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

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

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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 miscrosimulation 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

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

Measuring poverty

To identify the individuals in the 45-64 year old Australian population that were in poverty in 2009, an income poverty line based on 50 per cent of the median income unit income was used in conjunction with OECD-modified equivalence scales [12-13]. This income poverty line was calculated from STINMOD, in order to ascertain the poverty line based upon the entire Australian population. The 50 per cent of median income poverty line expresses the economic situation of those in poverty relation to those in the middle of the income distribution. Those who are in poverty will have less than half the income of those in the middle of the income distribution of the population. The 50 per cent of the median income has been widely used as a poverty line both in Australia and internationally [14-16].

While we are assessing how many individuals are in poverty, considering an individual's personal income is not seen as a true reflection of an individual's economic situation. Within a family, it can be assumed that members pool their economic resources to the benefit of all members – thus looking at the wider income of the whole family will be more accurate [17]. Due to this assumption of the sharing of economic resources, the income unit's income (members of the same income unit are identified within the SDAC) will be used rather than the individual's income in this analysis. The terms 'income unit' and 'family' are

interchangeable in the remainder of this paper as they both refer an income unit as defined above.

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

Statistical analysis

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

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

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

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

Results

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

In 2009, there were 316, 300 individuals not in the labour force due to ill health and were aged 45 to 64 years. The majority, 73%, of the individuals who were not in the labour force due to ill health were in income poverty. Only the unemployed had a greater proportion in income poverty – 79%. Those employed part-time and full-time had the lowest proportion in income poverty – 15% and 4% respectively. Around half of the individuals who were out of the labour force for reasons other than ill health were in income poverty, which is lower proportion than the 73% of those who were in out of the labour force due to ill health who were in income poverty.

Once adjusted for age, sex and education (Table 1) those who were employed full time, employed part time, or were out of the labour force for reasons other than ill health were significantly more likely to *not* be in income poverty than those who were out of the labour force due to their ill health. 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.

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

After controlling for age, sex and education, those who were in full time employment and part-time employment had consistently higher odds of *not* being in income poverty regardless of income unit type than those with the corresponding income unit type who were out of the labour force due to ill health (Table 3). Those who were unemployed and were in single person or single parent with dependent children income unit types did not have significantly different odds of being in income poverty as those who were out of the labour force due to ill health and in the same income unit type. Those who were not in the labour force for other reasons and were married with children had higher odds of *not* being in poverty than those in the corresponding income unit type and who were out of the labour force due to ill health.

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

Table 3 shows the proportion of 45 to 64 year olds who were in income poverty based upon the characteristics of their income unit. The majority of those – 68% -- who had a member of their income unit out of the labour force due to ill health were in income poverty. Whereas

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

When adjusted for the age, sex and education characteristics of the individual, those aged 45 to 64 years, and had all members of their income unit (who were of working age) employed, were 32 times more likely (OR 95% CI: 25.0 to 41.4) to *not* be in income poverty than those individuals who had an income unit member not in the labour force due to ill health. Similarly, those who had other income unit compositions (no family member out of the labour force due to ill health and at least one member not in employment), were three times more likely to not be in income poverty (OR 95% CI: 3.0 to 4.6) than those individuals who had an income unit member not in the labour force due to ill health.

Discussion

Poverty is a phenomenon experienced by over half of the Australians aged 46 to 64 years who are not in the labour force due to illness. The financial impact of illness related early retirement is not only borne by the individual – it also affects their entire family with half the individuals who are in a family with someone out of the labour force due to ill health being in poverty. Being out of the labour force due to illness is related to detrimental financial situations for both the individual and their family.

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

with a higher incidence of poverty. Addressing the impact of ill health on the labour force participation of older workers may help to alleviate poverty.

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

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

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

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

The unemployed are often considered to be one of the most 'at risk' subpopulations of being in poverty [30-31]. However, this paper has shown that those not in the labour force due to ill health, in the 45 to 64 year old age group, are just as susceptible to poverty as the unemployed.

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.

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Competing Interests

None

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

Employment Status	OR	95% CI	P-value
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[1], 45 to 64 year old population.

Employment status		Family Type			
		Married with dependents	*Married couple only*	*One parent, dependents*	*One person*
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]OR adjusted for age, sex and education.

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*	*Not in poverty*	% in poverty	OR of NOT being in poverty*	95% CI*	P-value*
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

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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 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

understanding by wider society that an individual is not coping financially and they have inadequate economic resources to support a decent standard of living [22]. Leaving the workforce due to ill health may increase the chance of living in income 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 income poverty amongst members of the older working aged population. 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. It will also assess how retiring due to ill health can place other family members in income poverty.

Methods

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

Data source - Health&WealthMOD

Within Australia, there is no nationally-representative data that contains detailed information on both health status, income, poverty and not being in the labour force due to ill health. To fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the Australian Bureau of Statistics [23] that contains detailed information on chronic health condition, reasons for not being in the labour force and individual income range – and STINMOD – a nationally representative microsimulation model of continuous income, taxes, benefits and wealth. 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 income information, labour force status, reasons for not being in the workforce and poverty status.

Information on 45 to 64 years olds and their family members were taken from the SDAC to form 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 between 2003 and 2009. The up-rating only accounted for the change in the number of people reporting health conditions that was due to the ageing of the population. Any change in the number of people reporting health conditions between 2003 and 2009 that was related to trend increases or decline in illness were not captured by up-rating. However, the proportion of the Australian population reporting a long term health condition has remained stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe that the portion of people reporting a long term health condition would increase between 2003 and 2009 [24] beyond the impact of age.

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 [25], which is maintained and further developed for the Commonwealth by the National Centre for Social and Economic Modelling and is routinely used by Commonwealth departments for assessing the distributional and revenue implications of tax and cash transfer reforms. The model operates at the 'micro' level of families and individuals, and uses Australian Bureau of Statistics income survey unit record files as the base population. STINMOD contains a range of additional economic information such as continuous data on individual income, government support payments, income tax liability,

values of individuals' financial assets such as cash, superannuation, shares, property investment and owner occupied home.

The economic information from STINMOD was linked to the base population by a miscrosimulation method call synthetic matching[1] [27]. Records from STINMOD were matched to records from Health&WealthMOD by matching on a number of variables that were common to the two datasets. In this case 9 matching variables were chosen: labour force status, income unit type, type of government pension/support, income quintile, age group, sex, hours worked per week, highest educational qualification and home ownership – based upon their strong association with income. Once the records were matched the economic information from STINMOD was transferred onto the base population of Health&WealthMOD. For a more detailed account of the process by which Health&WealthMOD was created see Schofield *et al* [28].

Measuring poverty

To identify the individuals in the 45-64 year old Australian population that were in income poverty in 2009, an income poverty line based on 50 per cent of the median income unit income[2] was used in conjunction with OECD-modified equivalence scales [14, 30]. This

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

[2] The income unit is defined by the ABS as "a group of two or more related persons in the same household assumed to pool their income and savings and share the benefits deriving from them equitably; or one person assumed to have sole command over his or her income, consumption and savings" [29]

income poverty line was calculated from STINMOD, in order to ascertain the poverty line based upon the entire Australian population. The 50 per cent of median income poverty line expresses the economic situation of those in poverty relative to those in the middle of the income distribution. Those who were in income poverty had less than half the income of those in the middle of the income distribution of the population. The 50 per cent of the median income has been widely used as a poverty line both in Australia and internationally [31-33].

While we assessed how many individuals were in income poverty, considering an individual's personal income is not seen as a true reflection of an individual's economic situation. Within a family, it can be assumed that members pool their economic resources to the benefit of all members – thus looking at the wider income of the whole family will be more accurate [34]. Due to this assumption of the sharing of economic resources, the income unit's income will be used rather than the individual's income in this analysis[3]. Members of the same income unit were identified within the SDAC and the personal income of all adult members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family' income.

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

[3] The terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an income unit as defined above.

score, thereby equivalising the income and allowing comparisons between families of different sizes.

If a family is identified as being in income poverty then all family members are considered to be income poverty. This has important implications for identifying the relationship between retiring early due to ill health and poverty status – if retiring early due to ill health reduces the family's income below the poverty line then the entire family is considered to be in income poverty.

Statistical analysis

The 45 to 64 year old Australian population were grouped into one of five groups based on their labour force status: employed full time, employed part time, unemployed (not employed but looking for work), not in the labour force due to ill health, and not in the labour force due to other reasons[4]. The proportion of the 45 to 64 year old Australian population who were in poverty in each group was estimated.

Logistic regression models were used to compare the odds of being in poverty for those who were employed full time, employed part time, unemployed, and not in the labour force for reasons other than ill health. Not in the labour force due to ill health was used as the reference group so that the difference in the odds ratio of being in poverty between these individuals

[4] The 2003 SDAC recorded individual labour force participation. For those who stated they were 'not in the labour force', their main reason for not being in the labour force was recorded. Response options included: retired, study or returning to study, own ill health or disability, child care availability or children too young or prefers to look after them, too old, does not need or want to work, some else's ill health or disability, other family considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and other. In this study those who were out of the labour force and stated their main reason for this was their own ill health or disability were considered to be 'out of the labour force due to ill health'; and those who selected all other options were considered to be 'out of the labour force due to other reasons'.

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

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

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

Results

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

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

Once adjusted for age, sex and education (Table 1) those who were employed full time, employed part time, or were out of the labour force for reasons other than ill health were significantly less likely to be in income poverty than those who were out of the labour force due to their ill health. The odds ratio of being in income poverty compared to those not in the labour force due to ill health was very small for those employed full time and part time. 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 income poverty (by family type), behind those who were part of a married couple without dependants (Table 2).

After controlling for age, sex and education, those who were single had six times the odds of being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36). There was no significant difference in the odds of being in income poverty between those who were married with dependants, single with dependants, and those who were married without dependants (Table 2).

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

Discussion

Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to 64 years who are not in the labour force due to their ill health – 316 300 people. The financial impact of illness related early retirement is not only borne by the individual – it also affects their entire family with 173 300 individuals in the same family as someone not in the labour force due to ill health also being in income poverty. Those not in the labour force due to ill health who were single with no children were the most likely to be in income poverty (90%). This emphasises the importance of having a partner to share the financial burden of being not in the labour force due to ill health [37, 38], and also the potential financial reliance people who are not in the labour force due to ill health have on their partners. Interestingly, those who were single with dependent children were *not* more likely to be in income poverty than those who were married. This may be because those who have poor health and dependent children have higher welfare payments and may have income support from a non-custodian parent.

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

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

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

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

Further to this, the additional economic burden imposed by illness in terms of medical costs is not captured by income poverty lines [44]. Those who do not have chronic health conditions will not have the additional medical expenses of those not in the labour force due to ill health [45, 46]. The actual disposable income available to those not in the labour force due to ill health, once essential medical costs are taken into account, may reduce these individual's income even further and place more families in poverty or push some families further below the poverty line.

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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 childrten[1], 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
Married couple only	75 700	123 500	62		REFERENCE	
Married with dependents	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
One person	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
One parent, dependents	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

[1]OR adjusted for age, sex and education.

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

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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 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].

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Methods

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as well as detailed income information, labour force status, reasons for not being in the workforce and poverty status.

Information on 45 to 64 years olds and their family members were taken from the SDAC to form 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 between 2003 and 2009. The up-rating only accounted for the change in the number of people reporting health conditions that was due to the ageing of the population. Any change in the number of people reporting health conditions between 2003 and 2009 that was related to trend increases or decline in illness were not captured by up-rating. However, the proportion of the Australian population reporting a long term health condition has remained stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe that the portion of people reporting a long term health condition would increase between 2003 and 2009 [24] beyond the impact of age.

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 [25], which is maintained and further developed for the Commonwealth by the National Centre for Social and Economic Modelling and is routinely used by Commonwealth departments for assessing the distributional and revenue implications of tax and cash transfer reforms. The model operates at the 'micro' level of families and individuals, and uses Australian Bureau of Statistics income survey unit record files as the base population. STINMOD contains a range of additional economic information such as continuous data on individual income, government support payments, income tax liability,

values of individuals' financial assets such as cash, superannuation, shares, property investment and owner occupied home.

The economic information from STINMOD was linked to the base population by a miscrosimulation method call synthetic matching[1] [27]. Records from STINMOD were matched to records from Health&WealthMOD by matching on a number of variables that were common to the two datasets. In this case 9 matching variables were chosen: labour force status, income unit type, type of government pension/support, income quintile, age group, sex, hours worked per week, highest educational qualification and home ownership – based upon their strong association with income. Once the records were matched the economic information from STINMOD was transferred onto the base population of Health&WealthMOD. For a more detailed account of the process by which Health&WealthMOD was created see Schofield *et al* [28].

Measuring poverty

To identify the individuals in the 45-64 year old Australian population that were in income poverty in 2009, an income poverty line based on 50 per cent of the median income unit income[2] was used in conjunction with OECD-modified equivalence scales [14, 30]. This

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

[2] The income unit is defined by the ABS as "a group of two or more related persons in the same household assumed to pool their income and savings and share the benefits deriving from them equitably; or one person assumed to have sole command over his or her income, consumption and savings" [29]

income poverty line was calculated from STINMOD, in order to ascertain the poverty line based upon the entire Australian population. The 50 per cent of median income poverty line expresses the economic situation of those in poverty relative to those in the middle of the income distribution. Those who were in income poverty had less than half the income of those in the middle of the income distribution of the population. The 50 per cent of the median income has been widely used as a poverty line both in Australia and internationally [31-33].

While we assessed how many individuals were in income poverty, considering an individual's personal income is not seen as a true reflection of an individual's economic situation. Within a family, it can be assumed that members pool their economic resources to the benefit of all members – thus looking at the wider income of the whole family will be more accurate [34]. Due to this assumption of the sharing of economic resources, the income unit's income will be used rather than the individual's income in this analysis[3]. Members of the same income unit were identified within the SDAC and the personal income of all adult members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family' income.

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

[3] The terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an income unit as defined above.

score, thereby equivalising the income and allowing comparisons between families of different sizes.

If a family is identified as being in income poverty then all family members are considered to be income poverty. This has important implications for identifying the relationship between retiring early due to ill health and poverty status – if retiring early due to ill health reduces the family's income below the poverty line then the entire family is considered to be in income poverty.

Statistical analysis

The 45 to 64 year old Australian population were grouped into one of five groups based on their labour force status: employed full time, employed part time, unemployed (not employed but looking for work), not in the labour force due to ill health, and not in the labour force due to other reasons[4]. The proportion of the 45 to 64 year old Australian population who were in poverty in each group was estimated.

Logistic regression models were used to compare the odds of being in poverty for those who were employed full time, employed part time, unemployed, and not in the labour force for reasons other than ill health. Not in the labour force due to ill health was used as the reference group so that the difference in the odds ratio of being in poverty between these individuals

[4] The 2003 SDAC recorded individual labour force participation. For those who stated they were 'not in the labour force', their main reason for not being in the labour force was recorded. Response options included: retired, study or returning to study, own ill health or disability, child care availability or children too young or prefers to look after them, too old, does not need or want to work, some else's ill health or disability, other family considerations, pregnancy, lacks relevant schooling, training or experience, don't know, and other. In this study those who were out of the labour force and stated their main reason for this was their own ill health or disability were considered to be 'out of the labour force due to ill health'; and those who selected all other options were considered to be 'out of the labour force due to other reasons'.

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

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

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

Results

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

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

Once adjusted for age, sex and education (Table 1) those who were employed full time, employed part time, or were out of the labour force for reasons other than ill health were significantly less likely to be in income poverty than those who were out of the labour force due to their ill health. The odds ratio of being in income poverty compared to those not in the labour force due to ill health was very small for those employed full time and part time. 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 income poverty (by family type), behind those who were part of a married couple without dependants (Table 2).

After controlling for age, sex and education, those who were single had six times the odds of being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36). There was no significant difference in the odds of being in income poverty between those who were married with dependants, single with dependants, and those who were married without dependants (Table 2).

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

Discussion

Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to 64 years who are not in the labour force due to their ill health – 316 300 people. The financial impact of illness related early retirement is not only borne by the individual – it also affects their entire family with 173 300 individuals in the same family as someone not in the labour force due to ill health also being in income poverty. Those not in the labour force due to ill health who were single with no children were the most likely to be in income poverty (90%). This emphasises the importance of having a partner to share the financial burden of being not in the labour force due to ill health [37, 38], and also the potential financial reliance people who are not in the labour force due to ill health have on their partners. Interestingly, those who were single with dependent children were *not* more likely to be in income poverty than those who were married. This may be because those who have poor health and dependent children have higher welfare payments and may have income support from a non-custodian parent.

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

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

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

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

Further to this, the additional economic burden imposed by illness in terms of medical costs is not captured by income poverty lines [44]. Those who do not have chronic health conditions will not have the additional medical expenses of those not in the labour force due to ill health [45, 46]. The actual disposable income available to those not in the labour force due to ill health, once essential medical costs are taken into account, may reduce these individual's income even further and place more families in poverty or push some families further below the poverty line.

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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 childrten[1], 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
Married couple only	75 700	123 500	62		REFERENCE	
Married with dependents	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
One person	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
One parent, dependents	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

[1]OR adjusted for age, sex and education.

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

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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],

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 [26]. To be labelled as being in income 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 [27]. Leaving the workforce due to ill health may increase the chance of living in income 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 income poverty amongst members of the older working aged population, and assess the influence of family type on this relationship.

Methods

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

Data source - Health&WealthMOD

Within Australia, there is no nationally-representative data that contains detailed information on both health status, income, poverty and not being in the labour force due to ill health. To fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the Australian Bureau of Statistics [28] that contains detailed information on chronic health condition, reasons for not being in the labour force and individual income range – and STINMOD – a nationally representative microsimulation model of continuous income, taxes, benefits and wealth. 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 income information, labour force status, reasons for not being in the workforce and poverty status.

Information on 45 to 64 years olds and their family members were taken from the SDAC to form 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 between 2003 and 2009. The up-rating only accounted for the change in the number of people reporting health conditions that was due to the ageing of the population. Any change in the number of people reporting health conditions between 2003 and 2009 that was related to trend increases or decline in illness were not captured by up-rating. However, the proportion of the Australian population reporting a long term health condition has remained stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe that the portion of people reporting a long term health condition would increase between 2003 and 2009 [29] beyond the impact of age.

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

Measuring poverty

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

income unit is defined by the ABS as "a group of two or more related persons in the same household assumed to pool their income and savings and share the benefits deriving from them equitably; or one person assumed to have sole command over his or her income, consumption and savings" [35]

This income poverty line was calculated from STINMOD, in order to ascertain the poverty line based upon the entire Australian population. The 50 per cent of median income poverty line expresses the economic situation of those in poverty relative to those in the middle of the income distribution. Those who were in income poverty had less than half the income of those in the middle of the income distribution of the population. The 50 per cent of the median income has been widely used as a poverty line both in Australia and internationally [36-38].

While we assessed how many individuals were in income poverty, considering an individual's personal income is not seen as a true reflection of an individual's economic situation. Within a family, it can be assumed that members pool their economic resources to the benefit of all members – thus looking at the wider income of the whole family will be more accurate [39]. Due to this assumption of the sharing of economic resources, the income unit's income will be used rather than the individual's income in this analysis (the terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an income unit as defined above). Members of the same income unit were identified within the SDAC and the personal income of all adult members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family' income.

Differences in numbers and composition of families were accommodated for using equivalence scales [40]. The OECD modified equivalence scale [41] was utilised in this

study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each child (person aged under 15 years). The family's income was divided by their equivalence score, thereby equivalising the income and allowing comparisons between families of different sizes.

If a family is identified as being in income poverty then all family members are considered to be income poverty. This has important implications for identifying the relationship between retiring early due to ill health and poverty status – if retiring early due to ill health reduces the family's income below the poverty line then the entire family is considered to be in income poverty.

Statistical analysis

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

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

but looking for work), not in the labour force due to ill health, and not in the labour force due to other reasons. The proportion of the 45 to 64 year old Australian population who were in poverty in each group was estimated.

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

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

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

Results

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

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

Once adjusted for age, sex and education (Table 1) those who were employed full time, employed part time, or were out of the labour force for reasons other than ill health were significantly less likely to be in income poverty than those who were out of the labour force due to their ill health. The odds ratio of being in income poverty compared to those not in the labour force due to ill health was very small for those employed full time and part time. 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

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

After controlling for age, sex and education, those who were single had six times the odds of being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36). There was no significant difference in the odds of being in income poverty between those who were married with dependants, single with dependants, and those who were married without dependants (Table 2).

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

Discussion

Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to 64 years who are not in the labour force due to their ill health – 316 300 people. The financial impact of illness related early retirement is not only borne by the individual – it also affects their entire family with 173 300 individuals in the same family as someone not in the labour force due to ill health also being in income poverty. Those not in the labour force due to ill health who were single with no children were the most likely to be in income poverty (90%). This emphasises the importance of having a partner to share the financial burden of being not in the labour force due to ill health [42-43], and also the potential financial reliance people who are not in the labour force due to ill health have on their partners. Interestingly, those who were single with dependent children were *not* significantly more likely to be in income

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

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

The difference in the likelihood of being in poverty between those who are not in the labour force due to ill health and those who are so for other reasons suggests that it is being out of the labour force due to illness and not just being out of the labour force in general that increases the individual's chances of being in poverty. Those who are not in the labour force for reasons other than ill health fare better in terms of their poverty status than those not in the labour force due to illness. This may be due to the potential for greater choice to be

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

Further to this, the additional economic burden imposed by illness in terms of medical costs is not captured by income poverty lines [51]. Those who do not have chronic health conditions will not have the additional medical expenses of those not in the labour force due to ill health [52-53]. The actual disposable income available to those not in the labour force due to ill health, once essential medical costs are taken into account, may reduce these individual's income even further and place more families in poverty or push some families further below the poverty line.

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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.

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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 childrten[1], 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
Married couple only	75 700	123 500	62		REFERENCE	
Married with dependents	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
One person	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
One parent, dependents	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

[1]OR adjusted for age, sex and education.

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

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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],

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 [26]. To be labelled as being in income 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 [27]. Leaving the workforce due to ill health may increase the chance of living in income 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 income poverty amongst members of the older working aged population, and assess the influence of family type on this relationship.

Methods

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

Data source - Health&WealthMOD

Within Australia, there is no nationally-representative data that contains detailed information on both health status, income, poverty and not being in the labour force due to ill health. To fill this deficiency, Health&WealthMOD was constructed based upon the 2003 Survey of Disability, Ageing and Carers (SDAC) – a nationally representative survey conducted by the Australian Bureau of Statistics [28] that contains detailed information on chronic health condition, reasons for not being in the labour force and individual income range – and STINMOD – a nationally representative microsimulation model of continuous income, taxes, benefits and wealth. 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 income information, labour force status, reasons for not being in the workforce and poverty status.

Information on 45 to 64 years olds and their family members were taken from the SDAC to form 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 between 2003 and 2009. The up-rating only accounted for the change in the number of people reporting health conditions that was due to the ageing of the population. Any change in the number of people reporting health conditions between 2003 and 2009 that was related to trend increases or decline in illness were not captured by up-rating. However, the proportion of the Australian population reporting a long term health condition has remained stable in more ten years between 1995 and 2007/8, so the authors had no reason to believe that the portion of people reporting a long term health condition would increase between 2003 and 2009 [29] beyond the impact of age.

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 [30], which is maintained and further developed for the Commonwealth by the National Centre for Social and Economic Modelling and is routinely used by Commonwealth departments for assessing the distributional and revenue implications of tax and cash transfer reforms. The model operates at the 'micro' level of families and individuals, and uses Australian Bureau of Statistics income survey unit record files as the base population. STINMOD contains a range of additional economic information such as continuous data on individual income, government support payments, income tax liability,

values of individuals' financial assets such as cash, superannuation, shares, property investment and owner occupied home.

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

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

Measuring poverty

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

income unit is defined by the ABS as "a group of two or more related persons in the same household assumed to pool their income and savings and share the benefits deriving from them equitably; or one person assumed to have sole command over his or her income, consumption and savings" [35]

This income poverty line was calculated from STINMOD, in order to ascertain the poverty line based upon the entire Australian population. The 50 per cent of median income poverty line expresses the economic situation of those in poverty relative to those in the middle of the income distribution. Those who were in income poverty had less than half the income of those in the middle of the income distribution of the population. The 50 per cent of the median income has been widely used as a poverty line both in Australia and internationally [36-38].

While we assessed how many individuals were in income poverty, considering an individual's personal income is not seen as a true reflection of an individual's economic situation. Within a family, it can be assumed that members pool their economic resources to the benefit of all members – thus looking at the wider income of the whole family will be more accurate [39]. Due to this assumption of the sharing of economic resources, the income unit's income will be used rather than the individual's income in this analysis (the terms 'income unit' and 'family' are interchangeable in the remainder of this paper as they both refer an income unit as defined above). Members of the same income unit were identified within the SDAC and the personal income of all adult members (aged 15 and over) of the family were tallied to obtain the 'income unit' or 'family' income.

Differences in numbers and composition of families were accommodated for using equivalence scales [40]. The OECD modified equivalence scale [41] was utilised in this

study, whereby a value of 1.0 was given to the first adult member (person aged 15 years and over), a value of 0.5 to each subsequent adult family member and a value of 0.3 given to each child (person aged under 15 years). The family's income was divided by their equivalence score, thereby equivalising the income and allowing comparisons between families of different sizes.

If a family is identified as being in income poverty then all family members are considered to be income poverty. This has important implications for identifying the relationship between retiring early due to ill health and poverty status – if retiring early due to ill health reduces the family's income below the poverty line then the entire family is considered to be in income poverty.

Statistical analysis

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

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

but looking for work), not in the labour force due to ill health, and not in the labour force due to other reasons. The proportion of the 45 to 64 year old Australian population who were in poverty in each group was estimated.

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

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

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

Results

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

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

Once adjusted for age, sex and education (Table 1) those who were employed full time, employed part time, or were out of the labour force for reasons other than ill health were significantly less likely to be in income poverty than those who were out of the labour force due to their ill health. The odds ratio of being in income poverty compared to those not in the labour force due to ill health was very small for those employed full time and part time. 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

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

After controlling for age, sex and education, those who were single had six times the odds of being in income poverty than those who were married (OR 6.28, 95% CI: 3.47 – 11.36). There was no significant difference in the odds of being in income poverty between those who were married with dependants, single with dependants, and those who were married without dependants (Table 2).

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

Discussion

Poverty is a phenomenon experienced by nearly three quarters of the Australians aged 46 to 64 years who are not in the labour force due to their ill health – 316 300 people. The financial impact of illness related early retirement is not only borne by the individual – it also affects their entire family with 173 300 individuals in the same family as someone not in the labour force due to ill health also being in income poverty. Those not in the labour force due to ill health who were single with no children were the most likely to be in income poverty (90%). This emphasises the importance of having a partner to share the financial burden of being not in the labour force due to ill health [42-43], and also the potential financial reliance people who are not in the labour force due to ill health have on their partners. Interestingly, those who were single with dependent children were *not* significantly more likely to be in income

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

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

The difference in the likelihood of being in poverty between those who are not in the labour force due to ill health and those who are so for other reasons suggests that it is being out of the labour force due to illness and not just being out of the labour force in general that increases the individual's chances of being in poverty. Those who are not in the labour force for reasons other than ill health fare better in terms of their poverty status than those not in the labour force due to illness. This may be due to the potential for greater choice to be

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

Further to this, the additional economic burden imposed by illness in terms of medical costs is not captured by income poverty lines [51]. Those who do not have chronic health conditions will not have the additional medical expenses of those not in the labour force due to ill health [52-53]. The actual disposable income available to those not in the labour force due to ill health, once essential medical costs are taken into account, may reduce these individual's income even further and place more families in poverty or push some families further below the poverty line.

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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 childrten[1], 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
Married couple only	75 700	123 500	62		REFERENCE	
Married with dependents	17 600	28 600	62	1.16	0.52 – 2.61	0.7151
One person	17 500	157 200	90	6.28	3.47 – 11.36	<.0001
One parent, dependents	4 600	6 600	59	1.80	0.63 – 5.17	0.2722

[1]OR adjusted for age, sex and education.