International disparity of mental disorders burden: New trends of global mental health disparity

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Abstract

Background: Mental illness had been a worldwide concern. Global Mental Health (GMH) had become a movement to fight for Global health inequality. In low-income country, adequate and quality mental health infrastructure, mental health services are not provided equitably to people with mental disorders.

Methods: We used the data of global burden of 204 countries from 1990 to 2019 in Global Burden of Disease database. The Years Lived with Disability (YLDs) due to mental disorders was treated as an indicator of national mental health. In the GBD Results Tool toolkit provided by the Institute of Health Measurement and Evaluation, retrieved and visualized the data in global burden of disease data. In addition, we used correlation analysis to analyze the correlation between the burden of mental illness and the level of national development.

Results: It is found that, mental health had been a global issue which showing a gradual upward trend. There is a significant positive and moderate correlation between national development and the burden of mental disorder. The better the national development, the higher the YLDs Rate caused by mental disorders. The burden of mental illness in low-income countries is not high, but the rate of increase is relatively fast, while the burden of mental illness in low- and middle-income countries is relatively high, but the rate of decrease is apparent.

Conclusion: The burden of mental disorders in developed countries is relatively high, but it has shown a downward trend. However, although the burden of mental disorders in developing countries is not large, the growth rate is relatively fast. This may be related to mental health policy. It is high time to notice that mental health had been a global issue. Global mental health movement should be done to narrow the gap between different countries, especially in developing countries.

Background

Health disparity in mental health

The Black Report, which was the first academic work on health inequality, pointed out that there are significant differences in the mortality and morbidity rates of residents of different occupational classes and incomes. The report believes that there is widespread health inequality in the UK, as well as France, the United States and other countries. After *The Black Report* released, researches on health inequality gradually turned to focus on micro and macro socioeconomic factors. The micro factors of health inequality mainly include income [1], healthcare utilization [2], and socio-economic status [3]. The macro factors [4] mainly include social class [5], medical system [6], national wealth [7] and income inequality [8]. These studies pay more attention to factors related to physical health, such as mortality and the prevalence of physiological diseases.

With the increasing of global health governance, residents of low-income countries and their physical health of people have improved, but mental health problems have become increasingly prominent and have received widespread attention [9–10]. The 2001 World Health Organization report *Mental Health: New Understanding, New Hope* pointed out that, more than 25% of people are suffered from mental disorders [11]. Depression is the third leading contributor to the global disease burden [12]. With the high incidence of mental illnesses on a global scale, the differences in the wealth of mental illnesses between regions and countries are becoming more apparent [13]. Cross-national epidemiological studies have emphasized that mental disorders are prevalent

across the globe, but are underdiagnosed and undertreated [14]. Mental health disparity is becoming a new manifestation of health inequality on a global perspective, and is constantly evolving into a new trend that has a negative impact on health equity.

Global mental health and mental health across countries

Following the enlightenment of physical health inequality in *the Black report*, the impact of economic and wealth on personal mental health is the first to be concerned. Survey data show that the lower the socioeconomic status, the higher the prevalence and risk of mental illness [15], and the higher the probability of being admitted to a mental hospital [16]. More macro-level data show macro factors, such as regional development levels [17], income inequality [18], etc., are closely related to the prevalence of mental illness. These studies regard the economic factors as an important factor affecting individual's mental health or one seeking mental health services.

With the progress of globalization, the trend of mental health differences on a global scale has become a new research direction. Mental health disorders are viewed as a global concern requiring globally led approaches to address them [19]. Global Mental Health (GMH) had become a movement with proponents, adherents, opponents, and an ideology and core activities [9]. Mental health between low-income, middle-income and high-income countries [20–21] had been found, but low-income countries got more attention [22]. In low-income country, adequate and quality mental health infrastructure [23], mental health services are not provided equitably to people with mental disorders [24–25], persons with serious mental illness in less-developed countries do not receive treatment [26]. A research pointed out that, 32% of 191 countries did not have a specified budget for mental health. Many countries from Africa (79%) and the South East Asia (63%) spent less than 1% of their total health budget on mental health [27]. The stated aims of the Movement for GMH are 'to improve services for people living with mental health problems and psychosocial disabilities worldwide, especially in low- and middle-income countries where effective services are often scarce' [28].

A large number of studies on international differences in mental health follow the research logic of health inequality, evaluating mental health disparity from the perspective of mental health services and resources. However, few studies have specifically focused on mental health between different countries, especially the differences in mental health between low- and high-income countries. Are there differences in the burden of mental illness between different countries and regions? How is mental health related to the country's economic and social development? What are the trends in the mental health disparity of countries with different levels of economic development in different periods? Based on the data of the Global Burden of Disease database, this article discussed the current situation and trend of the burden of mental health in global context.

Methods

Data

The data we used is the Global Burden of Disease database, which is an open database on the website of The Institute for Health Metrics and Evaluation (IHME). The construction of the global burden of disease database has a long history. The World Bank commissioned the Harvard School of Public Health and the World Health Organization for its 1993 World Development Report to jointly complete the first global burden of disease. Since 1990, the data has recorded more than 350 diseases and injuries, and collected the latest estimates of deaths

and disability deaths by different causes, ages and genders in most countries and regions around the world [29]. In the GBD Results Tool toolkit provided by the Institute of Health Measurement and Evaluation, the data in the global burden of disease database can be retrieved and visualized, and research data can be exported. The disease burden data for analysis was applied for through the IHME data team. Tables 1 and 2 were organized through authorized data, and figure 1, 2, and 4 were generated on the data analysis platform GBD Compare provided by the team. The use of the above data and images is authorized.

Variables

Mental Health

Health is not only disease-free and being strong, but also a state of fulfillment in three aspects: physical, mental, and social (Well-being). The World Health Organization's definition of mental health: Mental health is regarded as a state of health. In this state, individuals are aware of their own potential, can cope with the pressure of daily life, are creative, and can do something to the group they belong to make their own contributions [30]. Since mental health is a multi-dimensional concept, and mental illnesses are juxtaposed with substance use disorders in the Global Burden of Disease database (Mental and substance use disorders), the study selected several typical mental illnesses as the observed diseases. The main mental illnesses used in the study include five main types of mental illness: Depressive disorders, Bipolar disorder, Schizophrenia, Anxiety disorders, Autism and Asperger's syndrome.

Disabled and lost healthy life years (DALYs and YLDs)

Murray proposed DALYs (Disability Adjusted Life Years) in 1996, which refers to the years of healthy life lost due to premature death and disability due to a certain cause [31]. It consists of two parts. Years of life lost (YLLs, Years of life lost) and years of life lost (YLDs, Years Lived with Disability). It is difficult to identify deaths due to mental illness. The data on health life years lost due to death in disability-adjusted life years may not be accurately estimated, and the difference between the two values of DALYs and YLDs in actual data is very small, so when assessing the burden of mental illness The burden of mental health disease is measured by years of disability and loss of healthy lives.

National development level

Comprehensive and multiple indicators are often used to measure the level of development of a country or region. The human development index and the socio-demographic index are two more commonly used indicators in the health field. The Human Development Index (HDI, Human Development Index) was proposed by the United Nations Development Program (UNDP) in the "Human Development Report 1990" to measure the level of economic and social development of UN member states. The Human Development Index is composed of three indicators: average life expectancy, literacy rate, and real GDP per capita. In 2015, the global burden of disease project team introduced the social demography index (SDI, social demography index), which is a brief indicator used to determine the level of development of a country or other region. SDI is the comprehensive average of the per capita income, average education level and fertility rate of all regions in the global burden of disease project group, which is between 0 and 1.

Analysis method

The mental illness burden data and socio-demographic index indicators in the study come from the GBD Results Tool toolkit, while the human development data comes from the World Bank database. The analysis database is obtained by matching the names of countries or regions. In the analysis of the study, the mental health disease burden data was derived from the GBD Results Tool toolkit, and the data was analyzed in STATA 16.0. Part of the visualized image comes from the GBD Compare Viz Hub visualization function provided on the website of the Institute of Health Measurement and Evaluation. All methods were performed in accordance with the relevant guidelines and regulations.

Results

Mental disorders burden and increasing trend worldwide

In table 1, it can be seen from the global burden of disease database that in 2019, the number of life-years lost due to all causes reached 860973.780 thousand per year. According to the global population of that year, the average person lost 0.11 years of life due to various diseases. The number of life-years lost due to mental disorders is 125293.960 thousand per year; the average life-year lost due to various diseases is 1619.32 person-years per 100,000 people.

Table 1 global YLDs caused by major mental disorders in 2019

	Number thousand per year	Percent %	Rate per 100 thousand
Total all cause	860973.780	100.00	11127.34
Mental disorders	125293.960	14.59	1619.32
schizophrenia	15107.248	1.78	195.25
Depressive disorders	46863.642	5.45	605.67
Major Depressive disorder	37202.741	4.33	480.81
Dysthymia	9660.900	1.12	124.86
Bipolar disorder	8502.426	0.99	109.89
Anxiety disorders	28676.050	3.34	370.61
Autism spectrum disorders	4306.615	0.50	55.66

Global YLDs caused by mental disorders accounts for 14.95% of total .Depression and anxiety are the two types of mental disorders that cause disability and loss of life years, regardless of the total number, proportion or average amount of life lost due to major mental disorders. It can be seen from this that depression and anxiety are both important mental disorders that affect mental health and cause the loss of healthy life years, and require attention. In addition, mental disorders such as schizophrenia and bipolar disorder are also factors that cause the loss of healthy life years.

A statistical analysis of the years of life lost due to disability from major mental disorders worldwide from 1990 to 2019. Judging from the total number of life-years lost due to mental disorders over the years, it was only 82.17 million person-years in 1990, and it increased to 125.31 million person-years in 2019. The burden of mental disorders has increased by nearly half in 30 years. The average annual increase in life lost due to mental disorders is 1.534 million per year, with an average annual increase of 1.5%. Among them, the annual average annual increase in life lost due to Depressive disorders is 206,000•years, with an average annual increase of 1.75%; the average annual increase in life loss due to anxiety disorders is 345345•years, with an average annual increase of 1.49%; The annual average annual increase in life lost due to schizophrenia is 206065, an average annual increase of 1.75%; the average annual increase in life lost due to Autism spectrum disorders is 41403, an average annual increase of 1.13%; bipolar disorder causes The average annual increase of disabled lives lost was 108770 person-years, with an average annual increase of 1.61%.

Table 2 global YLDs caused by major mental disorders in 1990-2019, per 100 thousand

		Mental disorders		schizophrenia	Depressive disorders	Bipolar disorder	Anxiety disorders	Autism spectrum disorders
		DALYS	YLDS	YLDS	YLDS	YLDS	YLDS	YLDS
1990		821.7	821.6	77.9	282.5	60.2	181.7	34.6
2000		975.2	975.0	95.1	337.4	71.6	217.8	39.2
2010		1120.9	1120.7	114.0	388.0	84.5	250.0	43.9
2015		1197.2	1197.0	123.3	418.5	90.5	265.3	46.4
2019		1253.1	1252.9	151.0	468.6	85.0	286.7	43.0
annual average growth	Number	15.34	15.34	2.06	6.13	1.88	3.45	0.4
	Rate (%)	1.53	1.53	1.75	1.66	1.61	1.49	1.13

It can be seen that the overall burden of various mental disorders has shown an increasing trend. From 1990 to 2019, the average annual growth rate has reached 1.5%. At the same time, it can be seen that depression and anxiety are not only the major factors in the loss of life years due to mental disorders, but the growth rate of the two types of mental disorders is also relatively high. Depression is the only mental disorders among the top five diseases that have lost life years [32].

Correlation between national development level and burden of mental disorders

The burden of mental disorders can be compared internationally through the years of life lost due to mental disorders in different countries or regions (Figure1). From the perspective of the total number of life years lost due to mental disorders, the average number of life years lost due to mental disorders in each country or region is 614186.09 person*years. Among them, India has the highest number of life-years lost due to mental disorders, at 21893508.43 person * years; followed by China, with 20291585.67 person *years; and the United States, with

7312617.813 person * years. It can be seen that the burden of mental disorders of the top three most populous countries are quite high.

From the perspective of the average annual loss of life due to mental disorders (Figure 2), the average life-year lost due to mental disorders in each country or region is 1619.32 person* years/100,000 people. Among them, the per capita loss of life-years caused by mental disorders in Portugal, was the highest, with 2603.9 person* years/100,000; followed by Greece, with 2509.77 person* years/10,000; and third was Greenland, with 2485.91 person* years/10,000. Taking into account the differences in the population of different countries and regions, after weighting by the population, the YLD rate of the country with the highest population is no longer high. In terms of the proportion of years of life lost due to mental disorders, the international average is 14.59%. Among them, Palestine has the highest proportion, accounting for 23.76%; followed by Qatar, accounting for 22.43%; and third is Iran, accounting for 21.63%.

Judging from the YLDs due to mental disorders of 204 countries and regions, agglomeration has appeared in some regions, and the level of national development in this agglomeration region is also very similar. On this basis, the correlation between the level of development and the country's mental health can be tested.

The correlation between the development level and the national mental health is analyzed, and HDI and SDI are used as proxy variables for the national development level (Table 2). The results show that the Pearson correlation coefficient values of the two variables HDI and SDI in the four years of 1990, 2000, 2010 and 2019 are between 0.5 and 0.7, and the national development level and the national mental disorders burden show a significant intermediate level correlation.

We uses scatter plots to fit the YLDS in the GBD database in 1990, 2000, 2010, and 2019, and the HDI and SDI of each country (Figure 3). It turns out that whether HDI or SDI is used as a measure of a country's development level, the fitted straight lines for all four years are inclined to the upper right corner. In other words, the higher the development level, the greater the national burden of mental disorders. This shows that in the past three decades, the significant correlation between the national development level and the burden of mental disorders has stabilized, and we can use the national development level to predict the national burden of mental disorders. The result seems to be contrary to the claims of the GMH movement, but the data shows that, on average, countries with higher levels of economic development are experiencing a higher level of mental disorders burden than low- and middle-income countries. This does not mean that there is no need to worry about the burden of mental disorders in low- and middle-income countries.

Trend of mental disorders burden across different countries

Are there any differences in mental disorders burden of countries with different levels of development? In order to further analyze the burden of mental disorders and its changing trends in countries with different development levels, the study compared the trends of the burden of mental disorders in low-income countries, low-middle-income countries, middle-income countries, middle-high-income countries, and high-income countries from 1990 to 2019(Figure 4). The GBD Results Tool is used to compare and analyze the burden of mental disorders in countries with different income levels.

From the YLDs of countries with different levels of development, it can be seen that, firstly, the YLDs Number of countries of all development levels is always on a rising trend, which shows that the burden of mental disorders

in all countries is always rising, and it needs to be alert. Second, the YLDs of high-level SDI countries are only higher than those of low-SDI countries, and are always lower than YLDs of medium-SDI countries. Medium-SDI countries have the highest burden of mental disorders. Finally, the growth trend of YLDs in low-SDI and low-medium SDI countries is always faster than that in high-medium SDI countries and high-SDI countries, and the burden of mental disorders in low-SDI countries may become more serious.

From the YLDs percent due to mental disorders in countries with different levels of development, only the YLDs percent of low-SDI countries has been rising. Although YLDs percent of other countries have once risen, they have shown a downward trend in recent years. Judging from the downward trend of YLDs percent, the burden of disease caused by mental disorders in high-SDI countries has fallen the most. The decline in high-middle SDI and middle- SDI countries has been significant, but the decline in low- middle SDI countries has not been significant in recent years. It can be seen that the burden of disease caused by mental disorders in low-SDI countries is rising, while the percentage of the burden of mental disorders in high-SDI countries has a clear advantage.

The YLDs rate of countries with different levels of developments shows that, the average burden of mental disorders in high-SDI countries is relatively high and stable, low-SDI countries are relatively low and stable, and the rate of mental disorders burden in medium-SDI countries is at an intermediate level but the rate of increase obvious. However, in recent years, the rate of mental disorders burden in low and middle SDI countries seems to be on the rise.

From the comparison of the burden of mental disorders in countries with different SDI levels, it can be seen that the number and percent of the mental disorders burden in high-SDI countries is at a medium level, but the average burden of mental disorders is at a relatively high level; The total amount, proportion and average amount are all at a medium-to-high level; the burden of mental disorders in low-SDI countries is relatively low. Judging from the changing trend over the years, the proportion of the burden of mental disorders in high-SDI countries has gradually decreased, while the proportion of the burden of mental disorders in low- and medium-SDI countries has continued to increase. It can be seen that the burden of mental disorders in high-SDI countries has shown a downward trend, while the burden of mental disorders in low- and middle-SDI countries is gradually increasing.

Discussion

The analysis of the correlation between the level of development and the burden of mental disorders found that there is a clear correlation between the high level of development and the high burden of mental disorders, but developed countries have a greater advantage in reducing the growth rate of the burden of mental disorders. In countries with low and medium levels of development, although the total burden of mental disorders is not large, it has shown strong signs of increase in the proportion of mental disorders burden and rate.

The core factors that form the relationship between the level of development and the burden of mental disorders may reflect the health costs and service advantages of development. The health cost refers to the loss of mental health that may be brought about by rapid development, and the service advantage refers to the mental health services and system construction that a strong economy can provide. Therefore, we see that developed countries have a leading position in the number of mental disorders burdens, but at the same time, we see a

slowdown or even a downward trend in the percentage and rate of mental disorders burdens. However, under the current circumstances, the development trend of the burden of mental disorders is unfavorable for developing countries with poorer development levels, no matter in terms of total amount or average amount. It is high time to notice that mental health had been a global issue. Global mental health movement should be done to narrow the gap between different countries, especially in the low development countries.

Limitation

The study used GBD disease burden data and correlated it with national HDI and SDI data for correlation analysis, revealing the correlation between the level of development and the burden of mental disorders. The use of second-hand data may force research to rely on data with uncertain data quality. Moreover, limited to the operationalization of variables of second-hand data, the logical relationship between the research variables can be completely clarified. If we can further correlate more cultural, social and other factors of the country, we can better present the logical picture behind the global mental health differences.

Conclusion

Based on the historical data of the Global Burden of Disease database, the study compares and analyzes the global burden of mental disorders, differences between different development countries and changing trends of the burden of mental health in a global context. Firstly, mental health had been a global issue. Mental disorders are a worldwide health problem. Depression and anxiety are both major mental disorders that cause the loss of healthy life years. The global burden of mental disorders is showing a gradual upward trend from 1990 to 2019. Secondly, there is a significant positive and moderate correlation between the level of national development and the burden of mental disorders. The better the national development, the higher the YLDs Rate caused by mental disorders. Thirdly, countries or regions with medium and high SDI levels have a relatively high burden of mental disorders, but there is a downward trend in the proportion of the burden of mental disorders and the growth rate of the number. The burden of mental disorders in low-income countries is not high, but the growth rate is obvious.

The burden of mental illness is equally severe in low-income and upper-middle-income countries. The burden of mental illness in low-income countries is not high, but the rate of increase is relatively fast, while the burden of mental illness in low- and middle-income countries is relatively high, but the rate of decrease is apparent.

Declarations

Ethical Approval and Consent to participate

This study does not involve human participants or animals. The authors declare that this study was approved by the institutional review board of science and technology ethics committee.

Consent for publication

Not applicable.

Availability of data and materials

All data relevant to the study are included in the article or uploaded as online supplemental information.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

HJ ZHU wrote the main manuscript. HJ JIANG, ZP ZHU and ZY YAO critically revised the manuscript. All authors reviewed the manuscript.

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Figures

Figure 1

rate of YLDs caused by mental disorders in 2019

Figure 2

percent of YLDs caused by mental disorders in 2019

Figure 3

scatter plot of YLDs With HDI and SDI, 1990-2019

Figure 4

YLDs of mental disease burden of different countries (1990-2019)