Chapter 13

Universal Health Coverage for Mental, Neurological, and Substance Use Disorders: An Extended Cost-Effectiveness Analysis

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INTRODUCTION

Universal Health Coverage and Mental, Neurological, and Substance Use Disorders

Health System Goals

Health systems are complex entities, involving the development of appropriate policies and legal frameworks, mobilization and allocation of resources, organization, and actual delivery of services, as well as the timely evaluation of these components. Ultimately, the goal of such a system and each of its parts is to improve the mental and physical health of the population it seeks to serve, revealed in terms of enhanced well-being or declining rates of morbidity and mortality.

Earlier chapters in this volume showed the extent of global health losses associated with a range of mental, neurological, and substance use (MNS) disorders—and how the implementation of evidence-based, cost-effective treatment and prevention strategies can mitigate these losses. This chapter goes further by considering important attributes of health systems other than health improvement itself, namely, equity and financial protection. Equitable access to care, fair financing, service quality, and human rights protection represent other important goals; a well-functioning health system should deliver high-quality services to all people, whenever and wherever they need those services (WHO 2010a). A health system functions fully only if it protects the right to health for everyone, including people with MNS disorders. That right to health includes physical or geographical access to essential services, as well as financial access, so that those in need can use and benefit from services without risking financial hardship.

Toward Universal Health Coverage for Mental, Neurological, and Substance Use Disorders

MNS disorders pose several service and financial access challenges. First, persons with these disorders are too often subjected to discrimination and stigmatization, which can reduce their willingness to seek care. Second, individuals may be unaware of their condition and not seek or know about appropriate treatment. Third, MNS disorders are typically chronic and require ongoing treatment. Yet health care and treatment for MNS disorders are often excluded from essential packages of care or insurance schemes. Without such coverage, people with MNS disorders and their families face a difficult choice: pay out-of-pocket (OOP) for treatment

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by private providers of variable and sometimes poor quality—often by cutting other household spending and investment, or by liquidating assets or savings—or go without treatment altogether.

Either way, MNS disorders pose a direct threat to the well-being of households. In India, for example, the National Sample Survey Organization found that in 2004, national OOP expenditures for treatment of psychiatric disorders amounted to nearly Rs 7 billion (US$280 million in 2012 US$), half of which was borrowed, and a further 40 percent drawn from household income or savings (Mahal, Karan, and Engelgau 2010). Another study, conducted in the Indian state of Goa, found that 15 percent of women with common mental disorders, such as depression or anxiety, spent more than 10 percent of household income on health-related care (Patel and others 2007).

The high, potentially catastrophic cost to households of securing needed health services and goods is a fundamental concern underlying the drive toward universal health coverage (UHC). Direct OOP payments represent a regressive form of health financing—penalizing those least able to afford care—and are an obvious channel through which impoverishment may occur or deepen. Prepayment mechanisms, such as national or social insurance, more equitably safeguard at-risk populations from the adverse financial consequences of mental disorders. Accordingly, ongoing efforts to move toward UHC focus on increasing (1) the proportion of the population covered by some form of financial protection; (2) the proportion of total costs covered by some form of prepayment, such as health insurance; and (3) the depth of coverage (the range of services or interventions available to insured persons) (WHO 2010a).

Current coverage of essential health care and treatment services for MNS disorders is limited, in terms of access and financial protection or benefit inclusion. Efforts to scale up community-based public health services for these conditions can contribute strongly to greater equality of access, because such services will serve more people in need, with less reliance on direct OOP spending. This chapter explores the veracity of this claim through an innovative approach to economic evaluation called extended cost-effectiveness analysis (ECEA) (Verguet, Laxminarayan, and Jamison 2015; Verguet and others 2015).

ECEA goes beyond conventional cost-effectiveness analysis (CEA) not only by considering the distribution of costs and outcomes across different socioeconomic groups in the population, but also by explicitly examining the extent to which interventions or policies protect households against the financial risk of medical impoverishment. We apply this ECEA approach to a range of MNS disorders in two distinct geographical and health system contexts: India and Ethiopia. India is a very large, lower-middle-income country in South Asia; Ethiopia is a large, low-income country in East Africa. We selected these two countries for in-depth analysis because both have recently articulated ambitious plans to enhance mental health service quality and coverage, as well as to extend financial protection or health insurance for their citizens.

Extended Cost-Effectiveness Analysis: Principles and Practice

Objectives and Components

In addition to health gains, a potential nonhealth benefit of specific interventions or policies, such as public financing, is the value that some form of health insurance bestows on households that would otherwise pay privately for health services and goods. Because OOP spending for the care and treatment of MNS disorders can be considerable and enduring, the reduction or elimination of such expenditures can represent major savings or even financial salvation for affected households. Public financing of health service costs can also increase the use of services, especially for those whose incomes are so low that they do not access services in the first place.

Our application of ECEA to MNS disorders focuses on public financing as an instrument for financial risk protection (FRP). Public financing provides FRP benefits to households by shielding them from the OOP costs and impoverishment-related consequences of the covered health care services (Verguet and others 2015). Our approach to the measurement of FRP is described in box 13.1.

Another essential component of ECEA is its examination of the distribution of health and economic benefits by population subgroup, for example, by geographical location, care setting, or income quintile. Such an analysis enables policy makers to understand how an intervention or a policy such as public financing would affect different segments of the population, particularly those with low incomes or high vulnerability.

In short, ECEA provides a tool to amplify understanding of the extent and distribution of health and financial benefits associated with health policies and interventions. Elucidation and enumeration of these benefits provides a more holistic assessment of the expected returns on health service investments while providing new, evidence-based insights to the national policy makers responsible for setting priorities and allocating resources within and beyond the health sector.

Box 13.1

Measuring the Financial Risk Protection Effects of Health Policies

Several metrics can be used to quantify the financial risk protection (FRP) benefits of health policies. One approach is to estimate the amount of households' private out-of-pocket (OOP) expenditures averted by the policy; another is to estimate the number of cases of poverty averted by counting the number of individuals no longer falling under a poverty line/threshold because of substantial OOP medical expenditures. In this study, we used as FRP metric the money-metric value of insurance provided by public financing (Verguet, Laxminarayan, and Jamison 2015), which quantifies insurance risk premiums; it reflects risk aversion, in which individuals would prefer the certainty of insurance over the uncertainty/risk of possible OOP expenditures, and hence are willing to pay a certain amount of money to avoid that risk.

To estimate the FRP, we first estimated the individual's expected income before public financing, which depends on treatment coverage and associated OOP costs. We then estimated the individual's certainty equivalent by assigning individuals a utility function that specifies their risk aversion, which is equivalent to calculating their willingness to pay for insurance against the risk of medical expenditures. Finally, we derived a money-metric value of the insurance provided by public financing (risk premium) as the difference between the expected value of income and the certainty equivalent (Verguet, Laxminarayan, and Jamison 2015). Aggregating the money-metric value of insurance with the income distribution of the population—with a proxy based on the country's gross domestic product per capita and Gini coefficient—yielded a dollar value of FRP at the societal level.

Application to Mental, Neurological, and Substance Use Disorders

ECEA is applicable to many interventions to prevent or treat MNS disorders, whether considered separately or in combination. However, since this approach to economic analysis is new and yet to be tried in the context of MNS disorders, our first goal was to test its applicability and assess its internal validity. We accomplished this by constructing a series of equation-based ECEA models that employed the same epidemiological and treatment cost-outcome input data used in previous CEA studies, such as the treatment of psychosis, bipolar disorder, and depression with psychosocial treatment and psychotropic medication, which Chisholm and Saxena (2012) already examined in the contexts of Sub-Saharan Africa and South-East Asia. Additional information output from the ECEA model—particularly the estimated value of FRP arising from public financing of health care costs—could then be readily interpreted with reference to this earlier published work.

We combined the results of these intervention-specific analyses to evaluate the impact of defined packages of care. Future applications of the ECEA approach could focus more on prevention, including the prevention of childhood behavioral disorders as part of a community health worker care package, and the prevention of common mental disorders and substance use disorders as part of a school-based intervention package.

These analyses focus on establishing the distributional consequences and the value of FRP resulting from increased levels of publicly financed interventions. Because the availability and use of mental health services in most low- and middle-income countries is very low, however, the economic benefit associated with a switch from private to public payment for services would be correspondingly small. Accordingly, we assess the impacts of increased FRP and increased service coverage.

TOWARD UNIVERSAL HEALTH COVERAGE: TWO COUNTRY ANALYSES

Although analysis has only been conducted for the two countries presented, the insights and lessons from it have a far broader applicability that can be confirmed through further country-based work using the methods and models developed for this chapter. Analysis of this kind can be of particular informational value to other countries planning to reform their mental health programming and public health financing policies.

India

India's health sector is undergoing a rapid and stark transition, not only in epidemiological terms as the deaths and disabilities from chronic diseases and injuries take an ever-higher toll, but also in systemic terms as efforts to improve service quality and expand financial protection take effect (Patel and others 2011). In particular, there is a strong push to move toward universal public finance (UPF)—the government finances an intervention irrespective of who is delivering or receiving it—to reverse decades of high, often impoverishing OOP health care expenditures and to allocate resources more equitably.

This subsection estimates the expected health and economic benefits of scaling up services for the treatment of three prominent contributors to the burden of MNS disorders: epilepsy, schizophrenia, and depression. All monetary values are expressed in 2012 US$.

Enhanced Financial and Service Coverage of Epilepsy Treatment

Fewer than half of the estimated 6 million to 10 million individuals with epilepsy in India receive any treatment (Meyer and others 2010). To counter this health and financial burden, the Ministry of Health is considering a national epilepsy program that could increase access to, and utilization of, treatment through three interventions (Tripathi and others 2012): public awareness campaigns, better training of health workers, and UPF for first- and second-line anti-epilepsy drugs (AEDs) and epilepsy surgery. The ECEA that follows examines UPF—a policy intervention that would also address the financial risk posed by OOP spending on epilepsy treatment. The incremental impacts of three UPF interventions were assessed: UPF for first-line AEDs (intervention 1); UPF for first- and second-line AEDs (intervention 2); and UPF for first- and second-line AEDs and epilepsy surgery (intervention 3).

First-line AEDs include carbamazepine, phenytoin, and valproate, as well as phenobarbital; the second-line AED is lamotrigine. Seventy percent of patients are expected to respond to first-line AEDs; the remaining 30 percent are allocated equally to three groups: those receiving second-line AED treatment, those receiving surgery, and refractory cases who do not respond to any treatment.

Each intervention increases access to the treatment provided by UPF to 80 percent (from less than 50 percent without UPF). We estimate that 70 percent of all treatment costs—including outpatient visits, inpatient visits, and drugs—are paid OOP in the baseline and that the interventions reduce OOP expenditures for the covered services to zero. Relative to the full model and detailed results presented by Megiddo and others (2016), we make several simplifying assumptions so that the results are comparable to the ECEAs presented for schizophrenia and depression treatment. For example, treatment-seeking costs, such as travel expenses, were omitted. The analysis by Megiddo and others (2016) also employs differing government and consumer costs, but here we assume the costs of a given service to be equal, regardless of the purchaser.

Prevalence and other epidemiological parameters came from the Global Burden of Disease (GBD) 2010 study estimates for South Asia (Whiteford and others 2013). For calculation of healthy life-years, we applied the following disability weights: 0.072 for seizure-free patients, 0.319 for patients with seizures, and 0.420 for untreated individuals with epilepsy (IHME 2012). For each scenario, we estimated the policy's impact on population health (healthy life-years gained), direct government expenditures, OOP expenditures averted, and the FRP provided.

The results, presented in table 13.1, relate to a population of one million persons in the general population, divided into equal household income quintiles of 200,000 persons. The model is dynamic, and the values change over time (meaning that the data for each point in time are needed to replicate the results exactly): here we present the results for the average year. The estimated disease burden associated with epilepsy amounts to 2,200 lost years of healthy life per one million population. Current intervention efforts lead to 503 healthy life-years gained (23 percent of the total estimated disease burden); the three enhanced-coverage intervention scenarios result in gains of between 1,118 and 1,251 healthy life-years, equivalent to more than 50 percent of the measured disease burden. Public financing of second-line AEDs as well as first-line AEDs to 80 percent of those in need (intervention 2) generates 90 more healthy life-years than intervention 1 alone; the addition of surgery (intervention 3) adds a further 44 healthy life-years per one million population. Intervention health benefits are distributed equitably across income quintiles.

The total cost of implementing intervention 1 is US$0.16 per capita, rising to US$0.30 for intervention 3 (table 13.1). Compared with no intervention, the cost per healthy life-year gained for all three intervention scenarios falls below US$200 (range: US$112–US$181). Relative to the current situation, the incremental cost-effectiveness of intervention 1 is US$70 per healthy life-year gained; intervention 3 is the next most cost-effective (incremental cost-effectiveness ratio US$850).

UPF coverage would avert more than US$100,000 in OOP expenditures per one million population under intervention 1, and US$190,000 and US$208,000 under interventions 2 and 3, respectively. Finally, the

Table 13.1 Extended Cost-Effectiveness Analysis of Publicly Financed Epilepsy Treatment in India

Outcome	Income quintile					Total (per one million persons)
	I	II	III	IV	V	
Averted disease burden[a]						
Current burden (healthy life-years lost)	448	440	442	432	435	2,197
Current-coverage averted burden (healthy life-years gained)	89	95	99	112	108	503
Intervention 1 averted burden (healthy life-years gained)	221	219	224	229	225	1,118
Intervention 2 averted burden (healthy life-years gained)	238	237	242	245	245	1,207
Intervention 3 averted burden (healthy life-years gained)	248	247	250	254	252	1,251
Cost of care ($)[b]						
Current-coverage total costs	19,738	21,120	21,167	23,393	22,864	108,283
Current-coverage private expenditures averted (under UPF)	13,817	14,784	14,817	16,375	16,005	75,798
Intervention 1 total costs	32,930	33,132	33,431	33,536	33,608	166,636
Intervention 1 private expenditures averted (under UPF)	23,051	23,192	23,401	23,475	23,526	116,645
Intervention 2 total costs	53,830	53,893	54,578	54,757	54,976	272,033
Intervention 2 private expenditures averted (under UPF)	37,681	37,725	38,204	38,330	38,483	190,423
Intervention 3 total costs	58,980	59,121	59,421	59,810	59,381	296,714
Intervention 3 private expenditures averted (under UPF)	41,286	41,385	41,595	41,867	41,567	207,699
Insurance value ($)[c]						
Intervention 1	778	484	408	253	176	2,098
Intervention 2	4,096	2,699	1,925	1,490	899	11,109
Intervention 3	4,096	2,699	1,925	1,490	1,200	11,410

Source: Megiddo and others 2016.
Note: UPF = universal public financing for 80 percent of the population in need. Intervention 1 = UPF for first-line anti-epileptic drugs (AEDs). Intervention 2 = UPF for first- and second-line AEDs. Intervention 3 = UPF for first- and second-line AEDs and epilepsy surgery. First-line AEDs include carbamazepine, phenytoin, and valproate, as well as phenobarbital. The second-line AED is lamotrigine. Results are based on a population of one million people, with intervention benefits equally divided among income quintiles of 200,000 persons each (quintile I having the lowest household income and quintile V the highest). All monetary values are expressed in 2012 US$.
a. The estimated disease burden, expressed as healthy life-years lost or gained, is drawn from the Global Burden of Disease 2010 study for South Asia (Whiteford and others 2013). Healthy life-years lost are based on the prevalence of individuals with active epilepsy: seizure-free patients (disability weight [DW] 0.072), patients with seizures (DW 0.319), and untreated individuals with seizures (DW 0.420).
b. Total costs = (direct government expenditures) + (private expenditures, including out-of-pocket costs). The costs and expenditures are based on the number of prescriptions and surgeries, which are dependent on the prevalence of epilepsy and the coverage of treatment.
c. Insurance value = financial risk protection provided, based on current coverage.

monetized value of insurance was found to amount to US$11,000 per one million population for interventions 2 and 3, with evidence of a clear trend for it to decrease with wealth. For example, the poorest quintile derives 37 percent of the total insurance value, compared with 8 percent for the wealthiest.

The primary conclusion from this analysis is that intervention 1 is the most cost-effective and least costly strategy to implement from a public payer perspective, but intervention 3—increased service and financial coverage of first- *and* second-line AEDs, as well as surgery—would generate the greatest level of health gain and offer the greatest level of financial protection at the population level.

Enhanced Financial and Service Coverage of Schizophrenia Treatment

Schizophrenia poses a considerable public health and social policy challenge because of its severity, its often catastrophic effect on the welfare and income of family members, and the significant risk that patients will suffer severe human rights violations. Here we analyze the impact of enhanced public financing and provision of schizophrenia treatment on health and financial outcomes, including increased uptake of treatment (leading to more health gains), reduced OOP treatment costs, and greater insurance against catastrophic health expenses (Raykar, Nigam, and Chisholm 2015).

In this model, all persons treated for schizophrenia in nonspecialized health care settings receive a combination of first-generation antipsychotic drugs, such as haloperidol or chlorpromazine, as well as basic—or, for a small proportion, intensive—psychosocial treatment. Fifteen percent of cases are expected to require short-term inpatient psychiatric care; 2 percent are assumed to be long-term residential patients in community-based facilities; and 50 percent receive hospital outpatient care (Chisholm and others 2008).

The resulting cost per treated case is US$177 per year. Given that OOP spending as a share of total health expenditure amounts to at least 70 percent for noncommunicable diseases in India (Mahal, Karan, and Engelgau 2010), we estimate that the annual expected cost to households would be US$124. Treatment improves the average level of functioning or disability by an estimated 24 percent (Chisholm and others 2008); adherence to treatment was set at 76 percent (Chatterjee and others 2014). The estimated proportion of total cases currently receiving treatment in India is 40 percent (Murthy 2011), to which we applied a socioeconomic gradient to account for increased detection and health care utilization rates among wealthier groups (ranging from 30 percent in the poorest income group to 50 percent in the richest). Target coverage for all income groups was set at 80 percent, meaning that 80 percent of those needing treatment would receive publicly financed care.

Schizophrenia prevalence rates for South Asia were taken from the GBD 2010 study (Whiteford and others 2013), stratified by region, age, and gender, but not by income. To derive prevalence rates by income group, these estimates were applied to the household survey in India (District Level Household and Facility Survey-3); this showed a higher prevalence among higher-income groups, which could reflect better detection, greater health service uptake, or both. Disability weights, which are necessary for the calculation of healthy life-years lost or gained, are 0.576 and 0.756 for residual and acute cases, respectively (IHME 2012). A composite disability weight of 0.612 was used, based on a weighted average of acute (20 percent) and residual (80 percent) cases.

The results, displayed in table 13.2, indicate that the current public health burden of schizophrenia amounts to 1,700 lost healthy life-years per one million population. Treatment of schizophrenia with a combination of psychosocial treatment and antipsychotic medication generates 126 healthy life-years at current levels of

Table 13.2 Extended Cost-Effectiveness Analysis of Publicly Financed Schizophrenia Treatment in India

Outcome	Income quintile					Total (per one million persons)
	I	II	III	IV	V	
Averted disease burden[a]						
Current burden (healthy life-years lost)	307	316	333	354	394	1,704
Current-coverage averted burden (healthy life-years gained)	17	20	24	29	36	126
Target-coverage averted burden (healthy life-years gained)	45	46	49	52	57	249
Cost of care ($)[b]						
Current-coverage total costs	26,721	32,042	38,666	46,156	57,059	200,644
Current-coverage private expenditures averted (under UPF)	18,705	22,429	27,066	32,309	39,942	140,451
Target-coverage total costs	71,257	73,238	77,331	82,055	91,295	395,176
Target-coverage private expenditures averted (under UPF)	49,880	51,267	54,132	57,439	63,906	276,623
Insurance value ($)[c]	7,282	5,587	4,972	4,302	2,439	24,582

Source: Raykar, Nigam, and Chisholm 2015.

Note: UPF = universal public financing for 80 percent of the population in need. Results are based on a population of one million people, with intervention benefits equally divided among income quintiles of 200,000 persons each (quintile I having the lowest household income and quintile V the highest). Target coverage of UPF for schizophrenia treatment for all income groups was set at 80 percent. All monetary values are expressed in 2012 US$.

a. The estimated disease burden, expressed as healthy life-years lost or gained, is drawn from the Global Burden of Disease 2010 study for South Asia (Whiteford and others 2013).

b. Total costs = (direct government expenditures) + (private expenditures, including out-of-pocket costs).

c. Insurance value = financial risk protection provided, based on current coverage.

coverage in the population, and 249 at target coverage rates, equivalent to 7.4 percent and 14.6 percent of the current disease burden, respectively (Raykar, Nigam, and Chisholm 2015). Each healthy life-year would be gained at a cost of approximately US$1,600.

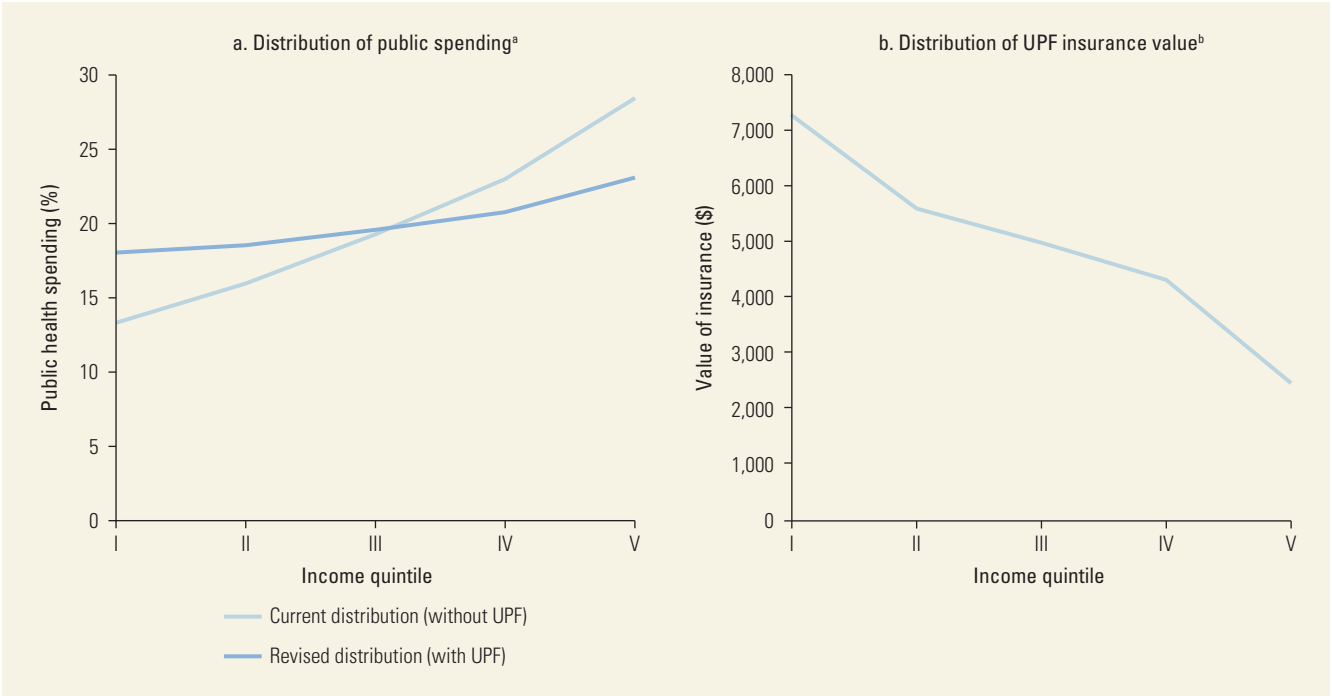
Public financing of the 70 percent of treatment costs incurred by households would remove US$140,000 of OOP spending per one million population at current coverage, and US$277,000 at target coverage (US$0.28 per capita). On top of the share already financed publicly (30 percent), this would take the total government cost to US$0.39 per capita. The health impacts of healthy life-years gained and averted OOP spending would be higher for higher-income groups; however, UPF would still flatten the distribution of public health spending appreciably away from today's regressive pattern to a more equitable allocation of resources, as shown in figure 13.1 and Mahal, Karan, and Engelgau (2010). Moreover, analysis of the insurance value indicates that increasing service and financial coverage for schizophrenia treatment in India would have a clear pro-poor effect: 30 percent of the total insurance value (estimated at US$24,582) is bestowed on the poorest quintile of the population, compared with 10 percent for the richest quintile.

Enhanced Financial and Service Coverage of Depression Treatment

As the single-largest contributor to the burden of mental and behavioral disorders, depression presents major public health and economic challenges to India. Using the same methods and data sources as those applied to schizophrenia, we assess the consequences of scaled-up service and financial coverage for depression.

In this model, all cases of depression receive basic psychosocial treatment, advice, and follow-up in non-specialized health care settings; 20 percent receive more intensive psychological treatment (an average of eight sessions); and 70 percent are prescribed a generic selective serotonin reuptake inhibitor (SSRI) antidepressant (fluoxetine). Hospital-based outpatient and inpatient services are used by 20 and 2 percent of cases, respectively. The mean cost per treated episode is estimated to

Figure 13.1 Distribution of Public Spending and Insurance Value of UPF for Schizophrenia Treatment in India, by Income Quintile



Source: Raykar, Nigam, and Chisholm 2015.

Note: UPF = universal public finance. Results are based on a population of one million people, with intervention benefits equally divided among income quintiles of 200,000 persons each (quintile I having the lowest household income and quintile V the highest). All monetary values are expressed in 2012 US$.

a. Target coverage of UPF for schizophrenia treatment for all income groups was set at 80 percent. Current coverage ranges from 30 percent in the poorest income group to 50 percent in the richest. This panel shows the distribution of public health spending across income quintiles before and after the introduction of UPF.

b. Insurance value is the financial risk protection provided by UPF for those in contact with services. This panel shows the distribution of final protection benefits across income quintiles resulting from a policy of UPF; the value of insurance is per income quintile (each with 200,000 persons).

be close to US$35 (Chisholm and Saxena 2012; Patel and others 2011), of which 70 percent (US$25) is projected to be paid by households. Treatment affects the duration of a depressive episode and is expressed here as an improvement in the remission rate by 35 percent, subsequently adjusted downward to reflect expected rates of nonadherence of 70 percent (Chisholm and Saxena 2012). We modeled the impact of moving from current coverage (ranging from an estimated 10 percent for the lowest-income quintile to 30 percent for the highest) to a target coverage of 50 percent for all income groups.

As shown in table 13.3, the public health burden of depression is considerable (more than 14,000 healthy life-years lost per one million population). At current coverage rates in the population, treatment is estimated to generate 729 healthy life-years (equivalent to only 5 percent of current disease burden) per million population. With coverage scaled up to 50 percent, close to 1,800 healthy life-years would be gained, equivalent to 12 percent of the current disease burden; as a proportion of current burden, the impact is similar to that of schizophrenia treatment, but because of the higher prevalence of depression, the absolute amount of avertable health gain in the population is at least five times greater.

As in the case of schizophrenia treatment, health benefits are distributed much more evenly across income groups at the assumed scaled-up coverage level of 50 percent among all income groups than under current coverage, which is skewed in favor of the richer quintiles. The total cost of providing this elevated level of service coverage approaches US$700,000 per one million population per year, or US$0.70 per head of population, compared with US$0.28 now. Publicly financing this scaled-up treatment will avert more than US$477,000 of OOP spending per one million population, shared fairly equally among income quintiles. The overall insurance value is approximately US$5,400, much lower than that of schizophrenia treatment because of the lower coverage rate and cost of treatment, and also much flatter (there is no clear income gradient between quintiles I–IV).

Combination Package

Combining the results of these analyses of UPF for the treatment of epilepsy, schizophrenia, and depression, several findings become apparent. First, over 90 percent of the total avertable burden of disease, in healthy life-years gained per one million population, is attributable to UPF of treatment for depression and epilepsy; UPF of treatment for schizophrenia accounts for only 7 percent of the 3,683 healthy life-years. Second, UPF for treatment of depression also accounts for the greatest share of averted OOP spending at specified target-coverage levels—half in this instance (US$477,000 of a total of US$962,000 per one million population). Both of these findings reflect the larger number of prevalent cases

Table 13.3 Extended Cost-Effectiveness Analysis of Publicly Financed Depression Treatment in India

Outcome	Income quintile I	II	III	IV	V	Total (per one million persons)
Averted disease burden[a]						
Current-coverage burden (healthy life-years lost)	2,754	2,817	2,914	2,996	3,153	14,633
Current-coverage averted burden (healthy life-years gained)	67	104	143	184	232	729
Target-coverage averted burden (healthy life-years gained)	337	345	357	367	386	1,793
Cost of care ($)[b]						
Current-coverage total costs	25,669	39,385	54,318	69,821	88,178	277,371
Current-coverage private expenditures averted (under UPF)	17,968	27,569	38,023	48,875	61,725	194,160
Target-coverage total costs	128,346	131,282	135,795	139,642	146,964	682,028
Target-coverage private expenditures averted (under UPF)	89,842	91,897	95,056	97,750	102,875	477,420
Insurance value ($)[c]	1,101	1,167	1,232	1,183	717	5,400

Note: UPF = universal public financing for 50 percent of the population in need. Results are based on a population of one million people, with intervention benefits equally divided among income quintiles of 200,000 persons each (quintile I having the lowest household income and quintile V the highest). Target coverage of UPF for depression treatment for all income groups was set at 80 percent. All monetary values are expressed in 2012 US$.

a. The estimated disease burden, expressed as healthy life-years lost or gained, is drawn from the Global Burden of Disease 2010 study for South Asia (Whiteford and others 2013).

b. Total costs = (direct government expenditures) + (private expenditures, including out-of-pocket costs).

c. Insurance value = financial risk protection provided, based on current coverage.

in the population. By contrast, by far the largest share of the composite value of insurance is associated with UPF of schizophrenia treatment (77 percent of the total US$32,000 per one million population).

Comparing these results by income quintile rather than by disease shows that, at target coverage levels, the averted disease burden and averted OOP expenditures are shared more or less equally across income groups (not shown). However, the value of insurance is markedly skewed toward the poorer income groups (figure 13.2).

Ethiopia

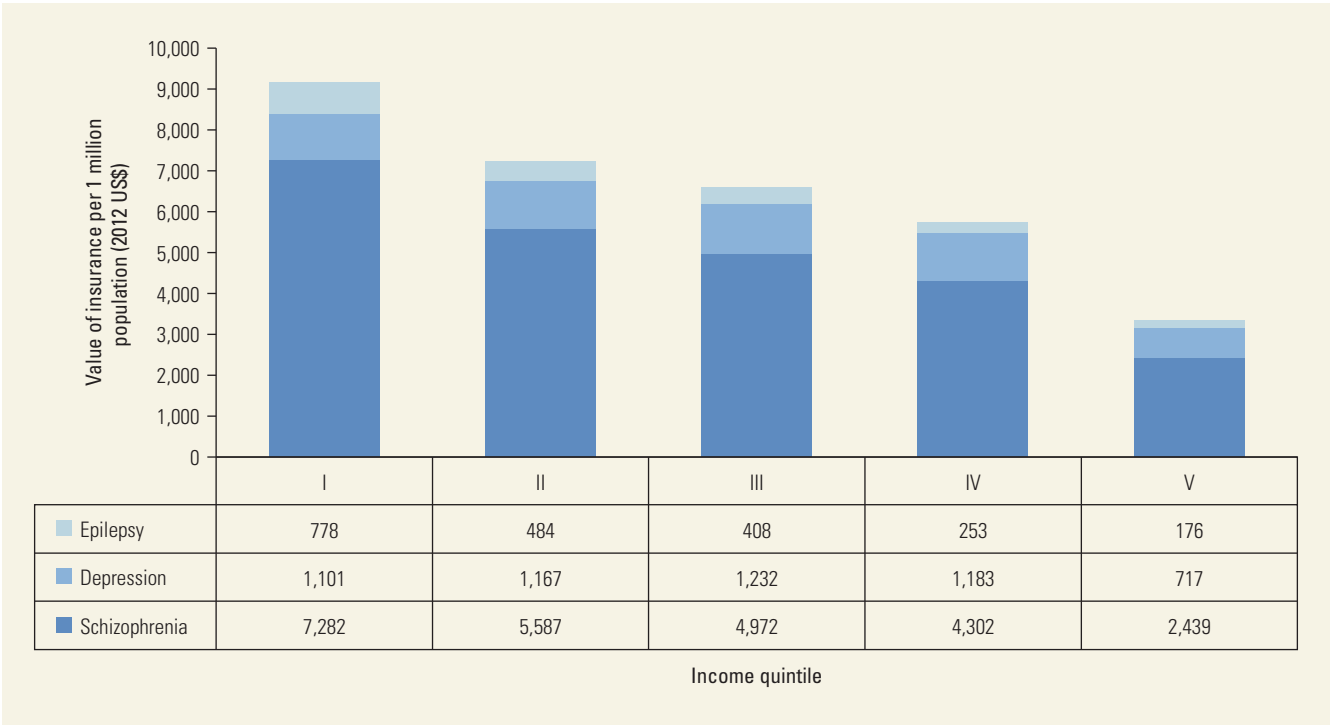
Ethiopia is one of many low-income countries in Sub-Saharan Africa that is facing a severe shortage of skilled workers and other resources for addressing the burden of MNS disorders; for example, there are only 0.4 psychiatrists per one million population in Ethiopia, compared with a global average of more than 10. However, the Ethiopian government has launched a National Mental Health Strategy to scale up mental health services over the next decade (Federal Democratic Republic of Ethiopia 2012). The strategy explicitly recognizes the importance of an efficient, equitable scale-up of mental health care within a broader, ongoing effort to increase levels of health insurance in the general population (Federal Democratic Republic of Ethiopia 2010).

This section on the ECEA of UHC for MNS disorders assesses the health, distributional, and financial impacts of scaling up a publicly financed mental health program in Ethiopia. Unlike the Indian analysis, which considered each disease in turn before assessing the combined effect, the primary interest here was in the cumulative impact of a defined package of care. In addition, this Ethiopian analysis includes an assessment of the potential productivity effects of scaling up for depression.

Enhanced Financial and Service Coverage of a Mental and Neurological Health Care Package

The basic scale-up scenario in the National Mental Health Strategy targets treatment for depression, schizophrenia, bipolar disorder, and epilepsy—all of which are priority disorders in the World Health Organization's (WHO) Mental Health Gap Action Programme (mhGAP) *Intervention Guide* (WHO 2010b). We included for this analysis the most cost-effective interventions for each disease category, identified through a recent contextualized

Figure 13.2 Composite Value of Insurance through UPF for Treatment of MNS Disorders in India, by Illness and Income Quintile



	I	II	III	IV	V
Epilepsy	778	484	408	253	176
Depression	1,101	1,167	1,232	1,183	717
Schizophrenia	7,282	5,587	4,972	4,302	2,439

Note: MNS = mental, neurological, and substance use; UPF = universal public finance. Value of insurance = financial risk protection provided at current coverage. Results are based on a population of one million people, equally divided into income quintiles of 200,000 persons each (quintile I having the lowest household income and quintile V the highest). Results assume target coverage levels of 80 percent for all income groups.

CEA of the National Mental Health Strategy (Bjerkreim Strand and others 2015). The selected interventions include phenobarbital for epilepsy, fluoxetine combined with cognitive therapy and proactive case management for depression, valproate combined with psychosocial therapy for bipolar affective disorder, and first-line antipsychotic medication (haloperidol or chlorpromazine) plus psychosocial treatment for schizophrenia.

As with the Indian analyses, the ECEA splits the population into five income quintiles and runs the analytical model for each income group with quintile-specific prevalence rates. The average age-specific disease prevalence rates used in the standard CEA (Bjerkreim Strand and others 2015) were distributed into income-quintile-specific prevalence rates, using a population-based prevalence study conducted in Ethiopia (n = 1,497) (Fekadu and others 2014).[1] Disease-specific mortality, intervention coverage, and intervention effectiveness were held constant in each income group. Estimates of the efficacy of interventions were drawn from systematic reviews, meta-analyses, and randomized controlled trials (full details can be found in Bjerkreim Strand and others 2015).

Current treatment coverage for all disorders is less than 5 percent (Bjerkreim Strand and others 2015). Following the introduction of UPF, and in line with the National Mental Health Strategy, coverage for all income groups is modeled to reach 75 percent for treatment of schizophrenia and epilepsy, 50 percent for treatment of bipolar disorder, and 30 percent for treatment of depression (Federal Democratic Republic of Ethiopia 2012). Target coverage for depression is lower than the other disorders because of its higher prevalence and lower detectability.

A significant proportion of total health spending in Ethiopia is from OOP expenditures, varying between 30 and 40 percent of the total over the past 10 years (World Bank 2014). This analysis assumes a current household contribution of 34 percent toward the cost of treatment; the government covers the remaining 66 percent. To estimate the amount of household OOP expenditures averted by UPF, we quantified what households would pay for illness-related treatment cost at current service delivery levels.

For the country as a whole, which had a population of 94.6 million in 2012 (United Nations 2015), the expected annual cost of implementing the defined mental and neurological health care package at specified target coverage levels is approximately US$153 million, equivalent to a little more than US$1.60 per capita (Johansson and others 2015). The return on this investment, in total population health gain, exceeds 155,000 healthy life-years, the majority of which derives from treatment of depression and epilepsy. The costs and health benefits of the intervention package are estimated to be higher for the lowest-income groups (table 13.4) based on the higher prevalence and treatment gap among those groups. Similarly, the measured value of insurance is highest among the lowest-income group. Although UPF would reduce household private expenditures for those with current access to care, the averted OOP expenditures would be extremely low, given the very low current access to and coverage of treatment services (less than 5 percent), particularly among the lower-income quintiles (Bjerkreim Strand and others 2015). In other words, the FRP of UPF is extremely low because of the low current level of private spending on mental health care in Ethiopia, a direct consequence of the very low coverage of services.

Findings from this ECEA indicate that investing in UPF of public mental health will create substantial health benefits, but it will most likely produce a low degree of FRP. Accordingly, while the ECEA approach captures FRP and equity in the economic evaluation of mental health policy, the FRP benefits are less relevant when the current utilization and spending on care is low, as they are in Ethiopia. Nevertheless, we expect that many families experience impoverishing loss of income because of mental disorders.

Productivity Impact of Scaled-Up Depression Treatment

Owing to low levels of current investment, OOP spending averted and FRP conferred as a result of switching to a publicly financed model of mental health care are modest. However, implementation of the National Mental Health Strategy can lead to other important welfare gains, in particular, productivity at the household and societal levels.

Therefore, we also explored the expected productivity gains from scaling up the provision of depression care and treatment. We focused only on depression because the disease burden of depression is high, and evidence indicates that depression has a substantial impact on productivity (Clark and others 2009; Goetzel and others 2004). Between 1 and 3 percent of the adult Ethiopian population is estimated to have a depressive episode at any given time, with an average duration of 8.4 months (Bjerkreim Strand and others 2015). Productivity is lost during such episodes because of increased absence from work (absenteeism) and decreased work performance when present at work (presenteeism). Depression treatment programs have been shown to improve rates of employment by up to 5 percent in the United Kingdom (Clark and others 2009); in the United States, costs associated with

Table 13.4 Extended Cost-Effectiveness Analysis of a Publicly Financed Mental and Neurological Health Care Package in Ethiopia

Outcome	Income quintile					Total (per one million persons)
	I	II	III	IV	V	
Healthy life-years gained (at target coverage)[a]						
Schizophrenia	26	22	19	16	12	95
Bipolar disorder	58	50	43	35	28	214
Depression	173	152	130	108	86	649
Epilepsy	187	163	140	115	77	682
Total cost of care (at target coverage)[b]						
Schizophrenia ($)	75,900	66,100	56,300	46,400	36,600	281,200
Bipolar disorder ($)	109,300	95,100	81,000	66,800	52,600	404,800
Depression ($)	159,200	139,000	118,600	98,100	77,600	592,500
Epilepsy ($)	92,500	80,500	69,900	56,600	37,200	336,600
Private expenditures averted (at current coverage)[c]						
Schizophrenia ($)	380	330	280	230	180	1,420
Bipolar disorder ($)	1,140	990	840	700	550	4,220
Depression ($)	760	660	610	5870	470	2,840
Epilepsy ($)	2,610	2,280	1,980	1,600	1,600	9,520
Insurance value (at current coverage)[d]						
Schizophrenia ($)	0.08	0.03	0.01	0.01	0.01	0.14
Bipolar disorder ($)	3.2	1.1	0.6	0.6	0.3	5.7
Depression ($)	9.5	3.4	1.9	1.8	0.8	17.3
Epilepsy ($)	70.7	22.9	13.0	11.9	3.6	122.1

Source: Johansson and others 2015.
Note: Results are based on a population of one million people, equally divided into income quintiles of 200,000 persons (quintile I has the lowest household income and quintile V the highest). Target coverage associated with enhanced public financing for all income groups was set at 30 percent for depression treatment, 50 percent for bipolar disorder, and 75 percent for the other two disorders. All monetary values are expressed in 2012 US$.
a. The estimated disease burden, expressed as healthy life-years gained, is drawn from the Global Burden of Disease 2010 study for Eastern Sub-Saharan Africa (Whiteford and others 2013).
b. Total cost of care = direct government expenditure associated with public financing at target coverage.
c. Private expenditures averted = out-of-pocket spending that is eliminated by switching to public financing.
d. Insurance value = financial risk protection provided, based on current coverage.

presenteeism have been estimated to be higher than the costs of treatment (Goetzel and others 2004).

To estimate the productivity impact across income groups from scaling up treatment of depression in Ethiopia, we first adapted the Goetzel and others (2004) approach to presenteeism to the context of Ethiopia. We used epidemiological, demographic, efficacy, and cost data from the contextualized CEA of mental health care in Ethiopia by Bjerkreim Strand and others (2015). It was estimated that treatment led to an average reduction in the duration of a depressive episode of 2.9 months (8.4 months * efficacy of 0.35). Second, this reduction in duration was converted to reduction in absenteeism. Disability days (per month) because of depression are estimated to be 2.9 in low-income settings (Alonso and others 2011). Hence, we assumed treatment would reduce the number of disability days by 8.7 days in total (2.9 days * 2.9 months). Subsequently, the population with depression, target coverage (30 percent), and average daily income (per wealth quintile in the productive age groups [ages 15–60 years]) were multiplied by this change in absenteeism (8.7 days) to derive an estimate of the potential productivity gains in Ethiopia. In addition, persons with depression have been found to have 3.7 days with partial disability per month in low-income countries (Bruffaerts and others 2012). Partial disability

means that on-the-job productivity is reduced because of disease; it was estimated that patients with depression had 1.2 full days lost per month because of presenteeism, based on the assumption that each partial day is equivalent to one-third of a full lost day. Subsequently, the associated productivity gain was estimated using the same method as for absenteeism.[2]

The results shown in table 13.5 indicate that scaled-up depression treatment at 30 percent coverage could lead to total productivity gains of close to US$40 million per year. The largest benefits accrue to the wealthier quintiles because of their higher average income level (Johansson and others 2015). Our estimates indicate that the expected productivity gain from scaled-up treatment of depression is likely to reduce the expected governmental cost of the treatment program by 71 percent.

We acknowledge that it is problematic to apply a high-income country method to an agrarian economy like Ethiopia to estimate productivity losses. Nevertheless, calculations of productivity impact, based on presenteeism and absenteeism, are applied to illustrate how such information may be an important supplement to information on the expected FRP of mental health care in a low-income context. Appropriate measures of presenteeism and absenteeism need to be contextualized and found for each particular setting. More conceptual and empirical work on this issue is needed.

CONCLUSIONS AND RECOMMENDATIONS

This chapter employed a novel approach to the economic analysis of mental health care interventions, with a view to gaining insights into intervention or policy impacts other than health gain itself. Assessment of the health and nonhealth impacts of scaled-up treatment by income group, for example, provides an important equity dimension that has so far been largely absent from conventional economic evaluation methods (including the WHO's CHOICE [CHOosing Interventions that are Cost-Effective] project and earlier editions of *Disease Control Priorities*). Identification of the averted OOP spending associated with a move to UPF usefully complements other research related to UHC, such as estimation of the costs of scaling up services.

We found ECEA to be a feasible approach and a useful addition to the methodological toolbox available to analysts, particularly since it can be incorporated into existing cost-effectiveness modeling frameworks. The main additional data requirement is to be able to break down epidemiological and other key input parameters by income group, the source of which would typically be nationally representative demographic and health surveys. Static and more dynamic approaches to ECEA modeling have been developed and employed; for MNS disorders with long-term impacts, or for other interventions, a dynamic, agent-based approach to modeling can be used that requires more data as well as analytical expertise, but may be better able to capture sociodemographic changes and disease interactions over time.

Whichever approach is used, both are subject to the inherent uncertainty surrounding population-level projections of intervention costs, impacts, and consequences, consideration of which is contained in the primary analyses underlying the base case findings reported in this chapter (Johansson and others 2015; Megiddo and others 2016; Raykar, Nigam, and Chisholm 2015). These uncertainty analyses indicate that results for FRP—as well as overall costs and health effects—are sensitive to assumptions around target coverage rates to be achieved in the population, the proportion of total

Table 13.5 Productivity Impact of Scaled-Up Depression Treatment in Ethiopia

Cost/outcome	Income quintile					Total population
	I	II	III	IV	V	
Government cost of depression treatment program ($, millions)	–15.1	–13.2	–11.2	–9.3	–7.3	–56.1
Productivity gain from scaled-up depression treatment ($, million)[a]						
Caused by absenteeism	3.0	4.9	5.9	6.6	7.9	28.3
Caused by presenteeism	1.2	2.0	2.4	2.7	3.3	11.6
Net societal cost of depression treatment program ($, million)[b]	–10.9	–6.3	–2.9	–0.0	3.9	–16.2

Source: Johansson and others 2015.

Note: Results are based on the total Ethiopian population, with intervention costs equally divided among income quintiles of the population (quintile I having the lowest household income and quintile V the highest). All monetary values are expressed in 2012 US$.

a. Total societal income/wealth in productive ages (15–60 years) (2012) in Ethiopia is US$879: by quintile (Q), US$281 for QI, US$536 for QII, US$772 for QIII, US$1,072 for QIV, and US$1,732 for QV.

b. Net societal cost = (governmental cost) – (productivity gain).

spending that is OOP, and the estimated cost per treated case. Our initial findings from the application of ECEA to MNS disorders need to be interpreted with a due degree of caution.

A primary aim of the preceding analysis was to ascertain the extent to which scaled-up and publicly funded mental health services can contribute to greater equality of access to care and fairness in financial contributions as well as health gains. Across the two geographical settings and multiple disorders considered (table 13.6), and after allowing for uncertainty, it is clear that enhanced coverage of effective treatment leads to significant improvements in population health (1,500 and 3,000 healthy life-years per one million population in Ethiopia and India, respectively, when the three disorders are considered together) and that this can be achieved at a very reasonable cost

Table 13.6 Comparative Results of Extended Cost-Effectiveness in India and Ethiopia

	Per one million population	
Disease/outcome	**India**	**Ethiopia**
Schizophrenia		
Current treatment coverage (target coverage) (%)	40 (80)	1 (75)
Avertable burden (at target coverage)[a]	249	95
Treatment cost (at target coverage, in $, millions)[b]	0.40	0.28
Averted OOPs (at current coverage, in $, millions)[c]	0.140	0.001
Insurance value (at current coverage, in $)[d]	24,582	0.1
Insurance value, two lowest quintiles (% of total)[e]	52	78
Depression		
Current treatment coverage (target coverage) (%)	20 (50)	1 (30)
Avertable burden (at target coverage)[a]	1,793	649
Treatment cost (at target coverage, in $, millions)[b]	0.68	0.59
Averted OOPs (at current coverage, in $, millions)[c]	0.190	0.003
Insurance value (at current coverage, in $)[d]	5,400	17
Insurance value, two lowest quintiles (% of total)[e]	42	74
Epilepsy		
Current treatment coverage (target coverage) (%)	47 (80)	5 (75)
Avertable burden (at target coverage)[a]	1,251	682
Treatment cost (at target coverage, in $, millions)[b]	0.30	0.34
Averted OOPs (at current coverage, in $, millions)[c]	0.210	0.010
Insurance value (at current coverage, in $)[d]	11,410	122
Insurance value, two lowest quintiles (% of total)[e]	60	77
Combined		
Avertable burden (at target coverage)[a]	3,293	1,425
Treatment cost (at target coverage, in $, millions)[b]	1.37	1.21
Averted OOPs (at current coverage, in $, millions)[c]	0.540	0.014
Insurance value (at current coverage, in $)[d]	41,392	139
Insurance value, two lowest quintiles (% of total)[e]	51	76

Note: Results are based on a population of one million people. All monetary values are expressed in 2012 US$. OOP = out-of-pocket.

a. Averted disease burden is expressed as healthy life-years gained and is drawn from the Global Burden of Disease 2010 study for Eastern Sub-Saharan Africa (Whiteford and others 2013).

b. Total cost of care = direct government expenditure associated with public financing at target coverage.

c. Private expenditures averted = out-of-pocket spending that is eliminated by switching to public financing.

d. Insurance value = financial risk protection provided, based on current coverage.

e. Proportion of total insurance value that accrues to the two lowest income quintile groups (the poorest 40 percent of households).

(US$1.21 per capita in Ethiopia and US$1.37 in India). Furthermore, a UPF policy can lead to a more equitable allocation of public health resources across income groups, and benefit the lowest-income groups most in terms of the value of insurance, used here as a measure of financial protection: the poorest 40 percent of households receive over 50 percent of the combined value of insurance in India, and 76 percent in Ethiopia.

It should be pointed out, however, that because existing treatment coverage is low (especially in Ethiopia, where it is 5 percent or less), averted OOP expenditures arising from a switch to public finance of treatment costs will be correspondingly low (table 13.6). This again points to the substantial shortage of appropriate mental health services in Ethiopia. It should also be noted that private expenditures on complementary or traditional remedies would not be covered by such public financing, and this might continue to be a significant drain on the income or resources of some household groups.

Only when a substantial increase in service coverage is modeled does one see the true scale of the private expenditures that would pertain in the absence of UPF. It is vital that increased financial protection goes hand in hand with enhanced coverage of an essential package of care. Improved service access without commensurate financial protection will lead to inequitable rates of service uptake and outcomes, but improved financial protection without appropriate service scale-up will bring little improvement at all. In short, a concerted, multidimensional effort is needed if the much-needed move toward UHC for MNS disorders is to be realized.

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World Bank Income Classifications as of July 2014 are as follows, based on estimates of gross national income (GNI) per capita for 2013:

- Low-income countries (LICs) = US$1,045 or less
- Middle-income countries (MICs) are subdivided:
  a) Lower-middle-income = US$1,046–US$4,125
  b) Upper-middle-income (UMICs) = US$4,126–US$12,745
- High-income countries (HICs) = US$12,746 or more.

1. For each disorder, based on data extracted from Fekadu and others (2014), we extract a prevalence ratio between income quintiles using a risk index by income quintile (Q) (QI, 1.4; QII, 1.2; QIII, 1; QIV, 0.8; and QV, 0.6) applied to the mean prevalence of each disorder (Johansson and others 2015).
2. The total gain in productivity by wealth quintile *i* due to absenteeism averted is given by: $Prod\_A_i = AP * Income_i * Dur_{dis} * Eff * Pop_i * Cov$, where *AP* is the number of days of absenteeism prevented (8.7 days); $Income_i$ is the average daily income in each wealth quintile *i*; Dur_{dis} is the average duration of a depressive episode (8.4 months); *Eff* is the efficacy of the intervention (SSRI + cognitive therapy + proactive case management = 0.35); Pop_i is the number of people with depression in each wealth quintile *i*; and *Cov* is the target coverage of treatment (0.30). The total gain in productivity by wealth quintile *i* due to presenteeism averted is given by: $Prod\_P_i = PP * Income_i * Dur_{dis} * Eff * Pop_i * Cov$, where *PP* is the number of full days of presenteeism prevented by going from depressed to nondepressed (1.2); and the other variables are identical to those in $Prod\_A_i$. The estimated annual number of people with depression (ages 15–60 years) per quintile (Q) is QI, 900,000; QII, 771,000; QIII, 641,000; QIV, 511,000; and QV, 381,000.

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