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Health and multidimensional poverty: a cross-sectional study of the impact of certain health conditions on living standards

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ABSTRACT

Objectives

To identify the health conditions associated with multidimensional poverty.

Design

Cross-sectional study of the nationally representative *Survey of Disability, Ageing and Carers*.

Setting

Australian population in 2003

Participants

35,704 individuals randomly selected from the Australian population by the Australian Bureau of Statistics.

Outcome measures

Multidimensional poverty status, income poverty status, costs of disability, SF-6D health utility score, education attainment.

Results

Amongst those who were multidimensionally poor, 75% had a chronic health condition and the most common health conditions were back problems (11% of those in multidimensional

poverty had back problems), and arthritis (11%). The conditions with the highest proportion of individuals in multidimensional poverty were depression/mood affecting disorders (26% in multidimensional poverty) and mental and behavioural disorders (22%). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be multidimensionally poor than those with no health condition. Equivalising for the additional costs of disability increased the proportion of individuals in multidimensional poverty for all conditions and the conditions with the highest proportion of individuals in multidimensional poverty changed.

Conclusions

Due to the influence of certain health conditions on poverty status, health interventions have the potential to improve national living standards and poverty rates in a similar way that 'traditional' policy responses such as changes to welfare payment currently do. Using a multidimensional poverty measure reveals the health conditions that should be the focus of such efforts.

Article Summary

Article Focus

- Multidimensional poverty status of people with various chronic health conditions
- The influence of costs of disability on multidimensional poverty status

Key messages

- Amongst those who were multidimensionally poor the most commonly reported health conditions were back problems, and arthritis
- Those with depression were nearly 7 times more likely to be multidimensionally poor than those with no health condition
- Equivalising for the additional costs of disability changed the conditions with the highest proportion of individuals in multidimensional poverty

Strengths and limitations

- Uses Australia's first measure of multidimensional poverty
- Takes into consideration education attainment and overall health status (measured by the SF-6D) as well as income when assessing people's poverty status

INTRODUCTION

Health imparts a massive impact upon an individual's living standards by directly influencing what physical and mental functioning they can undertake. Furthermore, health affects living standards indirectly through limiting education and financial resources: poor health may reduce the ability to undertake education (1-3), and may also limit economic resources through restricting employment (4-7).

In recognition of the importance of good health for adequate living standards, health has been included as a key component of a new poverty measure - the Freedom Poverty Measure. The Freedom Poverty Measure, a multidimensional measure of poverty, sees health and education impacting on living standards in a similar way that low income does (8). Under the Freedom Poverty Measure health status, in part, determines poverty status.

Including health in a measure of poverty provides the opportunity for cross-portfolio responses to improving the living standards of disadvantaged members of society – with health being seen as key contributor to low living standards, health interventions have the potential to be a direct policy response to improving living standards alongside existing measures such as reform to social security arrangements (9). However, different health conditions are likely to have varying impacts upon living standards, with some conditions more severely affecting living standards than others. This paper will look at the relationship between multidimensional poverty and various long term health conditions in the Australian population to determine which health conditions have the largest impact upon living standards and as such their prevention or treatment should be targeted as a cross-portfolio concern.

METHODS

Data source

The 2003 Survey of Disability, Ageing and Carers (SDAC) provided the data source for this paper. The SDAC provided detailed self-reported data on socio-demographic status, labour force participation, health and disability status, and economic information on individuals and their families[1] (10). The original 2003 SDAC data was weighted by the Australian Bureau of Statistics to represent the whole Australian population in 2003 by broad population variables such as age and sex.

The ABS classified respondent's chronic health conditions according to the ICD-10 health coding system. Lists of what ICD-10 codes correspond with different chronic health condition groups can be found in Australian Bureau of Statistics (10). Respondents with Alzheimer's disease and 'certain conditions originating in the perinatal period' were excluded because of their low numbers (less than 10 respondents) on the SDAC.

Identifying those in freedom poverty

In order to determine how various health conditions impact upon living standards the newly developed Freedom Poverty Measure was utilised to identify those in multidimensional poverty. Under the Freedom Poverty Measure, poverty is defined as having low living standards. It seeks to combine measures of low income, poor health, and insufficient education (Figure 1) as all of these factors are seen to influence living standards. For more detailed information on the Freedom Poverty Measure and other examples of its application see (4, 8, 11-12).

[1] At the time of writing this paper the 2003 SDAC was the most current dataset that contains detailed and accurate income, health and education information on the one survey.

The Freedom Poverty measure looks at the income, health and education status of individuals to identify those with multi-dimensional disadvantage:

- If an individual's family income (measured by the income unit income (13)) is below the 50% of the median income poverty line then they are considered to have income disadvantage..
- If an individual has a poorer health utility score (measured by the SF6D (SF12) measure (14)) than the average for their age group they are considered to have a health disadvantage.
- If an individual has a highest level of education attainment lower than year 12 (for those aged 25 to 64 years), or lower than Year 10 (for those aged 65 years and over) they are considered to have an education disadvantage.

Based upon an individual's income, health and education, those with income disadvantage AND either a health or education disadvantage were considered to be in 'freedom poverty' and to be multidimensionally poor. This Freedom Poverty Measure was designed specifically for the Australian population in a manner that is consistent with international poverty measurement practices (15).

Statistical Analysis

Initially descriptive statistics were utilised to look at the proportion of people in multidimensional poverty with a long term health condition, the most common conditions experienced by those in multidimensional poverty, and the proportion of people with various conditions in multidimensional poverty.

Following this logistic regression models were utilised to look at the odds ratio of being in multidimensional poverty for those with various chronic health conditions. No chronic health condition was used as the reference condition, and the models were adjusted for age and sex.

Sensitivity Analysis – costs of disabiltiy

Ill health can further impact on living standards by imparting additional costs upon individuals, including the costs of treatment, support services, and medication, and it has been argued that these costs should be taken into consideration when comparing incomes (16). Those with long term health conditions are likely to need higher incomes to obtain the same level of living standards as those with no long term health conditions due to the additional costs of living for those with ill health. There is a small amount of literature that has developed a possible means of taking these costs into consideration, internationally this has been undertaken by Zaidi and Burchardt (16), and within Australia this has been undertaken by Saunders (17).

Using the methods developed by Saunders to measure the costs associated with disability, a sensitivity analysis was be undertaken to look at the difference in the number of people in multidimensional poverty as a result of accounting for the extra costs of disability. The long term health conditions associated with multidimensional poverty when the additional costs of disability in adults were taken into consideration was also examined. It is acknowledged by the authors that there is a number of limitations to this approach, including the exclusion of children in the methods developed by Saunders and also possible limitations in the use of disability classification to estimate the costs of health (18). However, this sensitivity will still provide an example of how taking into consideration the costs of disability will affect the financial situation of individuals and hence the numbers in multidimensional poverty.

RESULTS

There were 35 704 respondents in the SDAC, of these 3 469 were in Freedom poverty. Once weighted these data represented 19 320 000 individuals in the 2003 Australian population in private households, of which 1 857 000 were multidimensionally poor (10%) or in 'Freedom Poverty'. Of the Australian population in 2003, 40% identified that they had a long term health condition.

Amongst those who were multidimensionally poor, 75% identified having a long term health condition. Of those with a long term health condition, 18% were in multidimensional poverty; whereas for those with no long term health condition 4% were in multidimensional poverty (Table 1). Those with a long term health condition were 3 times more likely to be in multidimensional poverty than those with no health condition, after controlling for age and sex (OR 3.38, 95% CI: 3.06 – 3.76, p<.0001).

Amongst those in multidimensional poverty the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), arthritis and related disorders (11%), followed by mental and behavioural disorders (9%), hypertension (4%), asthma (4%) and injury/accident (4%). Amongst the individual health conditions, the condition with the highest proportion in multidimensional poverty was depression/mood affecting disorders (26% were in multidimensional poverty), mental and behavioural disorders (22% were in multidimensional poverty), certain infectious and parasitic diseases (22% were in multidimensional poverty), and diseases of the respiratory system (22% were in multidimensional poverty) (Table 2).

After controlling for age and sex there was no significant difference in the likelihood of being in multidimensional poverty between those with no health condition and those with high

cholesterol (p=0.3794), deafness/noise induced hearing loss (p=0.3938), and conditions grouped by the ABS into 'other 2003 codes which had no ICD–10 equivalent' (p=0.2993). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be in multidimensional poverty than those with no health condition. The odds of being in multidimensional poverty for other health conditions, compared to those with no health condition are shown in Table 2.

Before equivalising income for disability status there were 1 875 000 individuals in multidimensional poverty. After equivalising family income for the costs of disability in adults there were 2 462 000 individuals in multidimensional poverty. After equivalising income for the costs of disability in adults, 82% of people in multidimensional poverty identified having a long term health condition – an increase of 8 percentage points. Of those with a long term health condition, 27% were in multidimensional poverty; whereas for those with no long term health condition 5% were in multidimensional poverty after equivalising for the costs of disability. Those with a long term health condition were now more than 5 times more likely to be in multidimensional poverty than those with no long term health condition, after controlling for age and sex (OR 5.57, 95% CI: 5.07 – 6.12, p<.0001).

After equivalising for the costs of disability in adults, the most common health conditions amongst those in multidimensional poverty were still arthritis and related disorders (13%), back problems (12%), mental and behavioural disorders (9%), hypertension (5%) and asthma (4%). The conditions with the highest proportion of individuals in multidimensional poverty were diseases of the respiratory system (43% were in multidimensional poverty) and other diseases of the circulatory system (41% were in multidimensional poverty). The proportion of individuals in multidimensional poverty in each of these conditions increased after taking into consideration the costs of disability in adults when equivalising income, and the conditions

with the highest proportion of individuals in multidimensional poverty also changed (Table 3).

After controlling for age and sex, those with mental and behavioural disorders were nearly 14 times more likely to be in multidimensional poverty than those with no health condition after equivalising income for disability in adults (OR 13.83, 95% CI: 11.76 – 16.26, p <.0001). All health conditions with the exception of high cholesterol (p= 0.9623) were significantly more likely to be in multidimensional poverty than those with no health condition (Table 3).

DISCUSSION

The results have shown that those with a chronic health condition were significantly more likely to be in multidimensional poverty than those without a chronic health condition, with 18% of those with a chronic health condition in multidimensional poverty, compared to only 4% of those with good health. Furthermore, 74% of those in multidimensional poverty had a long term health condition.

The results of the sensitivity analysis show that after equivalising income for adult disability, there was a 3 percentage point increase in the proportion of the population in multidimensional poverty, and a 9 percentage point increase in the proportion of individuals with ill health in multidimensional poverty. However, there is opportunity to improve the methods by which costs of ill health are produced by including children in the methodology and having further consideration as to how health is measured. For example, the large costs of treating a health condition may result in an individual having only a mild disability. In spite of this the sensitivity analysis has shown the additional burden health conditions can have upon living standards – through the economic burden placed upon families as a result of disability.

The most common long term health conditions associated with multidimensional poverty have been shown to be arthritis and related disorders, back problems and mental and behavioural disorders – all of which have been shown to be preventable. There are numerous interventions for each of these conditions that have been shown to be cost-effective in either preventing the onset of the condition or reducing the severity of the condition (19-22). When considering the additional costs of low living standards the further benefits of such intervention programs become more apparent.

Using mental and behavioural problems as an example, the benefit of interventions such as those deemed to be cost effective in Mihaloposlos *et. al.* (23) could not only be listed as improvements in health status and the associated savings to health care systems, but also the added benefits of reducing of the number of people in multidimensional poverty. Improving the health of individuals with mental and behavioural problems will potentially result in 27% of these individuals no longer being multidimensionally poor and amongst the most disadvantaged members of society. Furthermore, improving health status may also increase employment opportunities, with around one quarter of those with mental and behavioural problems being out of the labour force due to their ill health (24), which is likely to in turn improve the financial situation of individuals with mental health problems further improving their living standards. As such, health interventions should be incorporated into policy responses to improve national living standards.

Political rhetoric is currently shifting to advocate the use of cross-portfolio responses to social issues (25). As such, there is opportunity for consideration of health interventions to be taken up in government departments other than those traditionally responsible for health care, and be included alongside other efforts to improve living standards such as education and skills reform and social security reform. Using the Freedom Poverty Measure reveals the

health conditions experienced by the most disadvantaged people in society – those who not only do they have the lowest incomes, but also have to bear the burden of a insufficient education and the impact of poor health on their daily living standards – and should be the focus of political efforts to improve living standards.

Funding

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Competing Interests

None

Contributorship

EC conceived, designed and led the study. EC undertook data analysis and drafted the manuscript. DS and RS provided guidance on data analysis, and contributed to the drafting of the manuscript. All authors edited the final manuscript.

Data sharing

The dataset used in this study, the 2003 Survey of Disability, Ageing and Carers, is publically available for the Australian Bureau of Statistics upon application.

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Table 1: Number of individuals in multidimensional poverty by health status, 2003

	In Multidimensional Poverty	Not in Multidimensional Poverty
Has a long term health condition	1 387 000	6 371 000
Does not have a long term health condition	449 000	11 113 000

Table 2: Multidimensional poverty status of those with varying long term health conditions, 2003

Long term health condition	Total number	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	11 562 248	4%	488 700	REFERENCE			
Depression/ mood affective disorders	208 400	28%	57 300	6.60	5.09	8.55	<.0001
Congenital malformations, deformations and chromosomal abnormalities	48 200	17%	8 000	5.53	3.07	9.99	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	124 700	24%	29 500	4.71	3.29	6.76	<.0001
Certain infectious and parasitic diseases	28 200	24%	6 800	4.66	2.36	9.17	<.0001
Mental and behavioural disorders	621 800	27%	164 900	4.60	1.04	20.35	0.0441
Diseases of the respiratory system	127 900	27%	34 200	4.49	3.24	6.23	<.0001
Other injury/poisoning	65 900	23%	14 900	4.17	2.63	6.62	<.0001
Injury/accident	434 700	17%	74 900	3.85	3.11	4.77	<.0001
Diseases of the blood and blood forming organs	17 200	22%	3 700	3.72	1.53	9.00	0.0036
Back problems	1 128 200	19%	210 100	3.49	3.01	4.04	<.0001
Diseases of the skin and subcutaneous tissues	65 700	15%	9 900	3.41	2.06	5.65	<.0001
Other diseases of the musculoskeletal system and connective tissue	251 600	22%	56 300	3.35	2.59	4.33	<.0001
Arthritis and related disorders	902 200	23%	207 200	3.27	2.79	3.83	<.0001
Heart Disease	225 100	23%	52 300	3.24	2.47	4.26	<.0001

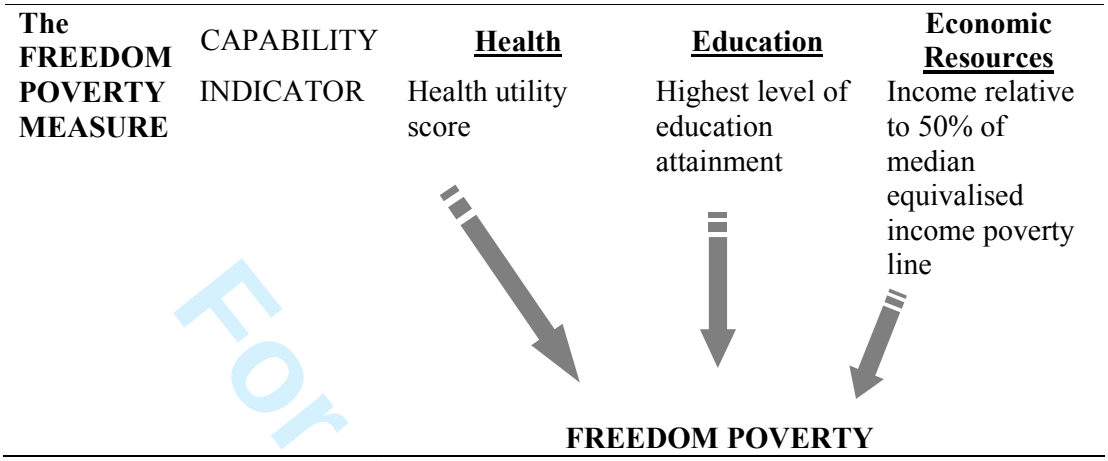
Diseases of the eye and adnexa	99 800	19%	19 100	3.18	2.08	4.86	<.0001
Other diseases of the circulatory system	122 600	22%	27 600	3.13	2.21	4.44	<.0001
Diabetes	271 100	19%	51 700	2.99	2.31	3.87	0.0441
Neoplasms (tumours/cancers)	97 000	19%	18 800	2.90	1.92	4.37	<.0001
Diseases of the ear and mastoid process	284 800	10%	47 800	2.73	2.08	3.59	<.0001
Diseases of the nervous system	491 800	13%	65 500	2.67	2.14	3.32	<.0001
Diseases of the digestive system	154 100	14%	21 900	2.37	1.67	3.38	<.0001
Diseases of the genitourinary system	70 800	14%	9 900	2.28	1.36	3.82	0.0018
Asthma	925 200	8%	76 600	2.01	1.65	2.44	<.0001
Hypertension	604 200	14%	83 200	1.84	1.50	2.26	<.0001
Other endocrine/nutritional and metabolic disorders	87 300	10%	8 500	1.55	0.92	2.62	0.1015
Other	44 700	11%	4 812	1.48	0.71	3.10	0.2993
Deafness/hearing loss	153 300	8%	12 975	1.22	0.77	1.94	0.3938
High cholesterol	92 900	6%	5 211	0.77	0.43	1.39	0.3794

Table 3: Multidimensional poverty status of those with varying long term health conditions, after equivalising income for the cost of disability in adults, 2003

Long term health condition	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	4%	440 500	REFERENCE			
Mental and behavioural disorders	36%	220 900	13.83	11.76	16.26	<.0001
Depression/mood affective disorders	34%	71 600	9.86	7.72	12.61	<.0001
Congenital malformations, deformations and chromosomal abnormalities	23%	10 900	9.82	5.70	16.92	<.0001
Certain infectious and parasitic diseases	38%	10 900	9.58	5.20	17.64	<.0001
Diseases of the respiratory system	43%	55 100	9.13	6.75	12.35	<.0001
Other injury/poisoning	35%	23 000	7.84	5.25	11.71	<.0001
Other diseases of the circulatory system	41%	49 800	7.00	5.18	9.47	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	31%	38 400	6.97	4.93	9.85	<.0001
Diseases of the blood and blood forming organs	33%	5 700	6.94	3.40	14.17	<.0001
Diseases of the skin and subcutaneous tissues	24%	15 700	6.69	4.35	10.30	<.0001
Other diseases of the musculoskeletal system and connective tissue	36%	91 400	6.48	5.17	8.13	<.0001
Diseases of the eye and adnexa	31%	31 300	6.19	4.22	9.08	<.0001
Injury/accident	23%	102 000	6.07	5.00	7.37	<.0001
Back problems	27%	305 400	5.80	5.08	6.63	<.0001
Arthritis and related disorders	35%	316 300	5.63	4.88	6.50	<.0001
Heart Disease	36%	80 600	5.53	4.35	7.05	<.0001
Neoplasms (tumours/cancers)	32%	31 200	5.52	3.90	7.83	<.0001
Diseases of the nervous	20%	100 300	4.77	3.94	5.78	<.0001

system						
Diabetes	26%	70 600	4.31	3.42	5.45	<.0001
Diseases of the ear and mastoid process	24%	68 500	4.23	3.32	5.39	<.0001
Other	26%	11 600	4.22	2.45	7.26	<.0001
Diseases of the digestive system	22%	34 400	4.14	3.07	5.60	<.0001
Diseases of the genitourinary system	22%	15 400	3.92	2.52	6.09	<.0001
Asthma	11%	104 400	3.18	2.67	3.79	<.0001
Hypertension	18%	110 000	2.42	2.01	2.92	<.0001
Other endocrine/nutritional and metabolic disorders	13%	11 600	2.24	1.40	3.56	0.0007
Deafness/hearing loss	15%	22 300	2.13	1.46	3.08	<.0001
High cholesterol	8%	7 000	1.01	0.59	1.74	0.9623

Figure 1: Components of the 'freedom poverty measure'



Chronic health conditions and poverty: a cross-sectional study using a multidimensional poverty measure

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Objectives

To identify the chronic health conditions associated with multidimensional poverty.

Design

Cross-sectional study of the nationally representative *Survey of Disability, Ageing and Carers,* conducted by the Australian Bureau of Statistics.

Setting

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Participants

35,704 individuals randomly selected from the Australian population by the Australian Bureau of Statistics.

Outcome measures

Multidimensional poverty status, costs of disability, SF-6D health utility score, income, education attainment.

Results

Amongst those who were multidimensionally poor, 75% had a chronic health condition and the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), and arthritis (11%). The conditions with the highest proportion of individuals in multidimensional poverty were depression/mood affecting disorders (26% in

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Conclusions

Due to the influence of certain health conditions on poverty status, health interventions have the potential to improve national living standards and poverty rates in a similar way that 'traditional' policy responses such as changes to welfare payment currently do. Using a multidimensional poverty measure reveals the health conditions that should be the focus of such efforts.

Article Summary

Article Focus

- Multidimensional poverty status of people with various chronic health conditions
- The influence of costs of disability on multidimensional poverty status

Key messages

- Amongst those who were multidimensionally poor the most commonly reported health conditions were back problems, and arthritis
- Those with depression were nearly 7 times more likely to be multidimensionally poor than those with no health condition
- Equivalising for the additional costs of disability changed the conditions with the highest proportion of individuals in multidimensional poverty

Strengths and limitations

- Uses Australia's first measure of multidimensional poverty
- Takes into consideration education attainment and overall health status (measured by the SF-6D) as well as income when assessing people's poverty status

INTRODUCTION

Standard of living is a broad concept that loosely relates to the overall life of an individual, and the quality of that life. Poverty studies seek to measure an individual's living standards, with those who have a 'poor' standard of living being seen as living in poverty (1, 2). Traditionally, poverty has been measured based upon an individual's available income; however, it is now accepted that income gives too narrow a view of an individual's overall living standards and other indicators of living standards are needed (3, 4). The capabilities theory of Sen has been at the forefront of the movement away from the uni-dimensional income approach to poverty measurement, with Sen defining poverty as a lack of freedom due to "the deprivation of basic capabilities" (5). Capabilities are resources, attributes or circumstances that give an individual the capacity to adequately function and engage with the society they live in, and the ability to do things an individual values (5). This shift in conceptualising poverty and living standards has given rise to the now-widespread use of multidimensional poverty measures (6-10). These measures still seek to measure living standards and identify those living in poverty, however they use multiple indicators not just income.

Overall health status imparts a massive impact upon an individual's living standards by directly influencing what physical and mental functioning they can undertake, and is often seen as a basic capability (5, 11-14). Furthermore, health status affects living standards indirectly through limiting education and financial resources: poor health status may reduce the ability to undertake education (15-17), and may also limit economic resources through restricting employment (18-21). For a detailed discussion of how health acts as a key capability and determinant of living standards see (22).

In recognition of the importance of good health for adequate living standards, health status has been included as a key component in numerous measures of poverty (9, 23-25), including the Freedom Poverty Measure within Australia (22). The Freedom Poverty Measure, a multidimensional measure of poverty, sees overall health status and education attainment as impacting upon living standards in a similar way that low income does (22). Under the Freedom Poverty Measure overall health status, in part, determines poverty status: those in multidimensional poverty[1] have a low income and either poor overall health status or an insufficient level of education attainment.

Including health in a measure of poverty provides the opportunity for cross-portfolio responses to improving the living standards of disadvantaged members of society – with health being seen as key contributor to low living standards, health interventions have the potential to be a direct policy response to improving living standards alongside existing measures such as reform to social security arrangements (26). However, different chronic health conditions are likely to have varying impacts upon living standards, with some conditions more severely affecting living standards than others[2]. This paper will look at the relationship between multidimensional poverty, measured using the Freedom Poverty Measure, and specific chronic health conditions in the Australian population to determine which chronic health conditions have the largest impact upon living standards and as such their prevention or treatment should be targeted as a cross-portfolio concern.

[1] The use of both income measures of poverty and multidimensional measures of poverty in the literature creates the need to clarify which measure is being used. Hence people may be labelled as being in 'income poverty' or in 'multidimensional poverty' depending on which measure was used – both refer to a state of low living standards. The term 'freedom poverty' refers to those who are identified as being in multidimensional poverty using the Freedom Poverty Measure.

[2] Within this paper a chronic health condition refers to a specific aliment that has lasted, or is likely to last, for six months or more.

METHODS

Data source

The 2003 Survey of Disability, Ageing and Carers (SDAC) provided the data source for this paper. The SDAC provided detailed self-reported data on socio-demographic status, labour force participation, health and disability status, chronic health conditions, and economic information on individuals and their families[3] (30).

The 2003 SDAC is a comprehensive, nationally representative survey conducted by the Australian Bureau of Statistics (ABS) between 23 June 2003 to 1 November 2003 (27). Both private dwellings and care-accommodation establishments were included in the sample, with a response rate of 89% for private dwellings and 92% for care-accommodation establishments (28). The survey covered individuals in all states and territories, including both rural and urban populations – however, those in very remote areas were excluded. As these areas make up only 1% of the population, the ABS deemed that this would not affect the robustness of the data (29) The original 2003 SDAC data was weighted by the Australian Bureau of Statistics (ABS) to represent the Australian population in 2003 by broad population variables such as age and sex.

Identifying those in freedom poverty

In order to determine how various health conditions impact upon living standards the Freedom Poverty Measure was utilised to identify those in multidimensional poverty. The Freedom Poverty Measure combines measures of low income, poor health, and insufficient education. The Freedom Poverty Measure was designed specifically for the Australian

[3] At the time of writing this paper the 2003 SDAC was the most current dataset that contains detailed and accurate income, health and education information on the one survey.

population in a manner that is consistent with international poverty measurement practices (7). For more detailed information on the Freedom Poverty Measure and other examples of its application see (10, 18, 22, 31).

The income, health and education status of individuals was initially identified, as follows:

- If an individual's family income (measured by the income unit income (29)) was below the 50% of the median income poverty line then they were considered to have low income.
- If an individual had a poorer health utility score (measured by the Short Form 6D (SF-6D) measure (32)) than the average for their age group they were considered to have poor overall health status.
- If an individual had a highest level of education attainment lower than year 12 (for those aged 25 to 64 years), or lower than Year 10 (for those aged 65 years and over) they were considered to have an insufficient level of education attainment.

Those with low income AND either poor overall health status or an insufficient level of education attainment were considered to be in 'freedom poverty' and to be multidimensionally poor.

Identifying chronic health conditions

The 2003 SDAC recorded any chronic health conditions, defined as health conditions that had lasted or were likely to last for six months or more, experienced by respondents. If an individual recorded multiple health conditions then their main chronic health condition was also recorded. The ABS classified respondent's chronic health conditions according to the ICD-10 health coding system. Lists of what ICD-10 codes correspond with different chronic health condition groups can be found in (30). Respondents with Alzheimer's disease and

'certain conditions originating in the perinatal period' were excluded because of their low numbers (less than 10 respondents) on the SDAC.

Statistical Analysis

Initially descriptive statistics were utilised to look at the proportion of people in multidimensional poverty with a long term health condition, the most common conditions experienced by those in multidimensional poverty, and the proportion of people with various conditions in multidimensional poverty.

Following this logistic regression models were utilised to look at the odds ratio of being in multidimensional poverty for those with various chronic health conditions. Those with no chronic health conditions were used as the reference group, and the models were adjusted for age and sex.

Sensitivity Analysis – costs of disability

Ill health can further impact on living standards by imparting additional costs upon individuals, including the costs of treatment, support services, and medication, and it has been argued that these costs should be taken into consideration when comparing incomes (33). Those with chronic health conditions are likely to need higher incomes to obtain the same level of living standards as those with no chronic health conditions due to the additional costs of living for those with ill health. There is a small amount of literature that has developed a possible means of taking these costs into consideration. Internationally this has been undertaken by Zaidi and Burchardt (33), and within Australia this has been undertaken by Saunders (34).

Using the methods developed by Saunders to measure the costs associated with disability, a sensitivity analysis was be undertaken to look at the difference in the number of people in multidimensional poverty as a result of accounting for the extra costs of disability. The long term health conditions associated with multidimensional poverty when the additional costs of disability in adults were taken into consideration was also examined. It is acknowledged by the authors that there is a number of limitations to this approach, including the exclusion of children in the methods developed by Saunders and also possible limitations in the use of disability classification to estimate the costs of health (35). However, this sensitivity will still provide an example of how taking into consideration the costs of disability will affect the financial situation of individuals and hence the numbers in multidimensional poverty.

RESULTS

There were 35 704 respondents in the SDAC, and of these 3 469 were in multidimensional poverty. Once weighted these data represented 19 320 000 individuals in the 2003 Australian population in private households, of which 1 857 000 were multidimensionally poor (10%). Of the Australian population in 2003, 40% identified having a long term health condition.

Not all individuals with a chronic health condition had poor overall health status, with 74% of individuals with a chronic health condition having good overall health status, indicating that their health condition had only a mild impact on their overall health status. Table 1 shows the overall health status of those with various chronic health conditions. Conditions with a relatively low proportion of individuals reporting poor overall health status included high cholesterol, hypertension and asthma.

Amongst those who were multidimensionally poor, 75% identified having a chronic health condition. Of those with a chronic health condition, 18% were in multidimensional poverty;

whereas for those with no chronic health condition 4% were in multidimensional poverty (Table 2). Those with a long term health condition were 3 times more likely to be in multidimensional poverty than those with no health condition, after controlling for age and sex (OR 3.38, 95% CI: 3.06 – 3.76, p<.0001).

Amongst those in multidimensional poverty the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), arthritis and related disorders (11%), followed by mental and behavioural disorders (9%), hypertension (4%), asthma (4%) and injury/accident (4%). Amongst the individual health conditions, the condition with the highest proportion in multidimensional poverty was depression/mood affecting disorders (26% were in multidimensional poverty), mental and behavioural disorders (22% were in multidimensional poverty), certain infectious and parasitic diseases (22% were in multidimensional poverty), and diseases of the respiratory system (22% were in multidimensional poverty) (Table 3).

After controlling for age and sex there was no significant difference in the likelihood of being in multidimensional poverty between those with no chronic health condition and those with high cholesterol (p=0.3794), deafness/noise induced hearing loss (p=0.3938), and conditions grouped by the ABS into 'other 2003 codes which had no ICD–10 equivalent' (p=0.2993). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be in multidimensional poverty than those with no chronic health condition. The odds of being in multidimensional poverty for other chronic health conditions, compared to those with no health condition are shown in Table 3.

Costs of disability

Before equivalising income for disability status there were 1 875 000 individuals in multidimensional poverty. After equivalising family income for the costs of disability in adults there were 2 462 000 individuals in multidimensional poverty. After equivalising income for the costs of disability in adults, 82% of people in multidimensional poverty identified having a chronic health condition – an increase of 8 percentage points. Of those with a chronic health condition, 27% were in multidimensional poverty; whereas for those with no chronic health condition 5% were in multidimensional poverty after equivalising for the costs of disability. Those with a chronic health condition were now more than 5 times more likely to be in multidimensional poverty than those with no chronic health condition, after controlling for age and sex (OR 5.57, 95% CI: 5.07 – 6.12, p<.0001).

After equivalising for the costs of disability in adults, the most common chronic health conditions amongst those in multidimensional poverty were still arthritis and related disorders (13%), back problems (12%), mental and behavioural disorders (9%), hypertension (5%) and asthma (4%). The conditions with the highest proportion of individuals in multidimensional poverty were diseases of the respiratory system (43% were in multidimensional poverty) and other diseases of the circulatory system (41% were in multidimensional poverty). The proportion of individuals in multidimensional poverty in each of these conditions increased after taking into consideration the costs of disability in adults when equivalising income, and the conditions with the highest proportion of individuals in multidimensional poverty also changed (Table 4).

After controlling for age and sex, those with mental and behavioural disorders were nearly 14 times more likely to be in multidimensional poverty than those with no health condition after

equivalising income for disability in adults (OR 13.83, 95% CI: 11.76 – 16.26, p <.0001). All chronic health conditions with the exception of high cholesterol (p= 0.9623) were significantly more likely to be in multidimensional poverty than those with no chronic health condition (Table 4).

DISCUSSION

The results have shown that those with a chronic health condition were significantly more likely to be in multidimensional poverty than those without a chronic health condition, with 18% of those with a chronic health condition being in multidimensional poverty, compared to only 4% of those without a chronic health condition. Of those in multidimensional poverty, 74% had a long term health condition.

The results of the sensitivity analysis show that after equivalising income for adult disability, there was a 3 percentage point increase in the proportion of the population in multidimensional poverty, and a 9 percentage point increase in the proportion of individuals with a chronic health condition in multidimensional poverty. However, there is opportunity to improve the methods by which the costs of ill health are produced by including children in the methodology and having further consideration as to how health is measured. In spite of this, the sensitivity analysis has shown the additional burden chronic health conditions can have upon living standards – through the economic burden placed upon families as a result of disability.

Chronic health conditions impact upon living standards in a number of ways. Having a chronic health condition results in an increased likelihood of being out of the labour force (19), with recent Australian studies showing that being out of the labour force is associated with low incomes and high rates of income poverty (36, 37). Furthermore, having a chronic

health condition is likely to affect an individual's overall health status – however, as this study has shown, different chronic health conditions have varying impacts upon overall health status, with some chronic health conditions such as hypertension or asthma having few people reporting poor overall health status.

The chronic health conditions most commonly associated with multidimensional poverty were arthritis and related disorders, back problems and mental and behavioural disorders – all of which have been shown to be preventable. There are numerous interventions for each of these conditions that have been shown to be cost-effective in either preventing the onset of the condition or reducing the severity of the condition (38-41). When considering the additional costs of low living standards the further benefits of such intervention programs become more apparent.

Using mental and behavioural problems as an example, the benefit of interventions such as those deemed to be cost effective in Mihaloposlos *et. al.* (42) could not only be listed as improvements in health status and the associated savings to health care systems, but also the added benefits of reducing of the number of people in multidimensional poverty. Improving the health of individuals with mental and behavioural problems could potentially result in 27% of these individuals no longer being multidimensionally poor and amongst the most disadvantaged members of society. Furthermore, improving health status may also increase employment opportunities, with around one quarter of those with mental and behavioural problems being out of the labour force due to their ill health (43), which is likely to in turn improve the financial situation of individuals with mental health problems further improving their living standards. As such, health interventions should be incorporated into policy responses to improve national living standards.

Political rhetoric is currently shifting to advocate the use of cross-portfolio responses to social issues (44). As such, there is opportunity for health interventions to be taken up in government departments other than those traditionally responsible for health care, and be included alongside other efforts to improve living standards such as education and skills reform, and social security reform. Using the Freedom Poverty Measure reveals the chronic health conditions that are experienced by the most disadvantaged people in society and should be the focus of political efforts to improve living standards.

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Table 1: Overall health status of those with different chronic health conditions

Long term health condition	Proportion with poor overall health status, measured by SF-6D
Depression/ mood affective disorders	22%
Congenital malformations, deformations and chromosomal abnormalities	49%
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	36%
Certain infectious and parasitic diseases	41%
Mental and behavioural disorders	46%
Diseases of the respiratory system	42%
Other injury/poisoning	40%
Injury/accident	25%
Diseases of the blood and blood forming organs	52%
Back problems	32%
Diseases of the skin and subcutaneous tissues	28%
Other diseases of the musculoskeletal system and connective tissue	40%
Arthritis and related disorders	31%
Heart Disease	33%
Diseases of the eye and adnexa	33%
Other diseases of the circulatory system	43%
Diabetes	12%
Neoplasms (tumours/cancers)	33%
Diseases of the ear and mastoid process	23%
Diseases of the nervous system	27%
Diseases of the digestive system	17%
Diseases of the genitourinary system	17%
Asthma	10%
Hypertension	5%
Other endocrine/nutritional and metabolic disorders	11%
Other	32%
Deafness/hearing loss	15%
High cholesterol	2%

Table 2: Number of individuals in multidimensional poverty by health status, 2003

	In Multidimensional Poverty	Not in Multidimensional Poverty
Has a long term health condition	1 387 000	6 371 000
Does not have a long term health condition	449 000	11 113 000

Table 3: Multidimensional poverty status of those with varying long term health conditions, 2003

Long term health condition	Total number	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	11 562 200	4%	488 700	REFERENCE			
Depression/ mood affective disorders	208 400	28%	57 300	6.60	5.09	8.55	<.0001
Congenital malformations, deformations and chromosomal abnormalities	48 200	17%	8 000	5.53	3.07	9.99	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	124 700	24%	29 500	4.71	3.29	6.76	<.0001
Certain infectious and parasitic diseases	28 200	24%	6 800	4.66	2.36	9.17	<.0001
Mental and behavioural disorders	621 800	27%	164 900	4.60	1.04	20.35	0.0441
Diseases of the respiratory system	127 900	27%	34 200	4.49	3.24	6.23	<.0001
Other injury/poisoning	65 900	23%	14 900	4.17	2.63	6.62	<.0001
Injury/accident	434 700	17%	74 900	3.85	3.11	4.77	<.0001
Diseases of the blood and blood forming organs	17 200	22%	3 700	3.72	1.53	9.00	0.0036
Back problems	1 128 200	19%	210 100	3.49	3.01	4.04	<.0001
Diseases of the skin and subcutaneous tissues	65 700	15%	9 900	3.41	2.06	5.65	<.0001
Other diseases of the musculoskeletal system and connective tissue	251 600	22%	56 300	3.35	2.59	4.33	<.0001
Arthritis and related disorders	902 200	23%	207 200	3.27	2.79	3.83	<.0001
Heart Disease	225 100	23%	52 300	3.24	2.47	4.26	<.0001
Diseases of the eye and adnexa	99 800	19%	19 100	3.18	2.08	4.86	<.0001
Other diseases of the	122 600	22%	27 600	3.13	2.21	4.44	<.0001

circulatory system							
Diabetes	271 100	19%	51 700	2.99	2.31	3.87	0.0441
Neoplasms (tumours/cancers)	97 000	19%	18 800	2.90	1.92	4.37	<.0001
Diseases of the ear and mastoid process	284 800	10%	47 800	2.73	2.08	3.59	<.0001
Diseases of the nervous system	491 800	13%	65 500	2.67	2.14	3.32	<.0001
Diseases of the digestive system	154 100	14%	21 900	2.37	1.67	3.38	<.0001
Diseases of the genitourinary system	70 800	14%	9 900	2.28	1.36	3.82	0.0018
Asthma	925 200	8%	76 600	2.01	1.65	2.44	<.0001
Hypertension	604 200	14%	83 200	1.84	1.50	2.26	<.0001
Other endocrine/nutritional and metabolic disorders	87 300	10%	8 500	1.55	0.92	2.62	0.1015
Other	44 700	11%	4 812	1.48	0.71	3.10	0.2993
Deafness/hearing loss	153 300	8%	12 975	1.22	0.77	1.94	0.3938
High cholesterol	92 900	6%	5 211	0.77	0.43	1.39	0.3794

Table 4: Multidimensional poverty status of those with varying long term health conditions, after equivalising income for the cost of disability in adults, 2003

Long term health condition	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	4%	440 500	REFERENCE			
Mental and behavioural disorders	36%	220 900	13.83	11.76	16.26	<.0001
Depression/mood affective disorders	34%	71 600	9.86	7.72	12.61	<.0001
Congenital malformations, deformations and chromosomal abnormalities	23%	10 900	9.82	5.70	16.92	<.0001
Certain infectious and parasitic diseases	38%	10 900	9.58	5.20	17.64	<.0001
Diseases of the respiratory system	43%	55 100	9.13	6.75	12.35	<.0001
Other injury/poisoning	35%	23 000	7.84	5.25	11.71	<.0001
Other diseases of the circulatory system	41%	49 800	7.00	5.18	9.47	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	31%	38 400	6.97	4.93	9.85	<.0001
Diseases of the blood and blood forming organs	33%	5 700	6.94	3.40	14.17	<.0001
Diseases of the skin and subcutaneous tissues	24%	15 700	6.69	4.35	10.30	<.0001
Other diseases of the musculoskeletal system and connective tissue	36%	91 400	6.48	5.17	8.13	<.0001
Diseases of the eye and adnexa	31%	31 300	6.19	4.22	9.08	<.0001
Injury/accident	23%	102 000	6.07	5.00	7.37	<.0001
Back problems	27%	305 400	5.80	5.08	6.63	<.0001
Arthritis and related disorders	35%	316 300	5.63	4.88	6.50	<.0001
Heart Disease	36%	80 600	5.53	4.35	7.05	<.0001
Neoplasms (tumours/cancers)	32%	31 200	5.52	3.90	7.83	<.0001
Diseases of the nervous system	20%	100 300	4.77	3.94	5.78	<.0001
Diabetes	26%	70 600	4.31	3.42	5.45	<.0001
Diseases of the ear and	24%	68 500	4.23	3.32	5.39	<.0001

mastoid process						
Other	26%	11 600	4.22	2.45	7.26	<.0001
Diseases of the digestive system	22%	34 400	4.14	3.07	5.60	<.0001
Diseases of the genitourinary system	22%	15 400	3.92	2.52	6.09	<.0001
Asthma	11%	104 400	3.18	2.67	3.79	<.0001
Hypertension	18%	110 000	2.42	2.01	2.92	<.0001
Other endocrine/nutritional and metabolic disorders	13%	11 600	2.24	1.40	3.56	0.0007
Deafness/hearing loss	15%	22 300	2.13	1.46	3.08	<.0001
High cholesterol	8%	7 000	1.01	0.59	1.74	0.9623

Chronic health conditions and poverty: a cross-sectional study using a multidimensional poverty measure

ABSTRACT

Objectives

To identify the chronic health conditions associated with multidimensional poverty.

Design

Cross-sectional study of the nationally representative *Survey of Disability, Ageing and Carers,* conducted by the Australian Bureau of Statistics.

Setting

Australian population in 2003

Participants

35,704 individuals randomly selected from the Australian population by the Australian Bureau of Statistics.

Outcome measures

Multidimensional poverty status, costs of disability, SF-6D health utility score, income, education attainment.

Results

Amongst those who were multidimensionally poor, 75% had a chronic health condition and the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), and arthritis (11%). The conditions with the highest proportion of individuals in multidimensional poverty were depression/mood affecting disorders (26% in

multidimensional poverty) and mental and behavioural disorders (22%). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be multidimensionally poor than those with no health condition. Equivalising for the additional costs of disability increased the proportion of individuals in multidimensional poverty for all conditions and the conditions with the highest proportion of individuals in multidimensional poverty changed.

Conclusions

Due to the influence of certain health conditions on poverty status, health interventions have the potential to improve national living standards and poverty rates in a similar way that 'traditional' policy responses such as changes to welfare payment currently do. Using a multidimensional poverty measure reveals the health conditions that should be the focus of such efforts.

Article Summary

Article Focus

- Multidimensional poverty status of people with various chronic health conditions
- The influence of costs of disability on multidimensional poverty status

Key messages

- Amongst those who were multidimensionally poor the most commonly reported health conditions were back problems, and arthritis
- Those with depression were nearly 7 times more likely to be multidimensionally poor than those with no health condition
- Equivalising for the additional costs of disability changed the conditions with the highest proportion of individuals in multidimensional poverty

Strengths and limitations

- Uses Australia's first measure of multidimensional poverty
- Takes into consideration education attainment and overall health status (measured by the SF-6D) as well as income when assessing people's poverty status

INTRODUCTION

Standard of living is a broad concept that loosely relates to the overall life of an individual, and the quality of that life. Poverty studies seek to measure an individual's living standards, with those who have a 'poor' standard of living being seen as living in poverty (1, 2). Traditionally, poverty has been measured based upon an individual's available income; however, it is now accepted that income gives too narrow a view of an individual's overall living standards and other indicators of living standards are needed (3, 4). The capabilities theory of Sen has been at the forefront of the movement away from the uni-dimensional income approach to poverty measurement, with Sen defining poverty as a lack of freedom due to "the deprivation of basic capabilities" (5). Capabilities are resources, attributes or circumstances that give an individual the capacity to adequately function and engage with the society they live in, and the ability to do things an individual values (5). This shift in conceptualising poverty and living standards has given rise to the now-widespread use of multidimensional poverty measures (6-10). These measures still seek to measure living standards and identify those living in poverty, however they use multiple indicators not just income.

Overall health status imparts a massive impact upon an individual's living standards by directly influencing what physical and mental functioning they can undertake, and is often seen as a basic capability (5, 11-14). Furthermore, health status affects living standards indirectly through limiting education and financial resources: poor health status may reduce the ability to undertake education (15-17), and may also limit economic resources through restricting employment (18-21). For a detailed discussion of how health acts as a key capability and determinant of living standards see (22).

In recognition of the importance of good health for adequate living standards, health status has been included as a key component in numerous measures of poverty (9, 23-25), including the Freedom Poverty Measure within Australia (22). The Freedom Poverty Measure, a multidimensional measure of poverty, sees overall health status and education attainment as impacting upon living standards in a similar way that low income does (22). Under the Freedom Poverty Measure overall health status, in part, determines poverty status: those in multidimensional poverty[1] have a low income and either poor overall health status or an insufficient level of education attainment.

Including health in a measure of poverty provides the opportunity for cross-portfolio responses to improving the living standards of disadvantaged members of society – with health being seen as key contributor to low living standards, health interventions have the potential to be a direct policy response to improving living standards alongside existing measures such as reform to social security arrangements (26). However, different chronic health conditions are likely to have varying impacts upon living standards, with some conditions more severely affecting living standards than others[2]. This paper will look at the relationship between multidimensional poverty, measured using the Freedom Poverty Measure, and specific chronic health conditions in the Australian population to determine which chronic health conditions have the largest impact upon living standards and as such their prevention or treatment should be targeted as a cross-portfolio concern.

[1] The use of both income measures of poverty and multidimensional measures of poverty in the literature creates the need to clarify which measure is being used. Hence people may be labelled as being in 'income poverty' or in 'multidimensional poverty' depending on which measure was used – both refer to a state of low living standards. The term 'freedom poverty' refers to those who are identified as being in multidimensional poverty using the Freedom Poverty Measure.

[2] Within this paper a chronic health condition refers to a specific aliment that has lasted, or is likely to last, for six months or more.

METHODS

Data source

The 2003 Survey of Disability, Ageing and Carers (SDAC) provided the data source for this paper. The SDAC provided detailed self-reported data on socio-demographic status, labour force participation, health and disability status, chronic health conditions, and economic information on individuals and their families[3] (30).

The 2003 SDAC is a comprehensive, nationally representative survey conducted by the Australian Bureau of Statistics (ABS) between 23 June 2003 to 1 November 2003 (27). Both private dwellings and care-accommodation establishments were included in the sample, with a response rate of 89% for private dwellings and 92% for care-accommodation establishments (28). The survey covered individuals in all states and territories, including both rural and urban populations – however, those in very remote areas were excluded. As these areas make up only 1% of the population, the ABS deemed that this would not affect the robustness of the data (29) The original 2003 SDAC data was weighted by the Australian Bureau of Statistics (ABS) to represent the Australian population in 2003 by broad population variables such as age and sex.

Identifying those in freedom poverty

In order to determine how various health conditions impact upon living standards the Freedom Poverty Measure was utilised to identify those in multidimensional poverty. The Freedom Poverty Measure combines measures of low income, poor health, and insufficient education. The Freedom Poverty Measure was designed specifically for the Australian

[3] At the time of writing this paper the 2003 SDAC was the most current dataset that contains detailed and accurate income, health and education information on the one survey.

population in a manner that is consistent with international poverty measurement practices (7). For more detailed information on the Freedom Poverty Measure and other examples of its application see (10, 18, 22, 31).

The income, health and education status of individuals was initially identified, as follows:

- If an individual's family income (measured by the income unit income (29)) was below the 50% of the median income poverty line then they were considered to have low income.
- If an individual had a poorer health utility score (measured by the Short Form 6D (SF-6D) measure (32)) than the average for their age group they were considered to have poor overall health status.
- If an individual had a highest level of education attainment lower than year 12 (for those aged 25 to 64 years), or lower than Year 10 (for those aged 65 years and over) they were considered to have an insufficient level of education attainment.

Those with low income AND either poor overall health status or an insufficient level of education attainment were considered to be in 'freedom poverty' and to be multidimensionally poor.

Identifying chronic health conditions

The 2003 SDAC recorded any chronic health conditions, defined as health conditions that had lasted or were likely to last for six months or more, experienced by respondents. If an individual recorded multiple health conditions then their main chronic health condition was also recorded. The ABS classified respondent's chronic health conditions according to the ICD-10 health coding system. Lists of what ICD-10 codes correspond with different chronic health condition groups can be found in (30). Respondents with Alzheimer's disease and

'certain conditions originating in the perinatal period' were excluded because of their low numbers (less than 10 respondents) on the SDAC.

Statistical Analysis

Initially descriptive statistics were utilised to look at the proportion of people in multidimensional poverty with a long term health condition, the most common conditions experienced by those in multidimensional poverty, and the proportion of people with various conditions in multidimensional poverty.

Following this logistic regression models were utilised to look at the odds ratio of being in multidimensional poverty for those with various chronic health conditions. Those with no chronic health conditions were used as the reference group, and the models were adjusted for age and sex.

Sensitivity Analysis – costs of disability

Ill health can further impact on living standards by imparting additional costs upon individuals, including the costs of treatment, support services, and medication, and it has been argued that these costs should be taken into consideration when comparing incomes (33). Those with chronic health conditions are likely to need higher incomes to obtain the same level of living standards as those with no chronic health conditions due to the additional costs of living for those with ill health. There is a small amount of literature that has developed a possible means of taking these costs into consideration. Internationally this has been undertaken by Zaidi and Burchardt (33), and within Australia this has been undertaken by Saunders (34).

Using the methods developed by Saunders to measure the costs associated with disability, a sensitivity analysis was be undertaken to look at the difference in the number of people in multidimensional poverty as a result of accounting for the extra costs of disability. The long term health conditions associated with multidimensional poverty when the additional costs of disability in adults were taken into consideration was also examined. It is acknowledged by the authors that there is a number of limitations to this approach, including the exclusion of children in the methods developed by Saunders and also possible limitations in the use of disability classification to estimate the costs of health (35). However, this sensitivity will still provide an example of how taking into consideration the costs of disability will affect the financial situation of individuals and hence the numbers in multidimensional poverty.

RESULTS

There were 35 704 respondents in the SDAC, and of these 3 469 were in multidimensional poverty. Once weighted these data represented 19 320 000 individuals in the 2003 Australian population in private households, of which 1 857 000 were multidimensionally poor (10%). Of the Australian population in 2003, 40% identified having a long term health condition.

Not all individuals with a chronic health condition had poor overall health status, with 74% of individuals with a chronic health condition having good overall health status, indicating that their health condition had only a mild impact on their overall health status. Table 1 shows the overall health status of those with various chronic health conditions. Conditions with a relatively low proportion of individuals reporting poor overall health status included high cholesterol, hypertension and asthma.

Amongst those who were multidimensionally poor, 75% identified having a chronic health condition. Of those with a chronic health condition, 18% were in multidimensional poverty;

whereas for those with no chronic health condition 4% were in multidimensional poverty (Table 2). Those with a long term health condition were 3 times more likely to be in multidimensional poverty than those with no health condition, after controlling for age and sex (OR 3.38, 95% CI: 3.06 – 3.76, p<.0001).

Amongst those in multidimensional poverty the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), arthritis and related disorders (11%), followed by mental and behavioural disorders (9%), hypertension (4%), asthma (4%) and injury/accident (4%). Amongst the individual health conditions, the condition with the highest proportion in multidimensional poverty was depression/mood affecting disorders (26% were in multidimensional poverty), mental and behavioural disorders (22% were in multidimensional poverty), certain infectious and parasitic diseases (22% were in multidimensional poverty), and diseases of the respiratory system (22% were in multidimensional poverty) (Table 3).

After controlling for age and sex there was no significant difference in the likelihood of being in multidimensional poverty between those with no chronic health condition and those with high cholesterol (p=0.3794), deafness/noise induced hearing loss (p=0.3938), and conditions grouped by the ABS into 'other 2003 codes which had no ICD–10 equivalent' (p=0.2993). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be in multidimensional poverty than those with no chronic health condition. The odds of being in multidimensional poverty for other chronic health conditions, compared to those with no health condition are shown in Table 3.

Costs of disability

Before equivalising income for disability status there were 1 875 000 individuals in multidimensional poverty. After equivalising family income for the costs of disability in adults there were 2 462 000 individuals in multidimensional poverty. After equivalising income for the costs of disability in adults, 82% of people in multidimensional poverty identified having a chronic health condition – an increase of 8 percentage points. Of those with a chronic health condition, 27% were in multidimensional poverty; whereas for those with no chronic health condition 5% were in multidimensional poverty after equivalising for the costs of disability. Those with a chronic health condition were now more than 5 times more likely to be in multidimensional poverty than those with no chronic health condition, after controlling for age and sex (OR 5.57, 95% CI: 5.07 – 6.12, p<.0001).

After equivalising for the costs of disability in adults, the most common chronic health conditions amongst those in multidimensional poverty were still arthritis and related disorders (13%), back problems (12%), mental and behavioural disorders (9%), hypertension (5%) and asthma (4%). The conditions with the highest proportion of individuals in multidimensional poverty were diseases of the respiratory system (43% were in multidimensional poverty) and other diseases of the circulatory system (41% were in multidimensional poverty). The proportion of individuals in multidimensional poverty in each of these conditions increased after taking into consideration the costs of disability in adults when equivalising income, and the conditions with the highest proportion of individuals in multidimensional poverty also changed (Table 4).

After controlling for age and sex, those with mental and behavioural disorders were nearly 14 times more likely to be in multidimensional poverty than those with no health condition after

equivalising income for disability in adults (OR 13.83, 95% CI: 11.76 – 16.26, p <.0001). All chronic health conditions with the exception of high cholesterol (p= 0.9623) were significantly more likely to be in multidimensional poverty than those with no chronic health condition (Table 4).

DISCUSSION

The results have shown that those with a chronic health condition were significantly more likely to be in multidimensional poverty than those without a chronic health condition, with 18% of those with a chronic health condition being in multidimensional poverty, compared to only 4% of those without a chronic health condition. Of those in multidimensional poverty, 74% had a long term health condition.

The results of the sensitivity analysis show that after equivalising income for adult disability, there was a 3 percentage point increase in the proportion of the population in multidimensional poverty, and a 9 percentage point increase in the proportion of individuals with a chronic health condition in multidimensional poverty. However, there is opportunity to improve the methods by which the costs of ill health are produced by including children in the methodology and having further consideration as to how health is measured. In spite of this, the sensitivity analysis has shown the additional burden chronic health conditions can have upon living standards – through the economic burden placed upon families as a result of disability.

Chronic health conditions impact upon living standards in a number of ways. Having a chronic health condition results in an increased likelihood of being out of the labour force (19), with recent Australian studies showing that being out of the labour force is associated with low incomes and high rates of income poverty (36, 37). Furthermore, having a chronic

health condition is likely to affect an individual's overall health status – however, as this study has shown, different chronic health conditions have varying impacts upon overall health status, with some chronic health conditions such as hypertension or asthma having few people reporting poor overall health status.

The chronic health conditions most commonly associated with multidimensional poverty were arthritis and related disorders, back problems and mental and behavioural disorders – all of which have been shown to be preventable. There are numerous interventions for each of these conditions that have been shown to be cost-effective in either preventing the onset of the condition or reducing the severity of the condition (38-41). When considering the additional costs of low living standards the further benefits of such intervention programs become more apparent.

Using mental and behavioural problems as an example, the benefit of interventions such as those deemed to be cost effective in Mihaloposlos *et. al.* (42) could not only be listed as improvements in health status and the associated savings to health care systems, but also the added benefits of reducing of the number of people in multidimensional poverty. Improving the health of individuals with mental and behavioural problems could potentially result in 27% of these individuals no longer being multidimensionally poor and amongst the most disadvantaged members of society. Furthermore, improving health status may also increase employment opportunities, with around one quarter of those with mental and behavioural problems being out of the labour force due to their ill health (43), which is likely to in turn improve the financial situation of individuals with mental health problems further improving their living standards. As such, health interventions should be incorporated into policy responses to improve national living standards.

Political rhetoric is currently shifting to advocate the use of cross-portfolio responses to social issues (44). As such, there is opportunity for health interventions to be taken up in government departments other than those traditionally responsible for health care, and be included alongside other efforts to improve living standards such as education and skills reform, and social security reform. Using the Freedom Poverty Measure reveals the chronic health conditions that are experienced by the most disadvantaged people in society and should be the focus of political efforts to improve living standards.

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Table 1: Overall health status of those with different chronic health conditions

Long term health condition	Proportion with poor overall health status, measured by SF-6D
Depression/ mood affective disorders	22%
Congenital malformations, deformations and chromosomal abnormalities	49%
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	36%
Certain infectious and parasitic diseases	41%
Mental and behavioural disorders	46%
Diseases of the respiratory system	42%
Other injury/poisoning	40%
Injury/accident	25%
Diseases of the blood and blood forming organs	52%
Back problems	32%
Diseases of the skin and subcutaneous tissues	28%
Other diseases of the musculoskeletal system and connective tissue	40%
Arthritis and related disorders	31%
Heart Disease	33%
Diseases of the eye and adnexa	33%
Other diseases of the circulatory system	43%
Diabetes	12%
Neoplasms (tumours/cancers)	33%
Diseases of the ear and mastoid process	23%
Diseases of the nervous system	27%
Diseases of the digestive system	17%
Diseases of the genitourinary system	17%
Asthma	10%
Hypertension	5%
Other endocrine/nutritional and metabolic disorders	11%
Other	32%
Deafness/hearing loss	15%
High cholesterol	2%

Table 2: Number of individuals in multidimensional poverty by health status, 2003

	In Multidimensional Poverty	Not in Multidimensional Poverty
Has a long term health condition	1 387 000	6 371 000
Does not have a long term health condition	449 000	11 113 000

Table 3: Multidimensional poverty status of those with varying long term health conditions, 2003

Long term health condition	Total number	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	11 562 200	4%	488 700	REFERENCE			
Depression/ mood affective disorders	208 400	28%	57 300	6.60	5.09	8.55	<.0001
Congenital malformations, deformations and chromosomal abnormalities	48 200	17%	8 000	5.53	3.07	9.99	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	124 700	24%	29 500	4.71	3.29	6.76	<.0001
Certain infectious and parasitic diseases	28 200	24%	6 800	4.66	2.36	9.17	<.0001
Mental and behavioural disorders	621 800	27%	164 900	4.60	1.04	20.35	0.0441
Diseases of the respiratory system	127 900	27%	34 200	4.49	3.24	6.23	<.0001
Other injury/poisoning	65 900	23%	14 900	4.17	2.63	6.62	<.0001
Injury/accident	434 700	17%	74 900	3.85	3.11	4.77	<.0001
Diseases of the blood and blood forming organs	17 200	22%	3 700	3.72	1.53	9.00	0.0036
Back problems	1 128 200	19%	210 100	3.49	3.01	4.04	<.0001
Diseases of the skin and subcutaneous tissues	65 700	15%	9 900	3.41	2.06	5.65	<.0001
Other diseases of the musculoskeletal system and connective tissue	251 600	22%	56 300	3.35	2.59	4.33	<.0001
Arthritis and related disorders	902 200	23%	207 200	3.27	2.79	3.83	<.0001
Heart Disease	225 100	23%	52 300	3.24	2.47	4.26	<.0001
Diseases of the eye and adnexa	99 800	19%	19 100	3.18	2.08	4.86	<.0001
Other diseases of the	122 600	22%	27 600	3.13	2.21	4.44	<.0001

circulatory system							
Diabetes	271 100	19%	51 700	2.99	2.31	3.87	0.0441
Neoplasms (tumours/cancers)	97 000	19%	18 800	2.90	1.92	4.37	<.0001
Diseases of the ear and mastoid process	284 800	10%	47 800	2.73	2.08	3.59	<.0001
Diseases of the nervous system	491 800	13%	65 500	2.67	2.14	3.32	<.0001
Diseases of the digestive system	154 100	14%	21 900	2.37	1.67	3.38	<.0001
Diseases of the genitourinary system	70 800	14%	9 900	2.28	1.36	3.82	0.0018
Asthma	925 200	8%	76 600	2.01	1.65	2.44	<.0001
Hypertension	604 200	14%	83 200	1.84	1.50	2.26	<.0001
Other endocrine/nutritional and metabolic disorders	87 300	10%	8 500	1.55	0.92	2.62	0.1015
Other	44 700	11%	4 812	1.48	0.71	3.10	0.2993
Deafness/hearing loss	153 300	8%	12 975	1.22	0.77	1.94	0.3938
High cholesterol	92 900	6%	5 211	0.77	0.43	1.39	0.3794

Table 4: Multidimensional poverty status of those with varying long term health conditions, after equivalising income for the cost of disability in adults, 2003

Long term health condition	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	4%	440 500	REFERENCE			
Mental and behavioural disorders	36%	220 900	13.83	11.76	16.26	<.0001
Depression/mood affective disorders	34%	71 600	9.86	7.72	12.61	<.0001
Congenital malformations, deformations and chromosomal abnormalities	23%	10 900	9.82	5.70	16.92	<.0001
Certain infectious and parasitic diseases	38%	10 900	9.58	5.20	17.64	<.0001
Diseases of the respiratory system	43%	55 100	9.13	6.75	12.35	<.0001
Other injury/poisoning	35%	23 000	7.84	5.25	11.71	<.0001
Other diseases of the circulatory system	41%	49 800	7.00	5.18	9.47	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	31%	38 400	6.97	4.93	9.85	<.0001
Diseases of the blood and blood forming organs	33%	5 700	6.94	3.40	14.17	<.0001
Diseases of the skin and subcutaneous tissues	24%	15 700	6.69	4.35	10.30	<.0001
Other diseases of the musculoskeletal system and connective tissue	36%	91 400	6.48	5.17	8.13	<.0001
Diseases of the eye and adnexa	31%	31 300	6.19	4.22	9.08	<.0001
Injury/accident	23%	102 000	6.07	5.00	7.37	<.0001
Back problems	27%	305 400	5.80	5.08	6.63	<.0001
Arthritis and related disorders	35%	316 300	5.63	4.88	6.50	<.0001
Heart Disease	36%	80 600	5.53	4.35	7.05	<.0001
Neoplasms (tumours/cancers)	32%	31 200	5.52	3.90	7.83	<.0001
Diseases of the nervous system	20%	100 300	4.77	3.94	5.78	<.0001
Diabetes	26%	70 600	4.31	3.42	5.45	<.0001
Diseases of the ear and	24%	68 500	4.23	3.32	5.39	<.0001

mastoid process						
Other	26%	11 600	4.22	2.45	7.26	<.0001
Diseases of the digestive system	22%	34 400	4.14	3.07	5.60	<.0001
Diseases of the genitourinary system	22%	15 400	3.92	2.52	6.09	<.0001
Asthma	11%	104 400	3.18	2.67	3.79	<.0001
Hypertension	18%	110 000	2.42	2.01	2.92	<.0001
Other endocrine/nutritional and metabolic disorders	13%	11 600	2.24	1.40	3.56	0.0007
Deafness/hearing loss	15%	22 300	2.13	1.46	3.08	<.0001
High cholesterol	8%	7 000	1.01	0.59	1.74	0.9623

Chronic health conditions and poverty: a cross-sectional study using a multidimensional poverty measure

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Chronic health conditions and poverty: a cross-sectional study using a multidimensional poverty measure

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Ethics approval was obtained from the University of Sydney Human Ethics Committee.

ABSTRACT

Objectives

To identify the chronic health conditions associated with multidimensional poverty.

Design

Cross-sectional study of the nationally representative *Survey of Disability, Ageing and Carers,* conducted by the Australian Bureau of Statistics.

Setting

Australian population in 2003

Participants

35,704 individuals randomly selected from the Australian population by the Australian Bureau of Statistics.

Outcome measures

Multidimensional poverty status, costs of disability, SF-6D health utility score, income, education attainment.

Results

Amongst those who were multidimensionally poor, 75% had a chronic health condition and the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), and arthritis (11%). The conditions with the highest proportion of individuals in multidimensional poverty were depression/mood affecting disorders (26% in multidimensional poverty) and mental and behavioural disorders (22%). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be multidimensionally poor than those with no health condition.

Equivalising for the additional costs of disability increased the proportion of individuals in multidimensional poverty for all conditions and the conditions with the highest proportion of individuals in multidimensional poverty changed.

Conclusions

Due to the influence of certain health conditions on poverty status, health interventions have the potential to improve national living standards and poverty rates in a similar way that 'traditional' policy responses such as changes to welfare payment currently do. Using a multidimensional poverty measure reveals the health conditions that should be the focus of such efforts.

Article Summary

Article Focus

- Multidimensional poverty status of people with various chronic health conditions
- The influence of costs of disability on multidimensional poverty status

Key messages

- Amongst those who were multidimensionally poor the most commonly reported health conditions were back problems, and arthritis
- Those with depression were nearly 7 times more likely to be multidimensionally poor than those with no health condition
- Equivalising for the additional costs of disability changed the conditions with the highest proportion of individuals in multidimensional poverty

Strengths and limitations

- Uses Australia's first measure of multidimensional poverty
- Takes into consideration education attainment and overall health status (measured by the SF-6D) as well as income when assessing people's poverty status

INTRODUCTION

Standard of living is a broad concept that loosely relates to the overall life of an individual, and the quality of that life. Poverty studies seek to measure an individual's living standards, with those who have a 'poor' standard of living being seen as living in poverty (1, 2). Traditionally, poverty has been measured based upon an individual's available income; however, it is now accepted that income gives too narrow a view of an individual's overall living standards and other indicators of living standards are needed (3, 4). The capabilities theory of Sen has been at the forefront of the movement away from the uni-dimensional income approach to poverty measurement, with Sen defining poverty as a lack of freedom due to "the deprivation of basic capabilities" (5). Capabilities are resources, attributes or circumstances that give an individual the capacity to adequately function and engage with the society they live in, and the ability to do things an individual values (5). This shift in conceptualising poverty and living standards has given rise to the now-widespread use of multidimensional poverty measures (6-10). These measures still seek to measure living standards and identify those living in poverty, however they use multiple indicators not just income.

Overall health status imparts a massive impact upon an individual's living standards by directly influencing what physical and mental functioning they can undertake, and is often seen as a basic capability (5, 11-14). Furthermore, health status affects living standards indirectly through limiting education and financial resources: poor health status may reduce the ability to undertake education (15-17), and may also limit economic resources through restricting employment (18-21). For a detailed discussion of how health acts as a key capability and determinant of living standards see (22).

In recognition of the importance of good health for adequate living standards, health status has been included as a key component in numerous measures of poverty (9, 23-25), including the Freedom Poverty Measure within Australia (22). The Freedom Poverty Measure, a multidimensional measure of poverty, sees overall health status and education attainment as impacting upon living standards in a similar way that low income does (22). Under the Freedom Poverty Measure overall health status, in part, determines poverty status: those in multidimensional poverty[1] have a low income and either poor overall health status or an insufficient level of education attainment.

Including health in a measure of poverty provides the opportunity for cross-portfolio responses to improving the living standards of disadvantaged members of society – with health being seen as key contributor to low living standards, health interventions have the potential to be a direct policy response to improving living standards alongside existing measures such as reform to social security arrangements (26). However, different chronic health conditions are likely to have varying impacts upon living standards, with some conditions more severely affecting living standards than others[2]. This paper will look at the relationship between multidimensional poverty, measured using the Freedom Poverty Measure, and specific chronic health conditions in the Australian population to determine which chronic health conditions are associated with multidimensional poverty (being disadvantaged in terms of income AND education or health) and as such their prevention or treatment should be targeted as a cross-portfolio concern.

[1] The use of both income measures of poverty and multidimensional measures of poverty in the literature creates the need to clarify which measure is being used. Hence people may be labelled as being in 'income poverty' or in 'multidimensional poverty' depending on which measure was used – both refer to a state of low living standards. The term 'freedom poverty' refers to those who are identified as being in multidimensional poverty using the Freedom Poverty Measure.

[2] Within this paper a chronic health condition refers to a specific aliment that has lasted, or is likely to last, for six months or more.

METHODS

Data source

The 2003 Survey of Disability, Ageing and Carers (SDAC) provided the data source for this paper. The SDAC provided detailed self-reported data on socio-demographic status, labour force participation, health and disability status, chronic health conditions, and economic information on individuals and their families[3] (27).

The 2003 SDAC is a comprehensive, nationally representative survey conducted by the Australian Bureau of Statistics (ABS) between 23 June 2003 to 1 November 2003 (28). The survey covered individuals in all states and territories, including both rural and urban populations – however, those in very remote areas were excluded. As these areas make up only 1% of the population, the ABS deemed that this would not affect the robustness of the data (29). Both private dwellings and care-accommodation establishments were included in the sample, with a response rate of 89% for private dwellings and 92% for care-accommodation establishments (30). Despite the high response rate for the survey, the potential for non-response bias cannot be excluded. It has been noted previously in Australia that people with lower education attainment have been less likely to participate in surveys (31); hence this paper may underestimate the number of people in multidimensional poverty. The ABS sought to reduce non response bias through survey design and estimation procedures (30), and the use of weighted data in this analysis would also reduce non response bias, although it cannot be excluded entirely. The original 2003 SDAC data was weighted by the ABS against the 2001 Census of Population and Housing to represent the Australian

[3] At the time of writing this paper the 2003 SDAC was the most current dataset that contains detailed and accurate income, health and education information on the one survey.

population in 2003 by broad population variables such as age, sex, state/territory and section of state (27).

Identifying those in freedom poverty

In order to determine how various health conditions impact upon living standards the Freedom Poverty Measure was utilised to identify those in multidimensional poverty. The Freedom Poverty Measure combines measures of low income, poor health, and insufficient education. The Freedom Poverty Measure was designed specifically for the Australian population in a manner that is consistent with international poverty measurement practices (7). For more detailed information on the Freedom Poverty Measure and other examples of its application see (10, 18, 22, 32).

The income, health and education status of individuals was initially identified, as follows:

- If an individual's family income (measured by the income unit income (29)) was below the 50% of the median income poverty line then they were considered to have low income.
- If an individual had a poorer health utility score (measured by the Short Form 6D (SF-6D) measure (33)) than the average for their age group they were considered to have poor overall health status.
- If an individual had a highest level of education attainment lower than year 12 (for those aged 25 to 64 years), or lower than Year 10 (for those aged 65 years and over) they were considered to have an insufficient level of education attainment.

Those with low income AND either poor overall health status or an insufficient level of education attainment were considered to be in 'freedom poverty' and to be multidimensionally poor.

Identifying chronic health conditions

The 2003 SDAC recorded any chronic health conditions, defined as health conditions that had lasted or were likely to last for six months or more, experienced by respondents. If an individual recorded multiple health conditions then their main chronic health condition was also recorded. The ABS classified respondent's chronic health conditions according to the ICD-10 health coding system. Lists of what ICD-10 codes correspond with different chronic health condition groups can be found in (27). Respondents with Alzheimer's disease and 'certain conditions originating in the perinatal period' were excluded because of their low numbers (less than 10 respondents) on the SDAC.

Statistical Analysis

Initially descriptive statistics were utilised to look at the proportion of people in multidimensional poverty with a long term health condition, the most common conditions experienced by those in multidimensional poverty, and the proportion of people with various conditions in multidimensional poverty.

Following this logistic regression models were utilised to look at the odds ratio of being in multidimensional poverty for those with various chronic health conditions. Those with no chronic health conditions were used as the reference group, and the models were adjusted for age and sex. Due to the multiple comparisons being made between different chronic health conditions and no health condition (29 separate models were constructed), there is the potential for type I error to be created. To reduce the risk of this, Bonferroni correction has been undertaken with the significance level set to 0.0017 (0.05/29).

Sensitivity Analysis – costs of disability

Ill health can further impact on living standards by imparting additional costs upon individuals, including the costs of treatment, support services, and medication, and it has been argued that these costs should be taken into consideration when comparing incomes (34). Those with chronic health conditions are likely to need higher incomes to obtain the same level of living standards as those with no chronic health conditions due to the additional costs of living for those with ill health. There is a small amount of literature that has developed a possible means of taking these costs into consideration. Internationally this has been undertaken by Zaidi and Burchardt (34), and within Australia this has been undertaken by Saunders (35).

Using the methods developed by Saunders to measure the costs associated with disability, a sensitivity analysis was be undertaken to look at the difference in the number of people in multidimensional poverty as a result of accounting for the extra costs of disability. The long term health conditions associated with multidimensional poverty when the additional costs of disability in adults were taken into consideration was also examined. It is acknowledged by the authors that there is a number of limitations to this approach, including the exclusion of children in the methods developed by Saunders and also possible limitations in the use of disability classification to estimate the costs of health (36). However, this sensitivity will still provide an example of how taking into consideration the costs of disability will affect the financial situation of individuals and hence the numbers in multidimensional poverty.

RESULTS

There were 35 704 respondents in the SDAC, and of these 3 469 were in multidimensional poverty. Once weighted these data represented 19 320 000 individuals in the 2003 Australian

population in private households, of which 1 857 000 were multidimensionally poor (10%). Of the Australian population in 2003, 40% identified having a long term health condition.

Not all individuals with a chronic health condition had poor overall health status, with 74% of individuals with a chronic health condition having good overall health status, indicating that their health condition had only a mild impact on their overall health status. Table 1 shows the overall health status of those with various chronic health conditions. Conditions with a relatively low proportion of individuals reporting poor overall health status included high cholesterol, hypertension and asthma.

Amongst those who were multidimensionally poor, 75% identified having a chronic health condition. Of those with a chronic health condition, 18% were in multidimensional poverty; whereas for those with no chronic health condition 4% were in multidimensional poverty (Table 2). Those with a long term health condition were 3 times more likely to be in multidimensional poverty than those with no health condition, after controlling for age and sex (OR 3.38, 95% CI: 3.06 – 3.76, p<.0001).

Amongst those in multidimensional poverty the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), arthritis and related disorders (11%), followed by mental and behavioural disorders (9%), hypertension (4%), asthma (4%) and injury/accident (4%). Amongst the individual health conditions, the condition with the highest proportion in multidimensional poverty was depression/mood affecting disorders (26% were in multidimensional poverty), mental and behavioural disorders (22% were in multidimensional poverty), certain infectious and parasitic diseases (22% were in multidimensional poverty), and diseases of the respiratory system (22% were in multidimensional poverty) (Table 3).

After controlling for age and sex there was no significant difference in the likelihood of being in multidimensional poverty between those with no chronic health condition and those with high cholesterol (p=0.3794), deafness/noise induced hearing loss (p=0.3938), conditions grouped by the ABS into 'other 2003 codes which had no ICD–10 equivalent' (p=0.2993), mental and behavioural disorders (p=0.0441), diseases of the blood and blood forming organs (p=0.0036), diabetes (p=0.0441), and diseases of the genitourinary system (0.0018). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be in multidimensional poverty than those with no chronic health condition. The odds of being in multidimensional poverty for other chronic health conditions, compared to those with no health condition are shown in Table 3.

Costs of disability

Before equivalising income for disability status there were 1 875 000 individuals in multidimensional poverty. After equivalising family income for the costs of disability in adults there were 2 462 000 individuals in multidimensional poverty. After equivalising income for the costs of disability in adults, 82% of people in multidimensional poverty identified having a chronic health condition – an increase of 8 percentage points. Of those with a chronic health condition, 27% were in multidimensional poverty; whereas for those with no chronic health condition 5% were in multidimensional poverty after equivalising for the costs of disability. Those with a chronic health condition were now more than 5 times more likely to be in multidimensional poverty than those with no chronic health condition, after controlling for age and sex (OR 5.57, 95% CI: 5.07 – 6.12, p<.0001).

After equivalising for the costs of disability in adults, the most common chronic health conditions amongst those in multidimensional poverty were still arthritis and related

disorders (13%), back problems (12%), mental and behavioural disorders (9%), hypertension (5%) and asthma (4%). The conditions with the highest proportion of individuals in multidimensional poverty were diseases of the respiratory system (43% were in multidimensional poverty) and other diseases of the circulatory system (41% were in multidimensional poverty). The proportion of individuals in multidimensional poverty in each of these conditions increased after taking into consideration the costs of disability in adults when equivalising income, and the conditions with the highest proportion of individuals in multidimensional poverty also changed (Table 4).

After controlling for age and sex, those with mental and behavioural disorders were nearly 14 times more likely to be in multidimensional poverty than those with no health condition after equivalising income for disability in adults (OR 13.83, 95% CI: 11.76 – 16.26, p <.0001). All chronic health conditions with the exception of high cholesterol (p= 0.9623) were significantly more likely to be in multidimensional poverty than those with no chronic health condition (Table 4).

DISCUSSION

The results have shown that those with a chronic health condition were significantly more likely to be in multidimensional poverty than those without a chronic health condition, with 18% of those with a chronic health condition being in multidimensional poverty, compared to only 4% of those without a chronic health condition. Of those in multidimensional poverty, 74% had a long term health condition.

The results of the sensitivity analysis show that after equivalising income for adult disability, there was a 3 percentage point increase in the proportion of the population in multidimensional poverty, and a 9 percentage point increase in the proportion of individuals

with a chronic health condition in multidimensional poverty. However, there is opportunity to improve the methods by which the costs of ill health are produced by including children in the methodology and having further consideration as to how health is measured. In spite of this, the sensitivity analysis has shown the additional burden chronic health conditions can have upon living standards – through the economic burden placed upon families as a result of disability.

Chronic health conditions impact upon living standards in a number of ways. Having a chronic health condition results in an increased likelihood of being out of the labour force (19), with recent Australian studies showing that being out of the labour force is associated with low incomes and high rates of income poverty (37, 38). Furthermore, having a chronic health condition is likely to affect an individual's overall health status – however, as this study has shown, different chronic health conditions have varying impacts upon overall health status, with some chronic health conditions such as hypertension or asthma having few people reporting poor overall health status.

The chronic health conditions most commonly associated with multidimensional poverty were arthritis and related disorders, back problems and mental and behavioural disorders – all of which have been shown to be preventable. There are numerous interventions for each of these conditions that have been shown to be cost-effective in either preventing the onset of the condition or reducing the severity of the condition (39-42). When considering the additional costs of low living standards the further benefits of such intervention programs become more apparent.

Political rhetoric is currently shifting to advocate the use of cross-portfolio responses to social issues (43). As such, there is opportunity for health interventions to be taken up in

government departments other than those traditionally responsible for health care, and be included alongside other efforts to improve living standards such as education and skills reform, and social security reform. Using the Freedom Poverty Measure reveals the chronic health conditions that are experienced by the most disadvantaged people in society and should be the focus of political efforts to improve living standards.

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COMPETING INTERESTS

None

DATA SHARING

The dataset used in this study, the 2003 Survey of Disability, Ageing and Carers, is publically available for the Australian Bureau of Statistics upon application.

CONTRIBUTORSHIP

EC conceived, designed and led the study. EC undertook data analysis and drafted the manuscript. DS and RS provided guidance on data analysis, and contributed to the drafting of the manuscript. All authors edited the final manuscript.

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Table 1: Overall health status of those with different chronic health conditions

Long term health condition	Proportion with poor overall health status, measured by SF-6D
Depression/ mood affective disorders	22%
Congenital malformations, deformations and chromosomal abnormalities	49%
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	36%
Certain infectious and parasitic diseases	41%
Mental and behavioural disorders	46%
Diseases of the respiratory system	42%
Other injury/poisoning	40%
Injury/accident	25%
Diseases of the blood and blood forming organs	52%
Back problems	32%
Diseases of the skin and subcutaneous tissues	28%
Other diseases of the musculoskeletal system and connective tissue	40%
Arthritis and related disorders	31%
Heart Disease	33%
Diseases of the eye and adnexa	33%
Other diseases of the circulatory system	43%
Diabetes	12%
Neoplasms (tumours/cancers)	33%
Diseases of the ear and mastoid process	23%
Diseases of the nervous system	27%
Diseases of the digestive system	17%
Diseases of the genitourinary system	17%
Asthma	10%
Hypertension	5%
Other endocrine/nutritional and metabolic disorders	11%
Other	32%
Deafness/hearing loss	15%
High cholesterol	2%

Table 2: Number of individuals in multidimensional poverty by health status, 2003

	In Multidimensional Poverty	Not in Multidimensional Poverty
Has a long term health condition	1 387 000	6 371 000
Does not have a long term health condition	449 000	11 113 000

Table 3: Multidimensional poverty status of those with varying long term health conditions, 2003

Long term health condition	Total number	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	11 562 200	4%	488 700	REFERENCE			
Depression/ mood affective disorders	208 400	28%	57 300	6.60	5.09	8.55	<.0001
Congenital malformations, deformations and chromosomal abnormalities	48 200	17%	8 000	5.53	3.07	9.99	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	124 700	24%	29 500	4.71	3.29	6.76	<.0001
Certain infectious and parasitic diseases	28 200	24%	6 800	4.66	2.36	9.17	<.0001
Mental and behavioural disorders	621 800	27%	164 900	4.60	1.04	20.35	0.0441
Diseases of the respiratory system	127 900	27%	34 200	4.49	3.24	6.23	<.0001
Other injury/poisoning	65 900	23%	14 900	4.17	2.63	6.62	<.0001
Injury/accident	434 700	17%	74 900	3.85	3.11	4.77	<.0001
Diseases of the blood and blood forming organs	17 200	22%	3 700	3.72	1.53	9.00	0.0036
Back problems	1 128 200	19%	210 100	3.49	3.01	4.04	<.0001
Diseases of the skin and subcutaneous tissues	65 700	15%	9 900	3.41	2.06	5.65	<.0001
Other diseases of the musculoskeletal system and connective tissue	251 600	22%	56 300	3.35	2.59	4.33	<.0001
Arthritis and related disorders	902 200	23%	207 200	3.27	2.79	3.83	<.0001
Heart Disease	225 100	23%	52 300	3.24	2.47	4.26	<.0001
Diseases of the eye and adnexa	99 800	19%	19 100	3.18	2.08	4.86	<.0001
Other diseases of the	122 600	22%	27 600	3.13	2.21	4.44	<.0001

circulatory system							
Diabetes	271 100	19%	51 700	2.99	2.31	3.87	0.0441
Neoplasms (tumours/cancers)	97 000	19%	18 800	2.90	1.92	4.37	<.0001
Diseases of the ear and mastoid process	284 800	10%	47 800	2.73	2.08	3.59	<.0001
Diseases of the nervous system	491 800	13%	65 500	2.67	2.14	3.32	<.0001
Diseases of the digestive system	154 100	14%	21 900	2.37	1.67	3.38	<.0001
Diseases of the genitourinary system	70 800	14%	9 900	2.28	1.36	3.82	0.0018
Asthma	925 200	8%	76 600	2.01	1.65	2.44	<.0001
Hypertension	604 200	14%	83 200	1.84	1.50	2.26	<.0001
Other endocrine/nutritional and metabolic disorders	87 300	10%	8 500	1.55	0.92	2.62	0.1015
Other	44 700	11%	4 812	1.48	0.71	3.10	0.2993
Deafness/hearing loss	153 300	8%	12 975	1.22	0.77	1.94	0.3938
High cholesterol	92 900	6%	5 211	0.77	0.43	1.39	0.3794

Table 4: Multidimensional poverty status of those with varying long term health conditions, after equivalising income for the cost of disability in adults, 2003

Long term health condition	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	4%	440 500	REFERENCE			
Mental and behavioural disorders	36%	220 900	13.83	11.76	16.26	<.0001
Depression/mood affective disorders	34%	71 600	9.86	7.72	12.61	<.0001
Congenital malformations, deformations and chromosomal abnormalities	23%	10 900	9.82	5.70	16.92	<.0001
Certain infectious and parasitic diseases	38%	10 900	9.58	5.20	17.64	<.0001
Diseases of the respiratory system	43%	55 100	9.13	6.75	12.35	<.0001
Other injury/poisoning	35%	23 000	7.84	5.25	11.71	<.0001
Other diseases of the circulatory system	41%	49 800	7.00	5.18	9.47	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	31%	38 400	6.97	4.93	9.85	<.0001
Diseases of the blood and blood forming organs	33%	5 700	6.94	3.40	14.17	<.0001
Diseases of the skin and subcutaneous tissues	24%	15 700	6.69	4.35	10.30	<.0001
Other diseases of the musculoskeletal system and connective tissue	36%	91 400	6.48	5.17	8.13	<.0001
Diseases of the eye and adnexa	31%	31 300	6.19	4.22	9.08	<.0001
Injury/accident	23%	102 000	6.07	5.00	7.37	<.0001
Back problems	27%	305 400	5.80	5.08	6.63	<.0001
Arthritis and related disorders	35%	316 300	5.63	4.88	6.50	<.0001
Heart Disease	36%	80 600	5.53	4.35	7.05	<.0001
Neoplasms (tumours/cancers)	32%	31 200	5.52	3.90	7.83	<.0001
Diseases of the nervous system	20%	100 300	4.77	3.94	5.78	<.0001
Diabetes	26%	70 600	4.31	3.42	5.45	<.0001
Diseases of the ear and	24%	68 500	4.23	3.32	5.39	<.0001

mastoid process						
Other	26%	11 600	4.22	2.45	7.26	<.0001
Diseases of the digestive system	22%	34 400	4.14	3.07	5.60	<.0001
Diseases of the genitourinary system	22%	15 400	3.92	2.52	6.09	<.0001
Asthma	11%	104 400	3.18	2.67	3.79	<.0001
Hypertension	18%	110 000	2.42	2.01	2.92	<.0001
Other endocrine/nutritional and metabolic disorders	13%	11 600	2.24	1.40	3.56	0.0007
Deafness/hearing loss	15%	22 300	2.13	1.46	3.08	<.0001
High cholesterol	8%	7 000	1.01	0.59	1.74	0.9623

Chronic health conditions and poverty: a cross-sectional study using a multidimensional poverty measure

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Ethics:
Ethics approval was obtained from the University of Sydney Human Ethics Committee.

ABSTRACT

Objectives

To identify the chronic health conditions associated with multidimensional poverty.

Design

Cross-sectional study of the nationally representative *Survey of Disability, Ageing and Carers,* conducted by the Australian Bureau of Statistics.

Setting

Australian population in 2003

Participants

35,704 individuals randomly selected from the Australian population by the Australian Bureau of Statistics.

Outcome measures

Multidimensional poverty status, costs of disability, SF-6D health utility score, income, education attainment.

Results

Amongst those who were multidimensionally poor, 75% had a chronic health condition and the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), and arthritis (11%). The conditions with the highest proportion of individuals in multidimensional poverty were depression/mood affecting disorders (26% in multidimensional poverty) and mental and behavioural disorders (22%). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be multidimensionally poor than those with no health condition.

Equivalising for the additional costs of disability increased the proportion of individuals in multidimensional poverty for all conditions and the conditions with the highest proportion of individuals in multidimensional poverty changed.

Conclusions

Due to the influence of certain health conditions on poverty status, health interventions have the potential to improve national living standards and poverty rates in a similar way that 'traditional' policy responses such as changes to welfare payment currently do. Using a multidimensional poverty measure reveals the health conditions that should be the focus of such efforts.

Article Summary

Article Focus

- Multidimensional poverty status of people with various chronic health conditions
- The influence of costs of disability on multidimensional poverty status

Key messages

- Amongst those who were multidimensionally poor the most commonly reported health conditions were back problems, and arthritis
- Those with depression were nearly 7 times more likely to be multidimensionally poor than those with no health condition
- Equivalising for the additional costs of disability changed the conditions with the highest proportion of individuals in multidimensional poverty

Strengths and limitations

- Uses Australia's first measure of multidimensional poverty
- Takes into consideration education attainment and overall health status (measured by the SF-6D) as well as income when assessing people's poverty status

INTRODUCTION

Standard of living is a broad concept that loosely relates to the overall life of an individual, and the quality of that life. Poverty studies seek to measure an individual's living standards, with those who have a 'poor' standard of living being seen as living in poverty (1, 2). Traditionally, poverty has been measured based upon an individual's available income; however, it is now accepted that income gives too narrow a view of an individual's overall living standards and other indicators of living standards are needed (3, 4). The capabilities theory of Sen has been at the forefront of the movement away from the uni-dimensional income approach to poverty measurement, with Sen defining poverty as a lack of freedom due to "the deprivation of basic capabilities" (5). Capabilities are resources, attributes or circumstances that give an individual the capacity to adequately function and engage with the society they live in, and the ability to do things an individual values (5). This shift in conceptualising poverty and living standards has given rise to the now-widespread use of multidimensional poverty measures (6-10). These measures still seek to measure living standards and identify those living in poverty, however they use multiple indicators not just income.

Overall health status imparts a massive impact upon an individual's living standards by directly influencing what physical and mental functioning they can undertake, and is often seen as a basic capability (5, 11-14). Furthermore, health status affects living standards indirectly through limiting education and financial resources: poor health status may reduce the ability to undertake education (15-17), and may also limit economic resources through restricting employment (18-21). For a detailed discussion of how health acts as a key capability and determinant of living standards see (22).

In recognition of the importance of good health for adequate living standards, health status has been included as a key component in numerous measures of poverty (9, 23-25), including the Freedom Poverty Measure within Australia (22). The Freedom Poverty Measure, a multidimensional measure of poverty, sees overall health status and education attainment as impacting upon living standards in a similar way that low income does (22). Under the Freedom Poverty Measure overall health status, in part, determines poverty status: those in multidimensional poverty[1] have a low income and either poor overall health status or an insufficient level of education attainment.

Including health in a measure of poverty provides the opportunity for cross-portfolio responses to improving the living standards of disadvantaged members of society – with health being seen as key contributor to low living standards, health interventions have the potential to be a direct policy response to improving living standards alongside existing measures such as reform to social security arrangements (26). However, different chronic health conditions are likely to have varying impacts upon living standards, with some conditions more severely affecting living standards than others[2]. This paper will look at the relationship between multidimensional poverty, measured using the Freedom Poverty Measure, and specific chronic health conditions in the Australian population to determine which chronic health conditions have the largest impact upon living standards and as such their prevention or treatment should be targeted as a cross-portfolio concern.

[1] The use of both income measures of poverty and multidimensional measures of poverty in the literature creates the need to clarify which measure is being used. Hence people may be labelled as being in 'income poverty' or in 'multidimensional poverty' depending on which measure was used – both refer to a state of low living standards. The term 'freedom poverty' refers to those who are identified as being in multidimensional poverty using the Freedom Poverty Measure.

[2] Within this paper a chronic health condition refers to a specific aliment that has lasted, or is likely to last, for six months or more.

METHODS

Data source

The 2003 Survey of Disability, Ageing and Carers (SDAC) provided the data source for this paper. The SDAC provided detailed self-reported data on socio-demographic status, labour force participation, health and disability status, chronic health conditions, and economic information on individuals and their families[3] (27).

The 2003 SDAC is a comprehensive, nationally representative survey conducted by the Australian Bureau of Statistics (ABS) between 23 June 2003 to 1 November 2003 (28). The survey covered individuals in all states and territories, including both rural and urban populations – however, those in very remote areas were excluded. As these areas make up only 1% of the population, the ABS deemed that this would not affect the robustness of the data (29). Both private dwellings and care-accommodation establishments were included in the sample, with a response rate of 89% for private dwellings and 92% for care-accommodation establishments (30). Despite the high response rate for the survey, the potential for non-response bias cannot be excluded. It has been noted previously in Australia that people with lower education attainment have been less likely to participate in surveys (31); hence this paper may underestimate the number of people in multidimensional poverty. The ABS sought to reduce non response bias through survey design and estimation procedures (30), and the use of weighted data in this analysis would also reduce non response bias, although it cannot be excluded entirely. The original 2003 SDAC data was weighted by the ABS against the 2001 Census of Population and Housing to represent the Australian

[3] At the time of writing this paper the 2003 SDAC was the most current dataset that contains detailed and accurate income, health and education information on the one survey.

population in 2003 by broad population variables such as age, sex, state/territory and section of state (27).

Identifying those in freedom poverty

In order to determine how various health conditions impact upon living standards the Freedom Poverty Measure was utilised to identify those in multidimensional poverty. The Freedom Poverty Measure combines measures of low income, poor health, and insufficient education. The Freedom Poverty Measure was designed specifically for the Australian population in a manner that is consistent with international poverty measurement practices (7). For more detailed information on the Freedom Poverty Measure and other examples of its application see (10, 18, 22, 32).

The income, health and education status of individuals was initially identified, as follows:

- If an individual's family income (measured by the income unit income (29)) was below the 50% of the median income poverty line then they were considered to have low income.
- If an individual had a poorer health utility score (measured by the Short Form 6D (SF-6D) measure (33)) than the average for their age group they were considered to have poor overall health status.
- If an individual had a highest level of education attainment lower than year 12 (for those aged 25 to 64 years), or lower than Year 10 (for those aged 65 years and over) they were considered to have an insufficient level of education attainment.

Those with low income AND either poor overall health status or an insufficient level of education attainment were considered to be in 'freedom poverty' and to be multidimensionally poor.

Identifying chronic health conditions

The 2003 SDAC recorded any chronic health conditions, defined as health conditions that had lasted or were likely to last for six months or more, experienced by respondents. If an individual recorded multiple health conditions then their main chronic health condition was also recorded. The ABS classified respondent's chronic health conditions according to the ICD-10 health coding system. Lists of what ICD-10 codes correspond with different chronic health condition groups can be found in (27). Respondents with Alzheimer's disease and 'certain conditions originating in the perinatal period' were excluded because of their low numbers (less than 10 respondents) on the SDAC.

Statistical Analysis

Initially descriptive statistics were utilised to look at the proportion of people in multidimensional poverty with a long term health condition, the most common conditions experienced by those in multidimensional poverty, and the proportion of people with various conditions in multidimensional poverty.

Following this logistic regression models were utilised to look at the odds ratio of being in multidimensional poverty for those with various chronic health conditions. Those with no chronic health conditions were used as the reference group, and the models were adjusted for age and sex. Due to the multiple comparisons being made between different chronic health conditions and no health condition (29 separate models were constructed), there is the potential for type I error to be created. To reduce the risk of this, Bonferroni correction has been undertaken with the significance level set to 0.0017 (0.05/29).

Sensitivity Analysis – costs of disability

Ill health can further impact on living standards by imparting additional costs upon individuals, including the costs of treatment, support services, and medication, and it has been argued that these costs should be taken into consideration when comparing incomes (34). Those with chronic health conditions are likely to need higher incomes to obtain the same level of living standards as those with no chronic health conditions due to the additional costs of living for those with ill health. There is a small amount of literature that has developed a possible means of taking these costs into consideration. Internationally this has been undertaken by Zaidi and Burchardt (34), and within Australia this has been undertaken by Saunders (35).

Using the methods developed by Saunders to measure the costs associated with disability, a sensitivity analysis was be undertaken to look at the difference in the number of people in multidimensional poverty as a result of accounting for the extra costs of disability. The long term health conditions associated with multidimensional poverty when the additional costs of disability in adults were taken into consideration was also examined. It is acknowledged by the authors that there is a number of limitations to this approach, including the exclusion of children in the methods developed by Saunders and also possible limitations in the use of disability classification to estimate the costs of health (36). However, this sensitivity will still provide an example of how taking into consideration the costs of disability will affect the financial situation of individuals and hence the numbers in multidimensional poverty.

RESULTS

There were 35 704 respondents in the SDAC, and of these 3 469 were in multidimensional poverty. Once weighted these data represented 19 320 000 individuals in the 2003 Australian

population in private households, of which 1 857 000 were multidimensionally poor (10%). Of the Australian population in 2003, 40% identified having a long term health condition.

Not all individuals with a chronic health condition had poor overall health status, with 74% of individuals with a chronic health condition having good overall health status, indicating that their health condition had only a mild impact on their overall health status. Table 1 shows the overall health status of those with various chronic health conditions. Conditions with a relatively low proportion of individuals reporting poor overall health status included high cholesterol, hypertension and asthma.

Amongst those who were multidimensionally poor, 75% identified having a chronic health condition. Of those with a chronic health condition, 18% were in multidimensional poverty; whereas for those with no chronic health condition 4% were in multidimensional poverty (Table 2). Those with a long term health condition were 3 times more likely to be in multidimensional poverty than those with no health condition, after controlling for age and sex (OR 3.38, 95% CI: 3.06 – 3.76, p<.0001).

Amongst those in multidimensional poverty the most common health conditions were back problems (11% of those in multidimensional poverty had back problems), arthritis and related disorders (11%), followed by mental and behavioural disorders (9%), hypertension (4%), asthma (4%) and injury/accident (4%). Amongst the individual health conditions, the condition with the highest proportion in multidimensional poverty was depression/mood affecting disorders (26% were in multidimensional poverty), mental and behavioural disorders (22% were in multidimensional poverty), certain infectious and parasitic diseases (22% were in multidimensional poverty), and diseases of the respiratory system (22% were in multidimensional poverty) (Table 3).

After controlling for age and sex there was no significant difference in the likelihood of being in multidimensional poverty between those with no chronic health condition and those with high cholesterol (p=0.3794), deafness/noise induced hearing loss (p=0.3938), conditions grouped by the ABS into 'other 2003 codes which had no ICD–10 equivalent' (p=0.2993), mental and behavioural disorders (p=0.0441), diseases of the blood and blood forming organs (p=0.0036), diabetes (p=0.0441), and diseases of the genitourinary system (0.0018). Those with depression/mood affecting disorders were nearly 7 times (OR 6.60, 95% CI: 5.09 – 8.55, p<.0001) more likely to be in multidimensional poverty than those with no chronic health condition. The odds of being in multidimensional poverty for other chronic health conditions, compared to those with no health condition are shown in Table 3.

Costs of disability

Before equivalising income for disability status there were 1 875 000 individuals in multidimensional poverty. After equivalising family income for the costs of disability in adults there were 2 462 000 individuals in multidimensional poverty. After equivalising income for the costs of disability in adults, 82% of people in multidimensional poverty identified having a chronic health condition – an increase of 8 percentage points. Of those with a chronic health condition, 27% were in multidimensional poverty; whereas for those with no chronic health condition 5% were in multidimensional poverty after equivalising for the costs of disability. Those with a chronic health condition were now more than 5 times more likely to be in multidimensional poverty than those with no chronic health condition, after controlling for age and sex (OR 5.57, 95% CI: 5.07 – 6.12, p<.0001).

After equivalising for the costs of disability in adults, the most common chronic health conditions amongst those in multidimensional poverty were still arthritis and related

disorders (13%), back problems (12%), mental and behavioural disorders (9%), hypertension (5%) and asthma (4%). The conditions with the highest proportion of individuals in multidimensional poverty were diseases of the respiratory system (43% were in multidimensional poverty) and other diseases of the circulatory system (41% were in multidimensional poverty). The proportion of individuals in multidimensional poverty in each of these conditions increased after taking into consideration the costs of disability in adults when equivalising income, and the conditions with the highest proportion of individuals in multidimensional poverty also changed (Table 4).

After controlling for age and sex, those with mental and behavioural disorders were nearly 14 times more likely to be in multidimensional poverty than those with no health condition after equivalising income for disability in adults (OR 13.83, 95% CI: 11.76 – 16.26, p <.0001). All chronic health conditions with the exception of high cholesterol (p= 0.9623) were significantly more likely to be in multidimensional poverty than those with no chronic health condition (Table 4).

DISCUSSION

The results have shown that those with a chronic health condition were significantly more likely to be in multidimensional poverty than those without a chronic health condition, with 18% of those with a chronic health condition being in multidimensional poverty, compared to only 4% of those without a chronic health condition. Of those in multidimensional poverty, 74% had a long term health condition.

The results of the sensitivity analysis show that after equivalising income for adult disability, there was a 3 percentage point increase in the proportion of the population in multidimensional poverty, and a 9 percentage point increase in the proportion of individuals

with a chronic health condition in multidimensional poverty. However, there is opportunity to improve the methods by which the costs of ill health are produced by including children in the methodology and having further consideration as to how health is measured. In spite of this, the sensitivity analysis has shown the additional burden chronic health conditions can have upon living standards – through the economic burden placed upon families as a result of disability.

Chronic health conditions impact upon living standards in a number of ways. Having a chronic health condition results in an increased likelihood of being out of the labour force (19), with recent Australian studies showing that being out of the labour force is associated with low incomes and high rates of income poverty (37, 38). Furthermore, having a chronic health condition is likely to affect an individual's overall health status – however, as this study has shown, different chronic health conditions have varying impacts upon overall health status, with some chronic health conditions such as hypertension or asthma having few people reporting poor overall health status.

The chronic health conditions most commonly associated with multidimensional poverty were arthritis and related disorders, back problems and mental and behavioural disorders – all of which have been shown to be preventable. There are numerous interventions for each of these conditions that have been shown to be cost-effective in either preventing the onset of the condition or reducing the severity of the condition (39-42). When considering the additional costs of low living standards the further benefits of such intervention programs become more apparent.

Political rhetoric is currently shifting to advocate the use of cross-portfolio responses to social issues (43). As such, there is opportunity for health interventions to be taken up in

government departments other than those traditionally responsible for health care, and be included alongside other efforts to improve living standards such as education and skills reform, and social security reform. Using the Freedom Poverty Measure reveals the chronic health conditions that are experienced by the most disadvantaged people in society and should be the focus of political efforts to improve living standards.

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Table 1: Overall health status of those with different chronic health conditions

Long term health condition	Proportion with poor overall health status, measured by SF-6D
Depression/ mood affective disorders	22%
Congenital malformations, deformations and chromosomal abnormalities	49%
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	36%
Certain infectious and parasitic diseases	41%
Mental and behavioural disorders	46%
Diseases of the respiratory system	42%
Other injury/poisoning	40%
Injury/accident	25%
Diseases of the blood and blood forming organs	52%
Back problems	32%
Diseases of the skin and subcutaneous tissues	28%
Other diseases of the musculoskeletal system and connective tissue	40%
Arthritis and related disorders	31%
Heart Disease	33%
Diseases of the eye and adnexa	33%
Other diseases of the circulatory system	43%
Diabetes	12%
Neoplasms (tumours/cancers)	33%
Diseases of the ear and mastoid process	23%
Diseases of the nervous system	27%
Diseases of the digestive system	17%
Diseases of the genitourinary system	17%
Asthma	10%
Hypertension	5%
Other endocrine/nutritional and metabolic disorders	11%
Other	32%
Deafness/hearing loss	15%
High cholesterol	2%

Table 2: Number of individuals in multidimensional poverty by health status, 2003

	In Multidimensional Poverty	Not in Multidimensional Poverty
Has a long term health condition	1 387 000	6 371 000
Does not have a long term health condition	449 000	11 113 000

Table 3: Multidimensional poverty status of those with varying long term health conditions, 2003

Long term health condition	Total number	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	11 562 200	4%	488 700	REFERENCE			
Depression/ mood affective disorders	208 400	28%	57 300	6.60	5.09	8.55	<.0001
Congenital malformations, deformations and chromosomal abnormalities	48 200	17%	8 000	5.53	3.07	9.99	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	124 700	24%	29 500	4.71	3.29	6.76	<.0001
Certain infectious and parasitic diseases	28 200	24%	6 800	4.66	2.36	9.17	<.0001
Mental and behavioural disorders	621 800	27%	164 900	4.60	1.04	20.35	0.0441
Diseases of the respiratory system	127 900	27%	34 200	4.49	3.24	6.23	<.0001
Other injury/poisoning	65 900	23%	14 900	4.17	2.63	6.62	<.0001
Injury/accident	434 700	17%	74 900	3.85	3.11	4.77	<.0001
Diseases of the blood and blood forming organs	17 200	22%	3 700	3.72	1.53	9.00	0.0036
Back problems	1 128 200	19%	210 100	3.49	3.01	4.04	<.0001
Diseases of the skin and subcutaneous tissues	65 700	15%	9 900	3.41	2.06	5.65	<.0001
Other diseases of the musculoskeletal system and connective tissue	251 600	22%	56 300	3.35	2.59	4.33	<.0001
Arthritis and related disorders	902 200	23%	207 200	3.27	2.79	3.83	<.0001
Heart Disease	225 100	23%	52 300	3.24	2.47	4.26	<.0001
Diseases of the eye and adnexa	99 800	19%	19 100	3.18	2.08	4.86	<.0001
Other diseases of the	122 600	22%	27 600	3.13	2.21	4.44	<.0001

circulatory system							
Diabetes	271 100	19%	51 700	2.99	2.31	3.87	0.0441
Neoplasms (tumours/cancers)	97 000	19%	18 800	2.90	1.92	4.37	<.0001
Diseases of the ear and mastoid process	284 800	10%	47 800	2.73	2.08	3.59	<.0001
Diseases of the nervous system	491 800	13%	65 500	2.67	2.14	3.32	<.0001
Diseases of the digestive system	154 100	14%	21 900	2.37	1.67	3.38	<.0001
Diseases of the genitourinary system	70 800	14%	9 900	2.28	1.36	3.82	0.0018
Asthma	925 200	8%	76 600	2.01	1.65	2.44	<.0001
Hypertension	604 200	14%	83 200	1.84	1.50	2.26	<.0001
Other endocrine/nutritional and metabolic disorders	87 300	10%	8 500	1.55	0.92	2.62	0.1015
Other	44 700	11%	4 812	1.48	0.71	3.10	0.2993
Deafness/hearing loss	153 300	8%	12 975	1.22	0.77	1.94	0.3938
High cholesterol	92 900	6%	5 211	0.77	0.43	1.39	0.3794

Table 4: Multidimensional poverty status of those with varying long term health conditions, after equivalising income for the cost of disability in adults, 2003

Long term health condition	Proportion in multidimensional poverty	Number in multidimensional poverty	OR	95% CI		p-value
No condition	4%	440 500	REFERENCE			
Mental and behavioural disorders	36%	220 900	13.83	11.76	16.26	<.0001
Depression/mood affective disorders	34%	71 600	9.86	7.72	12.61	<.0001
Congenital malformations, deformations and chromosomal abnormalities	23%	10 900	9.82	5.70	16.92	<.0001
Certain infectious and parasitic diseases	38%	10 900	9.58	5.20	17.64	<.0001
Diseases of the respiratory system	43%	55 100	9.13	6.75	12.35	<.0001
Other injury/poisoning	35%	23 000	7.84	5.25	11.71	<.0001
Other diseases of the circulatory system	41%	49 800	7.00	5.18	9.47	<.0001
Symptoms/signs and abnormal clinical and laboratory findings n.e.c	31%	38 400	6.97	4.93	9.85	<.0001
Diseases of the blood and blood forming organs	33%	5 700	6.94	3.40	14.17	<.0001
Diseases of the skin and subcutaneous tissues	24%	15 700	6.69	4.35	10.30	<.0001
Other diseases of the musculoskeletal system and connective tissue	36%	91 400	6.48	5.17	8.13	<.0001
Diseases of the eye and adnexa	31%	31 300	6.19	4.22	9.08	<.0001
Injury/accident	23%	102 000	6.07	5.00	7.37	<.0001
Back problems	27%	305 400	5.80	5.08	6.63	<.0001
Arthritis and related disorders	35%	316 300	5.63	4.88	6.50	<.0001
Heart Disease	36%	80 600	5.53	4.35	7.05	<.0001
Neoplasms (tumours/cancers)	32%	31 200	5.52	3.90	7.83	<.0001
Diseases of the nervous system	20%	100 300	4.77	3.94	5.78	<.0001
Diabetes	26%	70 600	4.31	3.42	5.45	<.0001
Diseases of the ear and	24%	68 500	4.23	3.32	5.39	<.0001

mastoid process						
Other	26%	11 600	4.22	2.45	7.26	<.0001
Diseases of the digestive system	22%	34 400	4.14	3.07	5.60	<.0001
Diseases of the genitourinary system	22%	15 400	3.92	2.52	6.09	<.0001
Asthma	11%	104 400	3.18	2.67	3.79	<.0001
Hypertension	18%	110 000	2.42	2.01	2.92	<.0001
Other endocrine/nutritional and metabolic disorders	13%	11 600	2.24	1.40	3.56	0.0007
Deafness/hearing loss	15%	22 300	2.13	1.46	3.08	<.0001
High cholesterol	8%	7 000	1.01	0.59	1.74	0.9623