

Estimating mental health care shortfalls between patient's need and health system capacity: A cross-sectional analysis of data from 144 countries and territories

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ABSTRACT

Introduction

This study quantifies the overall gaps between health system capacity and patients' needs, with additional analysis based on the regional economy.

Methods

We extracted data on country's population, psychiatrist and physician density (per 100,000 population) from the World Bank Databases for 144 countries in 2021. Data on prevalence of mental disorders were obtained from Global Burden of Disease (GBD) 2021. We estimated the patient need for clinic visit for mental health care under three scenarios: 12 visits per patient per year (base scenario, reflecting the common practice in many LMICs where psychiatrist conduct monthly clinic visits to prescribe medication refills), six visits (intermediate scenario), three visits (minimal scenario), and two scenarios based on health worker capacity to provide clinic services: 20 patients per day (base capacity), and 40 patients per day (high capacity) per providers.

Results

Most countries showed deficits in the base scenario, with deficits decreasing as the number of visits per patient per year increased to 6 or 3 visits. However, deficits persisted in LICs and LMICs even with a single visit per year. In the high-capacity scenario, where 40 patients were seen daily, many countries still faced substantial deficits in clinical visits. Incorporating physicians in mental health workforce under the base scenario (20 patients per day, 12 visits per year) reduced these deficits, resulting in 12 countries achieving net surpluses. The largest surplus was observed in Cuba, with 11.1 million surplus visits.

Conclusions

Our analysis highlights significant disparities in mental health service capacity globally. Addressing these gaps requires targeted interventions, by leveraging innovative technologies, improving training, involving non-physician community health workers and enhancing healthcare infrastructure, to meet the growing demand for mental health services globally.

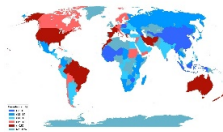
Keywords: mental health, psychiatrist, physicians, health system, low middle income countries

Graphical Abstract

Estimating gaps between patient need and health system capacity for mental health care



DESIGN



Cross sectional study 144 countries

High income (n=40), Upper middle income (n=51), Lower middle income (n=34), Low income (n=19)



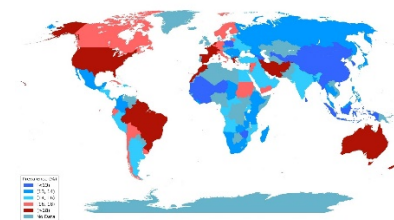
4.81 billion population
700 million with mental disorders
12-, 6- and 3- psychiatric visits per patient per year



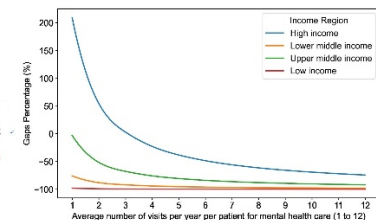
Baseline in 2021

KEY FINDINGS

- Most countries showed deficits under base scenarios. Deficits persisted in LICs and LMICs even with a single visit per year.
- Even in the high-capacity scenario, where 40 patients were seen daily, many countries still faced substantial deficits in clinical visits.
- Incorporating physicians in the mental health workforce under the base scenarios (20 patients per day, 12 visits per year) reduced these deficits, resulting in 12 countries achieving net surpluses.
- Addressing these gaps requires targeted interventions, by leveraging innovative technologies, improving training, involving non-physician community health workers and enhancing healthcare infrastructure, to meet the growing demand for mental health services globally.



Prevalence of mental health disorders



Percentage of countries with gap by number of visits per year (base scenario)

Policy implications

To address global disparities in mental health service capacity, policymakers should leverage innovative technologies, improve training, integrate non-physician health workers, and enhance healthcare infrastructure to meet rising demand and reduce inequities.

INTRODUCTION

Globally, mental disorders contributed to 125 million disability adjusted life years (DALYS) in 2019; nearly two-fold increase since 1990.[1] Poor mental health drains the world economy worth of \$2.5 trillion annually by increasing the sickness and reducing productivity, and is projected to increase to \$6 trillion annually by 2030.[2, 3] Despite increases in burden and impact of mental health conditions, providing mental health services remains limited globally due to shortages in trained human resources.

Availability of qualified human resources is a central pillar for increasing access to quality mental health services.[4] In many countries due to shortages of psychiatrists, mental health services are often provided by non-specialist health workers such as physicians, or allied health professionals with limited training on mental health. Mental health professionals either a psychiatrist or a trained physician in mental health is needed for long follow up visit to monitor progress and refill medications. However, availability of mental health professionals remains scarce for a large proportion of population.[2] Migration of qualified mental health professionals to high income countries further complicates the situation.

Despite recent literature assessing gaps on mental health services globally [2, 5]; no studies have systematically estimated the global gap between health system capacity (in terms of clinic visits provided by psychiatrist or a trained physician) and patient need (number of clinic visits needed to treat and monitoring progress for patients). The main objective of this study was to estimate the disparities in health system capacity and the mental health needs of patients, both globally and across different income regions.

METHODS

Data Sources

We extracted data on country's population, psychiatrist and physician density from the World Bank Databases. Data on prevalence of mental disorders were obtained from

Global Burden of Disease (GBD) results tool for 2021 [<https://vizhub.healthdata.org/gbd-results/>].[6] The GBD provides data on estimated prevalence of various mental disorders by countries.[7] Countries which did not have data on psychiatrist and physician density for were excluded from analysis; yielding 144 countries: high income (n=40), upper middle income (n=51), lower middle income (n=34) and low income (n=19) in the final analysis.

Estimation method for health system capacity and patient's need

We estimated the patient need for clinic visit for mental health care by multiplying total number of patients with mental disorders by the number of visits per year per patients with mental disorders. We explored three scenarios: 12 visits per year (base scenario), six visits per year, three visits per year per patient. Monthly visits for psychiatrist patients are most preferred based on clinical, therapeutic and patient-centered reasons. This allows better monitoring of medication and possible side effects, as well as allows for helps in identifying early signs of relapse or worsening symptoms. Both American Psychiatrist Association (APA) and National Institute for Health and Care Excellence (NICE) recommends for regular follow up visits; however, does not specify the frequency of visits. [8, 9] While the health service utilization pattern can vary widely across countries, our scenarios reflect the health service utilization pattern by patient with mental disorders in low-income setting.

Further, under a base scenario, we assumed a medical practitioner such as physician or a psychiatrist provide services to 20 patients per day, and with a total of 200 workdays per year. Given the variability in physician providing mental health services across diverse setting, we additionally explored a high-capacity scenario where physicians provide services to 40 patients per day. For physicians, we assumed that they spent on average, 10% of their time on providing mental health services, consistent with prior literatures.[10] Roughly 5% of all DALYs were attributed to mental disorders in 2019.[5] Therefore, we

calculated the physician time (%) by doubling its DALY contribution to account for the added complexity of mental health visits compared to other health conditions.

Country classification

Our country classification is based on the World Bank classification: low-income country (LIC) is defined as countries with gross national income of US\$ 1085 or less, lower middle-income (LMIC) (US\$ 1086 to US\$ 4255), upper middle income (UIC) (US\$ 4255 to 13845), and high income (HIC) (US\$ 13845 or above).[11]

RESULTS

Prevalence of mental disorders and health system's capacity

Our study includes data from 144 countries: high income (n=40), upper middle income (n=51), lower middle income (n=34) and low income (n=19). These countries combined contribute 4.81 billion population, of which 700 million live with some forms of mental disorders. The prevalence of mental disorder ranged from 11.1% to 20.7%: 15.9% in HIC, 14.5% in UIC, 13.7% in LMIC, and 14.1% in LIC. Based on types of mental health conditions, anxiety and depressive disorders constituted the largest category of mental disorders in all income regions.

Figure 2A shows psychiatrist density (per 100,000) by countries. The darkest red shows countries with lowest density. Overall, psychiatrist density per 100,000 population varied substantially based on income regions: 0.08 per 100,000 in LIC, 0.82 per 100,000 in LMIC, 3.4 per 100,000 in UIC, and 12.7 per 100,000 in HIC.

Figure 2A, shows physician density (per 100,000) by countries. The darkest red shows countries with lowest density. Overall, physician density was similar to that of psychiatrist per 100,000: 355.8 in HIC, 218.1 in UIC, 78.7 in LMIC and 17.8 in LIC.

Estimation of clinical visit deficits by income regions

Overall, in the base scenario of 12 visits per year per patient, most countries lacked capacity for optimal mental health care (Figure 4). These deficits persisted even after gradually reducing the number of visits from 12 visits to 6 visits. In most low-income countries these deficits reached 100%. High income countries showed smaller deficit after clinic visits were further reduced from 3 clinic visits to 1 visit.

Under our base scenario of 12 visits per patient per year, many countries in Africa and Asia showed deficit in clinic visits (darkest red four in Figure 3A). These deficits persisted even with 6 or 3 clinic visits per year per patient (darkest red in Figure 3B and 3C). When considering high-capacity scenario where psychiatrist or physicians are able to manage 40 patients per day, many countries in Asia and Africa still showed deficit in clinic visits. Even with a single clinic visit, most low and lower middle-income countries showed deficit in clinic visits.

We conducted a sensitivity analysis by using a low-capacity scenario (*10 patients per day*). All countries appeared to have clinical visits deficit when considering 12 visits per year. The largest deficit was found in India (1.8 billion visits) and Marshall Island (0.06 million visits) respectively. *eSupplementary Figure 1* shows the distribution of these deficits in clinical visits by countries using 12 visits per year, as well as under 6- and 3-visits per year. Only three countries with surpluses under 3 visits per year were Switzerland (2.1 million), Poland (3.4 million) and Norway (1.8 million); these surpluses disappeared when considering a higher clinical visit i.e. 6- and 12-visits per year. Additionally, we explored what if all the physicians provide mental health services under our base scenarios (20 patients per day and 12 visits per year), extent of clinical visit deficits lessened leaving 12 countries with surpluses in clinical visits (*eSupplementary Figure 2*). When using physicians in mental health services, largest surpluses and deficits were found in Cuba (-11.1 million) and India (1.5 billion) respectively.

DISCUSSION

We identified a substantial gap in health system capacity and patient need for clinic visits to a psychiatrist; with majority of countries failing to provide adequate psychiatric outpatient care. These deficits persisted even when considering one visit to a psychiatrist per year. Integrating physicians into mental health care reduced the size of deficits but did not eliminate them entirely. This highlights critical shortage of mental health professionals affecting the provision of mental health cares in most low and middle come countries.

Prior studies identified that there is a strong investment case for mental health with higher return when invested among children and adolescent as early as possible. For example, \$1 invested in treatment and management of depression and anxiety will provide \$4 in return in terms of better health and productivity.[2, 5, 12] Despite recognizing that monthly visits are highly beneficial to patients, we found that majority of countries have not achieved this under current availability of mental health professionals such as physiatrist or physicians trained in providing mental health services. Amidst the burgeoning global mental health crisis, renewed focus is essential, particularly with substantial investment in building and deploying qualified health human resources for mental health services. Health system in resource poor countries have arrived at a critical juncture to explore potential avenues to maximize mental health services including exploring the use of tele-consultation and more advanced digital technologies.

Given the lack of mental health workforce in low-income setting, skill transfer with nonphysician health workers and multi-disciplinary models of care involving psychiatrist, general practitioner, mental health nurses, exercise physiologist, nutritionist as well as community health workers can alleviate pressure on already stretched health system. [13, 14] Past studies have shown that task sharing with nurses was found to be effective in providing mental health care among post-partum women. [13, 14] Besides nonphysician health workers, community health workers could be augmented by training, simplified

protocol (e.g. algorithmic diagnosis and management) and consistent supervision so that they could support the mental health services in communities where they function as the frontline health services.[15-18] however one needs to be careful for not subjecting CHWs to overburden with too many responsibilities. Moreover a more novel approach would be involving all these professionals of different expertise and qualifications in a multidisciplinary model of care complementing each other in the care of patients in need of mental health services. Nonetheless, further research is needed to explore the feasibility, practicalities including cost-effectiveness of such a provision.

There are three major issues that underpins the shortages of mental health workforce in LMICs. Firstly, there is a systematic draining of human resources from LMICs to HICs because of poor incentivization, and insecurity.[19] It is not uncommon to see a final year medical student and even specialist doctor preparing for an overseas career at any point after graduation. The years of investment by the home country i.e. LMICs becomes readily available for HICs with minimal or no return on investment to LMICs. Secondly, the mental health workforce is poorly defined, and education and training has not systematically focused on meeting the demand. There is widespread belief that mental health service is dependent only on psychiatrist. Other cadres such as mental health nurses, remote area nurses with special mental health training, allied health and paramedical mid-level workforce which serve the majority of the population as unrecognized for their contribution. While psychiatrist are the extremely important to ensure clinical service to people with mental health condition, the other groups of health workforce is possibly most feasible, yet largely untapped resources within the health systems of LMICs. Finally, the mental health related careers within the professional career ladder are also projected as less attractive compared to other specialists. Therefore, efforts are needed to improve the outlook of mental health profession by providing better incentives and support system for mental health professionals.

Our study has several limitations. First, world Bank data for psychiatrist and physician density are not updated to recent years for majority of countries. Although there is an increase in physician training annually owing to the increase in number of medical schools, and medical technology, the disproportionate distribution of physicians stifles the needs in remote and rural locations including prominently in LMICs. Second, we included the age standardized prevalence of mental health conditions by GBD 2021 and did not exclude those below 18 years.[6, 7] Third, we integrated the various mental health conditions (e.g. anxiety and depression) and could have missed the granularity of how various conditions require different level, intensity and frequency of health services (capacity). Fourth, our estimation that 10% of physician working in mental health are likely an overestimation of the health system capacity, narrowing clinical visit deficit. Fifth, this is an aggregate level analysis at country level, therefore, does not reflect the variation in health workforce capacity within the country. Generally, urban areas in LMICs have higher psychiatrist and physician density compared to rural areas; therefore, we expect clinic visit deficit in urban areas to be narrow compared to rural areas.

CONCLUSIONS

Our study identified that most LMICs have deficit in clinical services for the management of mental health conditions. To address these gaps, countries should explore avenues to increase clinical capacity and efficiency through use of innovative technologies and engagement of nonphysician health workers including nursing workforce, mid-level community health workers and other contextually suitable workforce that can be trained in fairly short duration. Within the existing technology, there is opportunity to deliver mental health services using telehealth, health promotion services using various ways such as m-Health and share medical appointments to meet the need of resource poor setting. It is up to the respective health system to identify which models and technologies will fit best in

their context. Future research should explore effect of different treatment strategies for management of mental health conditions.

DISCLOSURES

Conflict of Interests

Authors declare no conflict of interests.

Data Availability

Data used in this study is available freely from GitHub repository

Funding Statement

Authors received no funding for this study.

Authors contribution

SRM and BA conceptualized the study. SRM and BA conducted the literature reviews supported by VK and NS. All the authors contributed to manuscript writing, revision and final approval.

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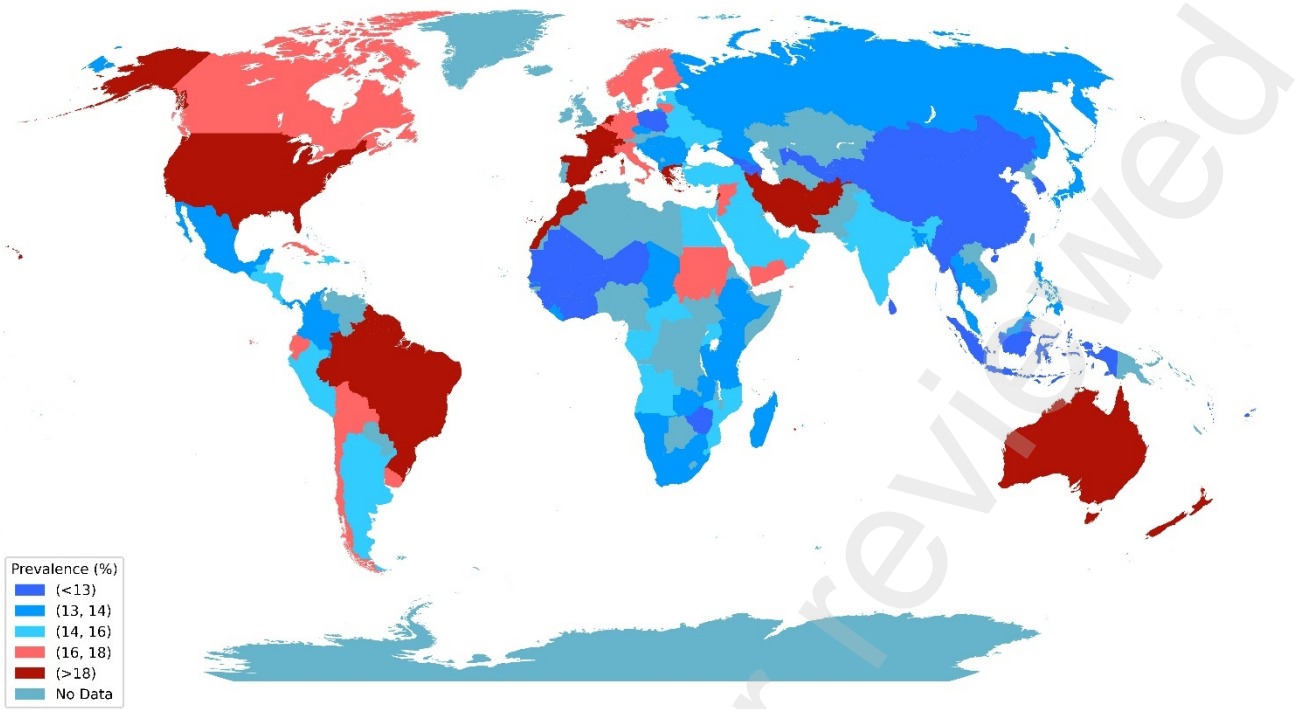
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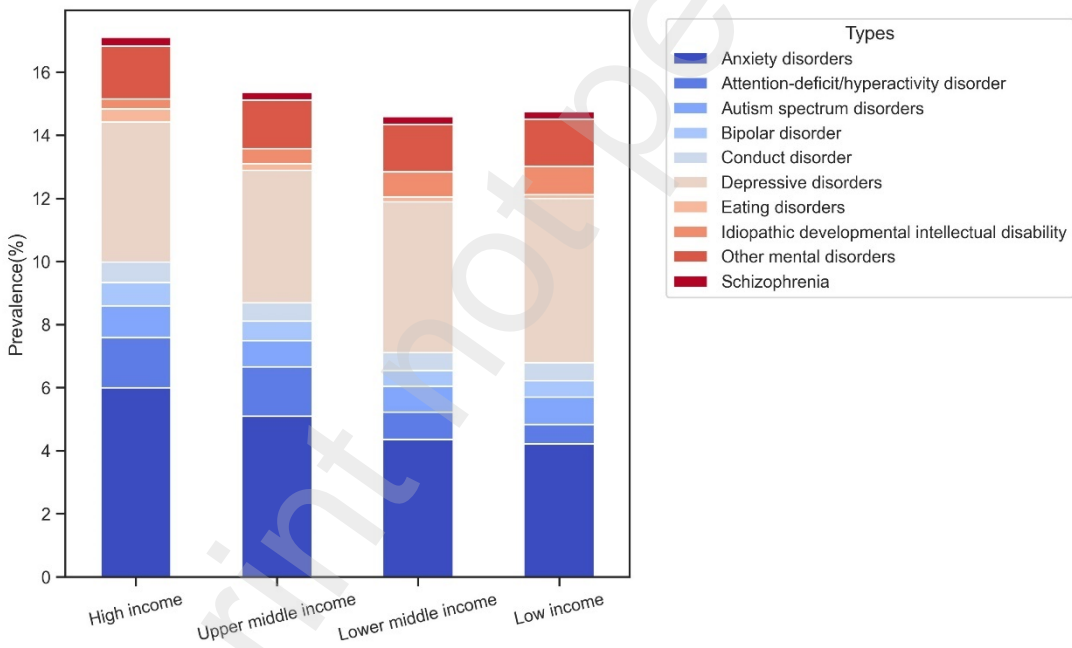
Table 1. Total Gap in Visit (Millions/y) by Average Number of Visits per Year (Base Case Scenario of Physician Volume)

Income Region	Visits (millions/year)											
	1	2	3	4	5	6	7	8	9	10	11	12
High income (n=40)	Surplus	Surplus	-0.6	-4.3	-8	-11.7	-15.3	-19	-22.7	-26.4	-30.1	-33.8
Upper middle income (n=51)	-1.3	-6.8	-12.4	-18	-23.5	-29.1	-34.6	-40.2	-45.8	-51.3	-56.9	-62.5
Lower middle income (n=34)	-6.0	-13	-19.9	-26.9	-33.8	-40.8	-47.7	-54.7	-61.6	-68.6	-75.5	-82.5
Low income (n=19)	-1.7	-3.5	-5.2	-7	-8.7	-10.5	-12.2	-14.0	-15.7	-17.5	-19.2	-21.0
Total*	-9	-23.3	-38.1	-56.2	-74	-92.1	109.8	127.9	145.8	163.8	-181.7	-199.8

*Included countries where psychiatrist density (per 100,000 population) could be available. Negative signs show deficit in clinic visits.

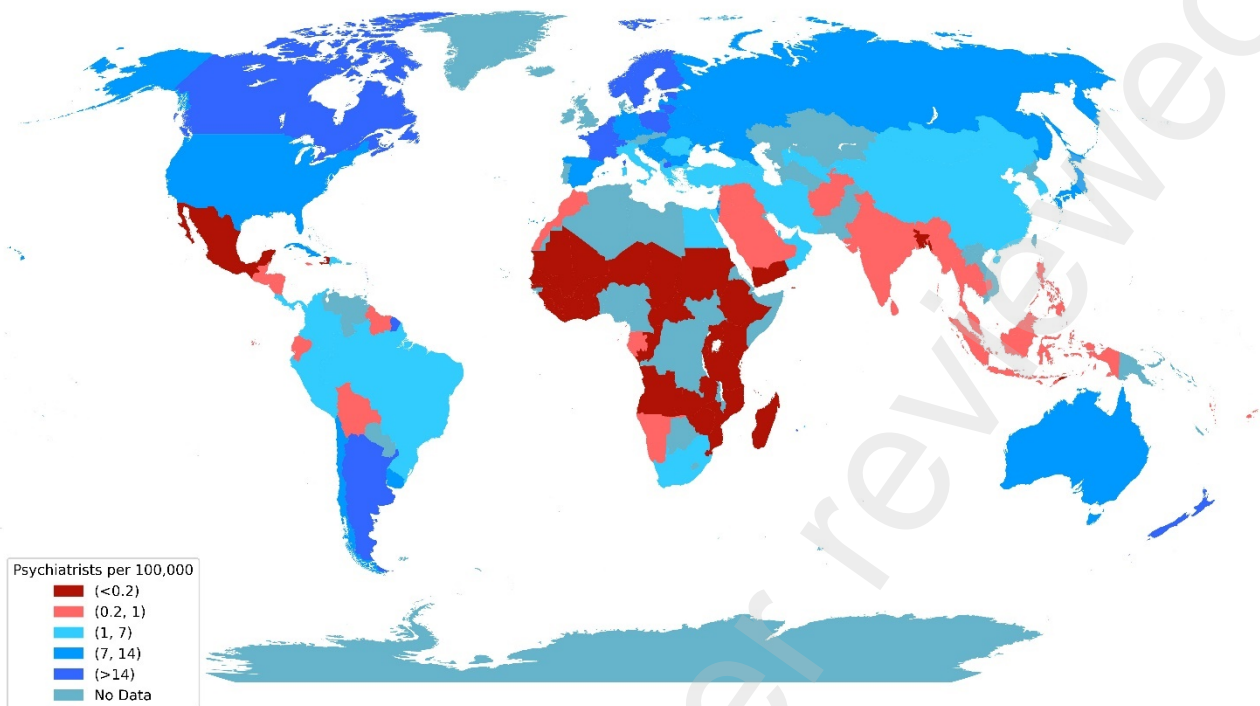


A

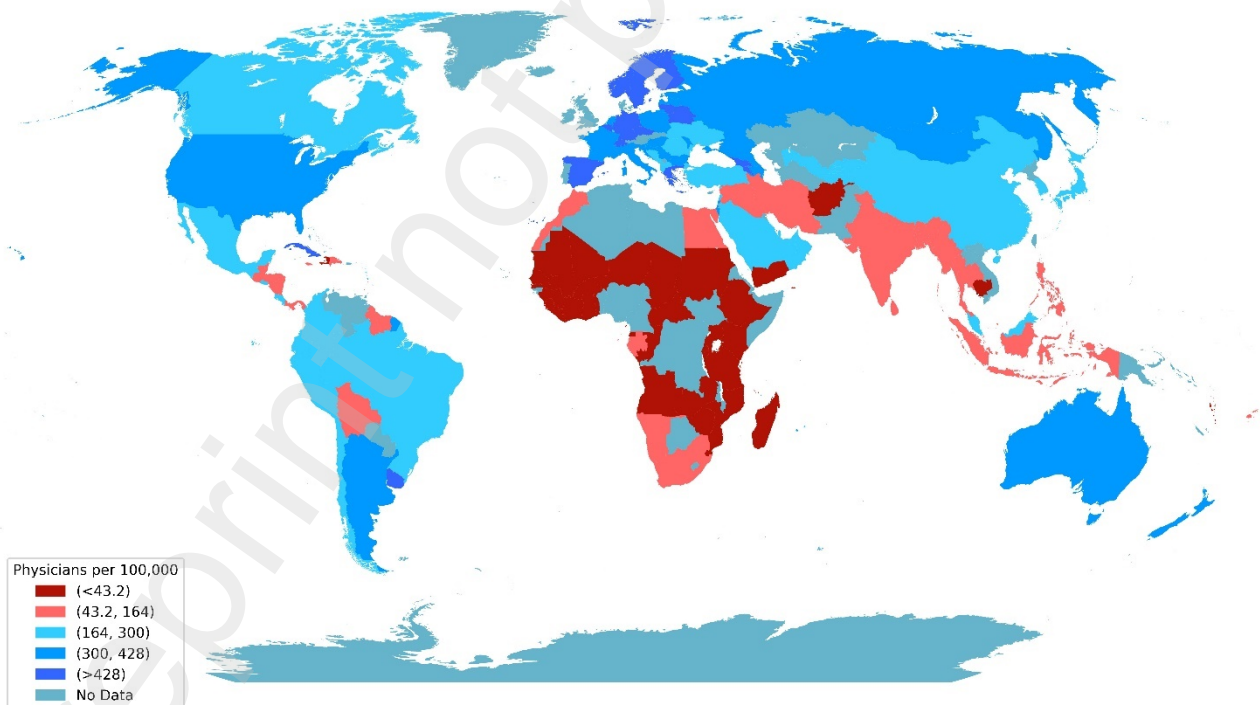


B

Figure 1. Prevalence of mental health disorders (A), and by types (B)

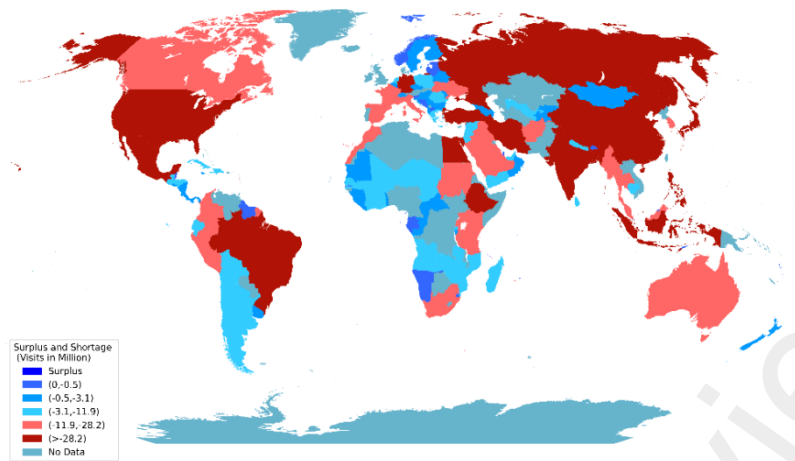


A

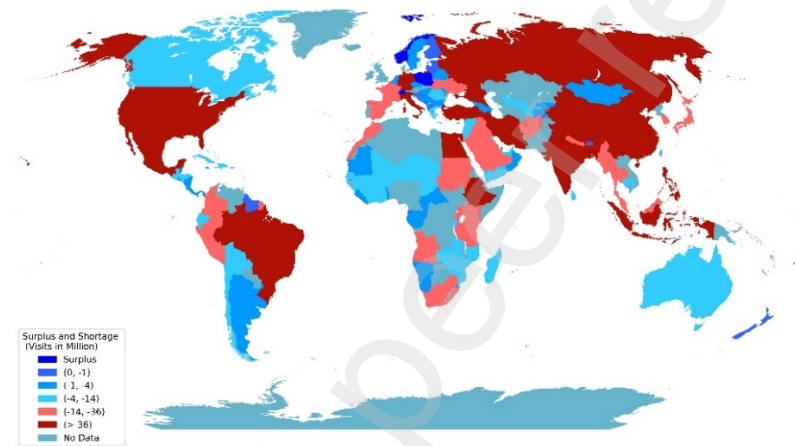


B

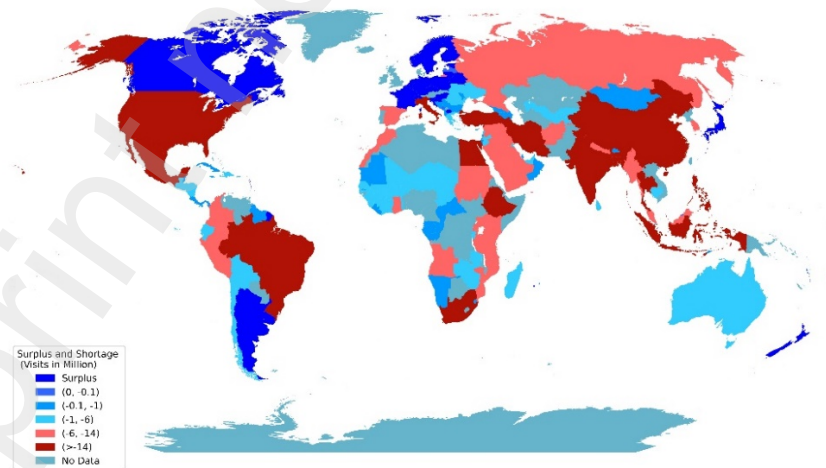
Figure 2. Psychiatrist density (A) and Physician density (B) per 100,000 population



A



B



C

Figure 3. Difference between clinical capacity and patient need in base scenario. A, 12 visits per year. B, 6 visits per year. C, 3 visits per year.

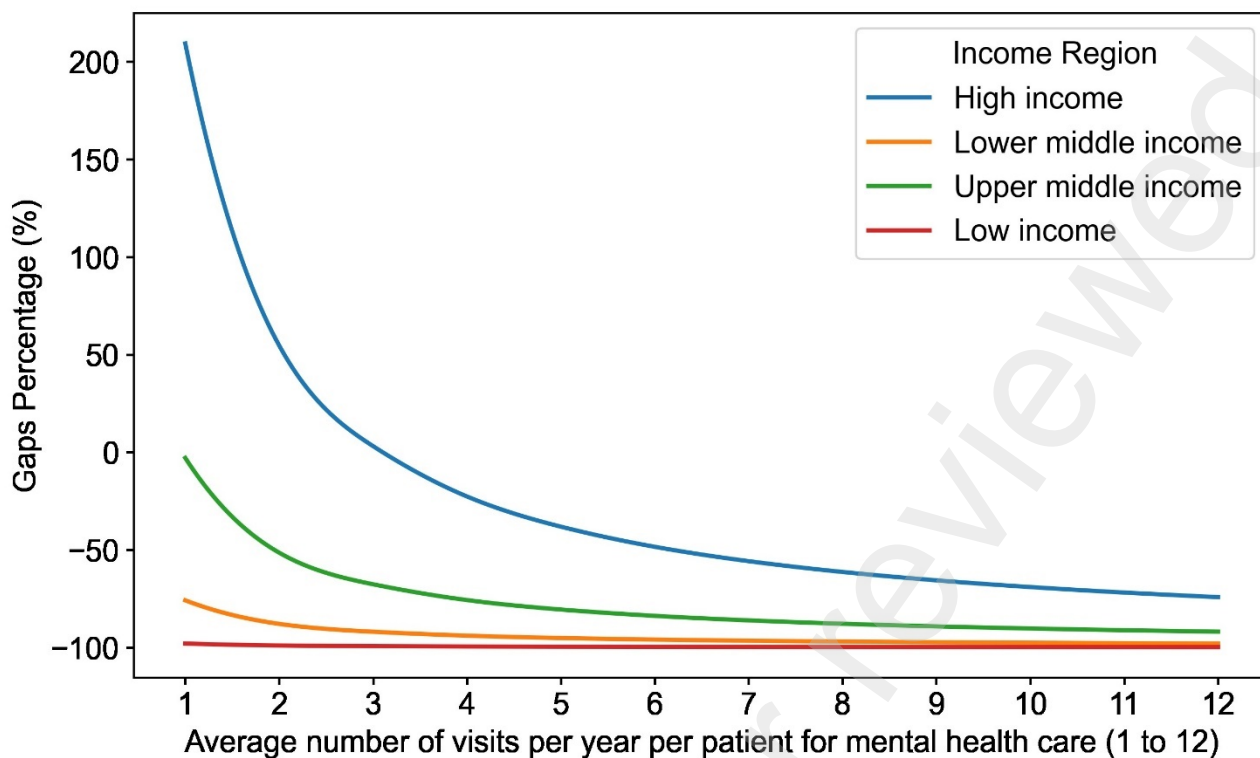


Figure 4. Percentage of countries with gap by number of visits per year, stratified by tier of income status (base scenario). Negative signs indicate gaps in visits per year (%).

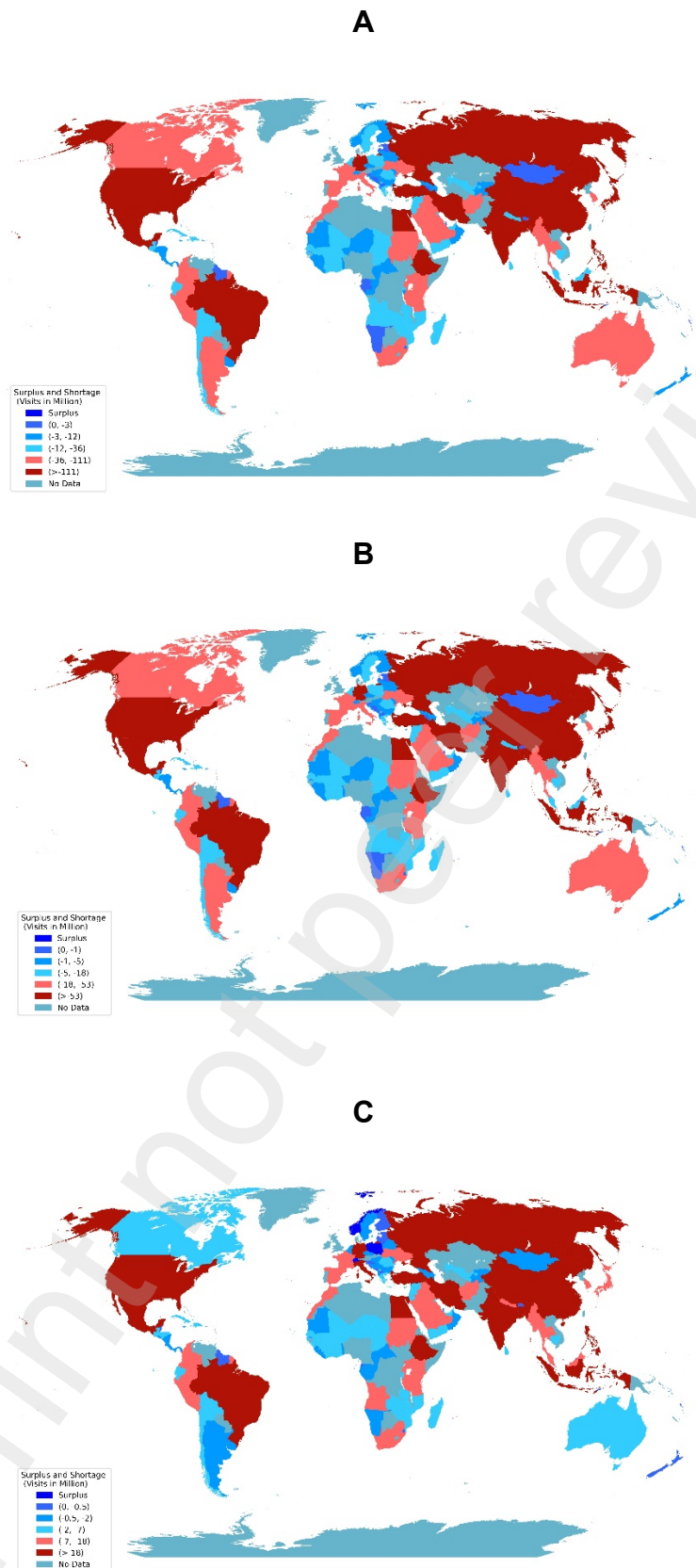
SUPPLEMENTARY MATERIAL

eSupplementary Figure 1. Difference between clinical capacity and patient need under a low-capacity scenario (10 patients per day). A, 12 visits per year. B, 6 visits per year. C, 3 visits per year.

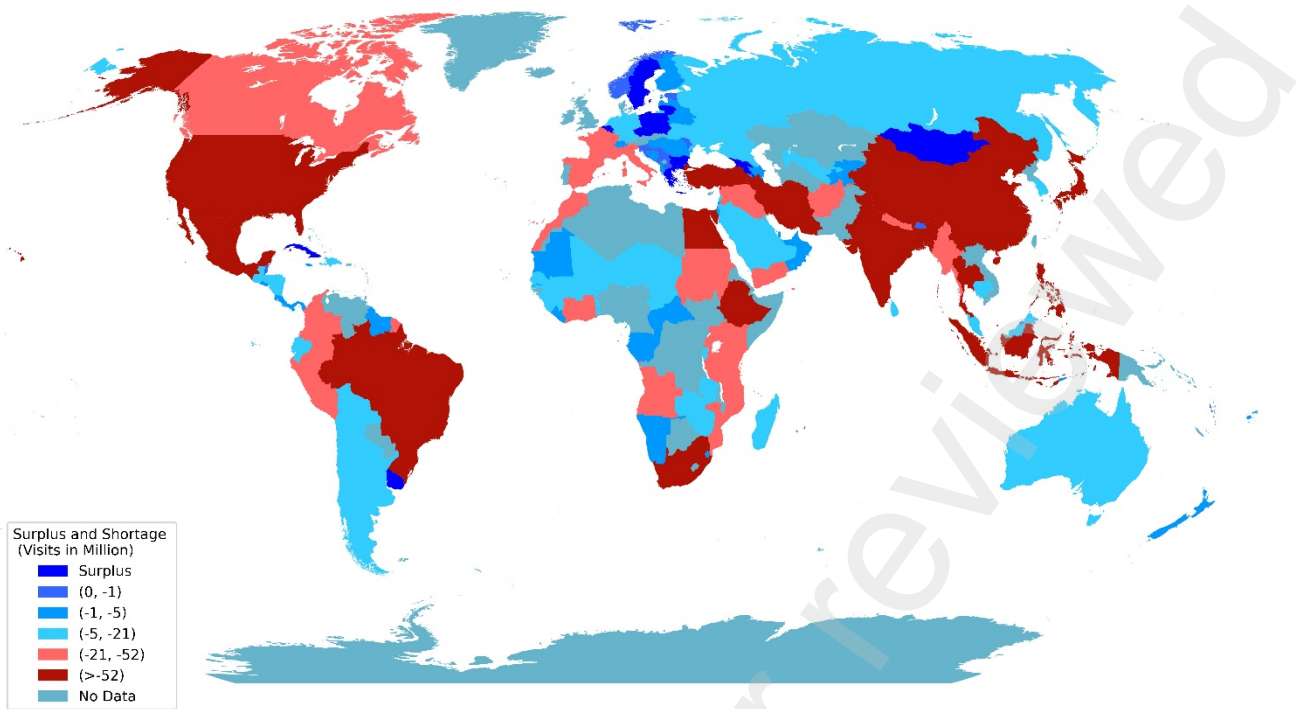
eSupplementary Figure 1. Difference between physician capacity and patient need under base scenarios (20 patients per day and 12 clinical visits per year).

eSupplementary Table 1. STROBE Statement—checklist of items that should be included in reports of observational studies.

Preprint not peer reviewed



eSupplementary Figure 1. Difference between clinical capacity for psychiatric care and patient need under a low-capacity scenario (10 patients per day). A, 12 visits per year. B, 6 visits per year. C, 3 visits per year.



eSupplementary Figure 1. Difference between physician capacity and patient need under base scenarios (20 patients per day and 12 clinical visits per year).

eSupplementary Table 1. STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No	Recommendation	Page No
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	Page 1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 3
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 3
Methods			
Study design	4	Present key elements of study design early in the paper	Page 4-5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 4-5
Participants	6	<i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants	Page 4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5
Bias	9	Describe any efforts to address potential sources of bias	Page 5-6, <i>Estimation method for health system capacity and patient's need.</i>
Study size	10	Explain how the study size was arrived at	Page 5-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 5-6, <i>Estimation method for health system capacity and patient's need.</i>
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	

		(b) Describe any methods used to examine subgroups and interactions	Page 5-6, <i>Estimation method for health system capacity and patient's need.</i>
		(c) Explain how missing data were addressed	
		<i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	Page 6.
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 5, Prevalence of mental disorders and health system's capacity
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 5, Prevalence of mental disorders and health system's capacity
		(b) Indicate number of participants with missing data for each variable of interest	NA
Outcome data	15*	<i>Cross-sectional study</i> —Report numbers of outcome events or summary measures	Page 5, Prevalence of mental disorders and health system's capacity
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Page 5-6
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 6
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 6

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page8
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 6-7
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 6-7
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 10

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.