Socio-economic disadvantage and resource distribution for mental health care; a model proposal and example application for Victoria, Australia

Graham Meadows[1,1], Frances Shawyer[2], Shrinkhala Dawadi[2], Brett Inder[2], and Joanne Enticott[2]

[1]Department of Psychiatry, School of Clinical Sciences at Monash University
[2]Affiliation not available

June 11, 2020

Abstract

The attached pre-print (working paper) paper describes an application of available epidemiological evidence in guiding the adjustment of mental health resources to areas. Described with an illustrative application in Victoria, Australia. We have also provided our research data as a supplementary spreadsheet to showcase our analytic approach (the spreadsheet cam also easily be adapted to calculate mental health resource adjustments in other states and territories, or nationally).

Socio-economic disadvantage and resource distribution for mental health care; a model proposal and example application for Victoria, Australia

Professor Graham Meadows[1,2], Dr. Frances Shawyer[1], Ms Shrinkhala Dawadi[1], Professor Brett Inder[3], Dr. Joanne Enticott[1,4]

1: Southern Synergy, Department of Psychiatry, School of Clinical Sciences at Monash Health, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, VIC, Australia;

2: Centre for Mental Health, Melbourne School of Population and Global Health, University of Melbourne, Parkville, VIC, Australia; Monash Health, Melbourne, VIC, Australia.

3: Department of Econometrics and Business Statistics, Faculty of Business & Economics, Monash University, Melbourne, VIC, Australia

4: Monash Centre for Health Research and Implementation, Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, VIC, Australia

Correspondence to: Prof Graham Meadows, Southern Synergy, Department of Psychiatry, School of Clinical Sciences at Monash Health, Monash University, Melbourne, VIC 3175, Australia. Email:*graham.meadows@monash.edu*. Telephone: 03 9902 9696

Abstract

Objective

A spreadsheet-based model for supporting equitable mental health resource distribution in Australia was developed, based on Australian Health Survey psychological distress findings associated with area socioeconomic disadvantage (SED). An illustrative application is presented.

Method

Stratum-specific psychological-distress rates for area SED quintiles are applied to local government areas, catchment areas and local health networks (LHNs). A case study applies the model to Victoria, including examining recommendations in the Royal Commission into Victoria's Mental Health Services 2019 interim report for increases to bed stock in two LHNs.

Results

Need-adjusted demand estimates considered as a ratio of raw population proportions for catchments range in Victoria between 0.59 and 1.60. Applying the formula to the Royal Commission recommendations suggests the proposed distribution of beds is a reasonable correction for these two LHNs and indicates next expansion priorities for more equitable distribution to other LHNs.

Conclusions

The spreadsheet, adaptable for other States and Territories, could complement National Mental Health Services Planning Framework outputs and assist in evaluation, for instance determining potential supply shortages in the tele-mental-health response to Covid-19. We outline research directions including consideration of the moral bases of value judgements, and identification of other variables including their use in parameterisation and calibration.

Key Words:

Mental Health Services, Distributive Justice, Health Disparities, Socioeconomic Status.

Introduction

Social and environmental determinants of mental health problems along with influences of inequity are important mental health policy and planning considerations (1). Many area characteristics influencing population mental health problems feature as weighted variables in the Australian Bureau of Statistics (ABS) Index of Relative Socio-economic Disadvantage (IRSD) and the ABS recommends the IRSD (2) when the user 'wants to ensure an allocation of funds goes to disadvantaged areas'. The IRSD as calculated in the mid-1990s was an important element of a resource distribution formula (RDF) supporting major reconfigurations in Victoria, including as adapted for different planning levels (3, 4). ABS survey confidentialised unit record files (CURFs) commonly include the IRSD. Australian Health Surveys (AHS) also include the Kessler 10 (K-10) scale which measures psychological distress. Very-high K-10 (VHK-10) scores are consistently associated with greatly increased likelihoods of significant mental disorders (5). Published work already presents information on area-based associations of IRSD characteristics of area and rates of psychological disorders or psychological distress (6) as well as on the most heavily weighted IRSD component variable, income (7). The mental health specific national surveys (1997, 2007), were about half the scale of the AHS, with lower response rates. So we propose that the AHS VHK-10 rates for Australian areas characterised by IRSD represent the best available information to parameterise a demand-estimation instrument. VHK-10 scores are in addition three times more frequent in the most disadvantaged IRSD quintiles than in the least disadvantaged (6).

The National Mental Health Services Planning Framework (NHMSPF) is widely used in planning in Australia and 'allows users to estimate need and expected demand for mental health care and the level and mix of mental health services required for a given population' (8, p3). However, the NMHSPF and its associated Planning Support Tool are limited as they provide outputs for regions in a way that 'only adjusts for the size and age distribution of the selected population'. Currently, the NMHSPF does not account for variations from the national average likely to arise from factors such as rurality, regional socio-demographic variability, and regional clustering of higher needs groups, such as people with severe and complex mental illness in boarding houses' (8, p24). Consideration of how such variations may be compensated for is therefore important in supporting use of the NMHSPF. Grounding in an economic paradigm, we use 'demand' rather than 'need' to describe model outputs.

The Royal Commission into Victoria's Mental Health Services (RCVMHS) made recommendations in an interim report in November 2019 (9), with final report delivery scheduled for late 2020. One prominent

interim report recommendation was a proposed increase of 135 public sector beds in two local health networks (LHNs), the Melbourne Health Alliance and Barwon Health. It may be important to consider if following this recommendation will increase or decrease alignment of beds in Victoria with estimated service demand taking into account socio-economic disadvantage (SED) and this presents an opportunity for a case study in application of an IRSD-based catchment area weighting. For the sake of transparency, we draw where possible on publicly-available information and peer-reviewed literature for estimation of key parameters.

Aims

To propose and describe an IRSD-based model to assist resource distribution formulae for adult mental health resources.

To use this approach to assess implications of interim recommendations of the RCVMHS.

Methods

A proposed model (aim 1)

Latest ABS census data (2016) provided the population of each local government area (LGA) within Victoria, and associated IRSD quintile scores. Applying quintile-specific AHS VHK-10 published findings (6), we estimated the number of individuals with VHK-10 scores in each LGA then, based on advice from DHHS Victoria regarding catchment configurations, aggregated this population onto Victoria's 21 adult mental health service delivery catchments. Catchment populations then were aggregated on to Victoria's 16 LHNs. To determine proportional estimation of IRSD-adjusted need, we divided the estimated number of people with VHK-10 scores in the relevant area by the total estimated number of people with VHK-10 scores in Victoria. Further details of this working and sources are in a supplementary-materials spreadsheet, which could be adapted for other State, Territory or regional applications.

Implications of model outputs with consideration of bed provision (aim 2)

IRSD-adjusted estimated State-proportional service demands were compared with information from the RCVMHS report regarding existing bed supply. Then an assessment was made as to how the additional 135 public sector beds proposed by the RCVMHS in their interim report would influence equity in service provision as estimated by the model. Beds are often provided in ward units of 25; as Barwon Health has a much smaller population then the Melbourne Health Alliance, we assumed the beds would be distributed 25 to Barwon Health and 110 to the Melbourne Health Alliance.

Results

Figure 1 displays outputs of the model at catchment area level as a bar-chart and includes the associated data table. Areas are ordered here from the point of view of size of needs-adjustment compared to population proportions, which varies from 0.59 (Outer East) to 1.60 (Mid-West). Figure 2, another bar chart, presents in sequence for LHNs, all as percentages of the State total: population, current bed numbers (9), IRSD adjusted estimated need, and beds following RCVMHS recommendations as set out earlier. We can see from Figure 2 that the additional LHN beds proposed by the RCVMHS – based on this model – brings the bed-state somewhat better into alignment with the IRSD needs-estimated service demand for these areas; the formula suggests next targets for bed expansion based on percentage discrepancy of >2%. These would be: metropolitan, Monash Health; and non-metropolitan, Latrobe Regional Health. More detail and the spreadsheet working are available in supplemental materials which also include a table comparing the overall weightings from this approach with that in the Victorian 1996 RDF (10).

Discussion

Key points

The target group for specialist mental health services is often stated as around 3% of the population and this is concordant with overall population prevalence of VHK-10 scores at 3.6% (6). While many factors influence levels of psychological distress, the composite construct of SED includes many powerful influences

on these rates (11) and so has a strong claim to be included in bed distribution (9) as well as other resource considerations.

Advancing the research agenda

While the IRSD as a composite index includes many important influences on mental health care need and demand, we may consider other input contributions that might enhance predictive value. By the time the 1990s Victorian RDF (3, 10) was developed, construction of these formulae was already a mature field so there may be worthwhile guidance from this to possible considerations. Table 1 presents some comparisons between the two approaches while a supplementary table compares overall weightings between the 1996 formula and that proposed here. Conspicuously, two inner-urban areas weighted highly in 1996 rank lower in this formula. Many changes in Australian cities since 1996 (12) will bear, for instance, on location of boarding houses that will have contributed to population demographics weighting in 1996, and on homelessness (Table 1); further integration of urban planning information, other survey findings and of NMHSPF demographic adjustments could refine understanding of this difference.

There are very significant problems with inequity in distribution of mental health care as funded through Medicare (13, 14). Covid-19 response has sought to increase access through video-conferencing but since the MBS items have come to allow co-payment they may not improve equity. The LGA-specific estimators of relative need and demand from this model could guide assessment of equity for these innovations.

Further research and debate should include consideration in peer reviewed literature of the moral bases of value judgements involved, of other candidate variables, and of how variables and data sources might be used in model parameterisation and calibration.

Limitations

We drew where possible on peer reviewed sources – with the advantage that the work used has been through critical review but the disadvantage that some data sources are not the most recent available. In relation to aim 2 any possible inaccuracies in the RCVMHS interim report will not be corrected here; overall resource distribution may be different from bed locations. The model is essentially a deterministic one; recent advances in simulation modelling approaches could enable incorporation of effects of feedback loops and other features of complex systems.

Conclusion

This work can help inform distributional justice in planning, including in application of the NMHSPF. As an example, considering new bed allocations recommended by the RCVMHS, the work provides some support that these are a justifiable local proportional increase. Following this reasonable first step, the model identifies next priorities among Victorian LHNs for equitable expansion.

Declaring of Conflicting Interests

The lead author is employed by Monash Health.

References

1. World Health Organization and Calouste Gulbenkian Foundation. Social Determinants of Mental Health. Geneva: World Health Organization, 2014.

2. Australian Bureau of Statistics. IRSD 2018. https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2033.0.55

3. Meadows G, Singh B. 'Victoria on the move': mental health services in a decade of transition 1992-2002. Australasian Psychiatry 2003; 1: 62–67.

4

4. Meadows G. A Proposal for a Local Resource Allocation Formula for Mental Health Services. Australasian Psychiatry 1996; 4: 125–128.

5. Slade T, Grove R, Burgess P. Kessler Psychological Distress Scale: Normative Data from the 2007 Australian National Survey of Mental Health and Wellbeing. Australian & New Zealand Journal of Psychiatry 2011; 45: 308–316.

6. Enticott JC, Meadows G, Shawyer F, Inder B, Patten S. Mental disorders and distress: Associations with demographics, remoteness and socioeconomic deprivation of area of residence across Australia. Australian and New Zealand Journal of Psychiatry 2016; 50: 1169–1179.

7. Isaacs AN, Enticott JC, Meadows G, Inder B. Lower Income Levels in Australia Are Strongly Associated With Elevated Psychological Distress: Implications for Healthcare and Other Policy Areas. Frontiers in Psychiatry 2018; 9: 536.

8. The University of Queensland. Introduction to the National Mental Health Service Planning Framework; V2.2. Brisbane: The University of Queensland, 2019.

9. State of Victoria. Royal Commission into Victoria's Mental Health System, Interim Report. Melbourne, Australia: 2019.

10. Department of Health Victoria. Purchasing Better Mental Health Services in Victoria: 1996-1997. 1996. Contract No.: 95/0376.

11. Meadows GN, Prodan A, Patten S, Shawyer F, Francis S, Enticott J, et al. Resolving the paradox of increased mental health expenditure and stable prevalence. Australian & New Zealand Journal of Psychiatry 2019; 53: 844–850.

12. O'Hanlon S. City Life; the new urban Australia. Sydney: NewSouth Publishing, 2018; 241.

13. Meadows G, Enticott J, Inder B, Russell G, Gurr R. Better access to mental health care and the failure of the Medicare principle of universality. Medical Journal of Australia 2015; 202: 190–195.

14. Meadows G, Enticott J, Rosenberg S. Three charts on: why rates of mental illness aren't going down despite higher spending 2018. https://theconversation.com/three-charts-on-why-rates-of-mental-illness-arent-going-down-despite-higher-spending-97534.

Tables

Table 1 A consideration of the 1996 Victorian RDF and the current model

Variable in the Victorian 1996 RDF	Consideration in regards to the current proposed model	Possible implications for research
Socioeconomic disadvantage (SD)	The updated IRSD is at the core of the current model	Updating information from later AHS findings and from future mental health surveys – if sample sizes permit the calculations could be made with deciles rather than quintiles.

Variable in the Victorian 1996 RDF	Consideration in regards to the current proposed model	Possible implications for research
Population demographics	Not featured in the current model, and this is a major contributor to differences between the 1996 formula and so potentially with current funding levels. But consideration of this is in the NMHSPF.	A useful next step could be to overlay these proposed adjustments for variability on the area-specific outputs of the NMHSPF planning support tool. Australian cities have seen major demographic changes since 1996 including potentially effects on urban-drift and how this should influence weighting needs research.
Indigenous peoples	Not in the current model. Indigenous people are an important priority group for health care (including mental health) – this may need separate treatment.	A topic for investigation is the extent to which increased morbidity in Indigenous people is accountable for through intermediate variables that feature in the IRSD including income, unemployment, overcrowding and educational attainment. Some adjustment above this will probably be indicated.
People from Non -English Speaking Backgrounds	The IRSD includes a variable capturing the percentage of people who do not speak English well.	Consideration of additional surveys may be useful – for instance regarding refugees.
Private sector activity correction	Not in current model. Private-sector varies with SD (although this is better measured with another index (13)).	The cited study relied on data released under a Freedom of information request – a more open policy on Medicare data would assist public transparency and accountability.
Homelessness	This is not captured in the IRSD and is an increasing issue in Australia. A further correction for this seems, *a-priori,* justifiable.	Further research into this population and its needs would assist parameter setting. With urban demographic changes this influence may have changed since 1996
Rurality	This is a significant influence on costs of service delivery and could usefully be incorporated into further models.	This bears on an interface with activity-based funding considerations and possible adjustments for travel time and other challenges of service delivery to more dispersed populations.

Figures

Figure 1: Resource Distribution to Victorian mental health catchments (adult); population and needs-estimation percentages of the State ranked by relative formula weighting.

[CHART]

	Mid West	Northern Mallee	Goulburn and Southern	Gippsland
Catchment % of State Pop. (2016)	6.20%	0.96%	2.47%	4.47%
Catchment % Very High K10	9.90%	1.35%	3.15%	5.70%
	South West	Barwon	Peninsula	Inner Urban Ea
Catchment % of State Pop. (2016)	6.60%	5.00%	4.78%	4.38%
Catchment % Very High K10	7.34%	5.04%	4.69%	3.29%

Figure 2: Comparison of formula outputs with population, existing and proposed bed distribution for Local Health Networks; data ranked by relative formula weighing

[CHART]

	Mildura Base Hospital	Goulburn Valley Health	Latrobe Regional Hos
LHN % of State Pop. (2016)	0.96%	2.47%	4.47%
LHN % Very High K10	1.35%	3.15%	5.70%
Current Bed Distribution	1.47%	2.17%	4.36%
RCVMHS Proposed Bed Distribution	1.55%	2.11%	3.64%
	Mercy Health	Monash Health	Barwon
LHN % of State Pop. (2016)	6.60%	15.47%	5.00%
LHN % Very High K10	7.34%	15.63%	5.04%
Current Bed Distribution	8.87%	15.60%	3.83%
RCVMHS Proposed Bed Distribution	7.01%	13.48%	5.66%

Hosted file

Supplementary Table 1 Comparison of 1996 and 2020 proposed weightings.docx available at https://authorea.com/users/718303/articles/703550-socio-economic-disadvantage-and-resource-distribution-for-mental-health-care-a-model-proposal-and-example-application-for-victoria-australia

Hosted file

SED and resource distribution for mental health.xlsx available at https://authorea.com/users/718303/articles/703550-socio-economic-disadvantage-and-resource-distribution-for-mental-health-care-a-model-proposal-and-example-application-for-victoria-australia