Minimum numbers of psychiatric beds and the importance of contextual factors: a study protocol to reach expert consensus using a Delphi process

Research Protocol

Adrian Mundt[1,2], Enzo Rozas[3], Matías Irarrázaval[4], Richard O'Reilly[5], Stephen Allison[6], Tarun Bastiampillai[7], Seggane Musisi[8], Ashraf Kagee[9], Andrei Golenkov[10], Jopeph El-Khoury[11], Seon-Cheol Park[12], Lydia Chwastiak[13], Stefan Priebe[14]

[1]Facultad de Medicina, Universidad Diego Portales, Santiago, Chile.

[2]Facultad de Medicina, Universidad San Sebastián, Puerto Montt, Chile.

[3]Department of Psychiatry and Mental Health, Hospital Clínico Universidad de Chile, Santiago, Chile.

[4]Ministry of Health, Republic of Chile, Santiago, Chile.

[5]Department of Psychiatry, Schulich School of Medicine & Dentistry, St. Joseph's Health Care London, London, ON, Canada.

[6]Department of Psychiatry, College of Medicine and Public Health, Flinders University, Adelaide, SA, Australia.

[7]Visiting Clinical Professor Department of Psychiatry Monash University Wellington Road, Clayton 3800, Australia.

[8]Department of Psychiatry School of Medicine, Mulago Hospital, Makerere University College of Health Sciences, Kampala, Uganda.

[9]Department of Psychology, Stellenbosch University, Stellenbosch, South Africa.

[10]Psychiatry and Medical Psychology, Chuvash State University, Cheboksary, Russian Federation.

[11]Department of Psychiatry, American University of Beirut, Beirut, Lebanon.

[12]Department of Psychiatry, Inje University Haeundae Paik Hospital, Busan, South Korea.

[13]Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, USA

[14]Unit for Social and Community Psychiatry (WHO Collaborating Centre for Mental Health Service Development), Queen Mary University of London, London, United Kingdom.

1. Background

1.1. Numbers of Psychiatric Beds and contextual factors

International consensus is lacking on how many psychiatric beds are recommended for the optimal functioning of mental health systems and what is a minimum number for acute care. The availability of psychiatric beds varies between countries. These variations cannot only be explained by geographical region and income level. Even among OECD member countries, there is a wide range of rates (Allison et al., 2018), with an average of 71 psychiatric beds per 100,000 inhabitants. The numbers in low- and middle- income countries (LMIC) are on average lower. Part of this variability could be due to the heterogeneity in the definitions of 'psychiatric bed' (O'Reilly, Allison, & Bastiampiallai, 2019). Furthermore, the variability may relate to a range of contextual factors, such as per capita income, health budget, the prevalence of morbidity, social services, incarceration rates (Mundt et al., 2015), density of psychiatric outpatient and outreach services, urbanicity, and whether specific diagnostic entities such as addictions and dementia are included or excluded from service provision.

1.2. Definition of Psychiatric Beds

Psychiatric inpatient units

Diversity of services, the loss of usefulness of traditional terminology, differences in the use of terms in different centers and countries, as well as difficulties in establishing inclusion/exclusion criteria of populations served in psychiatric inpatient units, are possible barriers to research and policies (Johnson & Kuhlmann, 2000).

Following the WHO Mental Health Atlas (WHO, 2018) method, we include:

- **Mental hospital units:** A specialized hospital-based facility that provides inpatient care. Usually these facilities are independent and standalone, although they may have some links with the rest of the health care system. The level of specialization varies considerably: in some cases, only long-stay custodial services are offered, in others specialized and short-term services are also available (rehabilitation services, specialist units for children and elderly, etc.). This includes both public and private non-profit and for-profit facilities, mental hospitals for children and adolescents only and mental hospitals for other specifics groups (e.g., elderly). However, facilities that treat only people with alcohol and substance abuse disorders or intellectual disability without accompanying mental disorder diagnoses are excluded.
- **Psychiatric wards in general hospitals:** These provide inpatient care for the management of mental disorders within a community-based facility. These units are usually located within general hospitals, they provide care to users with acute problems, and the period of stay is usually short (weeks to months). This includes both public and private non-profit and for-profit facilities, psychiatric wards in general hospital, psychiatric units in general

hospitals, community-based psychiatric inpatient units for children and adolescents only, community-based psychiatric inpatient units for other specific groups (e.g. elderly). However, mental hospitals, community residential facilities, facilities that treat only people with alcohol and substance abuse disorders or mental retardation are excluded.

- **Forensic inpatient units:** The units are exclusively maintained for the evaluation or treatment of people with mental disorders who are involved with the criminal justice system. These units can be located in mental hospitals, general hospitals, or elsewhere.

Recovery and rehabilitation services

Those are non-hospital, community-based mental health facilities that provides overnight residence for people with mental disorders. Usually these facilities serve users with relatively stable mental disorders not requiring intensive medical interventions (WHO, 2018).

1.3. The importance of contextual factors for estimating the required number of Psychiatric Beds: Expert consensus and Delphi Method.

In addition to attempts to calculate the optimum number of psychiatric beds based on outcomes, such as hospital key performance indicators and population outcomes (O'Reilly et al., 2019), expert consensus maybe helpful to establish standards. One approach could be estimating the required number of psychiatric beds (Harris, Buckingham, Pirkis, Groves, & Whiteford, 2012) based on the importance of contextual factors:

Following consensus of experts, Canadian and American organizations have recommended approaching an objective of 50 psychiatric beds financed with public funds per 100,000 inhabitants (Gordon, 1997; Torrey EF, 2008). However, the importance of contextual factors that may account for differences in psychiatric bed needs is not known. Therefore, to date, international consensus of experts with broader geographical and disciplinary representation regarding universal definitions of psychiatric beds is lacking.

Consensus is sometimes built quickly and spontaneously in the hard sciences, where only one evidence may be sufficient to change the beliefs of experts. On the contrary, in the sciences that deal with highly complex systems such as those related to hospitalization for mental health problems, consensus changes more slowly and it may be necessary to use formal mechanisms to be reached (Jorm, 2015).

Among the formal mechanisms, there are specific methodologies such as the *Delphi method (Jones & Hunter, 1995; McMillan, King, & Tully, 2016)*, which involves defining a group of experts (the *Delphi panel*) who are requested to provide anonymous sequential and structured information in response to questionnaires and surveys presented in multiple rounds. This process is usually designed by a scientific advisory committee that unifies and conducts the procedures (survey administration and information processing). After each round, participants can check their responses in the light of the feedback provided by knowing the means of the responses of all experts from the Delphi panel.

The final objective is the convergence of the group towards consensus. Specific characteristics of the Delphi panel have been proposed in order to get best results (Surowiecki, 2004):

Diversity of expertise refers to the need for heterogeneity of experts in terms of the professional training, as well as their geographical and / or cultural origin.

Independence: Decision making occurs without mediating external influences and responses are delivered under anonymity.

Decentralization: By recruiting autonomous experts who work in a decentralized manner.

Aggregation: Mechanism for integrating the group's experience through a coordinating team that analyzes the responses and provides feedback.

2. Objectives

We will explore the expert opinion and try to reach consensus regarding the importance of contextual factors for estimating minimum and optimum psychiatric bed numbers. The importance of geographic, socio-economic, cultural and epidemiological contexts will be assessed in order to build a matrix that synthesizes contextual factors for local, national and regional estimates and comparisons. Acknowledging this matrix of underlying factors, we aim to estimate ranges of psychiatric bed rates for optimum service provision with the lower margin as a minimum number for required beds as well as ranges for three zones of scarcity as mild, moderate and severe scarcity of psychiatric beds for specific situations. We also aim to estimate the importance of specialized inpatient units for populations with specific needs, such as children and adolescents, forensic populations, older people and people with substance use problems or intellectual disabilities as provided in some countries.

3. Methods

We will form an international ***Scientific Advisory Board***, in order to implement the Delphi method, according the following procedures (within the framework of the chronology proposed in ANNEX 1):

3.1. Defining the Scientific Advisory Board.

a. Structure

i. At least eight experts in the field of mental health, public health and provision of public mental health services.

ii. One or two experts in the Delphi methodology.

b. Functions

i. Review of the research protocol and proposals of improvements.

ii. Proposal of at least 12 experts to be part of the *Delphi panel* according the template in ANNEX 2 (members of this panel will be the ones that will respond the surveys, as defined in the corresponding *Delphi panel* section).

iii. Surveys the review and improvement of the questionnaire to be sent out to experts of the Delphi panel.

iv. Analysis of results and proposals for change in the second and eventually third rounds of the survey.

v. Final analysis and draft revision for the publication.

3.2. Establishing a group of expert researchers to respond the surveys, called Delphi Panel

The selection of panel members will be made through the nomination by the *Scientific Advisory Board* with special emphasis on the need to ensure geographical and professional heterogeneity.

a. Selection of participants in the Delphi panel. Each member of the Scientific Advisory Board will propose at least 12 researchers, aiming to comply with the following requirements:

i. Mental health researchers with participation in scientific articles of international journals related to the availability of mental health resources

ii. Mental health managers at a local (institutional) or regional/national administration level

iii. Mental health professionals from different disciplines (i.e. psychiatrists, health professionals, psychologists, mental health nurses, etc) will be considered

iv. Aiming to include at least half of the Delphi Panel members from his own UN region.

b. Establishing the minimum number of definitive members of the *Delphi Panel* and consensus requirements: rounds with at least 30 responses of experts will be included in the analyses.

c. Sending emails to establish those experts that will finally take part in the survey response process: potential panel members will receive a concept note by email with information on the initiative, including definitions, objectives and methods, through which they will be formally invited to participate.

3.3. Constructing the questionnaires

a. The chosen method in this study to prepare the surveys will be the deliberation between members of the Scientific *Advisory Board*. Communication will be done through emails. The proposal for first round survey is available in ANNEX 3.

b. All questions must yield a classification or a quantitative estimate, with three types of questions compatible with Delphi:

i. Open questions: any quantitative and qualitative response qualifies.

ii. Scales: Only responses are allowed on the scale provided (i.e. Essential, Important, Don't Know / Depends, Unimportant or Should not be included; or 9-point scale 1 = completely disagree, 9 = completely agree and 5 = neither).

iii. Ranking/Classification: experts must rank/classify several elements according to a certain order.

c. Questions will contain an open field for free suggestions of the experts in order to provide feedback to the *Scientific Advisory Committee* to modify or add elements in the subsequent survey rounds.

3.4. Administering the surveys

a. First round: a first survey will be sent electronically to the members of the *Delphi panel*, to be answered within 30 days.

b. Feedback of results to favor the judgments of the experts: The panel members receive comments on how their responses compare with the rest of the panel and are asked to re-classify the elements after considering the comments.

c. Second round: based on the analysis of the responses of the first round and considering the addition of elements of interest by suggestion of the experts, a second survey will be prepared.

d. Further rounds (third or fourth) will be considered aiming to progressively lead to conclusions that may generate consensus. Between each round, the feedback process will be repeated.

3.5. Data processing and analysis.

The international *Scientific Advisory Board* will collect and analyze the results based on previously established conditions of consensus (ANNEX 4, based on (Chalmers et al., 2014)). It is expected that experts' responses for each round will lead to different outcomes for each item (i.e. items to be excluded, items to be re-rated, new items or items to be included). This will finally lead to a list of accepted items, which means final consensus.

3.6. Reporting results

Data analysis will lead to a list of accepted items. If a small list is reached, we will simply report accepted items. If the whole process leads to many accepted items, we will report them under thematic headings aiming to turn them into a guideline text in order to ease communication. A flow-chart showing the evolution of items at each round will be used.

Finally, publications will be prepared and submitted, and dissemination activities will be conducted aiming to set up international recommendations for mental health services development.

4. References

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5. Annex

ANNEX 1. Gantt chart.

Calendar year	**2020/2021**												
Month	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Recruitment of scientific advisory board members	X	X											
Building of proposal and surveys		X	X										
Recruitment of Delphi panel members		X	X										
1st survey application and data analysis (1st Round)				X	X								
2nd survey application (2nd Round)						X	X						
3rd survey application (3rd Round)								X	X				
Final data compilation and data analysis										X	X		
Publication and dissemination												X	X

ANNEX 2. Table to be completed by the Scientific Advisory Board suggesting members of the Delphi panel.

	WHO Region	Expert name	Expertise Discipline	Country	Contact (e-mail – Phone)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
AFR Africa; AMR Americas; EMR Eastern Mediterranean; EUR Europe; South-East Asia; WPR Western Pacific					

ANNEX 3. First round survey.

Minimum numbers of psychiatric beds and the importance of contextual factors: a Delphi process

SECTION 1: Invitation and Informed consent

Consensus on minimum and optimum numbers of psychiatric beds is lacking internationally. Considering your expertise on mental health services, we would like to kindly invite you to be part of a Delphi panel in a scientific study on psychiatric beds that considers expert opinions around the world. Your participation is voluntary and will consist in answering an online questionnaire in several rounds (two, possibly three or four), an activity that will take approximately 10 to 15 minutes in each round. Surveys for each round will be send out during 2020 and 2021 with 6 to 8 weeks between each round. We will expect you to respond to the online surveys within a four-week period upon sending out the invitations via email. We will send out weekly reminders if your response is pending.

Your participation in the online surveys will not be anonymous, but your personal data will be eliminated in the feedback process and for analyses. All the information you provide will be exclusively used for scientific research and results will be published in an international scientific journal in an anonymized format. Delphi panel members are not considered to be co-authors in this publication. However, identity of expert members on the Delphi panel will acknowledged in this publication unless otherwise advised, although responses will not be linked to names in the publication.

If you have questions about this research, you can contact members of the research team: Dr Adrian Mundt, email: adrian.mundt@mail.udp.cl, phone: +56-9-50033439 and Dr Enzo Rozas, email: enzorozas@gmail.com, phone: +56-9-99998409. This research has been reviewed and approved by the Ethics Committee of the Diego Portales University in Santiago, Chile. If you have any doubt, question or claim, or if you believe that your rights have not been respected, you can contact the Research Ethics Committee of the Diego Portales University (comitedeetica@mail.udp.cl) address: Manuel Rodríguez Sur 415. Telephone: +56226762197.

You can withdraw your participation from this study at any point of time without any further justification. We would be grateful to have a note from you, if you decide to withdraw.

Q1. Do you agree to participate in this study?

◯ Yes, I agree to participate ◯ No, I prefer not to participate

SECTION 2: Contextual factors for local and regional recommendations on psychiatric bed numbers.

Demographic, geographic, socioeconomic, cultural or epidemiological factors may influence the number of psychiatric beds recommended for specific contexts. To acknowledge

regional and local needs, we would like to have your opinion on contextual factors that may specify or modify recommendations on psychiatric bed numbers.

In this first round we ask you to state factors that should be considered in order to establish specific regional/local recommendations on psychiatric beds numbers.

Please, note that although some of the following categories may overlap, the answers will later be categorized and synthesized in a matrix. Then, in a second round we will ask you to rate them according to their relative importance.

In this section both personal opinions and those based on literature are welcome and at least one answer will be required for each of the following categories.

Q2. Please state which factors related to health systems you would consider important in order to establish differential regional/local recommendations on psychiatric beds numbers.

1
2
3
4
5
6
7
8

Q3. Please state which epidemiological factors you would consider important in order to establish differential regional/local recommendations on psychiatric beds numbers.

1
2
3
4
5
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7
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Q4. Please state what you consider relevant demographic and/or geographic factors in order to establish differential regional/local recommendations on psychiatric beds numbers.

1
2
3
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7
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Q5. Please state what you consider relevant socioeconomic factors in order to establish differential regional/local recommendations on psychiatric beds numbers.

1
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3
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5
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Q6. Please state what you consider important social, cultural or legal factors in order to establish differential regional/local recommendations on psychiatric beds numbers.

1
2
3
4
5
6
7
8

Q7. Please, provide comments or make suggestions regarding this section.

SECTION 3: Global estimates for minimum and optimal numbers of psychiatric beds needed.

Estimating the minimum total number of psychiatric beds per 100,000 population needed for a mental health system. Based on the WHO (2018), we define 'psychiatric beds' as inpatient treatment places in psychiatric units including:

· Mental hospital units: A specialized hospital-based facility that provides inpatient care. Usually these facilities are independent and standalone, although they may have some links with the rest of the health care system. The level of specialization varies considerably: in some cases, only long-stay custodial services are offered, in others specialized and short-term services are also available (rehabilitation services, specialist units for children and elderly, etc.). This includes both public and private non-profit and for-profit facilities, mental hospitals for children and adolescents only and mental hospitals for other specifics groups (e.g., elderly). However, facilities that treat only people with alcohol and substance abuse disorders or intellectual disability without accompanying mental disorder diagnoses are excluded.

· Psychiatric wards in general hospitals: These provide inpatient care for the management of mental disorders within a community-based facility. These units are usually located within general hospitals, they provide care to users with acute problems, and the period of stay is usually short (weeks to months). This includes both public and private non-profit and for-profit facilities, psychiatric wards in general hospital, psychiatric units in general hospitals, community-based psychiatric inpatient units for children and adolescents only, community-based psychiatric inpatient units for other specific groups (e.g. elderly). However, mental hospitals, community residential facilities, facilities that treat only people with alcohol and substance abuse disorders or mental retardation are excluded.

· Forensic inpatient units: The units are exclusively maintained for the evaluation or treatment of people with mental disorders who are involved with the criminal justice system. These units can be located in mental hospitals, general hospitals, or elsewhere.

Services exclusively providing recovery and rehabilitation treatments were not included in this definition of "psychiatric beds".

Q8. Please, give your estimation for an optimal range and a minimum number of psychiatric beds per 100,000 population for a balanced mental health system.

Optimal range	
Minimum number	

Q9. If your estimation for minimum psychiatric bed numbers is higher than zero, please give three cut-off points for shortage levels of psychiatric beds (mild, moderate and severe).

Mild shortage

Moderate shortage

Severe shortage

Q10. Please provide comments or make suggestions regarding this section.

SECTION 4: Characterization of the Delphi panel members.

This section contains questions to characterize the Delphi Panel.

Q11. What is your age?

- ○ 34 or less
- ○ 35-44
- ○ 45-54
- ○ 55-64
- ○ 65+

Q12. What is your gender?

- ○ Female
- ○ Male
- ○ Other (specify)

Q13. What is the WHO region of the country in which you work?

- ◯ African Region (AFRO)
- ◯ Region of the Americas (PAHO): subregion of Northern America
- ◯ Region of the Americas (PAHO): subregions of Latin America and the Caribbean
- ◯ South-East Asia Region (SEARO)
- ◯ European Region (EURO)
- ◯ Eastern Mediterranean Region (EMRO)
- ◯ Western Pacific Region (WPRO)

Q14. According to the World Bank classification, what is the level of income of the country in which you work?

- ◯ Low Income
- ◯ Lower-Middle Income
- ◯ Upper-Middle Income
- ◯ High Income

Q15. Which of the following alternatives best reflects your area of expertise?

- ◯ Psychiatrist
- ◯ Non-psychiatrist mental health professional
- ◯ Non-psychiatrist public health professional
- ◯ Service user
- ◯ Family member
- ◯ Other (please specify)

Q16. Which describes best your main area of work/profession?

- ◯ Academia and/or research
- ◯ Administration
- ◯ Advocacy
- ◯ Clinician
- ◯ Policy
- ◯ Other (please specify)

Q17. Your identification (optional, for acknowledgements).

Name

Country of residence

Q18. Please, provide comments or make suggestions regarding this section.

ANNEX 4. Data management and consensus quantification.

Consensus on contextual factors

The first round will provide items based on the factors proposed by experts in open field responses.

In the second round, all inputs generated in round 1 will be presented in order to quantify their importance on 5-point scales (*Essential, Important, Don't know/depends, Unimportant* and *Should not be considered*). Consensus will be reached in the following way:

Criteria for accepting an item:

- At least 85% of the panel rating an item as *Essential* or *Important* will be retained for ranking in the third round.

Criteria for rejecting an item

- Any items that did not meet the above conditions will be excluded.

In a third round, respondents will be asked to rank all finally accepted items according to their relative importance. Final consensus will be reached based on ranking of most important factors made by the group of experts.

Consensus on numbers of psychiatric beds.

Regarding minimum numbers and optimum and shortage ranges of psychiatric beds per 100,000 population, all three rounds will require to state a specific numerical value.

Median values and interquartile rates (IQR) resulting from each round will be provided to respondents in order to reconsider their previous response towards consensus.

As a criterion for a significant tendency to a narrowing of the numerical responses towards agreement, consensus will be considered to be reached if at least 85% of the responses from the last round are found within the first and third quartiles of the answers given in the first round. If this is the case, median numbers and IQR will be reported as a final consensus reference for each of the numerical data we ask for (minimum and optimum numbers, and shortage ranges).

If the above criterion is not met, final median values and IQR will be reported emphasizing the absence of consensus.

Exploration and analyses of eventual needs for subpopulations of people with mental illness (i.e. child & adolescents, forensic, criminal justice system, etc) will be considered starting from the second round.