



**Premature retirement due to ill health and poverty: a cross-section study of older workers**

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-002683
Article Type:	Research
Date Submitted by the Author:	04-Feb-2013
Complete List of Authors:	Schofield, Deborah; University of Sydney, NHMRC Clinical Trials Centre Callander, Emily; University of Sydney, NHMRC Clinical Trials Centre Shrestha, Rupendra; University of Sydney, NHMRC Clinical Trials Centre Percival, Richard; University of Canberra, National Centre for Social and Economic Modelling Kelly, Simon; University of Canberra, National Centre for Social and Economic Modelling Passey, Megan; University of Sydney, University Centre for Rural Health (North Coast)
<b>Primary Subject Heading</b>:	Health economics
Secondary Subject Heading:	Public health
Keywords:	HEALTH ECONOMICS, PUBLIC HEALTH, PREVENTIVE MEDICINE

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5 **Premature retirement due to ill health and poverty: a cross-section**  
6 **study of older workers**  
7

8 Deborah J. Schofield<sup>1\*</sup>, Emily J. Callander<sup>1</sup>, Rupendra N. Shrestha<sup>1</sup>, Richard Percival<sup>2</sup>,  
9 Simon J. Kelly<sup>2</sup>, Megan E. Passey<sup>3</sup>  
10  
11

12 <sup>1</sup>NHMRC Clinical Trials Centre, University of Sydney, Locked Bag 77, Camperdown NSW  
13 1450, Australia  
14

15 <sup>2</sup>National Centre for Social and Economic Modelling, University of Canberra, ACT 2601,  
16 Australia  
17

18 <sup>3</sup>University Centre for Rural Health (North Coast), University of Sydney, 91 Uralba St,  
19 Lismore NSW 2480, Australia  
20

21 \*Corresponding author details:  
22

23 Emily Callander  
24 NHMRC Clinical Trials Centre  
25 Locked Bag 77  
26 Camperdown NSW 1450 Australia  
27 Ph: 61 2 9562 5068  
28 Fax: 61 2 9565 1863  
29 Email:: emily.callander@ctc.usyd.edu.au  
30

31 Email Addresses:  
32

33 DJS: [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au)  
34 EJC: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)  
35 RNS: [rupendra.shrestha@ctc.usyd.edu.au](mailto:rupendra.shrestha@ctc.usyd.edu.au)  
36 RP: [richard.percival@natsem.canberra.edu.au](mailto:richard.percival@natsem.canberra.edu.au)  
37 SJK: [simon@kellyresearch.com.au](mailto:simon@kellyresearch.com.au)  
38 MEP: [megan.passey@ucr.edu.au](mailto:megan.passey@ucr.edu.au)  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## ARTICLE SUMMARY

### Article Focus

- Is early retirement due to ill health associated with income poverty for individuals and their families?

### Key Messages

- Leaving the labour force before the age of 65 (the ‘traditional retirement age’) due to ill health is associated with higher rates of income poverty than leaving the labour force for other reasons
- Having a family member leave the labour force due to ill health increases the likelihood of the whole family being in income poverty

### Strengths and Limitations

- A limitation of this study is that it was conducted using cross-sectional data so cannot establish causality.
- A key strength is the use of nationally representative, individual level data.

**Abstract:****Objectives**

Illness is a leading cause of premature retirement amongst all people of working age, but particularly older workers. This study aims to determine whether individuals who have been forced out of the labour force due to illness are more likely to be in income poverty, and whether having a family member out of the labour force due to ill health increases the poverty risk for the entire family.

**Design**

Cross sectional analysis of Health&WealthMOD a microsimulation model of the 2009 Australian population

**Setting**

2009 Australian population

**Participants**

9,198 records of people aged between 45 and 64 years

**Results**

The majority, 73%, of the individuals who were not in the labour force due to ill health were in income poverty. Individuals who had retired due to reasons other than ill health were significantly more likely to avoid being in income poverty than those retired due to ill health (OR 2.32 95% CI: 1.78 to 3.02). Being in the same family as someone who is retired due to ill health also significantly increases an individual's odds of being in income poverty.

**Conclusions**

Early retirement due to poor health is associated with higher rates of income poverty for the individual and their entire family.

KEYWORDS: Poverty, retirement, health

## Introduction

Chronic health conditions will affect the majority of individuals living in western countries at some stage of their lives. For some of these individuals, the conditions may be severe enough to interrupt their normal working lifestyles, including forcing some individuals out of the labour force prematurely. Those aged 45-64 years who have a chronic health condition are significantly more likely to be out of the labour force due to ill health than those without a chronic health condition [1]. Early retirement is a concern internationally as the global population ages and an increasing proportion of the working population in many countries enters the preretirement years of 45 to 64. [2-3]

Exiting the labour force because of ill health results in poorer financial conditions both now and in the future [4-5]. Poverty is seen as a benchmark indicator of living standards within modern society [6]. To be labelled as being in poverty comes with an understanding by wider society that an individual is not coping financially and they have inadequate economic resources to support a decent standard of living [7]. Leaving the workforce due to ill health may increase the chance of living in poverty due to their poorer financial status.

This paper will examine the relationship between being out of the labour force due to ill health and being in poverty amongst members of the older working aged population. It will determine the number of Australians aged 45 to 64 years who were not in the labour force due to ill health who were in poverty in 2009 and will look at how being out of the labour force due to ill health increases the chances of being in poverty compared to those in employment and those out of the labour force for other reasons. This paper will also assess how retiring due to ill health can place other family members in poverty.

## Methods

This paper uses a microsimulation model – Health&WealthMOD to assess the poverty status of those who are aged between 45 and 64 years and have retired due to ill health, and also their family members. Health&WealthMOD is a nationally representative microsimulation model of 45 – 64 years old Australians in 2009 and captures their disability and illness status, as well as detailed economic information.

### *Data source - Health&WealthMOD*

The model used in this study draws its information on disability and illness from the *2003 Disability, Ageing and Carers Survey* (SDAC) – a nationally representative survey conducted by the Australian Bureau of Statistics [8].

Information on 45 to 64 years olds and their family members were taken from the SDAC and forms the base population of Health&WealthMOD. The records were then up-rated to represent the 2009 population, accounting for the changes in demographics that had taken place.

This base population of Health&WealthMOD was then combined with STINMOD, another microsimulation model that contains detailed economic information. STINMOD is Australia's leading static microsimulation model of nationally representative tax and cash transfer information [9].

The economic information from STINMOD was linked to the base population by a microsimulation method call synthetic matching [10]. Records from STINMOD are matched to records from Health&WealthMOD by matching on a number of variables that are common to the two datasets. In this case 9 matching variables were chosen: labour force status, income

1  
2  
3 unit type, type of government pension/support, income quintile, age group, sex, hours worked  
4  
5 per week, highest educational qualification and home ownership – based upon their strong  
6  
7 association with income. Once the records were matched the economic information from  
8  
9 STINMOD was transferred onto the base population of Health&WealthMOD. As previously  
10  
11 mentioned, for a more detailed account of the process by which Health&WealthMOD was  
12  
13 created see Schofield *et al* [11].  
14  
15

### 16 17 *Measuring poverty* 18

19  
20 To identify the individuals in the 45-64 year old Australian population that were in poverty in  
21  
22 2009, an income poverty line based on 50 per cent of the median income unit income was  
23  
24 used in conjunction with OECD-modified equivalence scales [12-13]. This income poverty  
25  
26 line was calculated from STINMOD, in order to ascertain the poverty line based upon the  
27  
28 entire Australian population. The 50 per cent of median income poverty line expresses the  
29  
30 economic situation of those in poverty relation to those in the middle of the income  
31  
32 distribution. Those who are in poverty will have less than half the income of those in the  
33  
34 middle of the income distribution of the population. The 50 per cent of the median income  
35  
36 has been widely used as a poverty line both in Australia and internationally [14-16].  
37  
38

39  
40 While we are assessing how many individuals are in poverty, considering an individual's  
41  
42 personal income is not seen as a true reflection of an individual's economic situation. Within  
43  
44 a family, it can be assumed that members pool their economic resources to the benefit of all  
45  
46 members – thus looking at the wider income of the whole family will be more accurate [17].  
47  
48 Due to this assumption of the sharing of economic resources, the income unit's income  
49  
50 (members of the same income unit are identified within the SDAC) will be used rather than  
51  
52 the individual's income in this analysis. The terms 'income unit' and 'family' are  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 interchangeable in the remainder of this paper as they both refer an income unit as defined  
4  
5 above.  
6  
7

8 Differences in numbers and composition of families are accommodated for using equivalence  
9  
10 scales [18]. The OECD modified equivalence scale [19] is utilised in this study, whereby a  
11  
12 value of 1.0 is given to the first adult member (person aged 15 years and over), a value of 0.5  
13  
14 to each subsequent adult family member and a value of 0.3 given to each child (person aged  
15  
16 under 15 years). The family's income is divided by their equivalence score, thereby  
17  
18 equivalising the income and allowing comparisons between families of different sizes.  
19  
20

### 21 22 *Statistical analysis* 23

24 The 45 to 64 year old Australian population were grouped into one of the four groups based  
25  
26 on their labour force status: employed full time, employed part time, unemployed (not  
27  
28 employed but looking for work), not in the labour force due to ill health, and not in the labour  
29  
30 force due to other reasons. The proportion of the 45 to 64 year old Australian population who  
31  
32 were in poverty in each group was estimated. Frequency analysis was then conducted to  
33  
34 determine the type of families that those aged 45 to 64 years and were in poverty belonged to.  
35  
36

37  
38 Logistic regression models were used to compare the odds of being in poverty for those in  
39  
40 full-time employment, part time employment, unemployment, and not in the labour force for  
41  
42 reasons other than ill health. Not in the labour force due to ill health was used as the reference  
43  
44 group. The outcomes were adjusted for age group, sex and education (having at least a  
45  
46 bachelors degree, or not).  
47  
48

49  
50 Logistic regression models were used to compare the odds of not being in poverty for those  
51  
52 who were aged 45 to 64 years, who had a family member not in the labour force due to ill  
53  
54 health, with those who had all working aged family members in employment (aged over 15  
55  
56



1  
2  
3 years and in full time or part time employment), and those with other family compositions  
4  
5 (no individuals out of the labour force due to ill health, and at least one member not in  
6  
7 employment). The outcomes were adjusted for age group, sex and education (having at least a  
8  
9 bachelors degree, or not). Odds ratios were presented with their 95% confidence intervals and  
10  
11 statistical tests were two sided with the significance set at the 5% level. Population estimates  
12  
13 were expressed in the nearest hundred.  
14  
15

## 16 17 **Results**

18  
19  
20 Within Health&WealthMOD there were 2 242 individuals in income poverty, once weighted  
21  
22 to represent the 45 to 64 year old Australia population in 2009, there were 1.313 million  
23  
24 individuals in income poverty – or 24% of this population.  
25  
26

27  
28 In 2009, there were 316, 300 individuals not in the labour force due to ill health and were  
29  
30 aged 45 to 64 years. The majority, 73%, of the individuals who were not in the labour force  
31  
32 due to ill health were in income poverty. Only the unemployed had a greater proportion in  
33  
34 income poverty – 79%. Those employed part-time and full-time had the lowest proportion in  
35  
36 income poverty – 15% and 4% respectively. Around half of the individuals who were out of  
37  
38 the labour force for reasons other than ill health were in income poverty, which is lower  
39  
40 proportion than the 73% of those who were in out of the labour force due to ill health who  
41  
42 were in income poverty.  
43  
44

45  
46 Once adjusted for age, sex and education (Table 1) those who were employed full time,  
47  
48 employed part time, or were out of the labour force for reasons other than ill health were  
49  
50 significantly more likely to *not* be in income poverty than those who were out of the labour  
51  
52 force due to their ill health. The unemployed were the only group to not have significantly  
53  
54 different odds of being in income poverty then those not in the labour force due to ill health.  
55  
56

1  
2  
3 Amongst those aged 45 to 64 years, the proportion of individuals who were in various income  
4 unit types varies with employment status (Table 2). The majority of those who were in  
5 income poverty and employed full-time or part-time were married – this is also true of those  
6 not in the labour force for other reasons. The majority of those who were in income poverty  
7 and unemployed or not in the labour force due to ill health were from one-person income  
8 units.  
9

10  
11  
12 After controlling for age, sex and education, those who were in full time employment and  
13 part-time employment had consistently higher odds of *not* being in income poverty regardless  
14 of income unit type than those with the corresponding income unit type who were out of the  
15 labour force due to ill health (Table 3). Those who were unemployed and were in single  
16 person or single parent with dependent children income unit types did not have significantly  
17 different odds of being in income poverty as those who were out of the labour force due to ill  
18 health and in the same income unit type. Those who were not in the labour force for other  
19 reasons and were married with children had higher odds of *not* being in poverty than those in  
20 the corresponding income unit type and who were out of the labour force due to ill health.  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37

38 When taking family members into account, there were 489 600 individuals who are in  
39 poverty, throughout the Australian population who have a member of their income unit aged  
40 45 to 64 years and is not in the labour force due to ill health (316, 300 who themselves are  
41 out of the labour force due to ill health, and an additional 173,300 family members).  
42  
43  
44  
45  
46  
47

48 Table 3 shows the proportion of 45 to 64 year olds who were in income poverty based upon  
49 the characteristics of their income unit. The majority of those – 68% -- who had a member of  
50 their income unit out of the labour force due to ill health were in income poverty. Whereas  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 only 6% of individuals whose working-aged members were all employed (either full-time or  
4  
5 part time) were in income poverty.  
6  
7

8 When adjusted for the age, sex and education characteristics of the individual, those aged 45  
9  
10 to 64 years, and had all members of their income unit (who were of working age) employed,  
11  
12 were 32 times more likely (OR 95% CI: 25.0 to 41.4) to *not* be in income poverty than those  
13  
14 individuals who had an income unit member not in the labour force due to ill health.

15  
16  
17 Similarly, those who had other income unit compositions (no family member out of the  
18  
19 labour force due to ill health and at least one member not in employment), were three times  
20  
21 more likely to not be in income poverty (OR 95% CI: 3.0 to 4.6) than those individuals who  
22  
23 had an income unit member not in the labour force due to ill health.  
24  
25

## 26 27 **Discussion**

28  
29 Poverty is a phenomenon experienced by over half of the Australians aged 46 to 64 years  
30  
31 who are not in the labour force due to illness. The financial impact of illness related early  
32  
33 retirement is not only borne by the individual – it also affects their entire family with half the  
34  
35 individuals who are in a family with someone out of the labour force due to ill health being in  
36  
37 poverty. Being out of the labour force due to illness is related to detrimental financial  
38  
39 situations for both the individual and their family.  
40  
41  
42

43  
44 Other studies linking health and poverty have discussed how the poor generally have worse  
45  
46 health and thus improving the health of these populations should be a goal to create greater  
47  
48 equity in health [20]. What these studies do not take into consideration is the specific impact  
49  
50 that health has on labour force participation, particularly amongst older workers, which can  
51  
52 influence the poverty status of individuals. That is, the impact of ill health on labour force  
53  
54 participation (and the associated loss of income and financial resources) is strongly associated  
55  
56

1  
2  
3 with a higher incidence of poverty. Addressing the impact of ill health on the labour force  
4  
5 participation of older workers may help to alleviate poverty.  
6  
7

8 The difference in likelihood of being in poverty between those who are not in the labour force  
9  
10 due to ill health and those who are so for other reasons suggests that it is being out of the  
11  
12 labour force due to illness and not just being out of the labour force in general that increases  
13  
14 the individual's chances of being in poverty. Those who are not in the labour force for  
15  
16 reasons other than ill health fare better in terms of their poverty status than those not in the  
17  
18 labour force due to illness. This may be due to the potential for greater choice to be exercised  
19  
20 in whether or not the individual leaves the labour force before the traditional retirement age  
21  
22 (65 years in Australia), and when this transition occurs (i.e. these individual may decide to  
23  
24 leave the labour force early due to a desire to pursue other interests, rather than being forced  
25  
26 to leave due to an inability to work any longer due to restrictions imposed by illness). Such  
27  
28 choice may allow individuals to obtain a level of financial security that keeps them above the  
29  
30 poverty line, for example creating an investment portfolio that provides an income stream  
31  
32 during retirement. Many individuals who retire early due to ill health are not well financially  
33  
34 prepared [21-22], indeed this is true for many beset by illness [23], and as such may not have  
35  
36 financial arrangements in place to finance retirement periods. The onset, or even long-term  
37  
38 experience of ill health may cause families to reduce the financial assets they have  
39  
40 accumulated that may have provided an income stream [24] – for example the sale of  
41  
42 investment properties (and the associated loss of rental income) to finance medical expenses  
43  
44 associated with chronic illness.  
45  
46  
47  
48  
49

50  
51 Further to this, the additional economic burden imposed by illness in terms of medical costs  
52  
53 is not captured by income poverty lines [25]. Those who do not have chronic health  
54  
55 conditions will not have the additional medical expenses of those not in the labour force due  
56  
57

1  
2  
3 to ill health [26-27]. The actual disposable income available to those not in the labour force  
4  
5 due to ill health, once essential medical costs are taken into account, may reduce these  
6  
7 individual's income even further and place more families in poverty or push some families  
8  
9 further below the poverty line.  
10

11  
12 The majority of individuals who are not in the labour force due to ill health and who are in  
13  
14 poverty are single. Marital status is associated with poverty among those retired early due to  
15  
16 poor health, with those who are married less likely to be in poverty than those who are single.  
17  
18 This emphasises the importance of having a partner to share the financial burden of being not  
19  
20 in the labour force due to ill health [28-29], and also the potential financial reliance people  
21  
22 who are not in the labour force due to ill health have on their partners.  
23  
24

25  
26 The unemployed are often considered to be one of the most 'at risk' subpopulations of being  
27  
28 in poverty [30-31]. However, this paper has shown that those not in the labour force due to ill  
29  
30 health, in the 45 to 64 year old age group, are just as susceptible to poverty as the  
31  
32 unemployed.  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

### Copyright for authors

The Corresponding Author has the right to grant on behalf of all authors and does grant on behalf of all authors, a worldwide licence to the Publishers and its licensees in perpetuity, in all forms, formats and media (whether known now or created in the future), to i) publish, reproduce, distribute, display and store the Contribution, ii) translate the Contribution into other languages, create adaptations, reprints, include within collections and create summaries, extracts and/or, abstracts of the Contribution, iii) create any other derivative work(s) based on the Contribution, iv) to exploit all subsidiary rights in the Contribution, v) the inclusion of electronic links from the Contribution to third party material where-ever it may be located; and, vi) licence any third party to do any or all of the above.

### Author Contributions

DS conceived the study, RS led the construction of the microsimulation model, EC carried out the data analysis and drafted the manuscript. All authors provided expert advice into the design of the study and the interpretation of the results, and contributed to the drafting of the manuscript. All authors read and approved the final version of the manuscript.

### Ethics Approval

The use of this data was approved by the Australian Bureau of Statistics.

### Data sharing

The data used in this study came from Health&WealthMOD, a microsimulation model constructed by the authors from the *2003 Survey of Disability, Ageing and Carers*, and STINMOD. The *2003 Survey of Disability, Ageing and Carers* is publically available through the Australian Bureau of Statistics. STINMOD is publically available through the National Centre for Social and Economic Modelling, University of Canberra. Enquiries regarding access to Health&WealthMOD should be directed to Professor Deborah Schofield, [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au).

### Funding

Funded by Australian Research Council and Pfizer Australia

### Competing Interests

None

## References

1. Schofield, D., et al., *Chronic disease and labour force participation among older Australians*. Medical Journal of Australia, 2008. **189**: p. 447-450.
2. Organisation for Economic Co-operation and Development, *Labour Force Statistics 1986-2006*. 2007, OECD Paris.
3. Organisation for Economic Co-operation and Development, *Ageing societies, in OECD Factbook 2008*. 2008, OECD: Paris.
4. Schofield, D., et al., *Retiring early with Cardiovascular Disease: Impact on the individual's financial assets*. International Journal of Cardiology, In press.
5. Brazenor, R., *Disabilities and Labour Market Earnings in Australia*. Australian Journal of Labour Economics, 2002. **5**(3): p. 319-334.
6. Hagenaars, A. and K. de Vos, *The definition and measurement of poverty*. The Journal of Human Resources, 1988. **23**(2): p. 211-221.
7. Harding, A., R. Lloyd, and H. Greenwell, *Financial disadvantage in Australian 1990 to 2000: The persistence of poverty in a decade of growth*. 2001, The Smith Family: Camperdown.
8. Australian Bureau of Statistics, *Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue)*. 2005, Australian Bureau of Statistics: Canberra.
9. Percival, R., A. Abello, and Q.N. Vu, *STINMOD (Static Income Model) 2007*, in *Modelling Our Future: Population ageing, health and aged care*, A. Gupta and A. Harding, Editors. 2007, Elsevier B.V.: Amsterdam.
10. Rässler, S., *Statistical matching: A frequentist theory, practical applications, and alternative Bayesian approaches*. 2002 New York Springer-Verlag New York, Inc.
11. Schofield, D., et al., *Modelling the cost of ill health in Health&WealthMOD (Version II): lost labour force participation, income and taxation, and the impact of disease prevention*. International Journal of Microsimulation, 2011. **4**(3): p. 32-36.
12. De Vos, K. and M.A. Zaidi, *Equivalence scale sensitivity of poverty statistics for the member states of the European community*. Review of Income and Wealth, 1997. **43**(3): p. 319-333.
13. Saunders, P., *Poverty, Income Distribution and Health: An Australian study*, in *SPRC Reports and Proceedings*. 1996, Social Policy Research Centre: Sydney.
14. Saunders, P. and B. Bradbury, *Monitoring Trends in Poverty and Income Distribution: Data, Methodology and Measurement*. The Economic Record, 2006. **82**(258): p. 341-64.
15. Saunders, P., T. Hill, and B. Bradbury, *Poverty in Australia: Sensitivity analysis and recent trends*. 2007, Social Policy Research Centre, University of New South Wales: Sydney.
16. Mejer, L. and C. Siermann, *Income poverty in the European Union: Children, gender and poverty gaps*, in *Statistics in focus: population and social conditions*. 2000, Eurostat.

17. Greenwell, H., R. Lloyd, and A. Harding, *An introduction to poverty measurement issues*. 2001, National Centre for Social and Economic Modelling: Canberra.
18. Trigger, D., *Does the way we measure poverty matter?*, in *Discussion Paper no. 59*. 2003, NATSEM: Canberra.
19. Hagenaars, A., K. de Vos, and M.A. Zaidi, *Poverty Statistics in the Late 1980s: Research Based on Micro-data*. 1994, Office for Official Publications of the European Communities.: Luxembourg.
20. Organisation for Economic Co-operation and Development (OECD) and the World Health Organisation (WHO), *Poverty and health*, in *DAC Guidelines and Reference Series*. 2003, OECD: Paris.
21. Kelly, S., et al., *The impact of illness on retirement living standards*. *The Economic Record*, 2012. **88**(283): p. 576-584.
22. Schofield, D., et al., *The financial vulnerability of individuals with diabetes*. *The British Journal of Diabetes and Vascular Disease*, 2010. **10**(6): p. 300-304.
23. Swoboda, S.M. and P.A. Lipsett, *Impact of a prolonged surgical critical illness on patients' families*. *American Journal of Critical Care*, 2002. **11**(5): p. 459-466.
24. Mills, A. and S. Shillcutt, *Communicable diseases*, in *Global crises, global solutions*, B. Lomborg, Editor. 2004, Cambridge University Press: Cambridge.
25. Saunders, P., *The costs of disability and the incidence of poverty*, *SPRC Discussion Paper No. 147*. 2006, Social Policy Research Centre (SPRC): Sydney.
26. Graham, S. and C. Stapleton, *The extra costs of disability*, in *Social Policy in Australia, What future for the welfare state?*, P. Saunders, Editor. 1990, Social Policy Research Centre, University of New South Wales: Sydney. p. 103-112.
27. Wightman, P. and F. Robertson, *Costs of disability. A survey of the costs of disability for people with disabilities in labour force related activity*, *Policy Research Paper No.59*. 1996, Social Policy Research Centre (SPRC): Sydney.
28. Henkens, K., *Retirement intentions and spousal support: A multi-actor approach*. *Journal of Gerontology: Social Sciences*, 1999. **54B**(2): p. S63-S73.
29. Australian Bureau of Statistics, *Summary of Findings*, in *Retirement and retirement intentions, Australia, July 2006 to June 2007 ABS Cat. No. 6238.0*. 2008, ABS: Canberra.
30. Goulden, C., *Cycles of poverty, unemployment and low pay*, in *Round-Up: reviewing the evidence*. 2010, Joseph Rowntree Foundation: London.
31. Community Affairs Reference Committee, *A hand up not a hand out: Renewing the fight against poverty*, in *Senate Inquiry into Poverty 2004*. 2004, The Senate: Canberra.



Table 1: Odds of NOT being in poverty, adjusted for age, sex and education for the Australian population aged 45 to 64 years, 2003

<b>Employment Status</b>	<b>OR</b>	<b>95% CI</b>	<b>P-value</b>
Not in the labour force due to ill health	REFERENCE		
Employed Full Time	63.10	46.63 to 85.39	<.0001
Employed Part Time	13.17	9.814 to 17.68	<.0001
Unemployed	0.79	0.46 to 1.36	0.4021
Not in the labour force due to other reasons	2.32	1.78 to 3.02	<.0001

**Table 2: Numbers in each family type with varying employment status, proportion who are in poverty and OR of NOT being in poverty compared to those not in the labour force due to ill health<sup>1</sup>, 45 to 64 year old population.**

<b>Employment status</b>		<b>Family Type</b>			
		<i>Married with dependents</i>	<i>Married couple only</i>	<i>One parent, dependents</i>	<i>One person</i>
Not in the labour force due to ill health	Weighted population	46 200	199 202	11 184	174 715
	% in Poverty	16	22	12	32
	OR of NOT being in poverty	REFERENCE	REFERENCE	REFERENCE	REFERENCE
Employed Full Time	Weighted population	983 605	1 189 281	76 810	407 291
	% in Poverty	22	9	11	3
	OR of NOT being in poverty	47.8 (21.0 – 108.5)	35.9 (23.3 – 55.5)	13.2 (3.6 – 48.3)	241.7 (131.2 – 445.2)
Employed Part Time	Weighted population	276 769	536 062	24 589	124 395
	% in Poverty	18	3	13	9
	OR of NOT being in poverty	7.0 (3.1 – 15.8)	11.5 (7.4 – 17.9)	3.2 (1.0 – 10.5)	16.3 (9.2 – 28.7)
Unemployed	Weighted population	11 209	35 534	11 372	49 139
	% in Poverty	3	11	20	10
	OR of NOT being in poverty	2.5 (0.7 – 8.5)	1.5 (0.7 – 3.1)	0.0 (0.0 – 0.2)	0.0 (0.0 – 0.2)
Not in the labour force due to other reasons	Weighted population	190 779	769 719	29 618	276 444
	% in Poverty	40	56	43	46
	OR of NOT being in poverty	1.9 (0.8 – 4.2)	2.1 (1.4 – 3.0)	0.5 (0.1 – 1.7)	1.7 (0.9 – 2.9)

1  
2  
3 <sup>1</sup>OR adjusted for age, sex and education.  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For peer review only

**Table 3: Poverty status of those aged 45 to 64 years and the characteristics of the family members of their family and the odds of being in poverty, adjusted for age, sex and education based on the characteristics of the family members, 2009**

Characteristics of the individual's family	Individual poverty status (Numbers)		% in poverty	OR of NOT being in poverty*	95% CI*	P-value*
	<i>In poverty</i>	<i>Not in poverty</i>				
Has a family member not in the labour force due to ill health	387 100	181 600	32%	REFERENCE		
All members of the family employed	150 200	250 300	94%	32.2	150 200	250 300
Other family composition (no family members out of the labour force due to ill health and at least one member not in employment)	776 100	1 425 500	65%	3.7	776 100	1 425 500

\* Adjusted for age, sex and education



**Premature retirement due to ill health and poverty: a cross-sectional study of older workers**

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-002683.R1
Article Type:	Research
Date Submitted by the Author:	27-Mar-2013
Complete List of Authors:	Schofield, Deborah; University of Sydney, NHMRC Clinical Trials Centre Callander, Emily; University of Sydney, NHMRC Clinical Trials Centre Shrestha, Rupendra; University of Sydney, NHMRC Clinical Trials Centre Percival, Richard; University of Canberra, National Centre for Social and Economic Modelling Kelly, Simon; University of Canberra, National Centre for Social and Economic Modelling Passey, Megan; University of Sydney, University Centre for Rural Health (North Coast)
<b>Primary Subject Heading</b>:	Health economics
Secondary Subject Heading:	Public health
Keywords:	HEALTH ECONOMICS, PUBLIC HEALTH, PREVENTIVE MEDICINE

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5 **Premature retirement due to ill health and income poverty: a cross-**  
6 **sectional study of older workers**  
7

8 Deborah J. Schofield<sup>1\*</sup>, Emily J. Callander<sup>1</sup>, Rupendra N. Shrestha<sup>1</sup>, Richard Percival<sup>2</sup>,  
9 Simon J. Kelly<sup>2</sup>, Megan E. Passey<sup>3</sup>  
10  
11

12 <sup>1</sup>NHMRC Clinical Trials Centre, University of Sydney, Locked Bag 77, Camperdown NSW  
13 1450, Australia  
14

15 <sup>2</sup>National Centre for Social and Economic Modelling, University of Canberra, ACT 2601,  
16 Australia  
17

18 <sup>3</sup>University Centre for Rural Health (North Coast), University of Sydney, 91 Uralba St,  
19 Lismore NSW 2480, Australia  
20

21 \*Corresponding author details:  
22

23 Emily Callander  
24 NHMRC Clinical Trials Centre  
25 Locked Bag 77  
26 Camperdown NSW 1450 Australia  
27 Ph: 61 2 9562 5068  
28 Fax: 61 2 9565 1863  
29 Email:: emily.callander@ctc.usyd.edu.au  
30

31 Email Addresses:  
32

33 DJS: [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au)  
34 EJC: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)  
35 RNS: [rupendra.shrestha@ctc.usyd.edu.au](mailto:rupendra.shrestha@ctc.usyd.edu.au)  
36 RP: [richard.percival@natsem.canberra.edu.au](mailto:richard.percival@natsem.canberra.edu.au)  
37 SJK: [simon@kellyresearch.com.au](mailto:simon@kellyresearch.com.au)  
38 MEP: [megan.passey@ucr.edu.au](mailto:megan.passey@ucr.edu.au)  
39

40 Ethics approval  
41

42 The use of the data in this manuscript was approved by the Australian Bureau of Statistics,  
43 with data for public release approved by the Microdata Review Committee.  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Abstract:

### Background

Illness may interrupt older workers lifestyles, forcing them to retire prematurely. Exiting the labour force because of ill health is likely to affect the living standards of older workers by reducing income and increasing the likelihood of being in poverty.

### Methods

Using a microsimulation model of the 2009 Australian population (Health&WealthMOD) the income poverty status of Australians who were aged between 45 and 64 years and were out of the labour force due to ill health was assessed, along with the characteristics of their family members. This was done using the 50% of the median equivalised income unit income poverty line.

### Results

It was found that individuals who had retired due to other reasons early were significantly less likely to be in income poverty than those retired due to ill health (OR 0.43 95%CI: 0.33 – 0.51), and there was no significant difference in the likelihood of being in income poverty between these individuals and the unemployed. Being in the same family as someone who is retired due to illness also significantly increases an individual's chance of being in income poverty.

### Conclusions

It can be seen that being retired due to illness impacts both the individual and their family.

KEYWORDS: Poverty, retirement, health

## Background

The health, unemployment and poverty relationship is complex and multidimensional.

Unemployment was found to lead to poor health in a longitudinal British study in the 1980s [1, 2], with Australian studies later also demonstrating the adverse impacts of unemployment on mental health [3-7]. There is additional evidence from the UK, Denmark, Germany and the United States of unemployment leading to depression, anxiety, cardiovascular disease, lung cancer, accidents and suicide [3, 4, 6-9]. Similarly, being in income poverty can also have a detrimental effect on overall health status [10-12].

However, there is a small body of evidence of the inverse relationship, with ill health being identified as having a significant negative impact on people's labour force participation and income [13-17]. However, it is not known how this impact on labour force participation affects income poverty status.

The potential for ill health to lead an individual into income poverty is important as chronic health conditions will affect the majority of individuals living in western countries at some stage of their lives. For some of these individuals, the conditions may be severe enough to interrupt their normal working lifestyles, including forcing some individuals out of the labour force prematurely. Those aged 45-64 years who have a chronic health condition are significantly more likely to be out of the labour force due to ill health than those without a chronic health condition [18].

Exiting the labour force because of ill health is already known to be associated with poorer financial conditions both now and in the future [19, 20], so ill health has the potential to be a major driver of income poverty. Poverty is seen as a benchmark indicator of living standards within modern society [21]. To be labelled as being in income poverty comes with an



1  
2  
3 understanding by wider society that an individual is not coping financially and they have  
4 inadequate economic resources to support a decent standard of living [22]. Leaving the  
5 workforce due to ill health may increase the chance of living in income poverty due to their  
6 poorer financial status. This paper will examine the relationship between being out of the  
7 labour force due to ill health and being in income poverty amongst members of the older  
8 working aged population. It is well established that unemployment and low income can lead  
9 to ill health, however there has been little research on exploring the potential of ill health to  
10 be a driver of income poverty, through employment status. It will also assess how retiring due  
11 to ill health can place other family members in income poverty.  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22

## 23 **Methods**

24  
25  
26 This paper uses a microsimulation model – Health&WealthMOD to assess the poverty status  
27 of those who were aged between 45 and 64 years and had retired due to ill health.  
28  
29

### 30 *Data source - Health&WealthMOD*

31  
32  
33  
34  
35 Within Australia, there is no nationally-representative data that contains detailed information  
36 on both health status, income, poverty and not being in the labour force due to ill health. To  
37 fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of  
38 Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the  
39 Australian Bureau of Statistics [23] that contains detailed information on chronic health  
40 condition, reasons for not being in the labour force and individual income range – and  
41 STINMOD – a nationally representative microsimulation model of continuous income, taxes,  
42 benefits and wealth. Health&WealthMOD is a nationally representative microsimulation  
43 model of 45 – 64 years old Australians in 2009 and captures their disability and illness status,  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54

1  
2  
3 as well as detailed income information, labour force status, reasons for not being in the  
4  
5 workforce and poverty status.  
6  
7

8 Information on 45 to 64 years olds and their family members were taken from the SDAC to  
9  
10 form the base population of Health&WealthMOD. The records were then up-rated to  
11  
12 represent the 2009 population, accounting for the changes in demographics that had taken  
13  
14 place between 2003 and 2009. The up-rating only accounted for the change in the number of  
15  
16 people reporting health conditions that was due to the ageing of the population. Any change  
17  
18 in the number of people reporting health conditions between 2003 and 2009 that was related  
19  
20 to trend increases or decline in illness were not captured by up-rating. However, the  
21  
22 proportion of the Australian population reporting a long term health condition has remained  
23  
24 stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe  
25  
26 that the portion of people reporting a long term health condition would increase between  
27  
28 2003 and 2009 [24] beyond the impact of age.  
29  
30  
31  
32

33 This base population of Health&WealthMOD was then combined with STINMOD, another  
34  
35 microsimulation model that contains detailed economic information. STINMOD is  
36  
37 Australia's leading static microsimulation model of nationally representative tax and cash  
38  
39 transfer information [25], which is maintained and further developed for the Commonwealth  
40  
41 by the National Centre for Social and Economic Modelling and is routinely used by  
42  
43 Commonwealth departments for assessing the distributional and revenue implications of tax  
44  
45 and cash transfer reforms. The model operates at the 'micro' level of families and individuals,  
46  
47 and uses Australian Bureau of Statistics income survey unit record files as the base  
48  
49 population. STINMOD contains a range of additional economic information such as  
50  
51 continuous data on individual income, government support payments, income tax liability,  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 values of individuals' financial assets such as cash, superannuation, shares, property  
4  
5 investment and owner occupied home.  
6  
7

8 The economic information from STINMOD was linked to the base population by a  
9  
10 microsimulation method call synthetic matching<sup>1</sup> [27]. Records from STINMOD were  
11  
12 matched to records from Health&WealthMOD by matching on a number of variables that  
13  
14 were common to the two datasets. In this case 9 matching variables were chosen: labour force  
15  
16 status, income unit type, type of government pension/support, income quintile, age group,  
17  
18 sex, hours worked per week, highest educational qualification and home ownership – based  
19  
20 upon their strong association with income. Once the records were matched the economic  
21  
22 information from STINMOD was transferred onto the base population of  
23  
24 Health&WealthMOD. For a more detailed account of the process by which  
25  
26 Health&WealthMOD was created see Schofield *et al* [28].  
27  
28  
29

### 30 31 *Measuring poverty* 32

33  
34 To identify the individuals in the 45-64 year old Australian population that were in income  
35  
36 poverty in 2009, an income poverty line based on 50 per cent of the median income unit  
37  
38 income<sup>2</sup> was used in conjunction with OECD-modified equivalence scales [14, 30]. This  
39  
40  
41

---

42  
43 <sup>1</sup> It is not possible to match individuals between STINMOD and the SDAC. Both are based on survey  
44  
45 information and so there would be few respondents in common on both data sources, and the data was collected  
46  
47 at different points in time, meaning that even for the few individuals that may be in common, some variables  
48  
49 will no longer be the same between the SDAC and the surveys underpinning STINMOD. Furthermore, for  
50  
51 privacy reasons exact matching between Australian Bureau of Statistics surveys is prohibited and the Australian  
52  
53 Bureau of Statistics removes all identifying information from individual-level data [26].

54  
55 <sup>2</sup> The income unit is defined by the ABS as “a group of two or more related persons in the same household  
56  
57 assumed to pool their income and savings and share the benefits deriving from them equitably; or one person  
58  
59 assumed to have sole command over his or her income, consumption and savings” [29]  
60

1  
2  
3 income poverty line was calculated from STINMOD, in order to ascertain the poverty line  
4  
5 based upon the entire Australian population. The 50 per cent of median income poverty line  
6  
7 expresses the economic situation of those in poverty relative to those in the middle of the  
8  
9 income distribution. Those who were in income poverty had less than half the income of  
10  
11 those in the middle of the income distribution of the population. The 50 per cent of the  
12  
13 median income has been widely used as a poverty line both in Australia and internationally  
14  
15 [31-33].  
16  
17

18  
19 While we assessed how many individuals were in income poverty, considering an  
20  
21 individual's personal income is not seen as a true reflection of an individual's economic  
22  
23 situation. Within a family, it can be assumed that members pool their economic resources to  
24  
25 the benefit of all members – thus looking at the wider income of the whole family will be  
26  
27 more accurate [34]. Due to this assumption of the sharing of economic resources, the income  
28  
29 unit's income will be used rather than the individual's income in this analysis<sup>3</sup>. **Members of  
30  
31 the same income unit were identified within the SDAC and the personal income of all adult  
32  
33 members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family'  
34  
35 income.**  
36  
37  
38

39  
40 Differences in numbers and composition of families were accommodated for using  
41  
42 equivalence scales [35]. The OECD modified equivalence scale [36] was utilised in this  
43  
44 study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and  
45  
46 over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each  
47  
48 child (person aged under 15 years). The family's income was divided by their equivalence  
49  
50

51  
52  
53 <sup>3</sup> The terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an  
54  
55 income unit as defined above.  
56  
57

1  
2  
3 score, thereby equivalising the income and allowing comparisons between families of  
4  
5 different sizes.  
6  
7

8 If a family is identified as being in income poverty then all family members are considered to  
9  
10 be income poverty. This has important implications for identifying the relationship between  
11  
12 retiring early due to ill health and poverty status – if retiring early due to ill health reduces the  
13  
14 family's income below the poverty line then the entire family is considered to be in income  
15  
16 poverty.  
17  
18

### 19 20 *Statistical analysis*

21  
22 The 45 to 64 year old Australian population were grouped into one of five groups based on  
23  
24 their labour force status: employed full time, employed part time, unemployed (not employed  
25  
26 but looking for work), not in the labour force due to ill health, and not in the labour force due  
27  
28 to other reasons<sup>4</sup>. The proportion of the 45 to 64 year old Australian population who were in  
29  
30 poverty in each group was estimated.  
31  
32

33  
34 Logistic regression models were used to compare the odds of being in poverty for those who  
35  
36 were employed full time, employed part time, unemployed, and not in the labour force for  
37  
38 reasons other than ill health. Not in the labour force due to ill health was used as the reference  
39  
40 group so that the difference in the odds ratio of being in poverty between these individuals  
41  
42  
43  
44  
45

---

46  
47 <sup>4</sup> The 2003 SDAC recorded individual labour force participation. For those who stated they were 'not in the  
48  
49 labour force', their main reason for not being in the labour force was recorded. Response options included:  
50  
51 retired, study or returning to study, own ill health or disability, child care availability or children too young or  
52  
53 prefers to look after them, too old, does not need or want to work, some else's ill health or disability, other  
54  
55 family considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and other. In this  
56  
57 study those who were out of the labour force and stated their main reason for this was their own ill health or  
58  
59 disability were considered to be 'out of the labour force due to ill health'; and those who selected all other  
60  
options were considered to be 'out of the labour force due to other reasons'.

1  
2  
3 and those in other labour force categories could be determined. The outcomes were adjusted  
4  
5 for age group, sex and education (having at least a bachelors degree, or not).  
6  
7

8 The analysis was then limited to those not in the labour force due to ill health. Logistic  
9  
10 regression models were used to compare the odds of being in income poverty for those in  
11  
12 different family types – married with dependants, married without dependants, single with  
13  
14 dependant, single without dependants. Those who were married without dependants were  
15  
16 used as the reference group. The outcomes were adjusted for age group, sex and education  
17  
18 (having at least a bachelors degree, or not).  
19  
20

21  
22 Odds ratios were presented with their 95% confidence intervals and statistical tests were two  
23  
24 sided with the significance set at the 5% level. Population estimates were expressed in the  
25  
26 nearest hundred.  
27  
28

## 29 30 **Results**

31  
32 Within Health&WealthMOD there were 2 242 individuals in income poverty, once weighted  
33  
34 to represent the 45 to 64 year old Australia population in 2009, there were 1.313 million  
35  
36 individuals in income poverty – or 24% of this population.  
37  
38

39  
40 In 2009, there were 431 300 individuals aged 45 to 64 years who were not in the labour force  
41  
42 due to ill health. The majority, 73%, of the individuals who were not in the labour force due  
43  
44 to ill health were in income poverty. Only the unemployed had a greater proportion in income  
45  
46 poverty – 79%. Those employed part-time and full-time had the lowest proportion in income  
47  
48 poverty – 15% and 4% respectively. Around half of the individuals who were out of the  
49  
50 labour force for reasons other than ill health were in income poverty, which is lower  
51  
52 proportion than the 73% of those who were in out of the labour force due to ill health who  
53  
54 were in income poverty.  
55  
56

1  
2  
3 Once adjusted for age, sex and education (Table 1) those who were employed full time,  
4  
5 employed part time, or were out of the labour force for reasons other than ill health were  
6  
7 significantly less likely to be in income poverty than those who were out of the labour force  
8  
9 due to their ill health. The odds ratio of being in income poverty compared to those not in the  
10  
11 labour force due to ill health was very small for those employed full time and part time.  
12  
13 Those employed full time had 0.02 times the odds of being in income poverty compared to  
14  
15 those not in the labour force due to ill health (95% CI: 0.01 – 0.02). However, those not in the  
16  
17 labour force for reasons other than ill health had 0.43 times the odds of being in income  
18  
19 poverty (or had a 57% chance of being in income poverty) compared to those in the labour  
20  
21 force due to ill health (95% CI: 0.33 – 0.56). The unemployed were the only group to not  
22  
23 have significantly different odds of being in income poverty then those not in the labour force  
24  
25 due to ill health (OR 1.26, 95% CI: 0.73 – 2.16).  
26  
27  
28

29  
30 When limited to those not in the labour force due to ill health, a similar proportion of people  
31  
32 who were married without dependants, married with dependants, or single with dependants  
33  
34 were in income poverty (62%, 62% or 59% respectively). However, 90% of those who were  
35  
36 single without dependants were in income poverty. This was also the second largest group in  
37  
38 income poverty (by family type), behind those who were part of a married couple without  
39  
40 dependants (Table 2).  
41  
42  
43

44  
45 After controlling for age, sex and education, those who were single had six times the odds of  
46  
47 being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36).  
48  
49 There was no significant difference in the odds of being in income poverty between those  
50  
51 who were married with dependants, single with dependants, and those who were married  
52  
53 without dependants (Table 2).  
54  
55  
56

1  
2  
3 When taking family members into account, there were 387 100 individuals who were in  
4  
5 income poverty, throughout the Australian population who had a member of their income unit  
6  
7 aged 45 to 64 years who was not in the labour force due to ill health (316, 300 who  
8  
9 themselves are out of the labour force due to ill health, and an additional 173,300 family  
10  
11 members).

## 12 13 14 15 **Discussion**

16  
17 Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to  
18  
19 64 years who are not in the labour force due to their ill health – 316 300 people. The financial  
20  
21 impact of illness related early retirement is not only borne by the individual – it also affects  
22  
23 their entire family with 173 300 individuals in the same family as someone not in the labour  
24  
25 force due to ill health also being in income poverty. Those not in the labour force due to ill  
26  
27 health who were single with no children were the most likely to be in income poverty (90%).  
28  
29 This emphasises the importance of having a partner to share the financial burden of being not  
30  
31 in the labour force due to ill health [37, 38], and also the potential financial reliance people  
32  
33 who are not in the labour force due to ill health have on their partners. Interestingly, those  
34  
35 who were single with dependent children were *not* more likely to be in income poverty than  
36  
37 those who were married. This may be because those who have poor health and dependent  
38  
39 children have higher welfare payments and may have income support from a non-custodian  
40  
41 parent.  
42  
43  
44  
45  
46

47 Other studies linking health and poverty have discussed how the poor generally have worse  
48  
49 health and thus improving the health of these populations should be a goal to create greater  
50  
51 equity in health [39]. What these studies do not take into consideration is the specific impact  
52  
53 that health has on labour force participation, particularly amongst older workers, which can  
54  
55 influence the poverty status of individuals. That is, the impact of ill health on labour force  
56  
57



1  
2  
3 participation (and the associated loss of income and financial resources) is strongly associated  
4  
5 with a higher incidence of poverty. While this study was undertaken using cross-sectional  
6  
7 data it is known that people not in the labour force due to ill health presently have higher  
8  
9 rates of income poverty. Before these people left the labour force it is highly unlikely they  
10  
11 would have been in income poverty – this paper has shown that only 4% and 15% of people  
12  
13 employed full time and part time respectively were in income poverty. As it is known that  
14  
15 health was the reason for exiting the labour force, it can be assumed that health, via its impact  
16  
17 on labour force participation, is a contributing factor to their current poverty status. As such,  
18  
19 addressing the impact of ill health on the labour force participation of older workers may help  
20  
21 to reduce income poverty rates.  
22  
23  
24

25  
26 The difference in the likelihood of being in poverty between those who are not in the labour  
27  
28 force due to ill health and those who are so for other reasons suggests that it is being out of  
29  
30 the labour force due to illness and not just being out of the labour force in general that  
31  
32 increases the individual's chances of being in poverty. Those who are not in the labour force  
33  
34 for reasons other than ill health fare better in terms of their poverty status than those not in  
35  
36 the labour force due to illness. This may be due to the potential for greater choice to be  
37  
38 exercised in whether or not the individual leaves the labour force before the traditional  
39  
40 retirement age (65 years in Australia), and when this transition occurs (i.e. these individual  
41  
42 may decide to leave the labour force early due to a desire to pursue other interests, rather than  
43  
44 being forced to leave due to an inability to work any longer due to restrictions imposed by  
45  
46 illness). Such choice may allow individuals to obtain a level of financial security that keeps  
47  
48 them above the poverty line, for example creating an investment portfolio that provides an  
49  
50 income stream during retirement. Many individuals who retire early due to ill health are not  
51  
52 well financially prepared [40, 41], indeed this is true for many beset by illness [42], and as  
53  
54  
55  
56

1  
2  
3 such may not have financial arrangements in place to finance retirement periods. The onset,  
4  
5 or even long-term experience of ill health may cause families to reduce the financial assets  
6  
7 they have accumulated that may have provided an income stream [43] – for example the sale  
8  
9 of investment properties (and the associated loss of rental income) to finance medical  
10  
11 expenses associated with chronic illness.  
12

13  
14 Further to this, the additional economic burden imposed by illness in terms of medical costs  
15  
16 is not captured by income poverty lines [44]. Those who do not have chronic health  
17  
18 conditions will not have the additional medical expenses of those not in the labour force due  
19  
20 to ill health [45, 46]. The actual disposable income available to those not in the labour force  
21  
22 due to ill health, once essential medical costs are taken into account, may reduce these  
23  
24 individual's income even further and place more families in poverty or push some families  
25  
26 further below the poverty line.  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## References

1. Moser, K., et al., *Unemployment and mortality in Goldblatt P ed. Longitudinal study: mortality and social organisation*. 1990, OPCS: London.
2. Moser, K., et al., *Unemployment and mortality: comparison of the 1971 and 1981 longitudinal census samples*. British Medical Journal, 1987. **1**: p. 86-90.
3. Greatz, *Health consequences of employment and unemployment: longitudinal evidence for young men and women*. Soc Sci Med, 1993. **36**: p. 715-724.
4. Morrell, S., et al., *A cohort study of unemployment as a cause of psychological disturbance in Australian youth*. Soc Sci Med, 1994. **38**: p. 1553-1564.
5. Banks, M., *Unemployment and the risk of minor psychiatric disorder in young people: cross-sectional and longitudinal evidence*. Psychol Med, 1982. **12**: p. 789-798.
6. Linn, M., R. Sandifer, and S. Stein, *Effects of unemployment on mental and physical health*. Am J Pub Hth, 1985. **75**: p. 502-506.
7. Iverson, L., et al., *Unemployment and mortality in Denmark*. British Medical Journal, 1987. **295**: p. 878-884.
8. Frese, M. and G. Mohr, *Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables*. Soc Sci Med, 1987. **25**: p. 173-178.
9. Bartley, M., *Unemployment and ill health: understanding the relationship*. Journal of epidemiology and community health, 1994. **48**(4): p. 333-337.
10. Buddelmeyer, H. and L. Cai, *Interrelated Dynamics of Health and Poverty in Australia*. 2009, Institute for the Study of Labour: Bonn, Germany.
11. McClland, A. and R. Scotton, *Poverty and health*, in *Australian Poverty: Then and now*, R. Fincher and J. Nieuwenhuysen, Editors. 1998, Melbourne University Press: Carlton South.
12. Saunders, P., *Disability, poverty and living standards: reviewing the Australia evidence, SPRC Discussion Paper No. 145*. 2005, Social Policy Research Centre (SPRC): Sydney.
13. Council of Australian Governments National Reform Initiative Working Group, *Human Capital Reform*. 2006, Council of Australian Governments: Canberra.
14. Saunders, P., *Poverty, Income Distribution and Health: An Australian study*, in *SPRC Reports and Proceedings*. 1996, Social Policy Research Centre: Sydney.
15. Schofield, D., et al., *The association between co-morbidities and labour force participation amongst people with back problems*. Pain, 2012. **153**(2012): p. 2068-2072.
16. Schofield, D., et al., *Labour force participation and the influence of having back problems on income poverty in Australia* Spine, 2011. **37**(13): p. 1156-63.
17. Schofield, D., et al., *Labour force participation and the influence of having CVD on income poverty of older workers*. International Journal of Cardiology, 2012. **156**(1): p. 80-83.
18. Schofield, D., et al., *Chronic disease and labour force participation among older Australians*. Medical Journal of Australia, 2008. **189**: p. 447-450.
19. Schofield, D., et al., *Retiring early with Cardiovascular Disease: Impact on the individual's financial assets*. International Journal of Cardiology, In press.
20. Brazenor, R., *Disabilities and Labour Market Earnings in Australia*. Australian Journal of Labour Economics, 2002. **5**(3): p. 319-334.

- 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10
  - 11
  - 12
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18
  - 19
  - 20
  - 21
  - 22
  - 23
  - 24
  - 25
  - 26
  - 27
  - 28
  - 29
  - 30
  - 31
  - 32
  - 33
  - 34
  - 35
  - 36
  - 37
  - 38
  - 39
  - 40
  - 41
  - 42
  - 43
  - 44
  - 45
  - 46
  - 47
  - 48
  - 49
  - 50
  - 51
  - 52
  - 53
  - 54
  - 55
  - 56
  - 57
  - 58
  - 59
  - 60
21. Hagenaaars, A. and K. de Vos, *The definition and measurement of poverty*. The Journal of Human Resources, 1988. **23**(2): p. 211-221.
22. Harding, A., R. Lloyd, and H. Greenwell, *Financial disadvantage in Australian 1990 to 2000: The persistence of poverty in a decade of growth*. 2001, The Smith Family: Camperdown.
23. Australian Bureau of Statistics, *Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue)*. 2005, Australian Bureau of Statistics: Canberra.
24. Australian Institute of Health and Welfare, *Australia's Health, 2010*. 2010, AIHW: Canberra.
25. Percival, R., A. Abello, and Q.N. Vu, *STINMOD (Static Income Model) 2007*, in *Modelling Our Future: Population ageing, health and aged care*, A. Gupta and A. Harding, Editors. 2007, Elsevier B.V.: Amsterdam.
26. National Statistical Service, *Confidentiality: What is it and why is it important?* 2012, Australian Government: Canberra.
27. Rässler, S., *Statistical matching: A frequentist theory, practical applications, and alternative Bayesian approaches*. 2002 New York Springer-Verlag New York, Inc.
28. Schofield, D., et al., *Modelling the cost of ill health in Health&WealthMOD (Version II): lost labour force participation, income and taxation, and the impact of disease prevention*. International Journal of Microsimulation, 2011. **4**(3): p. 32-36.
29. Australian Bureau of Statistics, *Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue)* 2005, ABS: Canberra.
30. De Vos, K. and M.A. Zaidi, *Equivalence scale sensitivity of poverty statistics for the member states of the European community*. Review of Income and Wealth, 1997. **43**(3): p. 319-333.
31. Saunders, P. and B. Bradbury, *Monitoring Trends in Poverty and Income Distribution: Data, Methodology and Measurement*. The Economic Record, 2006. **82**(258): p. 341-64.
32. Saunders, P., T. Hill, and B. Bradbury, *Poverty in Australia: Sensitivity Analysis and Recent Trends*. 2007, SPRC, University of New South Wales: Sydney.
33. Mejer, L. and C. Siermann, *Income poverty in the European Union: Children, gender and poverty gaps*, in *Statistics in focus: population and social conditions*. 2000, Eurostat.
34. Greenwell, H., R. Lloyd, and A. Harding, *An introduction to poverty measurement issues*. 2001, National Centre for Social and Economic Modelling: Canberra.
35. Trigger, D., *Does the way we measure poverty matter?*, in *Discussion Paper no. 59*. 2003, NATSEM: Canberra.
36. Hagenaaars, A., K. de Vos, and M.A. Zaidi, *Poverty Statistics in the Late 1980s: Research Based on Micro-data*. 1994, Office for Official Publications of the European Communities.: Luxembourg.
37. Henkens, K., *Retirement intentions and spousal support: A multi-actor approach*. Journal of Gerontology: Social Sciences, 1999. **54B**(2): p. S63-S73.
38. Australian Bureau of Statistics, *Summary of Findings*, in *Retirement and retirement intentions, Australia, July 2006 to June 2007 ABS Cat. No. 6238.0*. 2008, ABS: Canberra.

- 1  
2  
3 39. Organisation for Economic Co-operation and Development (OECD) and the World  
4 Health Organisation (WHO), *Poverty and health*, in *DAC Guidelines and Reference*  
5 *Series*. 2003, OECD: Paris.
- 6 40. Kelly, S., et al., *The impact of illness on retirement living standards*. The Economic  
7 Record, 2012. **88**(283): p. 576-584.
- 8 41. Schofield, D., et al., *The financial vulnerability of individuals with diabetes*. The  
9 British Journal of Diabetes and Vascular Disease, 2010. **10**(6): p. 300-304.
- 10 42. Swoboda, S.M. and P.A. Lipsett, *Impact of a prolonged surgical critical illness on*  
11 *patients' families*. American Journal of Critical Care, 2002. **11**(5): p. 459-466.
- 12 43. Mills, A. and S. Shillcutt, *Communicable diseases*, in *Global crises, global solutions*,  
13 B. Lomborg, Editor. 2004, Cambridge University Press: Cambridge.
- 14 44. Saunders, P., *The costs of disability and the incidence of poverty*, *SPRC Discussion*  
15 *Paper No. 147*. 2006, Social Policy Research Centre (SPRC): Sydney.
- 16 45. Graham, S. and C. Stapleton, *The extra costs of disability*, in *Social Policy in*  
17 *Australia, What future for the welfare state?*, P. Saunders, Editor. 1990, Social Policy  
18 Research Centre, University of New South Wales: Sydney. p. 103-112.
- 19 46. Wightman, P. and F. Robertson, *Costs of disability. A survey of the costs of disability*  
20 *for people with disabilities in labour force related activity*, *Policy Research Paper*  
21 *No.59*. 1996, Social Policy Research Centre (SPRC): Sydney.
- 22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Table 1: Odds ratio of being in poverty, adjusted for age, sex and education for the Australian population aged 45 to 64 years, 2003**

<b>Employment Status</b>	<b>Weighted population</b>	<b>% of population in poverty</b>	<b>OR of being in poverty</b>	<b>95% CI</b>	<b>P-value</b>
Not in the labour force due to ill health	431 300	73	REFERENCE		
Employed Full Time	2 657 000	4	0.02	0.01 – 0.02	<.0001
Employed Part Time	961 800	15	0.08	0.06 – 0.10	<.0001
Unemployed	107 300	79	1.26	0.73 – 2.16	0.4021
Not in the labour force due to other reasons	1 266 600	51	0.43	0.33 – 0.56	<.0001

**Table 2: Odds Ratio of being in income poverty compared to those married with dependant children<sup>1</sup>, 45 to 64 year old population not in the labour force due to ill health.**

<b>Family type</b>	<b>Weighted population NOT in poverty</b>	<b>Weighted population in poverty</b>	<b>% of population in poverty</b>	<b>OR</b>	<b>95% CI</b>	<b>P-value</b>
<i>Married couple only</i>	75 700	123 500	62		REFERENCE	
<i>Married with dependents</i>	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
<i>One person</i>	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
<i>One parent, dependents</i>	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

<sup>1</sup>OR adjusted for age, sex and education.

1  
2  
3  
4  
5 **Premature retirement due to ill health and income poverty: a cross-**  
6 **sectional study of older workers**  
7

8 Deborah J. Schofield<sup>1\*</sup>, Emily J. Callander<sup>1</sup>, Rupendra N. Shrestha<sup>1</sup>, Richard Percival<sup>2</sup>,  
9 Simon J. Kelly<sup>2</sup>, Megan E. Passey<sup>3</sup>  
10  
11

12 <sup>1</sup>NHMRC Clinical Trials Centre, University of Sydney, Locked Bag 77, Camperdown NSW  
13 1450, Australia  
14

15 <sup>2</sup>National Centre for Social and Economic Modelling, University of Canberra, ACT 2601,  
16 Australia  
17

18 <sup>3</sup>University Centre for Rural Health (North Coast), University of Sydney, 91 Uralba St,  
19 Lismore NSW 2480, Australia  
20

21 \*Corresponding author details:  
22

23 Emily Callander  
24 NHMRC Clinical Trials Centre  
25 Locked Bag 77  
26 Camperdown NSW 1450 Australia  
27 Ph: 61 2 9562 5068  
28 Fax: 61 2 9565 1863  
29 Email:: emily.callander@ctc.usyd.edu.au  
30

31 Email Addresses:  
32

33 DJS: [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au)  
34 EJC: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)  
35 RNS: [rupendra.shrestha@ctc.usyd.edu.au](mailto:rupendra.shrestha@ctc.usyd.edu.au)  
36 RP: [richard.percival@natsem.canberra.edu.au](mailto:richard.percival@natsem.canberra.edu.au)  
37 SJK: [simon@kellyresearch.com.au](mailto:simon@kellyresearch.com.au)  
38 MEP: [megan.passey@ucrh.edu.au](mailto:megan.passey@ucrh.edu.au)  
39

40 Ethics approval  
41

42 The use of the data in this manuscript was approved by the Australian Bureau of Statistics,  
43 with data for public release approved by the Microdata Review Committee.  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60



## Abstract:

### Background

Illness may interrupt older workers lifestyles, forcing them to retire prematurely. Exiting the labour force because of ill health is likely to affect the living standards of older workers by reducing income and increasing the likelihood of being in poverty.

### Methods

Using a microsimulation model of the 2009 Australian population (Health&WealthMOD) the income poverty status of Australians who were aged between 45 and 64 years and were out of the labour force due to ill health was assessed, along with the characteristics of their family members. This was done using the 50% of the median equivalised income unit income poverty line.

### Results

It was found that individuals who had retired due to other reasons early were significantly less likely to be in income poverty than those retired due to ill health (OR 0.43 95%CI: 0.33 – 0.51), and there was no significant difference in the likelihood of being in income poverty between these individuals and the unemployed. Being in the same family as someone who is retired due to illness also significantly increases an individual's chance of being in income poverty.

### Conclusions

It can be seen that being retired due to illness impacts both the individual and their family.

KEYWORDS: Poverty, retirement, health

## Background

The health, unemployment and poverty relationship is complex and multidimensional.

Unemployment was found to lead to poor health in a longitudinal British study in the 1980s [1, 2], with Australian studies later also demonstrating the adverse impacts of unemployment on mental health [3-7]. There is additional evidence from the UK, Denmark, Germany and the United States of unemployment leading to depression, anxiety, cardiovascular disease, lung cancer, accidents and suicide [3, 4, 6-9]. Similarly, being in income poverty can also have a detrimental effect on overall health status [10-12].

However, there is a small body of evidence of the inverse relationship, with ill health being identified as having a significant negative impact on people's labour force participation and income [13-17]. However, it is not known how this impact on labour force participation affects income poverty status.

The potential for ill health to lead an individual into income poverty is important as chronic health conditions will affect the majority of individuals living in western countries at some stage of their lives. For some of these individuals, the conditions may be severe enough to interrupt their normal working lifestyles, including forcing some individuals out of the labour force prematurely. Those aged 45-64 years who have a chronic health condition are significantly more likely to be out of the labour force due to ill health than those without a chronic health condition [18].

Exiting the labour force because of ill health is already known to be associated with poorer financial conditions both now and in the future [19, 20], so ill health has the potential to be a major driver of income poverty. Poverty is seen as a benchmark indicator of living standards within modern society [21]. To be labelled as being in income poverty comes with an

1  
2  
3 understanding by wider society that an individual is not coping financially and they have  
4 inadequate economic resources to support a decent standard of living [22]. Leaving the  
5 workforce due to ill health may increase the chance of living in income poverty due to their  
6 poorer financial status. This paper will examine the relationship between being out of the  
7 labour force due to ill health and being in income poverty amongst members of the older  
8 working aged population. It is well established that unemployment and low income can lead  
9 to ill health, however there has been little research on exploring the potential of ill health to  
10 be a driver of income poverty, through employment status. It will also assess how retiring due  
11 to ill health can place other family members in income poverty.  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23

## 24 **Methods**

25  
26 This paper uses a microsimulation model – Health&WealthMOD to assess the poverty status  
27 of those who were aged between 45 and 64 years and had retired due to ill health.  
28  
29

### 30 *Data source - Health&WealthMOD*

31  
32  
33  
34  
35 Within Australia, there is no nationally-representative data that contains detailed information  
36 on both health status, income, poverty and not being in the labour force due to ill health. To  
37 fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of  
38 Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the  
39 Australian Bureau of Statistics [23] that contains detailed information on chronic health  
40 condition, reasons for not being in the labour force and individual income range – and  
41 STINMOD – a nationally representative microsimulation model of continuous income, taxes,  
42 benefits and wealth. Health&WealthMOD is a nationally representative microsimulation  
43 model of 45 – 64 years old Australians in 2009 and captures their disability and illness status,  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 as well as detailed income information, labour force status, reasons for not being in the  
4  
5 workforce and poverty status.  
6  
7

8 Information on 45 to 64 years olds and their family members were taken from the SDAC to  
9  
10 form the base population of Health&WealthMOD. The records were then up-rated to  
11  
12 represent the 2009 population, accounting for the changes in demographics that had taken  
13  
14 place between 2003 and 2009. The up-rating only accounted for the change in the number of  
15  
16 people reporting health conditions that was due to the ageing of the population. Any change  
17  
18 in the number of people reporting health conditions between 2003 and 2009 that was related  
19  
20 to trend increases or decline in illness were not captured by up-rating. However, the  
21  
22 proportion of the Australian population reporting a long term health condition has remained  
23  
24 stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe  
25  
26 that the portion of people reporting a long term health condition would increase between  
27  
28 2003 and 2009 [24] beyond the impact of age.  
29  
30  
31  
32

33 This base population of Health&WealthMOD was then combined with STINMOD, another  
34  
35 microsimulation model that contains detailed economic information. STINMOD is  
36  
37 Australia's leading static microsimulation model of nationally representative tax and cash  
38  
39 transfer information [25], which is maintained and further developed for the Commonwealth  
40  
41 by the National Centre for Social and Economic Modelling and is routinely used by  
42  
43 Commonwealth departments for assessing the distributional and revenue implications of tax  
44  
45 and cash transfer reforms. The model operates at the 'micro' level of families and individuals,  
46  
47 and uses Australian Bureau of Statistics income survey unit record files as the base  
48  
49 population. STINMOD contains a range of additional economic information such as  
50  
51 continuous data on individual income, government support payments, income tax liability,  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 values of individuals' financial assets such as cash, superannuation, shares, property  
4  
5 investment and owner occupied home.  
6  
7

8 The economic information from STINMOD was linked to the base population by a  
9  
10 microsimulation method call synthetic matching<sup>1</sup> [27]. Records from STINMOD were  
11  
12 matched to records from Health&WealthMOD by matching on a number of variables that  
13  
14 were common to the two datasets. In this case 9 matching variables were chosen: labour force  
15  
16 status, income unit type, type of government pension/support, income quintile, age group,  
17  
18 sex, hours worked per week, highest educational qualification and home ownership – based  
19  
20 upon their strong association with income. Once the records were matched the economic  
21  
22 information from STINMOD was transferred onto the base population of  
23  
24 Health&WealthMOD. For a more detailed account of the process by which  
25  
26 Health&WealthMOD was created see Schofield *et al* [28].  
27  
28  
29

### 30 31 *Measuring poverty* 32 33

34 To identify the individuals in the 45-64 year old Australian population that were in income  
35  
36 poverty in 2009, an income poverty line based on 50 per cent of the median income unit  
37  
38 income<sup>2</sup> was used in conjunction with OECD-modified equivalence scales [14, 30]. This  
39  
40  
41

---

42  
43 <sup>1</sup> It is not possible to match individuals between STINMOD and the SDAC. Both are based on survey  
44  
45 information and so there would be few respondents in common on both data sources, and the data was collected  
46  
47 at different points in time, meaning that even for the few individuals that may be in common, some variables  
48  
49 will no longer be the same between the SDAC and the surveys underpinning STINMOD. Furthermore, for  
50  
51 privacy reasons exact matching between Australian Bureau of Statistics surveys is prohibited and the Australian  
52  
53 Bureau of Statistics removes all identifying information from individual-level data [26].

52  
53 <sup>2</sup> The income unit is defined by the ABS as “a group of two or more related persons in the same household  
54  
55 assumed to pool their income and savings and share the benefits deriving from them equitably; or one person  
56  
57 assumed to have sole command over his or her income, consumption and savings” [29]  
58  
59  
60

1  
2  
3 income poverty line was calculated from STINMOD, in order to ascertain the poverty line  
4  
5 based upon the entire Australian population. The 50 per cent of median income poverty line  
6  
7 expresses the economic situation of those in poverty relative to those in the middle of the  
8  
9 income distribution. Those who were in income poverty had less than half the income of  
10  
11 those in the middle of the income distribution of the population. The 50 per cent of the  
12  
13 median income has been widely used as a poverty line both in Australia and internationally  
14  
15 [31-33].  
16  
17

18  
19 While we assessed how many individuals were in income poverty, considering an  
20  
21 individual's personal income is not seen as a true reflection of an individual's economic  
22  
23 situation. Within a family, it can be assumed that members pool their economic resources to  
24  
25 the benefit of all members – thus looking at the wider income of the whole family will be  
26  
27 more accurate [34]. Due to this assumption of the sharing of economic resources, the income  
28  
29 unit's income will be used rather than the individual's income in this analysis<sup>3</sup>. **Members of  
30  
31 the same income unit were identified within the SDAC and the personal income of all adult  
32  
33 members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family'  
34  
35 income.**  
36  
37  
38  
39

40 Differences in numbers and composition of families were accommodated for using  
41  
42 equivalence scales [35]. The OECD modified equivalence scale [36] was utilised in this  
43  
44 study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and  
45  
46 over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each  
47  
48 child (person aged under 15 years). The family's income was divided by their equivalence  
49  
50

51  
52  
53 <sup>3</sup> The terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an  
54  
55 income unit as defined above.  
56  
57

1  
2  
3 score, thereby equivalising the income and allowing comparisons between families of  
4  
5 different sizes.  
6  
7

8 If a family is identified as being in income poverty then all family members are considered to  
9  
10 be income poverty. This has important implications for identifying the relationship between  
11  
12 retiring early due to ill health and poverty status – if retiring early due to ill health reduces the  
13  
14 family's income below the poverty line then the entire family is considered to be in income  
15  
16 poverty.  
17  
18

### 19 20 *Statistical analysis*

21  
22 The 45 to 64 year old Australian population were grouped into one of five groups based on  
23  
24 their labour force status: employed full time, employed part time, unemployed (not employed  
25  
26 but looking for work), not in the labour force due to ill health, and not in the labour force due  
27  
28 to other reasons<sup>4</sup>. The proportion of the 45 to 64 year old Australian population who were in  
29  
30 poverty in each group was estimated.  
31  
32

33  
34 Logistic regression models were used to compare the odds of being in poverty for those who  
35  
36 were employed full time, employed part time, unemployed, and not in the labour force for  
37  
38 reasons other than ill health. Not in the labour force due to ill health was used as the reference  
39  
40 group so that the difference in the odds ratio of being in poverty between these individuals  
41  
42  
43  
44

---

45  
46 <sup>4</sup> The 2003 SDAC recorded individual labour force participation. For those who stated they were 'not in the  
47  
48 labour force', their main reason for not being in the labour force was recorded. Response options included:  
49  
50 retired, study or returning to study, own ill health or disability, child care availability or children too young or  
51  
52 prefers to look after them, too old, does not need or want to work, some else's ill health or disability, other  
53  
54 family considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and other. In this  
55  
56 study those who were out of the labour force and stated their main reason for this was their own ill health or  
57  
58 disability were considered to be 'out of the labour force due to ill health'; and those who selected all other  
59  
60 options were considered to be 'out of the labour force due to other reasons'.

1  
2  
3 and those in other labour force categories could be determined. The outcomes were adjusted  
4  
5 for age group, sex and education (having at least a bachelors degree, or not).  
6  
7

8 The analysis was then limited to those not in the labour force due to ill health. Logistic  
9  
10 regression models were used to compare the odds of being in income poverty for those in  
11  
12 different family types – married with dependants, married without dependants, single with  
13  
14 dependant, single without dependants. Those who were married without dependants were  
15  
16 used as the reference group. The outcomes were adjusted for age group, sex and education  
17  
18 (having at least a bachelors degree, or not).  
19  
20  
21

22 Odds ratios were presented with their 95% confidence intervals and statistical tests were two  
23  
24 sided with the significance set at the 5% level. Population estimates were expressed in the  
25  
26 nearest hundred.  
27  
28

## 29 30 **Results**

31  
32 Within Health&WealthMOD there were 2 242 individuals in income poverty, once weighted  
33  
34 to represent the 45 to 64 year old Australia population in 2009, there were 1.313 million  
35  
36 individuals in income poverty – or 24% of this population.  
37  
38

39  
40 In 2009, there were 431 300 individuals aged 45 to 64 years who were not in the labour force  
41  
42 due to ill health. The majority, 73%, of the individuals who were not in the labour force due  
43  
44 to ill health were in income poverty. Only the unemployed had a greater proportion in income  
45  
46 poverty – 79%. Those employed part-time and full-time had the lowest proportion in income  
47  
48 poverty – 15% and 4% respectively. Around half of the individuals who were out of the  
49  
50 labour force for reasons other than ill health were in income poverty, which is lower  
51  
52 proportion than the 73% of those who were in out of the labour force due to ill health who  
53  
54 were in income poverty.  
55  
56



1  
2  
3 Once adjusted for age, sex and education (Table 1) those who were employed full time,  
4  
5 employed part time, or were out of the labour force for reasons other than ill health were  
6  
7 significantly less likely to be in income poverty than those who were out of the labour force  
8  
9 due to their ill health. The odds ratio of being in income poverty compared to those not in the  
10  
11 labour force due to ill health was very small for those employed full time and part time.  
12  
13 Those employed full time had 0.02 times the odds of being in income poverty compared to  
14  
15 those not in the labour force due to ill health (95% CI: 0.01 – 0.02). However, those not in the  
16  
17 labour force for reasons other than ill health had 0.43 times the odds of being in income  
18  
19 poverty (or had a 57% chance of being in income poverty) compared to those in the labour  
20  
21 force due to ill health (95% CI: 0.33 – 0.56). The unemployed were the only group to not  
22  
23 have significantly different odds of being in income poverty then those not in the labour force  
24  
25 due to ill health (OR 1.26, 95% CI: 0.73 – 2.16).  
26  
27  
28

29  
30 When limited to those not in the labour force due to ill health, a similar proportion of people  
31  
32 who were married without dependants, married with dependants, or single with dependants  
33  
34 were in income poverty (62%, 62% or 59% respectively). However, 90% of those who were  
35  
36 single without dependants were in income poverty. This was also the second largest group in  
37  
38 income poverty (by family type), behind those who were part of a married couple without  
39  
40 dependants (Table 2).  
41  
42

43  
44 After controlling for age, sex and education, those who were single had six times the odds of  
45  
46 being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36).  
47  
48 There was no significant difference in the odds of being in income poverty between those  
49  
50 who were married with dependants, single with dependants, and those who were married  
51  
52 without dependants (Table 2).  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 When taking family members into account, there were 387 100 individuals who were in  
4  
5 income poverty, throughout the Australian population who had a member of their income unit  
6  
7 aged 45 to 64 years who was not in the labour force due to ill health (316, 300 who  
8  
9 themselves are out of the labour force due to ill health, and an additional 173,300 family  
10  
11 members).

## 12 13 14 15 **Discussion**

16  
17 Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to  
18  
19 64 years who are not in the labour force due to their ill health – 316 300 people. The financial  
20  
21 impact of illness related early retirement is not only borne by the individual – it also affects  
22  
23 their entire family with 173 300 individuals in the same family as someone not in the labour  
24  
25 force due to ill health also being in income poverty. Those not in the labour force due to ill  
26  
27 health who were single with no children were the most likely to be in income poverty (90%).  
28  
29 This emphasises the importance of having a partner to share the financial burden of being not  
30  
31 in the labour force due to ill health [37, 38], and also the potential financial reliance people  
32  
33 who are not in the labour force due to ill health have on their partners. Interestingly, those  
34  
35 who were single with dependent children were *not* more likely to be in income poverty than  
36  
37 those who were married. This may be because those who have poor health and dependent  
38  
39 children have higher welfare payments and may have income support from a non-custodian  
40  
41 parent.  
42  
43  
44  
45  
46

47 Other studies linking health and poverty have discussed how the poor generally have worse  
48  
49 health and thus improving the health of these populations should be a goal to create greater  
50  
51 equity in health [39]. What these studies do not take into consideration is the specific impact  
52  
53 that health has on labour force participation, particularly amongst older workers, which can  
54  
55 influence the poverty status of individuals. That is, the impact of ill health on labour force  
56  
57

1  
2  
3 participation (and the associated loss of income and financial resources) is strongly associated  
4  
5 with a higher incidence of poverty. While this study was undertaken using cross-sectional  
6  
7 data it is known that people not in the labour force due to ill health presently have higher  
8  
9 rates of income poverty. Before these people left the labour force it is highly unlikely they  
10  
11 would have been in income poverty – this paper has shown that only 4% and 15% of people  
12  
13 employed full time and part time respectively were in income poverty. As it is known that  
14  
15 health was the reason for exiting the labour force, it can be assumed that health, via its impact  
16  
17 on labour force participation, is a contributing factor to their current poverty status. As such,  
18  
19 addressing the impact of ill health on the labour force participation of older workers may help  
20  
21 to reduce income poverty rates.  
22  
23  
24

25  
26 The difference in the likelihood of being in poverty between those who are not in the labour  
27  
28 force due to ill health and those who are so for other reasons suggests that it is being out of  
29  
30 the labour force due to illness and not just being out of the labour force in general that  
31  
32 increases the individual's chances of being in poverty. Those who are not in the labour force  
33  
34 for reasons other than ill health fare better in terms of their poverty status than those not in  
35  
36 the labour force due to illness. This may be due to the potential for greater choice to be  
37  
38 exercised in whether or not the individual leaves the labour force before the traditional  
39  
40 retirement age (65 years in Australia), and when this transition occurs (i.e. these individual  
41  
42 may decide to leave the labour force early due to a desire to pursue other interests, rather than  
43  
44 being forced to leave due to an inability to work any longer due to restrictions imposed by  
45  
46 illness). Such choice may allow individuals to obtain a level of financial security that keeps  
47  
48 them above the poverty line, for example creating an investment portfolio that provides an  
49  
50 income stream during retirement. Many individuals who retire early due to ill health are not  
51  
52 well financially prepared [40, 41], indeed this is true for many beset by illness [42], and as  
53  
54  
55  
56

1  
2  
3 such may not have financial arrangements in place to finance retirement periods. The onset,  
4  
5 or even long-term experience of ill health may cause families to reduce the financial assets  
6  
7 they have accumulated that may have provided an income stream [43] – for example the sale  
8  
9 of investment properties (and the associated loss of rental income) to finance medical  
10  
11 expenses associated with chronic illness.  
12

13  
14 Further to this, the additional economic burden imposed by illness in terms of medical costs  
15  
16 is not captured by income poverty lines [44]. Those who do not have chronic health  
17  
18 conditions will not have the additional medical expenses of those not in the labour force due  
19  
20 to ill health [45, 46]. The actual disposable income available to those not in the labour force  
21  
22 due to ill health, once essential medical costs are taken into account, may reduce these  
23  
24 individual's income even further and place more families in poverty or push some families  
25  
26 further below the poverty line.  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## References

1. Moser, K., et al., *Unemployment and mortality in Goldblatt P ed. Longitudinal study: mortality and social organisation*. 1990, OPCS: London.
2. Moser, K., et al., *Unemployment and mortality: comparison of the 1971 and 1981 longitudinal census samples*. British Medical Journal, 1987. **1**: p. 86-90.
3. Greatz, *Health consequences of employment and unemployment: longitudinal evidence for young men and women*. Soc Sci Med, 1993. **36**: p. 715-724.
4. Morrell, S., et al., *A cohort study of unemployment as a cause of psychological disturbance in Australian youth*. Soc Sci Med, 1994. **38**: p. 1553-1564.
5. Banks, M., *Unemployment and the risk of minor psychiatric disorder in young people: cross-sectional and longitudinal evidence*. Psychol Med, 1982. **12**: p. 789-798.
6. Linn, M., R. Sandifer, and S. Stein, *Effects of unemployment on mental and physical health*. Am J Pub Hth, 1985. **75**: p. 502-506.
7. Iverson, L., et al., *Unemployment and mortality in Denmark*. British Medical Journal, 1987. **295**: p. 878-884.
8. Frese, M. and G. Mohr, *Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables*. Soc Sci Med, 1987. **25**: p. 173-178.
9. Bartley, M., *Unemployment and ill health: understanding the relationship*. Journal of epidemiology and community health, 1994. **48**(4): p. 333-337.
10. Buddelmeyer, H. and L. Cai, *Interrelated Dynamics of Health and Poverty in Australia*. 2009, Institute for the Study of Labour: Bonn, Germany.
11. McClland, A. and R. Scotton, *Poverty and health*, in *Australian Poverty: Then and now*, R. Fincher and J. Nieuwenhuysen, Editors. 1998, Melbourne University Press: Carlton South.
12. Saunders, P., *Disability, poverty and living standards: reviewing the Australia evidence, SPRC Discussion Paper No. 145*. 2005, Social Policy Research Centre (SPRC): Sydney.
13. Council of Australian Governments National Reform Initiative Working Group, *Human Capital Reform*. 2006, Council of Australian Governments: Canberra.
14. Saunders, P., *Poverty, Income Distribution and Health: An Australian study*, in *SPRC Reports and Proceedings*. 1996, Social Policy Research Centre: Sydney.
15. Schofield, D., et al., *The association between co-morbidities and labour force participation amongst people with back problems*. Pain, 2012. **153**(2012): p. 2068-2072.
16. Schofield, D., et al., *Labour force participation and the influence of having back problems on income poverty in Australia* Spine, 2011. **37**(13): p. 1156-63.
17. Schofield, D., et al., *Labour force participation and the influence of having CVD on income poverty of older workers*. International Journal of Cardiology, 2012. **156**(1): p. 80-83.
18. Schofield, D., et al., *Chronic disease and labour force participation among older Australians*. Medical Journal of Australia, 2008. **189**: p. 447-450.
19. Schofield, D., et al., *Retiring early with Cardiovascular Disease: Impact on the individual's financial assets*. International Journal of Cardiology, In press.
20. Brazenor, R., *Disabilities and Labour Market Earnings in Australia*. Australian Journal of Labour Economics, 2002. **5**(3): p. 319-334.

- 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10
  - 11
  - 12
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18
  - 19
  - 20
  - 21
  - 22
  - 23
  - 24
  - 25
  - 26
  - 27
  - 28
  - 29
  - 30
  - 31
  - 32
  - 33
  - 34
  - 35
  - 36
  - 37
  - 38
  - 39
  - 40
  - 41
  - 42
  - 43
  - 44
  - 45
  - 46
  - 47
  - 48
  - 49
  - 50
  - 51
  - 52
  - 53
  - 54
  - 55
  - 56
  - 57
  - 58
  - 59
  - 60
21. Hagenaaars, A. and K. de Vos, *The definition and measurement of poverty*. The Journal of Human Resources, 1988. **23**(2): p. 211-221.
22. Harding, A., R. Lloyd, and H. Greenwell, *Financial disadvantage in Australian 1990 to 2000: The persistence of poverty in a decade of growth*. 2001, The Smith Family: Camperdown.
23. Australian Bureau of Statistics, *Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue)*. 2005, Australian Bureau of Statistics: Canberra.
24. Australian Institute of Health and Welfare, *Australia's Health, 2010*. 2010, AIHW: Canberra.
25. Percival, R., A. Abello, and Q.N. Vu, *STINMOD (Static Income Model) 2007*, in *Modelling Our Future: Population ageing, health and aged care*, A. Gupta and A. Harding, Editors. 2007, Elsevier B.V.: Amsterdam.
26. National Statistical Service, *Confidentiality: What is it and why is it important?* 2012, Australian Government: Canberra.
27. Rässler, S., *Statistical matching: A frequentist theory, practical applications, and alternative Bayesian approaches*. 2002 New York Springer-Verlag New York, Inc.
28. Schofield, D., et al., *Modelling the cost of ill health in Health&WealthMOD (Version II): lost labour force participation, income and taxation, and the impact of disease prevention*. International Journal of Microsimulation, 2011. **4**(3): p. 32-36.
29. Australian Bureau of Statistics, *Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue)* 2005, ABS: Canberra.
30. De Vos, K. and M.A. Zaidi, *Equivalence scale sensitivity of poverty statistics for the member states of the European community*. Review of Income and Wealth, 1997. **43**(3): p. 319-333.
31. Saunders, P. and B. Bradbury, *Monitoring Trends in Poverty and Income Distribution: Data, Methodology and Measurement*. The Economic Record, 2006. **82**(258): p. 341-64.
32. Saunders, P., T. Hill, and B. Bradbury, *Poverty in Australia: Sensitivity Analysis and Recent Trends*. 2007, SPRC, University of New South Wales: Sydney.
33. Mejer, L. and C. Siermann, *Income poverty in the European Union: Children, gender and poverty gaps*, in *Statistics in focus: population and social conditions*. 2000, Eurostat.
34. Greenwell, H., R. Lloyd, and A. Harding, *An introduction to poverty measurement issues*. 2001, National Centre for Social and Economic Modelling: Canberra.
35. Trigger, D., *Does the way we measure poverty matter?*, in *Discussion Paper no. 59*. 2003, NATSEM: Canberra.
36. Hagenaaars, A., K. de Vos, and M.A. Zaidi, *Poverty Statistics in the Late 1980s: Research Based on Micro-data*. 1994, Office for Official Publications of the European Communities.: Luxembourg.
37. Henkens, K., *Retirement intentions and spousal support: A multi-actor approach*. Journal of Gerontology: Social Sciences, 1999. **54B**(2): p. S63-S73.
38. Australian Bureau of Statistics, *Summary of Findings*, in *Retirement and retirement intentions, Australia, July 2006 to June 2007 ABS Cat. No. 6238.0*. 2008, ABS: Canberra.

- 1  
2  
3 39. Organisation for Economic Co-operation and Development (OECD) and the World  
4 Health Organisation (WHO), *Poverty and health*, in *DAC Guidelines and Reference*  
5 *Series*. 2003, OECD: Paris.
- 6 40. Kelly, S., et al., *The impact of illness on retirement living standards*. The Economic  
7 Record, 2012. **88**(283): p. 576-584.
- 8 41. Schofield, D., et al., *The financial vulnerability of individuals with diabetes*. The  
9 British Journal of Diabetes and Vascular Disease, 2010. **10**(6): p. 300-304.
- 10 42. Swoboda, S.M. and P.A. Lipsett, *Impact of a prolonged surgical critical illness on*  
11 *patients' families*. American Journal of Critical Care, 2002. **11**(5): p. 459-466.
- 12 43. Mills, A. and S. Shillcutt, *Communicable diseases*, in *Global crises, global solutions*,  
13 B. Lomborg, Editor. 2004, Cambridge University Press: Cambridge.
- 14 44. Saunders, P., *The costs of disability and the incidence of poverty*, *SPRC Discussion*  
15 *Paper No. 147*. 2006, Social Policy Research Centre (SPRC): Sydney.
- 16 45. Graham, S. and C. Stapleton, *The extra costs of disability*, in *Social Policy in*  
17 *Australia, What future for the welfare state?*, P. Saunders, Editor. 1990, Social Policy  
18 Research Centre, University of New South Wales: Sydney. p. 103-112.
- 19 46. Wightman, P. and F. Robertson, *Costs of disability. A survey of the costs of disability*  
20 *for people with disabilities in labour force related activity*, *Policy Research Paper*  
21 *No.59*. 1996, Social Policy Research Centre (SPRC): Sydney.
- 22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Table 1: Odds ratio of being in poverty, adjusted for age, sex and education for the Australian population aged 45 to 64 years, 2003**

<b>Employment Status</b>	<b>Weighted population</b>	<b>% of population in poverty</b>	<b>OR of being in poverty</b>	<b>95% CI</b>	<b>P-value</b>
Not in the labour force due to ill health	431 300	73	REFERENCE		
Employed Full Time	2 657 000	4	0.02	0.01 – 0.02	<.0001
Employed Part Time	961 800	15	0.08	0.06 – 0.10	<.0001
Unemployed	107 300	79	1.26	0.73 – 2.16	0.4021
Not in the labour force due to other reasons	1 266 600	51	0.43	0.33 – 0.56	<.0001



**Table 2: Odds Ratio of being in income poverty compared to those married with dependant children<sup>1</sup>, 45 to 64 year old population not in the labour force due to ill health.**

<b>Family type</b>	<b>Weighted population NOT in poverty</b>	<b>Weighted population in poverty</b>	<b>% of population in poverty</b>	<b>OR</b>	<b>95% CI</b>	<b>P-value</b>
<i>Married couple only</i>	75 700	123 500	62		REFERENCE	
<i>Married with dependents</i>	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
<i>One person</i>	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
<i>One parent, dependents</i>	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

<sup>1</sup>OR adjusted for age, sex and education.



**Premature retirement due to ill health and poverty: a cross-sectional study of older workers**

Journal:	<i>BMJ Open</i>
Manuscript ID:	bmjopen-2013-002683.R2
Article Type:	Research
Date Submitted by the Author:	18-Apr-2013
Complete List of Authors:	Schofield, Deborah; University of Sydney, NHMRC Clinical Trials Centre Callander, Emily; University of Sydney, NHMRC Clinical Trials Centre Shrestha, Rupendra; University of Sydney, NHMRC Clinical Trials Centre Percival, Richard; University of Canberra, National Centre for Social and Economic Modelling Kelly, Simon; University of Canberra, National Centre for Social and Economic Modelling Passey, Megan; University of Sydney, University Centre for Rural Health (North Coast)
<b>Primary Subject Heading</b>:	Health economics
Secondary Subject Heading:	Public health, Occupational and environmental medicine
Keywords:	HEALTH ECONOMICS, PUBLIC HEALTH, PREVENTIVE MEDICINE

SCHOLARONE™  
Manuscripts

## Premature retirement due to ill health and poverty: a cross-sectional study of older workers

Deborah J. Schofield<sup>1\*</sup>, Emily J. Callander<sup>1</sup>, Rupendra N. Shrestha<sup>1</sup>, Richard Percival<sup>2</sup>,  
Simon J. Kelly<sup>2</sup>, Megan E. Passey<sup>3</sup>

<sup>1</sup>NHMRC Clinical Trials Centre, University of Sydney, Locked Bag 77, Camperdown NSW  
1450, Australia

<sup>2</sup>National Centre for Social and Economic Modelling, University of Canberra, ACT 2601,  
Australia

<sup>3</sup>University Centre for Rural Health (North Coast), University of Sydney, 91 Uralba St,  
Lismore NSW 2480, Australia

### \*Corresponding author details:

Emily Callander  
NHMRC Clinical Trials Centre  
Locked Bag 77  
Camperdown NSW 1450 Australia  
Ph: 61 2 9562 5068  
Fax: 61 2 9565 1863  
Email:: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)

### Email Addresses:

DJS: [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au)  
EJC: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)  
RNS: [rupendra.shrestha@ctc.usyd.edu.au](mailto:rupendra.shrestha@ctc.usyd.edu.au)  
RP: [richard.percival@natsem.canberra.edu.au](mailto:richard.percival@natsem.canberra.edu.au)  
SJK: [simon@kellyresearch.com.au](mailto:simon@kellyresearch.com.au)  
MEP: [megan.passey@ucrh.edu.au](mailto:megan.passey@ucrh.edu.au)

### Ethics approval

The use of the data in this manuscript was approved by the Australian Bureau of Statistics,  
with data for public release approved by the Microdata Review Committee.

## Abstract:

### Background

Illness may interrupt older workers lifestyles, forcing them to retire prematurely. Exiting the labour force because of ill health is likely to affect the living standards of older workers by reducing income and increasing the likelihood of being in poverty.

### Methods

Using a microsimulation model of the 2009 Australian population (Health&WealthMOD) the income poverty status of Australians who were aged between 45 and 64 years and were out of the labour force due to ill health was assessed, along with the characteristics of their family members. This was done using the 50% of the median equivalised income unit income poverty line.

### Results

It was found that individuals who had retired due to other reasons early were significantly less likely to be in income poverty than those retired due to ill health (OR 0.43 95%CI: 0.33 – 0.51), and there was no significant difference in the likelihood of being in income poverty between these individuals and the unemployed. Being in the same family as someone who is retired due to illness also significantly increases an individual's chance of being in income poverty.

### Conclusions

It can be seen that being retired due to illness impacts both the individual and their family.

KEYWORDS: Poverty, retirement, health

## Background

The health, unemployment and poverty relationship is complex and multidimensional.

Unemployment was found to lead to poor health in a longitudinal British study in the 1980s [1-2], with Australian studies later also demonstrating the adverse impacts of unemployment on mental health [3-7]. There is additional evidence from the UK, Denmark, Germany and the United States of unemployment leading to depression, anxiety, cardiovascular disease, lung cancer, accidents and suicide [3-4 6-9]. Similarly, being in income poverty has also been identified as having a detrimental effect on overall health status [10-12].

However, there is a small body of evidence of the inverse relationship, with ill health being identified as having a significant negative impact on people's labour force participation and income within Australia [13-19] and internationally [20-22]. However, it is not known how this impact on labour force participation may follow through to affect income poverty status.

The potential for ill health to lead an individual into income poverty is important as chronic health conditions will affect the majority of individuals living in western countries at some stage of their lives. For some of these individuals, the conditions may be severe enough to interrupt their normal working lifestyles, including forcing some individuals out of the labour force prematurely. Those aged 45-64 years who have a chronic health condition are significantly more likely to be out of the labour force due to ill health than those without a chronic health condition [23].

It is well established that unemployment and low income can lead to ill health, however there has been little research on exploring the potential of ill health to be a driver of income poverty, through employment status. Exiting the labour force because of ill health is already known to be associated with poorer financial conditions both now and in the future [24-25],

1  
2  
3 so ill health has the potential to be a major driver of income poverty. Poverty is seen as a  
4  
5 benchmark indicator of living standards within modern society [26]. To be labelled as being  
6  
7 in income poverty comes with an understanding by wider society that an individual is not  
8  
9 coping financially and they have inadequate economic resources to support a decent standard  
10  
11 of living [27]. Leaving the workforce due to ill health may increase the chance of living in  
12  
13 income poverty due to their poorer financial status. This paper will examine the relationship  
14  
15 between being out of the labour force due to ill health and being in income poverty amongst  
16  
17 members of the older working aged population, and assess the influence of family type on  
18  
19 this relationship.  
20  
21  
22

## 23 **Methods**

24  
25  
26 This paper uses a microsimulation model – Health&WealthMOD to assess the poverty status  
27  
28 of those who were aged between 45 and 64 years and had retired due to ill health.  
29  
30  
31

### 32 *Data source - Health&WealthMOD*

33  
34  
35 Within Australia, there is no nationally-representative data that contains detailed information  
36  
37 on both health status, income, poverty and not being in the labour force due to ill health. To  
38  
39 fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of  
40  
41 Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the  
42  
43 Australian Bureau of Statistics [28] that contains detailed information on chronic health  
44  
45 condition, reasons for not being in the labour force and individual income range – and  
46  
47 STINMOD – a nationally representative microsimulation model of continuous income, taxes,  
48  
49 benefits and wealth. Health&WealthMOD is a nationally representative microsimulation  
50  
51 model of 45 – 64 years old Australians in 2009 and captures their disability and illness status,  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 as well as detailed income information, labour force status, reasons for not being in the  
4  
5 workforce and poverty status.  
6  
7

8 Information on 45 to 64 years olds and their family members were taken from the SDAC to  
9  
10 form the base population of Health&WealthMOD. The records were then up-rated to  
11  
12 represent the 2009 population, accounting for the changes in demographics that had taken  
13  
14 place between 2003 and 2009. The up-rating only accounted for the change in the number of  
15  
16 people reporting health conditions that was due to the ageing of the population. Any change  
17  
18 in the number of people reporting health conditions between 2003 and 2009 that was related  
19  
20 to trend increases or decline in illness were not captured by up-rating. However, the  
21  
22 proportion of the Australian population reporting a long term health condition has remained  
23  
24 stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe  
25  
26 that the portion of people reporting a long term health condition would increase between  
27  
28 2003 and 2009 [29] beyond the impact of age.  
29  
30  
31  
32

33 This base population of Health&WealthMOD was then combined with STINMOD, another  
34  
35 microsimulation model that contains detailed economic information. STINMOD is  
36  
37 Australia's leading static microsimulation model of nationally representative tax and cash  
38  
39 transfer information [30], which is maintained and further developed for the Commonwealth  
40  
41 by the National Centre for Social and Economic Modelling and is routinely used by  
42  
43 Commonwealth departments for assessing the distributional and revenue implications of tax  
44  
45 and cash transfer reforms. The model operates at the 'micro' level of families and individuals,  
46  
47 and uses Australian Bureau of Statistics income survey unit record files as the base  
48  
49 population. STINMOD contains a range of additional economic information such as  
50  
51 continuous data on individual income, government support payments, income tax liability,  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 values of individuals' financial assets such as cash, superannuation, shares, property  
4  
5 investment and owner occupied home.  
6  
7

8 The economic information from STINMOD was linked to the base population by a  
9  
10 microsimulation method call synthetic matching [31]. It is not possible to match individuals  
11  
12 between STINMOD and the SDAC for several reasons. Both are based on survey information  
13  
14 and so there would be few respondents in common on both data sources, and the data was  
15  
16 collected at different points in time, meaning that even for the few individuals that may be in  
17  
18 common, some variables (such as age and marital status) will no longer be the same between  
19  
20 the SDAC and the surveys underpinning STINMOD. Furthermore, for privacy reasons exact  
21  
22 matching between Australian Bureau of Statistics surveys is prohibited and the Australian  
23  
24 Bureau of Statistics removes all identifying information from individual-level data [32].  
25  
26  
27

28  
29 Records from STINMOD were matched to records from Health&WealthMOD by matching  
30  
31 on a number of variables that were common to the two datasets. In this case 9 matching  
32  
33 variables were chosen: labour force status, income unit type, type of government  
34  
35 pension/support, income quintile, age group, sex, hours worked per week, highest educational  
36  
37 qualification and home ownership – based upon their strong association with income. Once  
38  
39 the records were matched the economic information from STINMOD was transferred onto  
40  
41 the base population of Health&WealthMOD. For a more detailed account of the process by  
42  
43 which Health&WealthMOD was created see Schofield *et al* [33].  
44  
45  
46

#### 47 *Measuring poverty*

48  
49

50 To identify the individuals in the 45-64 year old Australian population that were in income  
51  
52 poverty in 2009, an income poverty line based on 50 per cent of the median income unit  
53  
54 income was used in conjunction with OECD-modified equivalence scales [16 34]. The  
55  
56  
57



1  
2  
3 income unit is defined by the ABS as “a group of two or more related persons in the same  
4  
5 household assumed to pool their income and savings and share the benefits deriving from  
6  
7 them equitably; or one person assumed to have sole command over his or her income,  
8  
9 consumption and savings” [35]  
10

11  
12 This income poverty line was calculated from STINMOD, in order to ascertain the poverty  
13  
14 line based upon the entire Australian population. The 50 per cent of median income poverty  
15  
16 line expresses the economic situation of those in poverty relative to those in the middle of the  
17  
18 income distribution. Those who were in income poverty had less than half the income of  
19  
20 those in the middle of the income distribution of the population. The 50 per cent of the  
21  
22 median income has been widely used as a poverty line both in Australia and internationally  
23  
24 [36-38].  
25  
26  
27  
28

29 While we assessed how many individuals were in income poverty, considering an  
30  
31 individual’s personal income is not seen as a true reflection of an individual’s economic  
32  
33 situation. Within a family, it can be assumed that members pool their economic resources to  
34  
35 the benefit of all members – thus looking at the wider income of the whole family will be  
36  
37 more accurate [39]. Due to this assumption of the sharing of economic resources, the income  
38  
39 unit’s income will be used rather than the individual’s income in this analysis (the terms  
40  
41 ‘income unit’ and ‘family’ are interchangeable in the remainder of this paper as they both  
42  
43 refer an income unit as defined above). Members of the same income unit were identified  
44  
45 within the SDAC and the personal income of all adult members (aged 15 and over) of the  
46  
47 family were tallied to obtain the ‘income unit’ or ‘family’ income.  
48  
49  
50

51  
52 Differences in numbers and composition of families were accommodated for using  
53  
54 equivalence scales [40]. The OECD modified equivalence scale [41] was utilised in this  
55  
56  
57  
58  
59  
60

1  
2  
3 study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and  
4  
5 over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each  
6  
7 child (person aged under 15 years). The family's income was divided by their equivalence  
8  
9 score, thereby equivalising the income and allowing comparisons between families of  
10  
11 different sizes.  
12

13  
14  
15 If a family is identified as being in income poverty then all family members are considered to  
16  
17 be income poverty. This has important implications for identifying the relationship between  
18  
19 retiring early due to ill health and poverty status – if retiring early due to ill health reduces the  
20  
21 family's income below the poverty line then the entire family is considered to be in income  
22  
23 poverty.  
24

### 25 26 27 *Statistical analysis* 28

29  
30 The 2003 SDAC recorded individual labour force participation. For those who stated they  
31  
32 were 'not in the labour force', their main reason for not being in the labour force was  
33  
34 recorded. Response options included: retired, study or returning to study, own ill health or  
35  
36 disability, child care availability or children too young or prefers to look after them, too old,  
37  
38 does not need or want to work, some else's ill health or disability, other family  
39  
40 considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and  
41  
42 other. In this study those who were out of the labour force and stated their main reason for  
43  
44 this was their own ill health or disability were considered to be 'out of the labour force due to  
45  
46 ill health'; and those who selected all other options were considered to be 'out of the labour  
47  
48 force due to other reasons'.  
49

50  
51  
52 The 45 to 64 year old Australian population were grouped into one of five groups based on  
53  
54 their labour force status: employed full time, employed part time, unemployed (not employed  
55  
56

1  
2  
3 but looking for work), not in the labour force due to ill health, and not in the labour force due  
4  
5 to other reasons. The proportion of the 45 to 64 year old Australian population who were in  
6  
7 poverty in each group was estimated.  
8  
9

10 Logistic regression models were used to compare the odds of being in poverty for those who  
11  
12 were employed full time, employed part time, unemployed, and not in the labour force for  
13  
14 reasons other than ill health. Not in the labour force due to ill health was used as the reference  
15  
16 group so that the difference in the odds ratio of being in poverty between these individuals  
17  
18 and those in other labour force categories could be determined. The outcomes were adjusted  
19  
20 for age group, sex and education (having at least a bachelors degree, or not).  
21  
22  
23

24 The analysis was then limited to those not in the labour force due to ill health. Logistic  
25  
26 regression models were used to compare the odds of being in income poverty for those in  
27  
28 different family types – married with dependants, married without dependants, single with  
29  
30 dependant, single without dependants. Those who were married without dependants were  
31  
32 used as the reference group. The outcomes were adjusted for age group, sex and education  
33  
34 (having at least a bachelors degree, or not).  
35  
36  
37

38 Odds ratios were presented with their 95% confidence intervals and statistical tests were two  
39  
40 sided with the significance set at the 5% level. Population estimates were expressed in the  
41  
42 nearest hundred.  
43  
44  
45

## 46 **Results**

47  
48

49 Within Health&WealthMOD there were 2 242 individuals in income poverty, once weighted  
50  
51 to represent the 45 to 64 year old Australia population in 2009, there were 1.313 million  
52  
53 individuals in income poverty – or 24% of this population.  
54  
55  
56

1  
2  
3 In 2009, there were 431 300 individuals aged 45 to 64 years who were not in the labour force  
4 due to ill health. The majority, 73%, of the individuals who were not in the labour force due  
5 to ill health were in income poverty. Only the unemployed had a greater proportion in income  
6 poverty – 79%. Those employed part-time and full-time had the lowest proportion in income  
7 poverty – 15% and 4% respectively. Around half of the individuals who were out of the  
8 labour force for reasons other than ill health were in income poverty, which is lower  
9 proportion than the 73% of those who were in out of the labour force due to ill health who  
10 were in income poverty.  
11

12  
13  
14  
15  
16  
17  
18  
19  
20  
21 Once adjusted for age, sex and education (Table 1) those who were employed full time,  
22 employed part time, or were out of the labour force for reasons other than ill health were  
23 significantly less likely to be in income poverty than those who were out of the labour force  
24 due to their ill health. The odds ratio of being in income poverty compared to those not in the  
25 labour force due to ill health was very small for those employed full time and part time.  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Those employed full time had 0.02 times the odds of being in income poverty compared to  
those not in the labour force due to ill health (95% CI: 0.01 – 0.02). However, those not in the  
labour force for reasons other than ill health had 0.43 times the odds of being in income  
poverty (or had a 57% chance of being in income poverty) compared to those in the labour  
force due to ill health (95% CI: 0.33 – 0.56). The unemployed were the only group to not  
have significantly different odds of being in income poverty then those not in the labour force  
due to ill health (OR 1.26, 95% CI: 0.73 – 2.16).

When limited to those not in the labour force due to ill health, a similar proportion of people  
who were married without dependants, married with dependants, or single with dependants  
were in income poverty (62%, 62% or 59% respectively). However, 90% of those who were  
single without dependants were in income poverty. This was also the second largest group in

1  
2  
3 income poverty (by family type), behind those who were part of a married couple without  
4 dependants (Table 2).  
5  
6

7  
8 After controlling for age, sex and education, those who were single had six times the odds of  
9 being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36).  
10  
11

12 There was no significant difference in the odds of being in income poverty between those  
13 who were married with dependants, single with dependants, and those who were married  
14 without dependants (Table 2).  
15  
16  
17

18  
19 When taking family members into account, there were 387 100 individuals who were in  
20 income poverty, throughout the Australian population who had a member of their income unit  
21 aged 45 to 64 years who was not in the labour force due to ill health (316, 300 who  
22 themselves are out of the labour force due to ill health, and an additional 173,300 family  
23 members).  
24  
25  
26  
27  
28  
29  
30  
31

### 32 **Discussion**

33  
34 Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to  
35 64 years who are not in the labour force due to their ill health – 316 300 people. The financial  
36 impact of illness related early retirement is not only borne by the individual – it also affects  
37 their entire family with 173 300 individuals in the same family as someone not in the labour  
38 force due to ill health also being in income poverty. Those not in the labour force due to ill  
39 health who were single with no children were the most likely to be in income poverty (90%).  
40  
41 This emphasises the importance of having a partner to share the financial burden of being not  
42 in the labour force due to ill health [42-43], and also the potential financial reliance people  
43 who are not in the labour force due to ill health have on their partners. Interestingly, those  
44 who were single with dependent children were *not* significantly more likely to be in income  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 poverty than those who were married. This may be because single parents who have poor  
4 health and dependent children up to the age of 8 years have higher welfare payments  
5 (Parenting Payments) and may have income support from a non-custodian parent. Within  
6 Australia, those who are unable to work because of a physical, intellectual, or psychiatric  
7 conditions, or if they are blind, are able to assess a Disability Support Pension. The rates of  
8 welfare payments are stratified by marital status, with those who are single or a member of a  
9 couple getting different rates or payment [44-45].  
10  
11  
12  
13  
14  
15  
16  
17  
18

19 Other studies linking health and poverty have discussed how the poor generally have worse  
20 health and thus improving the health of these populations should be a goal to create greater  
21 equity in health [46]. What these studies do not take into consideration is the specific impact  
22 that health has on labour force participation, particularly amongst older workers, which can  
23 influence the poverty status of individuals. That is, the impact of ill health on labour force  
24 participation (and the associated loss of income and financial resources) is strongly associated  
25 with a higher incidence of poverty. While this study was undertaken using cross-sectional  
26 data it is known that people not in the labour force due to ill health presently have higher  
27 rates of income poverty. Before these people left the labour force it is unlikely they would  
28 have been in income poverty – this paper has shown that only 4% and 15% of people  
29 employed full time and part time respectively were in income poverty.  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43

44 The difference in the likelihood of being in poverty between those who are not in the labour  
45 force due to ill health and those who are so for other reasons suggests that it is being out of  
46 the labour force due to illness and not just being out of the labour force in general that  
47 increases the individual's chances of being in poverty. Those who are not in the labour force  
48 for reasons other than ill health fare better in terms of their poverty status than those not in  
49 the labour force due to illness. This may be due to the potential for greater choice to be  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 exercised in whether or not the individual leaves the labour force before the traditional  
4  
5 retirement age (65 years in Australia), and when this transition occurs (i.e. these individual  
6  
7 may decide to leave the labour force early due to a desire to pursue other interests, rather than  
8  
9 being forced to leave due to an inability to work any longer due to restrictions imposed by  
10  
11 illness). Such choice may allow individuals to obtain a level of financial security that keeps  
12  
13 them above the poverty line, for example creating an investment portfolio that provides an  
14  
15 income stream during retirement. Many individuals who retire early due to ill health are not  
16  
17 well financially prepared [47-48], indeed this is true for many beset by illness [49], and as  
18  
19 such may not have financial arrangements in place to finance retirement periods. The onset,  
20  
21 or even long-term experience of ill health may cause families to reduce the financial assets  
22  
23 they have accumulated that may have provided an income stream [50] – for example the sale  
24  
25 of investment properties (and the associated loss of rental income) to finance medical  
26  
27 expenses associated with chronic illness.  
28  
29  
30

31  
32 Further to this, the additional economic burden imposed by illness in terms of medical costs  
33  
34 is not captured by income poverty lines [51]. Those who do not have chronic health  
35  
36 conditions will not have the additional medical expenses of those not in the labour force due  
37  
38 to ill health [52-53]. The actual disposable income available to those not in the labour force  
39  
40 due to ill health, once essential medical costs are taken into account, may reduce these  
41  
42 individual's income even further and place more families in poverty or push some families  
43  
44 further below the poverty line.  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

**Funding**

Australian Research Council and Pfizer Australia

**Competing Interests**

None

**Contributorship**

DS conceived the study, RS led the construction of the microsimulation model, EC carried out the data analysis and drafted the manuscript. All authors provided expert advice into the design of the study and the interpretation of the results, and contributed to the drafting of the manuscript. All authors read and approved the final version of the manuscript.

**Data sharing**

The data used in this study came from Health&WealthMOD, a microsimulation model constructed by the authors from the 2003 Survey of Disability, Ageing and Carers, and STINMOD. The 2003 Survey of Disability, Ageing and Carers is publically available through the Australian Bureau of Statistics. STINMOD is publically available through the National Centre for Social and Economic Modelling, University of Canberra. Enquiries regarding access to Health&WealthMOD should be directed to Professor Deborah Schofield, [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au).



## References

1. Moser K, Goldblatt P, Fox A, et al. Unemployment and mortality in Goldblatt P ed. Longitudinal study: mortality and social organisation. London: OPCS, 1990.
2. Moser K, Goldblatt P, Fox A, et al. Unemployment and mortality: comparison of the 1971 and 1981 longitudinal census samples. *British Medical Journal* 1987;**1**:86-90
3. Greatz. Health consequences of employment and unemployment: longitudinal evidence for young men and women. *Soc Sci Med* 1993;**36**:715-24
4. Morrell S, Taylor R, Quine S, et al. A cohort study of unemployment as a cause of psychological disturbance in Australian youth. *Soc Sci Med* 1994;**38**:1553-64
5. Banks M. Unemployment and the risk of minor psychiatric disorder in young people: cross-sectional and longitudinal evidence. *Psychol Med* 1982;**12**:789-98
6. Linn M, Sandifer R, Stein S. Effects of unemployment on mental and physical health. *Am J Pub Hth* 1985;**75**:502-06
7. Iverson L, Anderson O, Andersen P, et al. Unemployment and mortality in Denmark. *British Medical Journal* 1987;**295**:878-84
8. Frese M, Mohr G. Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables. *Soc Sci Med* 1987;**25**:173-78
9. Bartley M. Unemployment and ill health: understanding the relationship. *Journal of epidemiology and community health* 1994;**48**(4):333-37
10. Buddelmeyer H, Cai L. *Interrelated Dynamics of Health and Poverty in Australia*. Bonn, Germany: Institute for the Study of Labour, 2009.
11. McClelland A, Scotton R. Poverty and health. In: Fincher R, Nieuwenhuysen J, eds. *Australian Poverty: Then and now*. Carlton South: Melbourne University Press, 1998.
12. Saunders P. Disability, poverty and living standards: reviewing the Australia evidence, SPRC Discussion Paper No. 145. Sydney: Social Policy Research Centre (SPRC), 2005.
13. Cai L, Cong C. Effects of health and chronic disease on labour force participation of older working Australians. *Australian Economic Papers* 2009;**June**:166-82
14. Cai L, Kalb G. *Health Status and Labour Force Participation: Evidence from the HILDA Data*: Melbourne Institute of Applied Economic and Social Research, 2004.
15. Council of Australian Governments National Reform Initiative Working Group. *Human Capital Reform*. Canberra: Council of Australian Governments, 2006.
16. Saunders P. *Poverty, Income Distribution and Health: An Australian study*. SPRC Reports and Proceedings. Sydney: Social Policy Research Centre, 1996.
17. Schofield D, Callander E, Shrestha R, et al. The association between co-morbidities and labour force participation amongst people with back problems. *Pain* 2012;**153**(2012):2068-72
18. Schofield D, Callander E, Shrestha R, et al. Labour force participation and the influence of having back problems on income poverty in Australia *Spine* 2011;**37**(13):1156-63
19. Schofield D, Callander E, Shrestha R, et al. Labour force participation and the influence of having CVD on income poverty of older workers. *International Journal of Cardiology* 2012;**156**(1):80-83
20. van den Berg T, Schuring M, Avendano M, et al. The impact of ill health on exit from paid employment in Europe among older workers. *Occupational and environmental medicine* 2010;**67**(12):845-52

- 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
  - 8
  - 9
  - 10
  - 11
  - 12
  - 13
  - 14
  - 15
  - 16
  - 17
  - 18
  - 19
  - 20
  - 21
  - 22
  - 23
  - 24
  - 25
  - 26
  - 27
  - 28
  - 29
  - 30
  - 31
  - 32
  - 33
  - 34
  - 35
  - 36
  - 37
  - 38
  - 39
  - 40
  - 41
  - 42
  - 43
  - 44
  - 45
  - 46
  - 47
  - 48
  - 49
  - 50
  - 51
  - 52
  - 53
  - 54
  - 55
  - 56
  - 57
  - 58
  - 59
  - 60
21. Schuring M, Burdorf L, Kunst A, et al. The effects of ill health on entering and maintaining paid employment: evidence in European countries. *Journal of epidemiology and community health* 2007;**61**(7):597-604
22. Gannon B. A dynamic analysis of disability and labour force participation in Ireland 1995–2000. *Health Economics* 2005;**14**(9):925-38
23. Schofield D, Shrestha R, Passey M, et al. Chronic disease and labour force participation among older Australians. *Medical Journal of Australia* 2008;**189**:447-50
24. Schofield D, Passey M, Percival R, et al. Retiring early with Cardiovascular Disease: Impact on the individual's financial assets. *International Journal of Cardiology* In press
25. Brazenor R. Disabilities and Labour Market Earnings in Australia. *Australian Journal of Labour Economics* 2002;**5**(3):319-34
26. Hagenaars A, de Vos K. The definition and measurement of poverty. *The Journal of Human Resources* 1988;**23**(2):211-21
27. Harding A, Lloyd R, Greenwell H. Financial disadvantage in Australian 1990 to 2000: The persistence of poverty in a decade of growth. Camperdown: The Smith Family, 2001.
28. Australian Bureau of Statistics. Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue). Canberra: Australian Bureau of Statistics, 2005.
29. Australian Institute of Health and Welfare. Australia's Health, 2010. Canberra: AIHW, 2010.
30. Percival R, Abello A, Vu QN. STINMOD (Static Income Model) 2007. In: Gupta A, Harding A, eds. *Modelling Our Future: Population ageing, health and aged care*. Amsterdam: Elsevier B.V., 2007.
31. Rässler S. *Statistical matching: A frequentist theory, practical applications, and alternative Bayesian approaches*. New York Springer-Verlag New York, Inc., 2002
32. National Statistical Service. Confidentiality: What is it and why is it important? Canberra: Australian Government, 2012.
33. Schofield D, Shrestha R, Callander E, et al. Modelling the cost of ill health in Health&WealthMOD (Version II): lost labour force participation, income and taxation, and the impact of disease prevention. *International Journal of Microsimulation* 2011;**4**(3):32-36
34. De Vos K, Zaidi MA. Equivalence scale sensitivity of poverty statistics for the member states of the European community. *Review of Income and Wealth* 1997;**43**(3):319-33
35. Australian Bureau of Statistics. Information Paper - Basic Confidentialised Unit Record File: Survey of Disability, Ageing and Carers 2003 (reissue) Canberra: ABS, 2005.
36. Saunders P, Bradbury B. Monitoring Trends in Poverty and Income Distribution: Data, Methodology and Measurement. *The Economic Record* 2006;**82**(258):341-64
37. Saunders P, Hill T, Bradbury B. Poverty in Australia: Sensitivity Analysis and Recent Trends. Sydney: SPRC, University of New South Wales, 2007.
38. Mejer L, Siermann C. Income poverty in the European Union: Children, gender and poverty gaps. *Statistics in focus: population and social conditions: Eurostat*, 2000.
39. Greenwell H, Lloyd R, Harding A. An introduction to poverty measurement issues. Canberra: National Centre for Social and Economic Modelling, 2001.
40. Trigger D. Does the way we measure poverty matter? Discussion Paper no 59. Canberra: NATSEM, 2003.

- 1
- 2
- 3 41. Hagenaaers A, de Vos K, Zaidi MA. Poverty Statistics in the Late 1980s: Research Based
- 4 on Micro-data. Luxembourg: Office for Official Publications of the European
- 5 Communities., 1994.
- 6
- 7 42. Henkens K. Retirement intentions and spousal support: A mulit-actor approach. Journal of
- 8 Gerontology: Social Sciences 1999;**54B**(2):S63-S73
- 9
- 10 43. Australian Bureau of Statistics. Summary of Findings. Retirement and retirement
- 11 intentions, Australia, July 2006 to June 2007 ABS Cat No 62380. Canberra: ABS,
- 12 2008.
- 13 44. Department of Human Services. Parenting Payment. Secondary Parenting Payment 2013.
- 14 <http://www.humanservices.gov.au/customer/services/centrelink/parenting-payment>.
- 15 45. Department of Human Services. Disability Support Pension. Secondary Disability
- 16 Support Pension 2013.
- 17 [http://www.humanservices.gov.au/customer/services/centrelink/disability-support-](http://www.humanservices.gov.au/customer/services/centrelink/disability-support-pension)
- 18 [pension](http://www.humanservices.gov.au/customer/services/centrelink/disability-support-pension).
- 19 46. Organisation for Economic Co-operation and Development (OECD) and the World
- 20 Health Organisation (WHO). Poverty and health. DAC Guidelines and Reference
- 21 Series. Paris: OECD, 2003.
- 22 47. Kelly S, Schofield D, Shrestha R, et al. The impact of illness on retirement living
- 23 standards. The Economic Record 2012;**88**(283):576-84
- 24 48. Schofield D, Percival R, Passey M, et al. The financial vulnerability of individuals with
- 25 diabetes. The British Journal of Diabetes and Vascular Disease 2010;**10**(6):300-04
- 26 49. Swoboda SM, Lipsett PA. Impact of a prolonged surgical critical illness on patients'
- 27 families. American Journal of Critical Care 2002;**11**(5):459-66
- 28 50. Mills A, Shillcutt S. Communicable diseases. In: Lomborg B, ed. Global crises, global
- 29 solutions. Cambridge: Cambridge University Press, 2004.
- 30 51. Saunders P. The costs of disability and the incidence of poverty, SPRC Discussion Paper
- 31 No. 147. Sydney: Social Policy Research Centre (SPRC), 2006.
- 32 52. Graham S, Stapleton C. The extra costs of disability. In: Saunders P, ed. Social Policy in
- 33 Australia, What future for the welfare state? Sydney: Social Policy Research Centre,
- 34 University of New South Wales, 1990:103-12.
- 35 53. Wightman P, Robertson F. Costs of disability. A survey of the costs of disability for
- 36 people with disabilities in labour force related activity, Policy Research Paper No.59.
- 37 Sydney: Social Policy Research Centre (SPRC), 1996.
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

Table 1: Odds ratio of being in poverty, adjusted for age, sex and education for the Australian population aged 45 to 64 years, 2003

Employment Status	Weighted population	% of population in poverty	OR of being in poverty	95% CI	P-value
Not in the labour force due to ill health	431 300	73	REFERENCE		
Employed Full Time	2 657 000	4	0.02	0.01 – 0.02	<.0001
Employed Part Time	961 800	15	0.08	0.06 – 0.10	<.0001
Unemployed	107 300	79	1.26	0.73 – 2.16	0.4021
Not in the labour force due to other reasons	1 266 600	51	0.43	0.33 – 0.56	<.0001

Table 2: Odds Ratio of being in income poverty compared to those married with dependant children<sup>1</sup>, 45 to 64 year old population not in the labour force due to ill health.

Family type	Weighted population NOT in poverty	Weighted population in poverty	% of population in poverty	OR	95% CI	P-value
<i>Married couple only</i>	75 700	123 500	62		REFERENCE	
<i>Married with dependents</i>	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
<i>One person</i>	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
<i>One parent, dependents</i>	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

<sup>1</sup>OR adjusted for age, sex and education.

1  
2  
3  
4  
5 **Premature retirement due to ill health and income poverty: a cross-**  
6 **sectional study of older workers**  
7

8 Deborah J. Schofield<sup>1\*</sup>, Emily J. Callander<sup>1</sup>, Rupendra N. Shrestha<sup>1</sup>, Richard Percival<sup>2</sup>,  
9 Simon J. Kelly<sup>2</sup>, Megan E. Passey<sup>3</sup>  
10  
11

12 <sup>1</sup>NHMRC Clinical Trials Centre, University of Sydney, Locked Bag 77, Camperdown NSW  
13 1450, Australia  
14

15 <sup>2</sup>National Centre for Social and Economic Modelling, University of Canberra, ACT 2601,  
16 Australia  
17

18 <sup>3</sup>University Centre for Rural Health (North Coast), University of Sydney, 91 Uralba St,  
19 Lismore NSW 2480, Australia  
20

21 \*Corresponding author details:  
22

23 Emily Callander  
24 NHMRC Clinical Trials Centre  
25 Locked Bag 77  
26 Camperdown NSW 1450 Australia  
27 Ph: 61 2 9562 5068  
28 Fax: 61 2 9565 1863  
29 Email:: emily.callander@ctc.usyd.edu.au  
30

31 Email Addresses:  
32

33 DJS: [deborah.schofield@ctc.usyd.edu.au](mailto:deborah.schofield@ctc.usyd.edu.au)  
34 EJC: [emily.callander@ctc.usyd.edu.au](mailto:emily.callander@ctc.usyd.edu.au)  
35 RNS: [rupendra.shrestha@ctc.usyd.edu.au](mailto:rupendra.shrestha@ctc.usyd.edu.au)  
36 RP: [richard.percival@natsem.canberra.edu.au](mailto:richard.percival@natsem.canberra.edu.au)  
37 SJK: [simon@kellyresearch.com.au](mailto:simon@kellyresearch.com.au)  
38 MEP: [megan.passey@ucr.edu.au](mailto:megan.passey@ucr.edu.au)  
39

40 Ethics approval  
41

42 The use of the data in this manuscript was approved by the Australian Bureau of Statistics,  
43 with data for public release approved by the Microdata Review Committee.  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Abstract:

### Background

Illness may interrupt older workers lifestyles, forcing them to retire prematurely. Exiting the labour force because of ill health is likely to affect the living standards of older workers by reducing income and increasing the likelihood of being in poverty.

### Methods

Using a microsimulation model of the 2009 Australian population (Health&WealthMOD) the income poverty status of Australians who were aged between 45 and 64 years and were out of the labour force due to ill health was assessed, along with the characteristics of their family members. This was done using the 50% of the median equivalised income unit income poverty line.

### Results

It was found that individuals who had retired due to other reasons early were significantly less likely to be in income poverty than those retired due to ill health (OR 0.43 95%CI: 0.33 – 0.51), and there was no significant difference in the likelihood of being in income poverty between these individuals and the unemployed. Being in the same family as someone who is retired due to illness also significantly increases an individual's chance of being in income poverty.

### Conclusions

It can be seen that being retired due to illness impacts both the individual and their family.

KEYWORDS: Poverty, retirement, health

## Background

The health, unemployment and poverty relationship is complex and multidimensional.

Unemployment was found to lead to poor health in a longitudinal British study in the 1980s [1-2], with Australian studies later also demonstrating the adverse impacts of unemployment on mental health [3-7]. There is additional evidence from the UK, Denmark, Germany and the United States of unemployment leading to depression, anxiety, cardiovascular disease, lung cancer, accidents and suicide [3-4 6-9]. Similarly, being in income poverty **has also been identified as** having a detrimental effect on overall health status [10-12].

However, there is a small body of evidence of the inverse relationship, with ill health being identified as having a significant negative impact on people's labour force participation and income within **Australia [13-19] and internationally [20-22]**. However, it is not known how this impact on labour force participation **may follow through to** affect income poverty status.

The potential for ill health to lead an individual into income poverty is important as chronic health conditions will affect the majority of individuals living in western countries at some stage of their lives. For some of these individuals, the conditions may be severe enough to interrupt their normal working lifestyles, including forcing some individuals out of the labour force prematurely. Those aged 45-64 years who have a chronic health condition are significantly more likely to be out of the labour force due to ill health than those without a chronic health condition [23].

**It is well established that unemployment and low income can lead to ill health, however there has been little research on exploring the potential of ill health to be a driver of income poverty, through employment status.** Exiting the labour force because of ill health is already known to be associated with poorer financial conditions both now and in the future [24-25],



1  
2  
3 so ill health has the potential to be a major driver of income poverty. Poverty is seen as a  
4 benchmark indicator of living standards within modern society [26]. To be labelled as being  
5 in income poverty comes with an understanding by wider society that an individual is not  
6 coping financially and they have inadequate economic resources to support a decent standard  
7 of living [27]. Leaving the workforce due to ill health may increase the chance of living in  
8 income poverty due to their poorer financial status. This paper will examine the relationship  
9 between being out of the labour force due to ill health and being in income poverty amongst  
10 members of the older working aged population, and assess the influence of family type on  
11 this relationship.  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23

## 24 **Methods**

25  
26 This paper uses a microsimulation model – Health&WealthMOD to assess the poverty status  
27 of those who were aged between 45 and 64 years and had retired due to ill health.  
28  
29

### 30 *Data source - Health&WealthMOD*

31  
32 Within Australia, there is no nationally-representative data that contains detailed information  
33 on both health status, income, poverty and not being in the labour force due to ill health. To  
34 fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of  
35 Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the  
36 Australian Bureau of Statistics [28] that contains detailed information on chronic health  
37 condition, reasons for not being in the labour force and individual income range – and  
38 STINMOD – a nationally representative microsimulation model of continuous income, taxes,  
39 benefits and wealth. Health&WealthMOD is a nationally representative microsimulation  
40 model of 45 – 64 years old Australians in 2009 and captures their disability and illness status,  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 as well as detailed income information, labour force status, reasons for not being in the  
4  
5 workforce and poverty status.  
6  
7

8 Information on 45 to 64 years olds and their family members were taken from the SDAC to  
9  
10 form the base population of Health&WealthMOD. The records were then up-rated to  
11  
12 represent the 2009 population, accounting for the changes in demographics that had taken  
13  
14 place between 2003 and 2009. The up-rating only accounted for the change in the number of  
15  
16 people reporting health conditions that was due to the ageing of the population. Any change  
17  
18 in the number of people reporting health conditions between 2003 and 2009 that was related  
19  
20 to trend increases or decline in illness were not captured by up-rating. However, the  
21  
22 proportion of the Australian population reporting a long term health condition has remained  
23  
24 stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe  
25  
26 that the portion of people reporting a long term health condition would increase between  
27  
28 2003 and 2009 [29] beyond the impact of age.  
29  
30  
31  
32

33 This base population of Health&WealthMOD was then combined with STINMOD, another  
34  
35 microsimulation model that contains detailed economic information. STINMOD is  
36  
37 Australia's leading static microsimulation model of nationally representative tax and cash  
38  
39 transfer information [30], which is maintained and further developed for the Commonwealth  
40  
41 by the National Centre for Social and Economic Modelling and is routinely used by  
42  
43 Commonwealth departments for assessing the distributional and revenue implications of tax  
44  
45 and cash transfer reforms. The model operates at the 'micro' level of families and individuals,  
46  
47 and uses Australian Bureau of Statistics income survey unit record files as the base  
48  
49 population. STINMOD contains a range of additional economic information such as  
50  
51 continuous data on individual income, government support payments, income tax liability,  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 values of individuals' financial assets such as cash, superannuation, shares, property  
4  
5 investment and owner occupied home.  
6  
7

8 The economic information from STINMOD was linked to the base population by a  
9  
10 microsimulation method call synthetic matching [31]. It is not possible to match individuals  
11 between STINMOD and the SDAC for several reasons. Both are based on survey information  
12 and so there would be few respondents in common on both data sources, and the data was  
13 collected at different points in time, meaning that even for the few individuals that may be in  
14 common, some variables (such as age and marital status) will no longer be the same between  
15 the SDAC and the surveys underpinning STINMOD. Furthermore, for privacy reasons exact  
16 matching between Australian Bureau of Statistics surveys is prohibited and the Australian  
17 Bureau of Statistics removes all identifying information from individual-level data [32].  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27

28  
29 Records from STINMOD were matched to records from Health&WealthMOD by matching  
30 on a number of variables that were common to the two datasets. In this case 9 matching  
31 variables were chosen: labour force status, income unit type, type of government  
32 pension/support, income quintile, age group, sex, hours worked per week, highest educational  
33 qualification and home ownership – based upon their strong association with income. Once  
34 the records were matched the economic information from STINMOD was transferred onto  
35 the base population of Health&WealthMOD. For a more detailed account of the process by  
36 which Health&WealthMOD was created see Schofield *et al* [33].  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46

#### 47 *Measuring poverty*

48  
49  
50 To identify the individuals in the 45-64 year old Australian population that were in income  
51 poverty in 2009, an income poverty line based on 50 per cent of the median income unit  
52 income was used in conjunction with OECD-modified equivalence scales [16 34]. The  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 income unit is defined by the ABS as “a group of two or more related persons in the same  
4  
5 household assumed to pool their income and savings and share the benefits deriving from  
6  
7 them equitably; or one person assumed to have sole command over his or her income,  
8  
9 consumption and savings” [35]  
10

11  
12 This income poverty line was calculated from STINMOD, in order to ascertain the poverty  
13  
14 line based upon the entire Australian population. The 50 per cent of median income poverty  
15  
16 line expresses the economic situation of those in poverty relative to those in the middle of the  
17  
18 income distribution. Those who were in income poverty had less than half the income of  
19  
20 those in the middle of the income distribution of the population. The 50 per cent of the  
21  
22 median income has been widely used as a poverty line both in Australia and internationally  
23  
24 [36-38].  
25  
26  
27  
28

29 While we assessed how many individuals were in income poverty, considering an  
30  
31 individual’s personal income is not seen as a true reflection of an individual’s economic  
32  
33 situation. Within a family, it can be assumed that members pool their economic resources to  
34  
35 the benefit of all members – thus looking at the wider income of the whole family will be  
36  
37 more accurate [39]. Due to this assumption of the sharing of economic resources, the income  
38  
39 unit’s income will be used rather than the individual’s income in this analysis (the terms  
40  
41 ‘income unit’ and ‘family’ are interchangeable in the remainder of this paper as they both  
42  
43 refer an income unit as defined above). Members of the same income unit were identified  
44  
45 within the SDAC and the personal income of all adult members (aged 15 and over) of the  
46  
47 family were tallied to obtain the ‘income unit’ or ‘family’ income.  
48  
49  
50

51  
52 Differences in numbers and composition of families were accommodated for using  
53  
54 equivalence scales [40]. The OECD modified equivalence scale [41] was utilised in this  
55  
56  
57  
58  
59  
60

1  
2  
3 study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and  
4  
5 over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each  
6  
7 child (person aged under 15 years). The family's income was divided by their equivalence  
8  
9 score, thereby equivalising the income and allowing comparisons between families of  
10  
11 different sizes.  
12

13  
14  
15 If a family is identified as being in income poverty then all family members are considered to  
16  
17 be income poverty. This has important implications for identifying the relationship between  
18  
19 retiring early due to ill health and poverty status – if retiring early due to ill health reduces the  
20  
21 family's income below the poverty line then the entire family is considered to be in income  
22  
23 poverty.  
24

#### 25 26 27 *Statistical analysis* 28

29  
30 The 2003 SDAC recorded individual labour force participation. For those who stated they  
31  
32 were 'not in the labour force', their main reason for not being in the labour force was  
33  
34 recorded. Response options included: retired, study or returning to study, own ill health or  
35  
36 disability, child care availability or children too young or prefers to look after them, too old,  
37  
38 does not need or want to work, some else's ill health or disability, other family  
39  
40 considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and  
41  
42 other. In this study those who were out of the labour force and stated their main reason for  
43  
44 this was their own ill health or disability were considered to be 'out of the labour force due to  
45  
46 ill health'; and those who selected all other options were considered to be 'out of the labour  
47  
48 force due to other reasons'.  
49  
50  
51

52  
53 The 45 to 64 year old Australian population were grouped into one of five groups based on  
54  
55 their labour force status: employed full time, employed part time, unemployed (not employed  
56  
57

1  
2  
3 but looking for work), not in the labour force due to ill health, and not in the labour force due  
4  
5 to other reasons. The proportion of the 45 to 64 year old Australian population who were in  
6  
7 poverty in each group was estimated.  
8  
9

10  
11 Logistic regression models were used to compare the odds of being in poverty for those who  
12  
13 were employed full time, employed part time, unemployed, and not in the labour force for  
14  
15 reasons other than ill health. Not in the labour force due to ill health was used as the reference  
16  
17 group so that the difference in the odds ratio of being in poverty between these individuals  
18  
19 and those in other labour force categories could be determined. The outcomes were adjusted  
20  
21 for age group, sex and education (having at least a bachelors degree, or not).  
22  
23

24  
25 The analysis was then limited to those not in the labour force due to ill health. Logistic  
26  
27 regression models were used to compare the odds of being in income poverty for those in  
28  
29 different family types – married with dependants, married without dependants, single with  
30  
31 dependant, single without dependants. Those who were married without dependants were  
32  
33 used as the reference group. The outcomes were adjusted for age group, sex and education  
34  
35 (having at least a bachelors degree, or not).  
36  
37

38  
39 Odds ratios were presented with their 95% confidence intervals and statistical tests were two  
40  
41 sided with the significance set at the 5% level. Population estimates were expressed in the  
42  
43 nearest hundred.  
44  
45

## 46 **Results**

47  
48

49  
50 Within Health&WealthMOD there were 2 242 individuals in income poverty, once weighted  
51  
52 to represent the 45 to 64 year old Australia population in 2009, there were 1.313 million  
53  
54 individuals in income poverty – or 24% of this population.  
55  
56

1  
2  
3 In 2009, there were 431 300 individuals aged 45 to 64 years who were not in the labour force  
4 due to ill health. The majority, 73%, of the individuals who were not in the labour force due  
5 to ill health were in income poverty. Only the unemployed had a greater proportion in income  
6 poverty – 79%. Those employed part-time and full-time had the lowest proportion in income  
7 poverty – 15% and 4% respectively. Around half of the individuals who were out of the  
8 labour force for reasons other than ill health were in income poverty, which is lower  
9 proportion than the 73% of those who were in out of the labour force due to ill health who  
10 were in income poverty.  
11

12  
13  
14  
15  
16  
17  
18  
19  
20  
21 Once adjusted for age, sex and education (Table 1) those who were employed full time,  
22 employed part time, or were out of the labour force for reasons other than ill health were  
23 significantly less likely to be in income poverty than those who were out of the labour force  
24 due to their ill health. The odds ratio of being in income poverty compared to those not in the  
25 labour force due to ill health was very small for those employed full time and part time.  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Those employed full time had 0.02 times the odds of being in income poverty compared to  
those not in the labour force due to ill health (95% CI: 0.01 – 0.02). However, those not in the  
labour force for reasons other than ill health had 0.43 times the odds of being in income  
poverty (or had a 57% chance of being in income poverty) compared to those in the labour  
force due to ill health (95% CI: 0.33 – 0.56). The unemployed were the only group to not  
have significantly different odds of being in income poverty then those not in the labour force  
due to ill health (OR 1.26, 95% CI: 0.73 – 2.16).

When limited to those not in the labour force due to ill health, a similar proportion of people  
who were married without dependants, married with dependants, or single with dependants  
were in income poverty (62%, 62% or 59% respectively). However, 90% of those who were  
single without dependants were in income poverty. This was also the second largest group in

1  
2  
3 income poverty (by family type), behind those who were part of a married couple without  
4 dependants (Table 2).  
5  
6

7  
8 After controlling for age, sex and education, those who were single had six times the odds of  
9 being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36).  
10  
11

12 There was no significant difference in the odds of being in income poverty between those  
13 who were married with dependants, single with dependants, and those who were married  
14 without dependants (Table 2).  
15  
16  
17

18  
19 When taking family members into account, there were 387 100 individuals who were in  
20 income poverty, throughout the Australian population who had a member of their income unit  
21 aged 45 to 64 years who was not in the labour force due to ill health (316, 300 who  
22 themselves are out of the labour force due to ill health, and an additional 173,300 family  
23 members).  
24  
25  
26  
27  
28  
29  
30  
31

### 32 **Discussion**

33  
34 Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to  
35 64 years who are not in the labour force due to their ill health – 316 300 people. The financial  
36 impact of illness related early retirement is not only borne by the individual – it also affects  
37 their entire family with 173 300 individuals in the same family as someone not in the labour  
38 force due to ill health also being in income poverty. Those not in the labour force due to ill  
39 health who were single with no children were the most likely to be in income poverty (90%).  
40  
41 This emphasises the importance of having a partner to share the financial burden of being not  
42 in the labour force due to ill health [42-43], and also the potential financial reliance people  
43 who are not in the labour force due to ill health have on their partners. Interestingly, those  
44 who were single with dependent children were *not* significantly more likely to be in income  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60



1  
2  
3 poverty than those who were married. This may be because single parents who have poor  
4 health and dependent children up to the age of 8 years have higher welfare payments  
5 (Parenting Payments) and may have income support from a non-custodian parent. Within  
6  
7 Australia, those who are unable to work because of a physical, intellectual, or psychiatric  
8 conditions, or if they are blind, are able to assess a Disability Support Pension. The rates of  
9 welfare payments are stratified by marital status, with those who are single or a member of a  
10 couple getting different rates or payment [44-45].  
11  
12  
13  
14  
15  
16  
17  
18

19 Other studies linking health and poverty have discussed how the poor generally have worse  
20 health and thus improving the health of these populations should be a goal to create greater  
21 equity in health [46]. What these studies do not take into consideration is the specific impact  
22 that health has on labour force participation, particularly amongst older workers, which can  
23 influence the poverty status of individuals. That is, the impact of ill health on labour force  
24 participation (and the associated loss of income and financial resources) is strongly associated  
25 with a higher incidence of poverty. While this study was undertaken using cross-sectional  
26 data it is known that people not in the labour force due to ill health presently have higher  
27 rates of income poverty. Before these people left the labour force it is unlikely they would  
28 have been in income poverty – this paper has shown that only 4% and 15% of people  
29 employed full time and part time respectively were in income poverty.  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43

44 The difference in the likelihood of being in poverty between those who are not in the labour  
45 force due to ill health and those who are so for other reasons suggests that it is being out of  
46 the labour force due to illness and not just being out of the labour force in general that  
47 increases the individual's chances of being in poverty. Those who are not in the labour force  
48 for reasons other than ill health fare better in terms of their poverty status than those not in  
49 the labour force due to illness. This may be due to the potential for greater choice to be  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 exercised in whether or not the individual leaves the labour force before the traditional  
4  
5 retirement age (65 years in Australia), and when this transition occurs (i.e. these individual  
6  
7 may decide to leave the labour force early due to a desire to pursue other interests, rather than  
8  
9 being forced to leave due to an inability to work any longer due to restrictions imposed by  
10  
11 illness). Such choice may allow individuals to obtain a level of financial security that keeps  
12  
13 them above the poverty line, for example creating an investment portfolio that provides an  
14  
15 income stream during retirement. Many individuals who retire early due to ill health are not  
16  
17 well financially prepared [47-48], indeed this is true for many beset by illness [49], and as  
18  
19 such may not have financial arrangements in place to finance retirement periods. The onset,  
20  
21 or even long-term experience of ill health may cause families to reduce the financial assets  
22  
23 they have accumulated that may have provided an income stream [50] – for example the sale  
24  
25 of investment properties (and the associated loss of rental income) to finance medical  
26  
27 expenses associated with chronic illness.  
28  
29  
30

31  
32 Further to this, the additional economic burden imposed by illness in terms of medical costs  
33  
34 is not captured by income poverty lines [51]. Those who do not have chronic health  
35  
36 conditions will not have the additional medical expenses of those not in the labour force due  
37  
38 to ill health [52-53]. The actual disposable income available to those not in the labour force  
39  
40 due to ill health, once essential medical costs are taken into account, may reduce these  
41  
42 individual's income even further and place more families in poverty or push some families  
43  
44 further below the poverty line.  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## References

1. Moser K, Goldblatt P, Fox A, et al. Unemployment and mortality in Goldblatt P ed. Longitudinal study: mortality and social organisation. London: OPCS, 1990.
2. Moser K, Goldblatt P, Fox A, et al. Unemployment and mortality: comparison of the 1971 and 1981 longitudinal census samples. *British Medical Journal* 1987;**1**:86-90
3. Greatz. Health consequences of employment and unemployment: longitudinal evidence for young men and women. *Soc Sci Med* 1993;**36**:715-24
4. Morrell S, Taylor R, Quine S, et al. A cohort study of unemployment as a cause of psychological disturbance in Australian youth. *Soc Sci Med* 1994;**38**:1553-64
5. Banks M. Unemployment and the risk of minor psychiatric disorder in young people: cross-sectional and longitudinal evidence. *Psychol Med* 1982;**12**:789-98
6. Linn M, Sandifer R, Stein S. Effects of unemployment on mental and physical health. *Am J Pub Hth* 1985;**75**:502-06
7. Iverson L, Anderson O, Andersen P, et al. Unemployment and mortality in Denmark. *British Medical Journal* 1987;**295**:878-84
8. Frese M, Mohr G. Prolonged unemployment and depression in older workers: a longitudinal study of intervening variables. *Soc Sci Med* 1987;**25**:173-78
9. Bartley M. Unemployment and ill health: understanding the relationship. *Journal of epidemiology and community health* 1994;**48**(4):333-37
10. Buddelmeyer H, Cai L. *Interrelated Dynamics of Health and Poverty in Australia*. Bonn, Germany: Institute for the Study of Labour, 2009.
11. McClelland A, Scotton R. Poverty and health. In: Fincher R, Nieuwenhuysen J, eds. *Australian Poverty: Then and now*. Carlton South: Melbourne University Press, 1998.
12. Saunders P. Disability, poverty and living standards: reviewing the Australia evidence, SPRC Discussion Paper No. 145. Sydney: Social Policy Research Centre (SPRC), 2005.
13. Cai L, Cong C. Effects of health and chronic disease on labour force participation of older working Australians. *Australian Economic Papers* 2009;**June**:166-82
14. Cai L, Kalb G. *Health Status and Labour Force Participation: Evidence from the HILDA Data*: Melbourne Institute of Applied Economic and Social Research, 2004.
15. Council of Australian Governments National Reform Initiative Working Group. *Human Capital Reform*. Canberra: Council of Australian Governments, 2006.
16. Saunders P. *Poverty, Income Distribution and Health: An Australian study*. SPRC Reports and Proceedings. Sydney: Social Policy Research Centre, 1996.
17. Schofield D, Callander E, Shrestha R, et al. The association between co-morbidities and labour force participation amongst people with back problems. *Pain* 2012;**153**(2012):2068-72
18. Schofield D, Callander E, Shrestha R, et al. Labour force participation and the influence of having back problems on income poverty in Australia *Spine* 2011;**37**(13):1156-63
19. Schofield D, Callander E, Shrestha R, et al. Labour force participation and the influence of having CVD on income poverty of older workers. *International Journal of Cardiology* 2012;**156**(1):80-83
20. van den Berg T, Schuring M, Avendano M, et al. The impact of ill health on exit from paid employment in Europe among older workers. *Occupational and environmental medicine* 2010;**67**(12):845-52

- 1
- 2
- 3 21. Schuring M, Burdorf L, Kunst A, et al. The effects of ill health on entering and
- 4 maintaining paid employment: evidence in European countries. *Journal of*
- 5 *epidemiology and community health* 2007;**61**(7):597-604
- 6
- 7 22. Gannon B. A dynamic analysis of disability and labour force participation in Ireland
- 8 1995–2000. *Health Economics* 2005;**14**(9):925-38
- 9
- 10 23. Schofield D, Shrestha R, Passey M, et al. Chronic disease and labour force participation
- 11 among older Australians. *Medical Journal of Australia* 2008;**189**:447-50
- 12
- 13 24. Schofield D, Passey M, Percival R, et al. Retiring early with Cardiovascular Disease:
- 14 Impact on the individual's financial assets. *International Journal of Cardiology* In
- 15 press
- 16
- 17 25. Brazenor R. Disabilities and Labour Market Earnings in Australia. *Australian Journal of*
- 18 *Labour Economics* 2002;**5**(3):319-34
- 19
- 20 26. Hagenaars A, de Vos K. The definition and measurement of poverty. *The Journal of*
- 21 *Human Resources* 1988;**23**(2):211-21
- 22
- 23 27. Harding A, Lloyd R, Greenwell H. Financial disadvantage in Australian 1990 to 2000:
- 24 The persistence of poverty in a decade of growth. Camperdown: The Smith Family,
- 25 2001.
- 26
- 27 28. Australian Bureau of Statistics. Information Paper - Basic Confidentialised Unit Record
- 28 File: Survey of Disability, Ageing and Carers 2003 (reissue). Canberra: Australian
- 29 Bureau of Statistics, 2005.
- 30
- 31 29. Australian Institute of Health and Welfare. *Australia's Health, 2010*. Canberra: AIHW,
- 32 2010.
- 33
- 34 30. Percival R, Abello A, Vu QN. STINMOD (Static Income Model) 2007. In: Gupta A,
- 35 Harding A, eds. *Modelling Our Future: Population ageing, health and aged care*.
- 36 Amsterdam: Elsevier B.V., 2007.
- 37
- 38 31. Rässler S. *Statistical matching: A frequentist theory, practical applications, and*
- 39 *alternative Bayesian approaches*. New York Springer-Verlag New York, Inc., 2002
- 40
- 41 32. National Statistical Service. Confidentiality: What is it and why is it important? Canberra:
- 42 Australian Government, 2012.
- 43
- 44 33. Schofield D, Shrestha R, Callander E, et al. Modelling the cost of ill health in
- 45 Health&WealthMOD (Version II): lost labour force participation, income and
- 46 taxation, and the impact of disease prevention. *International Journal of*
- 47 *Microsimulation* 2011;**4**(3):32-36
- 48
- 49 34. De Vos K, Zaidi MA. Equivalence scale sensitivity of poverty statistics for the member
- 50 states of the European community. *Review of Income and Wealth* 1997;**43**(3):319-33
- 51
- 52 35. Australian Bureau of Statistics. Information Paper - Basic Confidentialised Unit Record
- 53 File: Survey of Disability, Ageing and Carers 2003 (reissue) Canberra: ABS, 2005.
- 54
- 55 36. Saunders P, Bradbury B. Monitoring Trends in Poverty and Income Distribution: Data,
- 56 Methodology and Measurement. *The Economic Record* 2006;**82**(258):341-64
- 57
- 58 37. Saunders P, Hill T, Bradbury B. *Poverty in Australia: Sensitivity Analysis and Recent*
- 59 *Trends*. Sydney: SPRC, University of New South Wales, 2007.
- 60
38. Mejer L, Siermann C. Income poverty in the European Union: Children, gender and
- poverty gaps. *Statistics in focus: population and social conditions: Eurostat*, 2000.
39. Greenwell H, Lloyd R, Harding A. An introduction to poverty measurement issues.
- Canberra: National Centre for Social and Economic Modelling, 2001.
40. Trigger D. Does the way we measure poverty matter? Discussion Paper no 59. Canberra:
- NATSEM, 2003.

- 1
- 2
- 3 41. Hagenaaers A, de Vos K, Zaidi MA. Poverty Statistics in the Late 1980s: Research Based
- 4 on Micro-data. Luxembourg: Office for Official Publications of the European
- 5 Communities., 1994.
- 6
- 7 42. Henkens K. Retirement intentions and spousal support: A mulit-actor approach. Journal of
- 8 Gentrology: Social Sciences 1999;**54B**(2):S63-S73
- 9
- 10 43. Australian Bureau of Statistics. Summary of Findings. Retirement and retirement
- 11 intentions, Australia, July 2006 to June 2007 ABS Cat No 62380. Canberra: ABS,
- 12 2008.
- 13 44. Department of Human Services. Parenting Payment. Secondary Parenting Payment 2013.
- 14 <http://www.humanservices.gov.au/customer/services/centrelink/parenting-payment>.
- 15 45. Department of Human Services. Disability Support Pension. Secondary Disability
- 16 Support Pension 2013.
- 17 [http://www.humanservices.gov.au/customer/services/centrelink/disability-support-](http://www.humanservices.gov.au/customer/services/centrelink/disability-support-pension)
- 18 [pension](http://www.humanservices.gov.au/customer/services/centrelink/disability-support-pension).
- 19 46. Organisation for Economic Co-operation and Development (OECD) and the World
- 20 Health Organisation (WHO). Poverty and health. DAC Guidelines and Reference
- 21 Series. Paris: OECD, 2003.
- 22 47. Kelly S, Schofield D, Shrestha R, et al. The impact of illness on retirement living
- 23 standards. The Economic Record 2012;**88**(283):576-84
- 24 48. Schofield D, Percival R, Passey M, et al. The financial vulnerability of individuals with
- 25 diabetes. The British Journal of Diabetes and Vascular Disease 2010;**10**(6):300-04
- 26 49. Swoboda SM, Lipsett PA. Impact of a prolonged surgical critical illness on patients'
- 27 families. American Journal of Critical Care 2002;**11**(5):459-66
- 28 50. Mills A, Shillcutt S. Communicable diseases. In: Lomborg B, ed. Global crises, global
- 29 solutions. Cambridge: Cambridge University Press, 2004.
- 30 51. Saunders P. The costs of disability and the incidence of poverty, SPRC Discussion Paper
- 31 No. 147. Sydney: Social Policy Research Centre (SPRC), 2006.
- 32 52. Graham S, Stapleton C. The extra costs of disability. In: Saunders P, ed. Social Policy in
- 33 Australia, What future for the welfare state? Sydney: Social Policy Research Centre,
- 34 University of New South Wales, 1990:103-12.
- 35 53. Wightman P, Robertson F. Costs of disability. A survey of the costs of disability for
- 36 people with disabilities in labour force related activity, Policy Research Paper No.59.
- 37 Sydney: Social Policy Research Centre (SPRC), 1996.
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

Table 1: Odds ratio of being in poverty, adjusted for age, sex and education for the Australian population aged 45 to 64 years, 2003

Employment Status	Weighted population	% of population in poverty	OR of being in poverty	95% CI	P-value
Not in the labour force due to ill health	431 300	73	REFERENCE		
Employed Full Time	2 657 000	4	0.02	0.01 – 0.02	<.0001
Employed Part Time	961 800	15	0.08	0.06 – 0.10	<.0001
Unemployed	107 300	79	1.26	0.73 – 2.16	0.4021
Not in the labour force due to other reasons	1 266 600	51	0.43	0.33 – 0.56	<.0001

Table 2: Odds Ratio of being in income poverty compared to those married with dependant children<sup>1</sup>, 45 to 64 year old population not in the labour force due to ill health.

Family type	Weighted population NOT in poverty	Weighted population in poverty	% of population in poverty	OR	95% CI	P-value
<i>Married couple only</i>	75 700	123 500	62		REFERENCE	
<i>Married with dependents</i>	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
<i>One person</i>	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
<i>One parent, dependents</i>	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

<sup>1</sup>OR adjusted for age, sex and education.