

^{*} One US Dollar was PKR 58.74 in 2005-06.

Table 1: Demographic and Other Characteristics of the Study Population.

Variable	Admissions	Ambulatory care	Total
Total	642	1240	1882
Male	58%	54%	1039
Married	58%	59%	1103
Age (years)			
Less than 10	0.3%	4.1%	53
10-20	12%	12.6%	234
20-30	29%	25.2%	499
30-40	25%	21.8%	431
40-50	17%	18.2%	334
50-60	7.6%	8.6%	156
60 and above	8.8%	9.5%	175
ICD-10 mental illnesses classification			
F00-09 Organic, including symptomatic, mental disorders	1.1%	2.2%	34
F10-19 Mental & behavioral disorders due to psychoactive substance use	6.2%	2.3%	69
F20-29 Schizophrenia, schizotypal and delusional disorders	29.9%	12.4%	346
F30-39 Mood [affective] disorders	51.2%	57.5%	1042
F40-48 Neurotic, stress-related and somatoform disorders	7.8%	17.6%	268
F60-69 Disorders of adult personality and behavior	1.1%	1.0%	20
F70-79 Mental retardation	0.9%	2.9%	42
F90-98 Behavioral and emotional disorders with onset usually occurring in childhood and adolescence	0.6%	2.6%	36
F99 Unspecified mental disorder	1.1%	1.5%	25

food etc. There is, therefore, a cost attached to providing any service. From the societal perspective all costs should be accounted for, no matter whether it pertains to government or household and family.

Sensitivity Analysis

We carried out sensitivity analysis on the key assumptions in estimating the economic burden of mental illnesses in Pakistan. We replaced the minimum prevalence of mental illnesses to maximum prevalence. Next we explored sensitivity of the health seeking assumption. We assumed a greater reliance on primary healthcare instead of tertiary care admissions. We assumed that if mental health is integrated at PHC level then majority of the mental health patients would be managed in a timely manner at the PHC level and only the more complex and difficult-to-manage cases would be referred to specialist services or admitted to the hospital. Lastly we examined the sensitivity of total economic burden and its components by replacing the average cost estimates with the upper and lower bounds values of 95% bootstrap confidence intervals (BS CI) of medicine costs, productivity costs and travel costs. We examined the individual change in the estimates of medicine costs, productivity losses and travel costs and their joint effect on total cost estimates.

Results

During the study period of 2005-6, there were a total of 16,135 (initial n = 2664; follow-up n = 13, 471) ambulatory care visits and 642 admissions to the admission unit. Of 2664

initial patients who presented to ambulatory care, 1240 (46%) cases had complete data set. Hence the final total number of patients on whom the analysis was carried out was 1882 (1240 initial + 642 admissions).

Our sample was dominated by males (55%), married (59%) and aged 20-50 years (67%) in all disease classification, except ICD-10 categories F70-79 (mental retardation) and F90-98 (behavioral and emotional disorders with onset usually occurring in childhood and adolescence). Most of the patients were diagnosed with mood (affective) disorders (55%) followed by schizophrenia, schizotypal and delusional disorders (18%). Demographic and summary of mental illnesses is provided in **Table 1**.

The average length of stay (LOS) for admissions care was around eight days. Daily average medical care cost of admitted patients was PKR 3273 (US \$ 55.72). For ambulatory care, on average a patient visited the clinic twice a year. Average number of medicines in a prescription for ambulatory care was around 3. In case of ambulatory care the average treatment episode was 51 days with an average cost PKR 1298 (US D 22.1). Summary of utilization of medical services is provided in **Table 2**.

The estimated average cost for all types of mental illnesses was PKR 62969 (US \$ 1071.99) and PKR 14628 (US \$ 249.03) for admissions and ambulatory care respectively. Productivity losses overrode medical care cost in both admissions and ambulatory care. Medical costs and productivity losses were highest amongst patients in F10-F19 (mental and behavioral disorders due to psychoactive substance use) in admissions as well as in ambulatory care. The average cost estimates and standard errors of means are provided in **Table 3**.

Table 2: Average (standard errors in parenthesis) Utilization of Services by ICD-10 Classifications (for each admission and ambulatory care visit).

ICD-10 classification	Admissions	Ambulatory care	
	Length of Stay (days)	Number of visits	Duration of Treatment (days)
F00-F09	5.00 (1.272)	1.41 (0.096)	29 (3.276)
F10-F19	6.53 (0.899)	4.00 (0.000)	77 (0.000)
F20-F29	9.85 (0.572)	2.00 (0.000)	33 (0.000)
F30-F39	7.01 (0.312)	2.00 (0.000)	49 (0.000)
F40-F48	5.06 (1.041)	2.39 (0.014)	73 (0.675)
F60-F69	5.86 (2.208)	3.50 (0.000)	88 (0.000)
F70-F79	2.83 (0.477)	1.28 (0.117)	23 (3.259)
F90-F98	9.00 (1.871)	3.03 (0.022)	72 (0.75)
F99-F99	6.29 (3.029)	1.39 (0.183)	20 (2.893)
Total	7.61 (0.265)	2.11 (0.013)	51 (0.455)

The 95% confidence intervals using 1000 bootstrap resamples for admissions and ambulatory care are graphed in **Figure 1**. Except F99-F99 in admissions and F10-F19 in ambulatory care, cost estimates for all other categories are robust to be generalized to national level estimates of economic burden of mental illnesses.

Based on our calculations, the economic burden of mental illnesses in Pakistan was estimated to be PKR 250,483 million (USD 4,264.27 million) in 2006. Medical care costs contributed to 37% of economic burden while the remaining costs were productivity losses and other healthcare costs. Productivity losses accounted for 58.97% of the total economic burden.

Tertiary care admissions costs were 70% of total medical care costs. Medical care and other costs were 40% of total economic burden while the remaining share was productivity losses. Bed occupancy charges constituted largest share in tertiary care admission, while consultation charges were greater than medicines and supplies in tertiary care level ambulatory care. At primary healthcare level this relationship was opposite: medicine costs were more than consultation charges. Summary of economic burden of mental illnesses is provided in **Table 4**.

Sensitivity Analysis

By relaxing the assumptions of our analysis we find significant changes in the estimates of economic burden of mental illnesses in Pakistan. By replacing the minimum prevalence of mental illnesses to maximum prevalence we

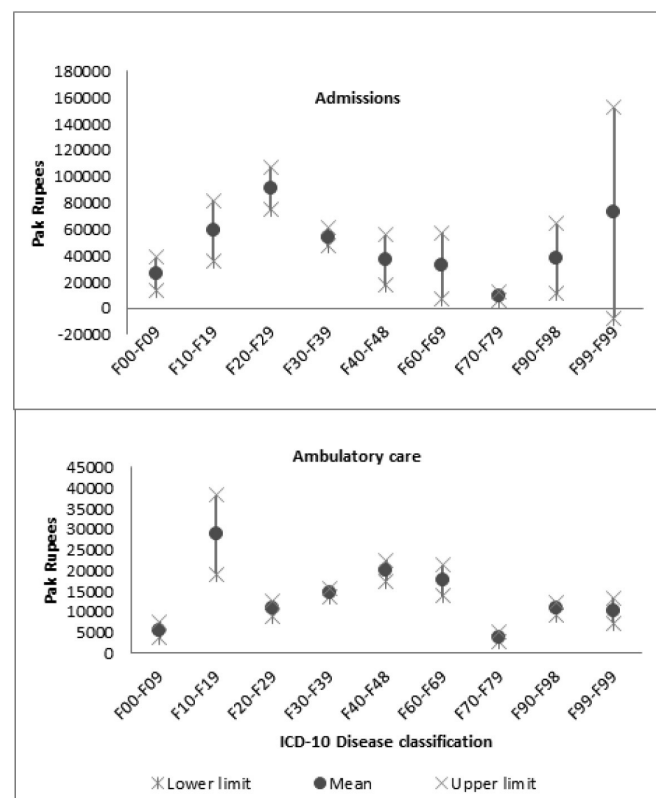


Figure 1: Mean and 95% Bootstrap Confidence Intervals of Total Cost by ICD-10 Disease Classification.

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Table 3: Average Cost (bootstrap standard errors in parenthesis) of Mental Illnesses (in PKR 2006 prices).

ICD-10 classification	Admissions				Ambulatory care			
	Medical costs	Other costs	Productivity losses ± !	All cost	Medical costs	Other costs	Productivity losses ±	All cost
F00-F09	14750 (2796.65)	1881 (420.18)	9410.90 (3708.09)	26042.16 (6347.34)	2276 (161)	304 (19.59)	2914.60 (932.15)	5494.00 (981.34)
F10-F19	19003 (2467.93)	884 (415.33)	38705 (9558)	58592.10 (11679.51)	4342 (0)	1081 (79.67)	23225.89 (4748.94)	28649.69 (4887.56)
F20-F29	26135 (1594.33)	2592 (148.19)	61992.52 (6755.29)	90719.92 (8249.65)	2884 (0)	438 (13.37)	7406.06 (927.52)	10728.89 (969.39)
F30-F39	19282 (936.44)	2000 (89.26)	32594.34 (2586.53)	53876.08 (3482.52)	3266 (0)	456 (6.28)	10704.02 (508.68)	14426.15 (533.69)
F40-F48	13616 (2507.25)	1485 (244.06)	21296.55 (7711.93)	36398.29 (9748.91)	3258 (30.51)	552 (13.22)	16069.27 (1242.41)	19879.47 (1275.25)
F60-F69	16570 (6489.16)	1511 (488.51)	14105.35 (6197.29)	32185.65 (12613.51)	4888 (0)	754 (53.85)	11797.82 (1784.47)	17439.53 (1889.06)
F70-F79	7112 (1211.25)	1043 (129.71)	1081.67 (414.43)	9236.90 (1541.19)	2579 (414.31)	263 (25.62)	931.30 (412.38)	3774.02 (557.39)
F90-F98	32253 (14361.36)	2816 (673.48)	2292.54 (888.40)	37361.50 (13538.16)	8445 (164.98)	644 (26.16)	1618.77 (799.79)	10707.94 (748.87)
F99-F99	23346 (9827.25)	1611 (656.88)	47383.47 (32038.14)	72340.41 (40679.69)	3885 (339.97)	344 (35.45)	5918.66 (1370.20)	10148.60 (1557.51)

Notes: Estimates are based on 1000 bootstrap resampling by ICD-10 disease classification.

± Productivity losses for ICD F00-09 7 F70-79 pertains to the time spent by the accompanying person with patient while seeking care.

! Productivity losses include bed rest advised to the patient after discharge from hospital.

find that economic burden escalated from USD 4246.27 million to USD 5653.61 million.

By tilting the base case scenario of medical care towards primary healthcare we demonstrated that USD 1577.19 million could potentially be saved with a nearly 200% (from USD 1577.93 million to USD 604.62 million) decrease in medical care costs annually.

The methodological uncertainty surrounding our estimates was captured by replacing the average cost estimates with the 95% bootstrapped confidence intervals. The total economic burden varied between USD 2209.82 million (at lower bound BS CI) and USD 6318.73 million (Upper bound of BS CIs). Productivity cost demonstrated high variability, ranging from USD 1022.17 million (at lower bound BS CI) to USD 4007.01 million (upper bound of BS CIs). The results of sensitivity analysis are provided in **Table 5**.

Discussion

There is wide recognition of the economic burden of mental illness but evidence for this is lacking in LMICs such as Pakistan. This study set out to generate evidence for economic burden of mental illness.

In conducting this study we are cognizant of the fact that AKUH has an excellent health information management system as well as a fully computerized billing and accounts system that made it relatively easy for us to access the required data for analysis. However, while many other health institutions in Pakistan and LMICs may have similar

facilities, we believe the critical element in our study was the presence of a health economist (MAM) on our research team. Absence of this element has been identified as a major reason for paucity of economic studies from LMICs.¹⁹

Other reasons for lack of studies on economic burden of mental illnesses in LMICs include mental health being a low priority health issue in LMICs, hence mental health services have traditionally been less well-developed. Also, economic analysis and justification were previously not always needed and data sets needed for economic analysis were not always readily available.⁵

Chisholm *et al.* studied healthcare cost and productivity losses for anxiety and depression in Pakistan (and India). They reported monthly healthcare cost of PKR 563-PKR 1020 and 'other costs' (travel, caregiver and loss of productivity) of PKR 1882- PKR 3885 (total PKR 2405-PKR 4807) in their analysis.⁴¹

In our analysis mean medical care cost for ambulatory care of F30-39 mood (affective) disorders was PKR 3266 (USD 60.71). On average a patient with mood (affective) disorders had two ambulatory care visits and spent 50 days in treatment spread over a year. While treatment at AKUH is otherwise believed to be expensive, this comparison confirms that treatment provided at AKUH is more cost-efficient. This also confirms our assumption that applying the fee-for-service healthcare facility cost of admissions and ambulatory care (like AKUH) to public sector health facilities is reasonable.

When all the costs are combined (direct and indirect costs incurred by patients and caregivers the magnitude of

Table 4: Economic Burden of Mental Illnesses in Pakistan in 2006 (Million PKR).

	PKR million	USD in million	Percent
Tertiary care Admissions			
Consultation charges	12454.16	212.02	19.27
Bed Occupancy charges	36991.30	629.75	57.23
Medicines, surgical supplies and laboratory diagnostics	15190.27	258.60	23.50
Sub total	64635.74	1100.37	100.00
Tertiary care level ambulatory care			
Consultation charges	15173.76	258.32	55.31
Medicine and supplies	12260.09	208.72	44.69
Sub total	27433.85	467.04	100.00
Primary healthcare level			
Consultation charges	152.69	2.60	24.71
Medicine and supplies	467.04	7.92	75.29
Sub total	618.05	10.52	100.00
Medical care cost (a + b + c)	92687.64	1577.93	37.00
Travel etc. costs	9665.61	164.55	3.86
Productivity losses	147706.90	2514.59	58.97
Total	250483.41	4264.27	100.00

Notes: All costs are estimated in 2006 prices and then converted to US dollars (One USD = PKR 58.74..

economic burden for mental disorders in Pakistan was considerable: the total cost for one year was estimated to be PKR 250,483 million (USD 4264.27 million), with the major contribution being productivity loss costs (PKR 147,707 million; USD 2514.59 million) and admissions treatment costs (PKR 64636 million; USD 1100.37 million).

The indirect costs that included time off work for the family member, productivity loss, informal care, travelling costs etc. were also considerable. Crucially, most of this cost was out-of-pocket payments.

Although we used data from a private fee-for-service healthcare facility, we feel that from a societal perspective, the figures we arrived at could be applied to any mental healthcare setting in Pakistan. Our belief is based on the following reasoning: in public sector health facilities in Pakistan, patients are not supposed to pay at the point of service, though as argued above, it is widely known that there are unofficial payments for seeking healthcare and out-of-pocket payments for medicines and food etc. In addition, almost all mental health professionals (psychiatrists, psychologists) in public sector mental health facilities are also involved in private practice, where the charges are comparable to that of private health facilities like AKUH (and in many cases they are more). The patient therefore ends up paying the same amount and the earnings of professionals working in both private and public sector settings are comparable. Secondly, even in public sector facilities there is a cost attached for delivery of the service, which is being borne by the government. Estimating this cost is therefore important.

Chisholm *et al.* in their study surveyed two centers in Pakistan and came to the same conclusion. Hence from the societal perspective, the cost of care we estimated could be applied to any mental health facility (private or public sector) in Pakistan.⁴¹

Literature on economic burden of mental illnesses is mostly from high income countries. We found at least three relevant studies on full economic burden of mental illnesses, i.e. from Sweden¹², Canada¹⁶ and the UK¹⁷ for the years 2001, 1998 and 1996-97 respectively. Economic burden estimates of Sweden included medical care cost, short term and long term disability and early deaths due to mental health problems.

The economic burden in Canada for depression and depressive disorders included medical care, lost productivity on short term and long-term disability and early deaths. Both the studies used national level survey applying top-down approach, except where the national level data was not available. We used bottom up approach due to paucity of nationally representative data on mental illness and lack of functionally classified data on expenditure on mental illness in the Pakistan.²³

The economic burden of mental illnesses in Sweden and Canada was Euros 9.4 billion in 2001 and Canadian Dollars 14.4 billion in 1998 respectively.^{12,16} In UK, the economic burden was 32.1 billion British Pounds for the years 1996-97.¹⁷ Our estimated economic burden of mental illness in Pakistan was much lower than these estimates. However, it is difficult to make direct comparison of estimated economic burden in Pakistan with that of other countries due to differences in the methodologies, costs of living and other economic factors. Moreover medical technology, health system structures and medical practice vary widely between Pakistan and these countries.

We can only comment that the difference in the estimates of economic burden in Pakistan with other high income countries is perhaps similar to the findings of the Global Economic Burden of non-communicable disease (NCDs). The economic burden of mental illness is projected to be nine trillion US Dollars for high-income countries and USD 7.3 trillion for LMICs, for 2010-2030.¹⁵

Table 5. Sensitivity Analysis on Economic Burden (In million PKR).

	Lower limits	Base case	Upper limit
At maximum prevalence			
Total	-	4264.27	5653.61
Medical care costs	-	1577.93	1956.51
Productivity losses	-	2514.59	3476.18
Travel etc. costs	-	164.55	211.91
Primary healthcare gate keeping			
Total	2687.08	4264.27	-
Medical care costs	604.62	1577.93	-
Productivity losses	1782.11	2514.59	-
Travel etc. costs	105.76	164.55	-
Bootstrap confidence intervals			
Total	2209.82	4264.27	6318.73
Medicine costs	290.00	476.00	664.00
Productivity losses	1022.17	2514.59	4007.01
Travel etc. costs	112.00	164.55	231.00

Notes: Base case estimates assume minimum prevalence and distribution of total demand among admissions, ambulatory care and primary healthcare based on current medical practice. Sensitivity analysis assumes a. maximum prevalence of mental illnesses, b. introduction of gate keeping role of primary healthcare, and c. values of lower and upper bounds of 95% confidence intervals around mean drawn from 1000 bootstrap samples by ICD-10 classification simultaneously for medicine cost, productivity costs and travel cost and their resulting variation in total costs, medical cost, productivity costs and travel costs.

However in order to make a case for integrating mental health in PHC in Pakistan we would like to make a point on the share of primary healthcare and secondary/tertiary care with other countries. In our analysis the share of tertiary care admission was 70% of medical care costs. In Sweden the share of hospital inpatient care was 31% of direct/medical care costs.¹² The remaining medical costs were distributed in ambulatory care services, municipality services and drugs. In many high-income countries majority of mental illnesses are managed by primary healthcare (PHC) and social services. In Pakistan, like many LMICs, in the absence of a viable PHC system, patients access tertiary care directly, even for illnesses that can be efficiently managed at PHC level. However, due to poorly organized and other supply side impediments, primary healthcare in Pakistan is mostly under-utilized.⁷ Successive rounds of national level surveys confirm that only around 3% of total health seeking is managed by PHC.³⁹ From a health system and economic perspective, seeking healthcare at tertiary care hospitals is expensive and inefficient. In the sensitivity analysis we provide a case for saving substantial health system and societal resources by introducing a gate-keeping role of primary healthcare for management of mental illnesses.

In economic terms, the non-medical consequences of mental illnesses are far greater than medical consequences. The share of medical cost in total economic burden was 43% in Sweden,¹² and 21% in Canada.¹⁶ In our estimates the share of medical cost was 37% of total economic burden. In the sensitivity analysis we observed the share of productivity losses varied from 35% to 48% of the base case productivity costs. This is largely due to the fact that many mental illnesses are treated at tertiary care level. Secondly, due to socio-cultural factors patients are usually brought to hospitals at a relatively advanced stage of the illness. In such circumstances, treatment is of a longer duration, adding to

the overall costs. Nevertheless a higher share of productivity losses makes a strong case for addressing mental health problems of the population in an efficient manner.

In Global Economic Burden of NCDs, productivity losses were estimated to be 33% of total costs¹⁵ with mental health contributing 35% of productivity losses of all NCDs. Other studies give similar findings: Stewart and Ricci estimated USD 31 billion as Lost Productivity Time (LPT) in United States workforce due to depression.⁴² Kessler *et al.* showed that earnings were lower by nearly 40 percent for men with serious mental illness (in the previous 12 months) compared to their mental illness free counterparts.⁴³

Although in absolute terms the share of high income countries in economic burden of NCDs in general and mental illnesses in particular is far greater than LMICs, yet the proportions of direct and indirect costs on mental illnesses is similar across LMICs and high income countries i.e. 30:70. This confirms that mental illnesses have disproportionately high impact on productivity than medical costs of mental illnesses and this trend is common across both LMICs and high-income countries.

Delay in seeking treatment and reliance on traditional and spiritual healers is common with mental health problems in LMICs. This results in more complicated illnesses that present to tertiary care, requiring more time and resources. This could be one of the reasons for high economic burden of mental healthcare and higher share of productivity costs subsequently in Pakistan.

Strengths and Limitations of the Study

The naturalistic observational approach, using and analyzing information that is collected routinely in clinical settings to estimate the economic burden of mental illness in Pakistan was a particular strength of our study. This is a relatively

simple and cost effective design that can be replicated in other healthcare settings in Pakistan and other LMICs. The inclusion of a health economist enhanced the quality of the study.

Other strengths of the study included using both admissions as well as ambulatory care patient data, estimating and including medication costs, calculating indirect costs and factoring in caregivers' costs (time off work, productivity loss costs, travel and meals cost etc.).

Some of the weakness of the study included estimating the economic burden of mental illnesses in Pakistan by using the average cost estimates. Our estimated average cost of mental illnesses has high bootstrap standard errors around mean in some cases, which has caused large variations in estimates, particularly of productivity losses (**Table 5**). We recommend careful interpretation of our estimates of productivity losses (**Table 5**) due to this variation.

As prevalence rates for many mental illnesses were not available we used regional and international literature to extrapolate prevalence estimates for Pakistan. This may have led to underestimation or inflation of the figures we arrived at. We explored the likely effect in the prevalence on total economic burden in the sensitivity analysis by changing the base case to maximum prevalence and subsequent escalation. Also, due to lack of accurate prevalence data we could not add long term productivity losses and disability and deaths in our analysis.

Implications for Health Policy in Pakistan

Our findings can be used to revisit the mental health policy in Pakistan. Firstly, we recommend that mental health should be prioritized equally as other NCDs as well as communicable and infectious diseases. The current health policy priorities overwhelmingly favor communicable and infectious illness at the cost of NCDs. The political economy context of this clearly reflects donors influence and international health policies such as the Millennium Development Goals (MDGs). However, in post-MDGs scenario, NCDs and mental ill-health are equally competing for resource allocation and priority setting in LMICs. Health policy makers in Pakistan need to focus on the emerging threat of NCDs and mental illnesses as well. Despite data limitation our analysis provides an overall economic picture of state of mental health in Pakistan and our estimates are comparable to similar studies, conducted mainly in high income countries.

Secondly, as recommended by others and based on the findings of sensitivity analysis, we also recommend integration of mental health in primary healthcare. This will not only save resources but also improve the quality of life of the patient through timely and cost efficient management of mental illnesses.

There remains a glaring absence of good robust data on economic costs of mental ill health in Pakistan. There is need to undertake similar studies in other healthcare centers of Pakistan that provide mental health care. We have tried to demonstrate that such an undertaking is possible.

Mental illness is largely ignored in the agenda of national health policies in Pakistan. Part of the reason is the lack of

economic data to support demands for resource allocation. Studies such as ours can help strengthen the case for increased funding for mental health care services in Pakistan.

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