COST–BENEFIT ANALYSIS OF MENTAL HEALTH INTERVENTIONS FOR DEPRESSION, BIPOLAR DISORDER, AND ANXIETY DISORDERS IN NIGERIA

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ABSTRACT

Depression, anxiety disorders, and bipolar disorder are chronic and highly disabling conditions that start early in life and often continue for a significant period, resulting in huge economic and health losses. Here, we make a compelling argument for scaled-up investments in mental health to address the losses from depression, anxiety disorders, and bipolar disorder. We used the mental health module of the OneHealth tool to calculate treatment costs and health impacts from 2022 to 2042. We assumed a linear increase in treatment coverage. Also, we factored in an improvement of 5% in both the ability to work and productivity at work because of the treatment, subsequently mapped to the prevailing rates of labor participation and gross domestic product (GDP) per capita. The net present value of investment needed over the period 2022-2042 to substantially scale up effective treatment coverage for depression, anxiety disorders, and bipolar disorders is estimated to be US$ 6.3 billion and US$ 10.7 billion in the moderate and aggressive scenarios respectively. The results of this analysis confirm the large impact mental health conditions have on the Nigerian economy and indicate the health and economic benefits to be gained from investing in the evidence-based interventions for depression, anxiety disorders, and bipolar disorder. To reduce the negative consequences of mental health conditions and increase people's life expectancy and quality of life, while concurrently reducing productivity losses, Nigeria can take the following actions to translate the expected returns on investment into policy and practice; strengthen mental health governance and legislation; improve upon existing mental health financing; prioritize mental health interventions; and invest in the evidence-based mental health interventions modelled in the study.

Keywords: Anxiety disorders, bipolar disorders, depression, healthy life-years, mental health, productivity losses.

BACKGROUND

Depression, anxiety disorders, and bipolar disorder are chronic and highly disabling conditions that start early in life and often continue for a significant period. The global burden of disease (GBD) study and recent large-scale global surveys show that mental disorders are prevalent in

the world with a lifetime prevalence of 12.1% to 26.2% in low- and middle-income countries. These global surveys also reveal that a large treatment gap for mental disorders exists in developing countries. Four out of five people in low- and middle-income countries who need services for mental conditions do not receive them. Even when available, the interventions often are neither evidence-based nor of high quality. (Abdulmalik, Kola, Fadahunsi, Adebayo, Yasamy, M. Musa, & Gureje 2013)

World Mental Health Survey for Nigeria revealed a huge treatment gap for mental disorders. In Nigeria, only 20% of people with prevalent mental disorders such as anxiety disorders and depression received treatment in the preceding 12 months of the survey due to meagre investments in mental health, and this treatment was mostly below the standards for minimally adequate care.(Abdulmalik et al., 2013) This large treatment gap has resulted in significant health and economic losses because of the highly disabling effects of mental disorders. (Gureje, Chisholm, Kola, Lasebikan, & Saxena 2007)

Previous studies have examined the costs and benefits of mental health interventions in a global and regional context. In a global study on scaling up interventions for depression and anxiety disorders, the costs needed over the period of 2016 – 2030 to scale up interventions for both depression and anxiety disorders were estimated to be US$147 billion. The corresponding accrued benefits in terms of health impacts and economic gains were estimated to be $310 billion and $399 billion respectively (Chisholm et al., 2016). Thus, indicating that the benefits of the interventions outweigh the costs of the interventions. In a benefit-cost analysis of mental health interventions in Ghana, the estimated costs of depression and anxiety disorder over the period of 2019 – 2029 were GHS110 million and GHS108 million respectively. The estimated benefit-cost ratios (BCRs) were 7.44 for depression and 4.94 for anxiety disorders. Both depression and anxiety disorders had >1 BCRs indicating the benefits from all programs are higher than their respective costs(Nonvignon, Amissah, Agyei Agyemang, & Wong, 2020). In a Kenya mental health investment case, the intervention packages for scaled-up treatment of depression and anxiety over a 20-year period resulted in BCRs of 5.1 and 3.8 KES, respectively, for every 1 KES invested (*KENYA MENTAL HEALTH INVESTMENT CASE Providing Evidence for the Long-Term Health, Social and Economic Benefits of Investment in Mental Health in Kenya.*, n.d.). Therefore, indicating higher benefits than costs.

In the local context of Nigeria, there were no studies on the costs and benefits of interventions targeting mental health disorders. Hence, we conducted this analysis to assess the costs and benefits associated with the treatment of depression, anxiety disorders and bipolar disorder in Nigeria. The costs identified were programme cost and cost for medication, outpatient visit, and outpatient stay. While the benefits identified were healthy life-years gained and prevalent cases averted. The benefit-cost ratios obtained in this study were similar to that of previous studies highlighted above. This study will serve as evidence to inform decision makers on allocating scarce resources to mental health interventions which can help to bridge the large treatment gaps that exists in Nigeria.

METHODOLOGY

Policy Options

Firstly, the mental health policy is a package of evidence-based interventions for addressing depression, bipolar disorder, and anxiety disorders. The interventions, their target population and population in need are outlined in the table below.

Table 1: The Evidence-based interventions for addressing depression, bipolar disorder, and anxiety disorders.

Intervention	Target Population	Population in need
Depression		
Basic psychosocial treatment for mild depression	People with depression	Those with mild depression requiring psychosocial support
Basic psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	People with depression	Those with moderate or severe depression requiring basic support and medication
Intensive psychosocial treatment and anti-depressant medication of first episode moderate-severe cases	People with depression	The percent of people with moderate or severe depression requiring intensive support and medication.
Intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on an episodic basis	People with depression	The percent of people with depression needing intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on an episodic basis.
Intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on a maintenance basis	People with depression	The percentage of people with depression needing intensive psychosocial treatment and anti-depressant medication of recurrent moderate-severe cases on a maintenance basis.
Bipolar disorder		
Basic psychosocial treatment, advice, and follow-up for bipolar disorder, plus mood-stabilizing medication	People with bipolar disorder	The total population
Intensive psychosocial	People with bipolar disorder	The total population

Intervention	Target Population	Population in need
intervention for bipolar disorder, plus mood-stabilizing medication		
Anxiety disorders		
Basic psychosocial treatment for anxiety disorders (mild cases)	People with anxiety	The % of people with anxiety needing this intervention
Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	People with anxiety	The % of people with anxiety needing this intervention
Intensive psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)	People with anxiety	The % of people with anxiety needing this intervention

Secondly, we considered more than one option for this policy because only one option is not sufficient to inform policy decisions. The options considered were the baseline scenario, the moderate scenario, and the aggressive scenario.

Baseline scenario

In this scenario, we assumed a baseline value of 10% for the interventions' coverages. We kept this value constant from the base year (2022) to the target year (2042). We modelled for a time horizon of 20 years to largely reflect the time course of the mental disorders and their differential costs and benefits.

Moderate scenario

In this scenario, we linearly scaled up coverage from 10% in 2022 to 50% in 2042.

Aggressive scenario

In this scenario, we linearly scaled up coverage from 10% in 2022 to 90% in 2042.

Perspective

Perspective refers to whose costs and benefits will be counted. We adapted a societal perspective in this analysis. Hence, we counted all the possible costs and benefits of the interventions irrespective of who incurred them.

Baseline conditions

Every other policy option was compared to a no action baseline that reflects the future predicted conditions in the absence of scaling up interventions. We predicted baseline

conditions using the OneHealth Tool (OHT) module on Mental, Neurological and Substance use (MNS) disorders.

Policy responses

This component involves predicting the impacts of each option in comparison to the baseline. The difference in the impact estimates between each option and the baseline scenario gives the policy responses. We used OneHealth tool supplemented with MS-Excel to predict the policy responses; we used OneHealth tool to generate impact estimates and we exported these estimates to MS-Excel to calculate the difference in them between each option and the baseline scenario.

OneHealth Tool

OneHealth is a software tool developed by international costing experts from WHO and other UN agencies to facilitate realistic and strategic health planning, costing, budgeting, research, and impact evaluation at program-specific and sector-wide levels. OHT links the epidemiology of depression, anxiety disorders, and bipolar disorder (disability weight, incidence, prevalence, case fatality rate, and remission) to national life tables, for the calculation of impact estimates at the population level.

Disability weight

GBD disability weights for depression, anxiety disorders, and bipolar disorder were disaggregated by health states (mild, moderate, and severe). But OHT MNS module requires the overall and not disaggregated disability weights for depression, anxiety disorders, and bipolar disorder. Therefore, we estimated the overall disability weights using the disability weights and severity splits of the various health states for each mental health disorder (Kruijshaar, Hoeymans, Spijker, Stouthard, & Essink-Bot 2005).

$$\sum_{i=1}^{n}(SS_i \times DW_i) \qquad n = 1,2,3,\dots,n$$

$SS = Severity\ Split$

$DW = Disability\ Weight$

Intervention effect on disability weight

Intervention impact on average functioning translates to intervention effect on disability weight. The intervention impact on functioning is reflected in the reduction of disability weights which in turn leads to fewer disability adjusted life-years. Since intervention coverages in the baseline scenario were kept constant, we assumed a value of zero percent for the interventions' effect on average functioning for depression, bipolar disorder, and anxiety disorders. For the moderate and aggressive scenarios with scaled up coverages, we assigned values greater than zero percent to the interventions' effect on average functioning for depression, bipolar disorder, and anxiety disorders. We extracted these values from a previous study on scaling up treatment of depression and anxiety (Chisholm, Sweeny, Sheehan,

Rasmussen, Smit, Cuijpers, & Saxena 2016) and the WHO guidance note on mental health investment case (World Health Organization & Programme, 2021).

Incidence

We extracted the incidence for depression, bipolar disorder, and anxiety disorders from the GBD 2019 study. We did not estimate intervention's effect on incidence because we limited our analysis of the mental health interventions within OneHealth Tool to only treatment. Whereas intervention's effect on incidence falls under prevention and not treatment.

Prevalence

We extracted prevalence for depression, bipolar disorder, and anxiety disorders from the GBD 2019 study. We did not estimate intervention effect on prevalence because the interventions affect prevalence only through their effect on remission (Chisholm et al., 2016).

Case fatality

We assumed a case fatality rate of zero for depression, bipolar disorder, and anxiety disorders because mental disorders are usually associated with nonfatal outcomes (Gureje et al., 2007). Since case fatality was zero, we did not go further to estimate intervention effect on case fatality.

Remission

We extracted remission for depression, anxiety disorders, and bipolar disorder from a previous study on mental disorders (Ferrari, Santomauro, Herrera, Shadid, Ashbaugh, Erskine, Charlson, Degenhardt, Scott, McGrath, Allebeck, Benjet, Breitborde, Brugha, Dai, Dandona, Fischer, Haagsma, & Whiteford 2022). The remission for each disorder was given as a range. So, we calculated the average of the range and used it for the analysis.

Intervention effect on remission

Intervention effect on remission is reflected as an increased rate of remission which leads to a decrease in the prevalence of these disorders over time. Since intervention coverages in the baseline scenario were kept constant, we assumed a value of zero percent for the interventions' effect on remission for depression, bipolar disorder, and anxiety disorders. For the moderate and aggressive scenarios with scaled up coverages, we assigned values greater than zero percent to the interventions' effect on average functioning for depression, bipolar disorder, and anxiety disorders. We extracted these values from a previous study on scaling up treatment of depression and anxiety (Chisholm et al., 2016) and the WHO guidance note on mental health investment case (World Health Organization & Programme, 2021).

Costs

We calculated costs by identifying the cost components; measuring the cost components; and valuing the cost components.

Identifying the cost components

Based on existing treatment guidelines for mental health disorders, the major cost components identified were medication, outpatient visit, inpatient stay, and programme costs. Depression, bipolar disorder, and anxiety disorders were assumed to be treated with first-line medication based on standard treatment guidelines. The antidepressant called fluoxetine (20mg) is the first-line drug for depression and anxiety disorders. While the mood-stabilizer called lithium (200mg) is the first-line drug for bipolar disorder.

Measuring the cost components

The quantity of drugs, outpatient visit, and inpatient stay needed to treat depression, bipolar disorder, and anxiety disorders per case per year was estimated as;

$$Quantity\ per\ case = \%\ receiving\ intervention \times number\ of\ units \times times\ per\ day \times days\ per\ case$$

Treatment of depression, bipolar disorder, and anxiety disorders is with 1-5 tablets of their first-line drugs for a period of 6-12 months. All cases of depression, anxiety disorders, and bipolar disorder require regular outpatient visits ranging from two or more visits per case per year for mild conditions to eight or more visits per case per year for moderate-severe cases. Only 2-3% of moderate-severe cases of depression and anxiety disorders, and 15% of bipolar disorder cases require hospital admission for an average length of stay of 14-28 days.

The percentage receiving the drug/outpatient visit/inpatient stay, number of units, times per day, and days per case for each mental disorder were gotten from OneHealth Tool intervention assumptions manual and where unavailable, we sought the opinion of healthcare experts.

Valuing the cost components

The unit cost for medication was extracted from the National Health Insurance Scheme (NHIS) medicines list and where unavailable, we sought the unit cost from local healthcare experts. The NHIS unit costs were in Ghana Cedes. So, we converted to Nigerian Naira using the market exchange rate for 2022 and then converted to US Dollars using 2022 exchange rate. We did not adjust for inflation because the NHIS medicines list was in 2022 prices. The unit costs of inpatient care and outpatient visit were taken from WHO's CHOosing Interventions that are Cost Effective (CHOICE) estimates expressed in 2010 prices and then adjusted to 2022 prices using GDP deflator. These 2022 prices were converted to US Dollars using the 2022 exchange rate.

$$Adjusted\ Cost\ (2022\ prices) = Cost\ (2010\ prices) = \frac{GDP\ Deflator\ for\ 2022}{GDP\ Deflator\ for\ 2010}$$

We calculated total intervention costs each year by multiplying quantity per case with unit cost to give a cost per case, and then multiplying cost per case by the total number of cases expected to receive a particular intervention. The total number of cases expected to receive a particular intervention is the product of population in need and coverage. The OHT module on

demographic projection linked to the MNS module estimates the population in need of interventions for depression, anxiety disorders, and bipolar disorder. While the coverage estimated by the researcher was manually inputted into OneHealth Tool.

$$Treatment\ cost\ per\ case = quantity\ \ per\ case \times unit\ cost$$

$$Total\ cost = population\ in\ need\ \times coverage \times treatment\ cost\ per\ case$$

We included an estimate of expected program costs and shared health system costs. These programme management and administration, training and supervision, drug safety monitoring, health promotion and awareness campaigns, and strengthened logistics and information systems. We expressed estimates as an on-cost to the estimated direct healthcare costs (medication, inpatient, and outpatient costs). The baseline value for this on-cost was 10% and therefore, grew in absolute terms during scale-up.

Benefits

We calculated benefits by identifying the benefit components; measuring the benefit components; and valuing the benefit components.

Identifying the benefit components

The benefits components are categorized into health and economic components. The health components are the OHT impact estimates which include healthy life-years gained and prevalent cases averted. While the economic components are mental health-related productivity changes which include increased labor force participation, decreased absenteeism and decreased presenteeism.

Healthy life-years gained (Disability adjusted life-years averted)

Healthy life-years gained, which is the same as disability adjusted life-years averted, reflect the time spent by the population in a particular state of health with a known degree of disability, because of the intervention.

Prevalent cases averted.

These are the cases of depression, bipolar disorder, and anxiety disorders that would have occurred during the time horizon but did not because of the intervention.

Increased labor force participation

Labor force participation refers to the extent to which people actively work and search for jobs. Individuals who suffer from mental health conditions such as depression, anxiety disorders and bipolar disorders are more likely to leave the labor force (due to premature death or disability). Hence, decreased absenteeism becomes an important benefit component because it reflects the increase in labor force participation attributable to the intervention.

Decreased absenteeism

Absenteeism refers to productivity losses related to not attending work due to ill health. Individuals with mental health conditions such as depression, anxiety disorders and bipolar

disorders are more likely to miss days of work. Hence, decreased absenteeism becomes an important benefit component because it reflects the reduction in missed days of work due to the intervention.

Decreased presenteeism.

Presenteeism relates to reduced productivity at work due to health problems. Individuals with mental health conditions such as depression, anxiety disorders and bipolar disorders are more likely to work at reduced capacity. Hence, decreased presenteeism becomes an important benefit component because it reflects the reduction in working at reduced capacity attributable to the intervention.

Measuring the benefit components

Healthy life-years gained, and prevalent cases averted.

We used OneHealth Tool to estimate the prevalent cases and healthy life-years for each policy option and the baseline scenario across the time horizon. We exported these estimates to MS-Excel and calculated the differences in them between each policy option and the baseline scenario. The results obtained were the prevalent cases averted and healthy life-years gained.

Labor force participation, absenteeism, and presenteeism

The additional time lost per year due to absenteeism was 13.1 days for depression, 13.5 days for anxiety disorders, and 36.5 days for bipolar disorder (Alonso, Petukhova, Vilagut, Chatterji, Heeringa, Üstün, Alhamzawi, Viana, Angermeyer, Bromet, Bruffaerts, de Girolamo, Florescu, Gureje, Haro, Hinkov, Karam, Kovess, , … Kessler 2011). Additional time lost per year due to presenteeism was 19.8 partial disability days for depression, 16.2 for anxiety disorders, and 20.4 for bipolar disorder (Bruffaerts, Vilagut, Demyttenaere, Alonso, AlHamzawi, Andrade, Benjet, Bromet, Bunting, de Girolamo, Florescu, Gureje, Haro, He, Hinkov, Hu, Karam, Lepine, Levinson, … Kessler 2012). Based on findings from a previous global ROI study, we estimated 5% reductions in absenteeism and presenteeism and a 5% increase in labor force participation for depression and anxiety disorders (Chisholm et al., 2016). We did not measure productivity changes for bipolar disorder because there was no data on the extent to which bipolar interventions increased labor force participation or reduced absenteeism and presenteeism.

Valuing the benefit components

Healthy life-years gained

Healthy life-years gained capture the overall health impact of mental health interventions and we valued them using GDP per capita. The value of one healthy life-year is estimated to be 2.3 times GDP per capita (Chisholm et al., 2016). This value is categorized into instrumental (economic) and intrinsic (health) elements. The instrumental value represents productivity changes, and this value is two-thirds the value of one healthy life-year which is equivalent to 1.5 times GDP per capita. While the intrinsic value represents the value of being alive and healthy in itself and this value is one-third the value of one healthy life-year which is equivalent

to 0.5 times GDP per capita (Chisholm et al., 2016). Since we directly measured productivity changes, we valued only the intrinsic element of healthy-life years gained.

$$Value\ of\ healthy\ life\ years\ gained = 0.5 \times GDP\ per\ capita \times healthy\ life\ years\ gained$$

Prevalent cases averted.

We did not directly value prevalent cases averted. However, we used them together with GDP per capita to value productivity changes. We applied employment-related adjustments to the number of prevalent cases averted. Employment-related adjustments include adjusting for working age population (15-69 years), labor force participation rate and unemployment rate. OneHealth Tool disaggregates impact estimates by age group. Hence, it was easy to extract the prevalent cases averted for working age population.

Increased labor force participation

We valued increased labor force participation by taking the number of cases averted; applying employment-related adjustments as described above; multiplying by the % increase in labor force participation; and then multiplying by GDP per capita.

$$Increased\ labor\ force\ participation = prevalent\ cases\ averted\ for\ working\ age\ population \times labor\ force\ participation\ rate \times unemployment\ rate \times \%\ increase\ in\ labor\ force\ participation \times GDP\ per\ capita.$$

Decreased absenteeism

We valued decreased absenteeism by taking the number of cases averted, applying the employment-related adjustments, multiplying by the % decrease in absenteeism; and then multiplying by GDP per capita.

$$Absenteeism = prevalent\ cases\ averted\ for\ working\ age\ population \times labor\ force\ participation\ rate \times unemployment\ rate \times \%\ decrease\ in\ absenteeism \times GDP\ per\ capita.$$

Decreased presenteeism

We valued decreased presenteeism by taking the number of cases averted, applying the employment-related adjustments, multiplying by the % decrease in presenteeism; and then multiplying by GDP per capita.

$$Presenteeism = prevalent\ cases\ averted\ for\ working\ age\ population \times labor\ force\ participation\ rate \times unemployment\ rate \times \%\ decrease\ in\ presenteeism \times GDP\ per\ capita.$$

We used the above methods to value the productivity changes for depression and anxiety disorders only. An alternative method was used to value the productivity changes for bipolar disorder because of the paucity of data on labor force outcomes for people with bipolar disorder and because there were no averted prevalent cases for bipolar disorder due to the zero percent

impact on remission for bipolar disorder interventions. We used the instrumental value method to value the productivity changes for bipolar disorder.

$$Value\ of\ productivity\ changes\ for\ bipolar\ disorder = 1.5 \times GDP\ per\ capita \times healthy\ life\ years\ gained$$

The GDP per capita used in valuing the benefit components was expressed in 2022 current US$.

Discounting

Individuals and societies prefer monetary values of today over monetary values of tomorrow. Hence, we multiplied future benefits and costs by a discounting factor of 3% to account for the time preference. This gives the discounted costs and benefits or the net present values (NPVs) of costs and benefits.

RESULTS AND DISCUSSION

Costs of Intervention

The costs of the interventions were estimated for the period of 2022–2042. Table 2 shows the absolute costs at baseline coverage and the incremental costs needed for scaling up coverage. Interventions for bipolar disorder incurred the largest estimated incremental costs followed by anxiety disorders and depression respectively.

In the moderate scenario, an additional $538 million is needed to scale up the interventions' coverages for depression from 10% to 50%. While for bipolar disorder and anxiety disorders, an additional $4,191 million and $1,600 million respectively is needed to scale up their interventions' coverages from 10% to 50%.

In the aggressive scenario, an additional $1,161 million is needed to scale up the interventions' coverages for depression from 10% to 90%. While for bipolar disorder and anxiety disorders, an additional $6,290 million and $3,249 million respectively is needed to scale up their interventions' coverages from 10% to 90%.

Table 2: Absolute costs at baseline coverage and the incremental costs needed for scaling up coverage.

Mental health intervention	**Baseline scenario**	**Moderate scenario**	**Aggressive scenario**
	Total costs (in 2022 US$)	**Incremental total costs (in 2022 US$)**	**Incremental total costs (in 2022 US$)**
Depression	491,126,845	538,271,952	1,161,337,263
Bipolar disorder	2,857,070,029	4,191,395,518	6,290,414,733
Anxiety disorders	858,115,081	1,600,433,038	3,249,653,903
Total	4,206,311,955	6,330,100,508	10,701,405,899

Health Impacts

Using the OneHealth Tool, the health impacts of expanding the coverages of the interventions from 10% to 50% and 90% are summarized in table 3. The health impacts constitute healthy life-years gained and prevalent cases averted for depression, bipolar disorder, and anxiety disorders.

Table 3: Health impacts of expanding the coverages of the interventions from 10% to 50% and 90%

Mental health intervention	**Moderate scenario (50% coverage)**		**Aggressive scenario (90% coverage)**	
	Healthy life-years gained	**Prevalent cases averted**	**Healthy life-years gained**	**Prevalent cases averted**
Depression	1,989,840	169,890,805	4,108,057	161,356,963
Bipolar disorder	601,863	0	1,363,052	0
Anxiety disorders	2,226,798	239,565,117	4,114,912	226,036,606
Total	4,818,501	409,455,922	9,586,021	387,393,569

Benefits

The benefits are the monetarily valued health impacts and productivity changes. The valued health impacts are the healthy-life years gained. While the valued productivity changes are the increased labor force participation, decreased absenteeism, and decreased presenteeism collectively referred to as productivity gains. These benefits, estimated for the period of 2022–2042 using the Human capital approach (GDP per capita) are summarized in the table below. In the moderate scenario and for healthy life-years gained, anxiety disorders yielded the highest incremental benefit of $1,592 million, followed by depression with a benefit of $1,443 million and bipolar disorder with a benefit of $434 million. For productivity gains, anxiety disorders have the highest productivity gains of $1,767 million, followed by bipolar disorder with productivity gains of $1,302 million and depression with productivity gains of $889 million.

In the aggressive scenario, depression yielded the highest benefit of $2,992 million for healthy life-years gained, followed by anxiety disorders with a benefit of $2,953 million and bipolar disorder with a benefit of $984 million. Also, anxiety disorders have the highest productivity gains of $5,084 million, followed by bipolar disorder with productivity gains of $2,953 million and depression with productivity gains of $2,755 million.

Table 4: The calculated benefits using the Human capital approach (GDP per capita).

Mental health intervention	Moderate scenario		Aggressive scenario	
	Healthy life-years gained (In 2022 US$)	Productivity gains (In 2022 US$)	Healthy life-years gained (In 2022 US$)	Productivity gains (In 2022 US$)
Depression	1,444,813,155	889,472,208	2,992,485,813	2,755,169,754
Bipolar disorder	434,147,799	1,302,443,398	984,582,300	2,953,746,900
Anxiety disorders	1,591,560,967	1,767,100,217	2,953,430,237	5,084,389,162

Benefit-Cost Ratios (BCR)

In the moderate scenario, the highest return is from depression with a BCR (economic returns) of 1.65 per dollar of investment and a BCR (economic + health returns) of 4.33 per dollar of investment, followed by anxiety disorders with a BCR (economic returns) of 1.10 per dollar of investment and a BCR (economic + health returns) of 2.09 per dollar of investment. Bipolar disorder yielded to the lowest returns with BCRs of less than 1.

In the aggressive scenario, the highest return is from depression with a BCR (economic returns) of 2.37 per dollar of investment and a BCR (economic + health returns) of 4.95 per dollar of investment, followed by anxiety disorders with a BCR (economic returns) of 1.56 per dollar of investment and a BCR (economic + health returns) of 2.47 per dollar of investment. Bipolar disorder yielded to the lowest returns with BCRs of less than 1.

Table 5: The calculated benefit-cost ratios

Mental health intervention	Moderate scenario		Aggressive scenario	
	BCR (economic returns)	BCR (economic and health returns)	BCR (economic returns)	BCR (economic and health returns)
Depression	1.65	4.33	2.37	4.95
Bipolar disorder	0.31	0.41	0.47	0.62
Anxiety disorders	1.10	2.09	1.56	2.47

These results show that the benefits of mental health interventions out-weigh the costs. It contributes additional evidence, emphasizing the importance of government investment in mental health interventions, particularly in a resource-constrained setting like Nigeria where

competing priorities exist. In the mental health policy sphere, the goal of cost-benefit analysis is to estimate, in monetary units, the value of benefits and costs associated with implementing a certain mental health intervention. The BCRs for depression and anxiety disorders in this analysis are comparable to the BCRs in a similar study on investments to scale up treatment for anxiety and depression (Chisholm et al., 2016). The interventions for both mental disorders had >1 BCRs indicating the benefits from all programs outweighs their respective costs. The best BCR was obtained in the treatment of depression intervention followed by the treatment of anxiety disorders. The BCRs for bipolar disorder in this analysis is comparable to the BCR in a similar study on investments to scale up treatment for anxiety and depression (Chisholm et al., 2016). The intervention for bipolar disorder had <1 BCRs indicating the costs incurred by the program outweighs its benefits.

RESEARCH IMPLICATION

Economic Evaluation, which is the comparative analysis of two or more alternative courses of actions in terms of their costs and benefits in order to inform policy decisions, is a rapidly advancing field because of the increased need for evidence-based decision-making. This study, which is a type of economic evaluation, would help increase the visibility of economic evaluation and further establish its importance especially in low- and middle-income countries. This study will help to ignite the interest and build the capacity of more people in conducting economic evaluation.

Beyond the field of economic evaluation, this study is also beneficial to society. This study can help decision-makers prioritize and justify investments in mental health programs that offer the highest returns in terms of improved mental health outcomes and social well-being relative to their costs. This study also delineates both the potential non-economic and economic benefits, such as improved quality of life, improved productivity and increased workforce participation.

Mental health issues significantly impact workforce productivity through absenteeism, presenteeism and turnover. Therefore, this study can help human resources managers assess the potential benefits of investing in resources and programs such as counselling services and wellness programs to support employee mental health. Mental health conditions can contribute to increased healthcare costs for employers through insurance claims and medical treatment expenses. This study can help human resources managers identify intervention strategies to mitigate these costs and potentially reduce healthcare spending for the organization.

In cost-benefit analysis, the value of a healthy life-year is used to monetize the health benefits of an intervention. The value of a healthy life-year can vary across countries due to differences in healthcare systems, income levels, cultural norms, and preferences and the choice of multiplier may have implications for equity, as it affects the distribution of costs and benefits across different population groups. For the value of a healthy life-year, we used a multiplier of 0.5 only. Future research can assess the sensitivity of the results to variability in the value of healthy life-year by adopting a multiplier of 0.7.

CONCLUSION

This study assesses the impact of scaling up mental health interventions for anxiety disorders, depression, and bipolar disorder in Nigeria. It provides for the first time, evidence on the intervention costs, health impacts and benefits for the scaled-up treatment of depression, anxiety disorders and bipolar disorder in Nigeria. The results of this analysis confirm the large impact mental health conditions have on the Nigerian economy and indicate the health and economic benefits to be gained from investing in the evidence-based interventions for depression, anxiety disorders, and bipolar disorder. To reduce the negative consequences of mental health conditions and increase people's mental well-being, life expectancy and quality of life, while concurrently reducing productivity losses such as presenteeism and absenteeism, Nigeria can take the following actions to translate the projected benefits of scaled-up mental health investments into policy and practice; strengthen mental health governance and legislation; improve upon existing mental health financing; prioritize mental health interventions; and invest in the evidence-based mental health interventions modelled in the study.

Study Limitation

This study did not include a sensitivity analysis. We did not assess the robustness of the results to changes in key parameters such as discounting factor and value of a healthy life-year.

Discounting is a common practice in cost-benefit analysis to account for the time value of money. However, selecting an appropriate discount rate is subjective and can significantly affect the results in terms of net present value. Moreover, discounting may not adequately capture the preferences of future generations or the distributional impacts of policy decisions. The study adopted a discounting factor of 3% alone. Further studies can assess the sensitivity of the results to variability in discounting by adopting discounting factors of 5% or 10%.

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