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Title of the paper

Mediating effects of assets on the relationship between poor health and livelihood outcomes

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ABSTRACT

This paper aims to understand the mediating effects of assets on the relationship between poor health and livelihood outcomes among low-income individuals in Singapore. Data for the paper is extracted from a one-time survey on low-income households with debt conducted by the Social Service Research Centre of National University of Singapore. The data analysis is based on a stepwise regression on a sample size of 471 respondents. Adapted from a model by Russell (2008), we study the vulnerability or resilience of poor health, as influenced by various assets in the form of human, physical, financial and social capital (McIntyre & Thiede, 2008). Three measures of livelihood outcomes are used: employment, household income and life satisfaction. The four types of capital are represented by education level, housing arrangement, total household arrears and social support.

The findings show mediating effects of assets on livelihood outcomes in 3 cases. Firstly, even though respondents in poor health are likely to be unemployed, those in poor health and have household arrears are less likely to be unemployed. This is translated to the observation of poor health acting as a mediator in the relationship between total arrears and household income. Recommendations have been made for more attention to be placed on the low-income population with household arrears, targeting employment assistance or debt relief programmes. Secondly, the findings show that poor health changes the statistical significance of the relationship between homeownership and life satisfaction. Non-home owners in poor health reported poorer life satisfaction than homeowners.

The paper challenges the principles of social policy planning, introducing new perspectives towards designing social policies for the vulnerable population. The compounding effects of poor health and household arrears from this paper suggest the need for more holistic policy approaches that integrate health, social welfare, employment assistance, debt management and housing schemes.

1. INTRODUCTION

Singapore prides herself as one of the leading nations in health and healthcare efficiency. Bloomberg has ranked Singapore as the 2nd in healthcare efficiency (Du & Lu, 2016) and 4th healthiest country (Lu & Giudice, 2017) in the world. These accomplishments have been possible with low healthcare spending per capita while ensuring affordable healthcare for citizens (Du & Lu, 2016).

Singapore's Public Healthcare System

Singapore's healthcare system is underpinned by a philosophy to promote individual responsibility, where individuals are 'encouraged to cultivate a strong sense of personal responsibility toward health' (Haseltine, 2013). Although the government aims to inculcate this culture of individual responsibility, the government also has measures in place to help citizens cope with healthcare costs. The 3Ms – Medisave, Medishield Life and Medifund, are in place to buffer the out-of-pocket medical expenses borne by patients (Ministry of Health, 2016). Medisave is part of the Central Provident Fund, which is a compulsory savings scheme for Singaporeans who are employed. An individual's Medisave account can be used to pay for personal and immediate family's medical costs (Haseltine, 2013). MediShield Life is a basic health insurance plan that covers 'large hospital bills and selected costly outpatient treatments' (MOH, 2014) for Singaporeans and Permanent Residents, including those who previously failed to qualify for insurance due to age or health conditions. Finally, Medifund is a safety net to support Singaporeans in financial need with their medical bills (Haseltine, 2013).

Despite the healthcare measures in place, what happens when a low-income individual is both in poor health and in debt? What if he has received low education and is unemployed as well?

The process of being diagnosed with a health condition and having to go through medical treatments in a hospital is a stressful experience for both the patient and family. Yet for many, what comes after the diagnosis and treatment are undesirable consequences. The impact of poor health often results in many more folds of stress as compared to poor health itself. Individuals may be unable to continue employment and lose their income. The life satisfaction of individuals may also be reduced. Individuals from low-income families are most vulnerable in such circumstances.

Existing economic and social qualities of the individual may influence the impact of poor health on his livelihood outcomes through a mediating effect. This paper will explore if there are any factors that may influence the impact of poor health on livelihood outcomes, specifically economic and psychosocial outcomes.

Coping with the cost of poor health

Poor health has an impact on many aspect of an individual, such as physical and mental well being (Dooley, Fielding & Levi, 1996). There is growing evidence of households being pushed into, or sunk further into poverty due to the large amount of medical expenses incurred from a poor health status (McIntyre et al, 2006). Medical bills above 10% of the household income are classified as a 'catastrophic' event for the individual and his family (Russell, 2005). When medical bills exceed this threshold, it is likely to result in "cuts to food consumption, debt and impoverishment" (Russell, 2005). This is exacerbated with a fall in household

income due to the inability to work as a result of poor health (Wagstaff & van Doorslaer, 2001), leading to a medical poverty trap (Bennett, Gilson & Mills, 2008; McIntyre, 2006;).

Russell (2008) presents that poor health has direct and indirect costs to the household. Medical bills and the loss in income due to inability to work may result in a fall in the quality of life of the household. At the same time, household assets will be tapped on to enable the household to cope with a member's poor health. With this, the vulnerability or resilience of a household to poor health is defined as the "capacity to cope with illness costs without long-term damage to household assets" (Russell, 2008). The household's ability to cope is dependent on the human, physical, financial assets, and social networks that he has (Russell, 2008).

Proposed framework

Adapting from Russell's framework on coping strategies (2008), the present study aims to understand the relationship between a health episode and livelihood outcomes, and how assets may mediate this relationship (Figure 1). These mediating factors are in the form of human assets, physical assets, financial assets and social networks.

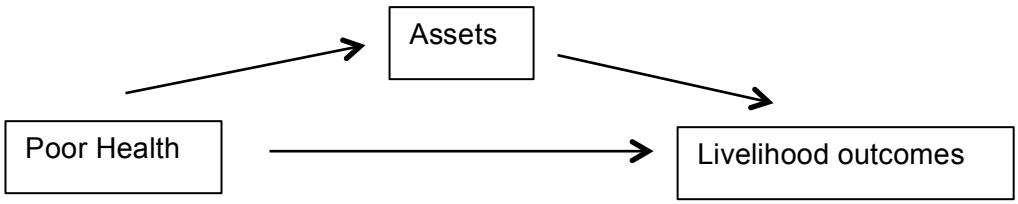

Figure 1: Proposed paper framework

Mediating variables

Mediating variables refer to the variables that exist in a relationship between an independent variable and a dependent variable. The inclusion of a third variable changes the relationship between an independent variable, X, and dependent variable, Y (MacKinnon, 2011).

The theory of assets suggests that social welfare is built on the basis of existing assets that are beneficial to an individual's circumstances (Sherraden, 1991). Assets present in the individual and his family act as a third variable that changes the impact of a health episode on the livelihood outcomes of the individual and family. Russell's categories of assets (2008) have been adopted to give an indication of the presence and strength of each asset.

Human Assets. Education is a human asset that may determine the extent of the impact of the health problem. Sen (1999) suggests that education contributes positively to the improvement of 'well-being and freedom of people', 'influencing social change' and 'influencing economic production'. For an individual with high education level, in the event of poor health, he would be able to continue employment in a skills-intensive post. However, an individual with low education level in poor health would not be able to continue employment in a labour-intensive job due to physical limitations. This will affect the livelihood outcomes of the individual and his family. As such, it may be hypothesized that education may be a mediating variable in the relationship between poor health and livelihood outcomes.

Physical Assets. The presence of a physical asset, such as the ownership of a home, is hypothesized to mediate the relationship between poor health and livelihood outcomes. The ownership of physical assets may have an impact on the resilience or vulnerability of the family to the health episode. Herbert & Belsky

(2008) discussed the benefits of homeownership as a 'vehicle for wealth accumulation', providing certain degree of stability for the family. In the event of poor health, home ownership may be a determinant of livelihood outcomes for the individual.

Financial Assets. Financial assets are often in the form of savings, but for low-income households, they might have financial liabilities in the form of debt and arrears instead. A study by Ong, Theseira and Ng (2016), which adopts the same data set as this paper, presented household arrears in three categories - home arrears, consumer debt and other needs. The types and prevalence of the arrears are summarized in Table 1 below.

Table 1
Type of arrears and prevalence

Category of debt	Type of arrears	Prevalence in respondents
Home arrears	Utility bills	68%
	Town council bills	47%
	Rental fees	27%
	Mortgage repayment	20%
Consumer debt	Telco bills	45%
	Credit card bills	18%
	Instalment Plans	14%
	Licensed money lenders	6%
Other needs	Medical	51%
	Loans from family and relatives	32%
	Education	20%

(Ong, Theseira & Ng, 2016)

Social support. Social support is a less tangible form of asset that allows the individuals to receive emotional support from their "relatives and friends, colleagues and employers" (Russell, 2008). As a mediating variable in the relationship between poor health and livelihood outcomes, social support improves the coping of illness and maintenance of employment. As a result, social support affects one's ability to cope both economically and psychologically with the illness (Ranson, 2002).

Livelihood Outcomes

Economic Outcomes. One economic cost of illness is the employment status of the patient post-diagnosis of poor health. For example, the patient may be unable to work due to circumstances as a result of their medical condition. In other circumstances where the poor health status does not restrict an individual's employment, the chronicity nature of the illness may affect his work performance, which possibly leads to unemployment (Dooley, D., Fielding, J. & Levi, L., 1996).

As a result, a second economic outcome of poor health is the loss of income due to unemployment of the household member in poor health. Ng (2016) discussed the type of jobs engaged by the low-income population in Singapore. This includes "delivery and despatch worker, driver, cleaner/sweeper, logistics worker and security guard" for males and "cleaner/sweeper, cashier/customer service, administrative assistant, sales assistant and production operator" for females. These jobs are considered to be laborious, shift-work, and long hours, which may be taxing on an individual in poor health, resulting in unemployment **(**Babiarz, P. et al, 2012**;** Michaud and van Soest, 2008**;** Russell, 2005). The economic outcomes of poor health of an individual may result in the entrenchment of the individual and his

family in a medical poverty trap (McIntyre, Theide, Dahlgren & Whitehead, 2006; Wagstaff & van Doorslaer, 2001).

Psychosocial Outcomes. The psychosocial outcomes of poor health in this study are measured by life satisfaction. Adopted by cross-national surveys as a measure of well being (Inoguchi et al, 2014), life satisfaction is reported through the administering of life satisfaction scales (Diener, 1994). Studies have shown that individuals in poor health are more likely to report a lower life satisfaction (Strine et al, 2008).

The Capabilities Approach

The present study complements Russell's mediating assets framework, with the capabilities approach by economist and philosopher Amartya Sen. The approach evaluates an individual's societal functioning and social policy by focusing on the capabilities the individual has. Capabilities consist of the freedom to achieve one's effectively possible potential, while functioning refers to one's realized achievements (Sen, 1993). In summary, the goal of social policy and improvement of population's well being should be targeted at one's capabilities to function in the society.

2. METHODOLOGY

The data for this paper is extracted from a one-time survey on low-income households with debt conducted by the Social Service Research Center of National University of Singapore. Clients who were receiving case management services in 27 family service centres (refer to Appendix A) in Singapore were invited to participate in the research. The eligibility to participate in the survey is low-income

and the presence of household arrears. Amongst the participants, one of the groups received debt relief while the other did not.

This paper will focus on the first wave of baseline data, taken from the two groups prior to the issuance of debt relief. Thus, it does not compare outcomes between debt relief and non-debt relief. Instead, its interest is on the mediating role of assets between health and livelihood outcomes. Ethics approval was obtained from the Institutional Review Board of the National University of Singapore on 1 April 2015, and face-to-face interviews were conducted between July and October 2015.

The analysis of the pre-intervention survey is based on the responses from 471 participants with existing arrears.

Empirical Model

The stepwise regression model is explicated through 3 specifications below.

The first specification explores the impact of poor health on livelihood outcomes while controlling for demographic variables and random events.

$$y_{outcomes} = \beta_0 + \beta_1(Poor\ Health) + \beta_2(Control\ Variables) + \varepsilon_{it} \quad (1)$$

where:

β's are the estimated coefficients,

$y_{outcomes}$ is the livelihood outcomes of the individual,

Controls represent other covariates such as demographic characteristics, and

ε is the random shock for individual *i* at time period *t*.

The second specification adds on to the first, introducing assets into the equation.

$$y_{outcomes} = \beta_0 + \beta_1(Poor\ Health) + \beta_2(Assets) + \beta_3(Control\ Variables) + \varepsilon_{it} \quad (2)$$

The third specification considers the interaction term of poor health and assets. The statistical significance of β_3 indicates whether the mediation effect of assets is significant.

$$y_{outcomes} = \beta_0 + \beta_1(Poor\ Health) + \beta_2(Assets) + \beta_3(Poor\ Health\ X\ Assets) + \beta_4(Controls) + \varepsilon_{it} \quad (3)$$

where:

β's are the estimated coefficients,
$y_{outcomes}$ is the livelihood outcomes of the individual,
Controls represent other covariates such as demographic characteristics,
(Poor Health X Assets) is the interaction term of poor health and assets, and
ε is the random shock for individual *i* at time period *t*.

A linear probability model was adopted for regression with binary variables such as employment and ordinary least squares (OLS) model for continuous variables such as household income.

Variables

Independent variable – Poor Health

The independent variable in the model is the health status of an individual, defined as the presence of chronic health or medical conditions. The binary variable – health status, is presented here as 1 = poor health and 0 = absence of poor health.

Dependent variables

The dependent variables are the livelihood outcomes of respondents, defined in terms of economic and psychosocial well being. Economic well being is defined by household income and employment status while psychosocial well being is defined by life satisfaction.

Household income is the combined income, *in thousands*, of the respondents and their families through employment. One's medical condition may deter or decrease the capacity of a person to work. Three cases with household incomes above $5,000 were dropped as outliers as this is a low-income sample receiving financial assistance.

Employment status is a dichotomous variable that states if a respondent is employed or not. This comprises of both full-time and part-time employment.

Life satisfaction is a continuous variable weighed on a Likert scale from 1 to 10, with 1 being 'dissatisfied' and 10 being 'satisfied'. This measurement of life satisfaction is similar to that in the World Values Survey (2014).

Mediating variables

Four assets, in the form of human, physical, financial and social capital, are used as the mediating assets. In this paper, assets are negatively specified, to exemplify the disadvantaged situation of low-income individuals in poor health.

Human assets are defined by the education level of the respondents. It is measured as a dichotomous variable, where 1 = the respondent has secondary school education and below, and 0 = the respondent received education post-secondary education and above.

One's physical asset is measured by home ownership. In this study, home ownership is measured as a dichotomous variable where 1 = not a homeowner and 0 = homeowner. Non-homeowners include renters or individuals staying at the home of a relative or friend.

In this study, financial "asset" of an individual is defined by the total amount of household arrears. This is because the sample belongs to the low-income population with a low or zero reported amount of savings. The total household arrears is a continuous variable that considers the sum of arrears as a whole.

The fourth asset, social support, is measured in a binary variable termed "isolated", where 1 = isolated and 0 = not isolated. Six questions in the survey were asked to determine the amount of social support that the respondent is receiving. The first three questions asked about the number of family members or relatives that the respondent (1) see or hear from at least once a month (2) feel at ease to talk about private matters, and (3) feel close to such that they can call them for help. The next three questions asked about the number of neighbours and/or friends that the respondent (4) see or hear from at least once a month (5) feel at ease to talk about private matters, and (6) feel close to such that they can call them for help. The

selections for the response of each of the six questions were identical. The options included (1) “None”, (2) “One”, (3) “Two”, (4) “Three or four”, (5) “Five through eight”, (6) “Nine or more”. An individual is considered isolated when the sum of the six-scaled questions is below six.

In summary, the assets, specified negatively, are education level, home ownership, social support and financial arrears.

Control variables

Control variables represent other covariates such as demographic characteristics. The control variables in this study include: *Gender, Race, Age,* and *Not Married. Gender* is measured as a dichotomous variable where male = 1 and female = 0. This is similar for the variable *Race*, where Malay = 1 and non-Malay = 0.

Malay has been selected as the dichotomous variable as the general socioeconomic profile of the Malay population shows that the education attainment, labour force participation and average income are below national average (Association of Muslim Professionals, 2010).

The variable, *Age,* is a continuous variable of the respondent actual age in years. Marital status is a dichotomous variable where married = 1 and single =0.

Robustness checks

Besides the specifications reported in this thesis, several other models were tested. The results from these other models yielded little additional information, and thus the models stated in the methodology were selected.

Firstly, the study does not specify the type of poor health one is in. Indeed, poor health may range from chronic health to physical mobility impairments, and even to mental health. The various specifications of health problems have been attempted previously. However, the sample size, when the type of health is specified was too small for comparison. In addition, similar results are achieved when the type of poor health is specified as chronic health. Hence, various types of poor health are classified under one category.

Secondly, different specifications of financial arrears have been attempted. Specifications that had been attempted include differentiation of the amount of mortgage, home arrears or medical arrears, as well as the total number of arrears. The findings from these attempts were similar or they did not produce any statistically significant results.

In both terms mentioned above, the lack of statistical significant results might be because sample sizes of respondents with different type of poor health or arrears might be small. Thus an overall measure of poor health and the value of arrears suffice for the purposes of the study.

3. RESULTS

The statistical analysis was carried out on 482 cases. Eleven cases were removed due to reasons of missing or outlier data. In this section, the summary statistics will first be discussed, followed by the results of the stepwise regression.

Summary Statistics

Table 2 shows the summary statistics of health, assets, livelihood outcomes and control variables used in the analysis. In general, the summary statistics reflect that the respondents face poor socioeconomic conditions.

Table 2

Summary Statistics of Health, Assets, Livelihood Outcomes and Control Variables

Category	*Variable*	*N*	*Mean*	*SD*	*Min*	*Max*
Health	Poor Health	471	46.3%	0.499	0	1
Assets	Sec Ed. & Below	471	54.1%	0.499	0	1
	Not Home Owner	471	56.3%	0.497	0	1
	Isolated	471	63.5%	0.482	0	1
	Total Arrears	471	$7582.78	$10895.49	$0	$70200
Livelihood Outcomes – Economic	Household Income	471	$1431.61	$1107	$0	$5000
	Employment	471	58.2%	0.494	0	1
Livelihood Outcomes – Socio-Emotional	Life Satisfaction	471	5.58	2.00	0	10
Control Variables	Age	471	41.8	9.56	19	78
	Malay	471	54.8%	0.498	0	1
	Male	471	22.7%	0.419	0	1
	Single	471	32.5%	0.469	0	1

A high percentage of 46.3% of the respondents are in poor health. This is slightly more than the 40% reported in another study of low-income individuals who were beneficiaries of the Work Support Programme in Singapore (Ng, 2013).

54.1% of the respondents received secondary school education and below, remarkably higher than the statistics of the general population, with 18.5% of the population attaining secondary education as their highest qualification (Department of Statistics, 2015).

The percentage of non-homeowners, 56.3%, amongst the respondents is much higher as compared to the general population in Singapore, which stands at 9.2% (Department of Statistics, 2015).

A majority of 63.5% of the respondents are socially isolated. This is an alarming statistic as social support is critical in buffering against stressful life events such as poor health (Cobb, 1976).

Turning next to livelihood outcomes, only 58.2% of the respondents are employed. This shows a high unemployment rate when compared with the national unemployment rate of about 3% (Channel News Asia, 2016). The average household income amongst the respondents was found to be $1431.61. This is only 16.5% of the median household income of $8666 (Department of Statistics, 2015).

The socio-emotional outcome of individuals in this study is measured by life satisfaction. On a scale of 1 to 10, with 1 being the least satisfied and 10 being the most satisfied, the average life satisfaction of the respondents is 5.58. This again is low compared to the general population. Singapore's mean life satisfaction reported in the World Values Survey 2010-2014 (2016) was 6.96.

In terms of control variables, the average age of the respondents is 41.8, where 22.7% were male, 32.5% were not married, and 54.8% were Malay. The profile of respondents is rather disproportionate from the general profile of citizens, but reflective of low-income households in Singapore. In the General Household

Survey 2015, the median age of Singaporeans is 39.6, where 49.1% are male, 40.7% of Singaporeans are not married and 13.3% are Malays.

Stepwise regression

Tables 4 to 6 report the stepwise regression results. The first column – Model 1 -- shows the regression of poor health on livelihood outcomes with the sole consideration of the control variables – age, race, gender and marital status. Model 2 adds the assets variables, and Model 3 considers the impact of poor health on the livelihood outcomes with the interactions between poor health and assets.

Table 4: Employment

	(1)	(2)	(3)
Poor Health	-0.093	-0.10	-0.18
	(0.047)*	(0.047)*	(0.11)
Age	-0.002	-0.003	-0.003
	(0.003)	(0.003)	(0.003)
Malay	-0.089	-0.085	-0.083
	(0.047)	(0.047)	(0.047)
Male	0.25	0.26	0.26
	(0.057)*	(0.058)*	(0.058)*
Single	0.13	0.14	0.13
	(0.049)*	(0.050)*	(0.050)*
Sec Ed.& Below		0.016	-0.037
		(0.047)	(0.063)
Not Home Owner		-0.046	-0.015
		(0.049)	(0.065)
Isolated		-0.076	-0.040
		(0.047)	(0.064)
Total Arrears		0.001	-0.005
		(0.002)	(0.003)
Poor Health X Sec Ed. & Below			0.13
			(0.091)
Poor Health X Not Home Owner			-0.054
			(0.092)
Poor Health X Isolated			-0.067
			(0.093)
Poor Health X Total Arrears			0.011
			(0.004)*
Constant	0.68	0.75	0.78
	(0.12)*	(0.13)*	(0.14)*
R^2	0.06	0.07	0.09
N	471	471	471

Notes: * denote statistical significant at 5%; standard errors are in parentheses. Values of "*Total Arrears*" are in thousands.

Table 4 shows that there is a statistically significant relationship between poor health and employment. An individual in poor health is less likely to be employed. However, none of the assets have any statistically significant relationship with employment.

When interaction terms are added in column 3, only the interaction between poor health and total arrears is statistically significant, and thus only total arrears mediates the effect of poor health on employment. The positive coefficient shows that the negative effect of poor health on employment is smaller (less negative) when respondents have more arrears.

Specifically, the computation of the effect of poor health in column 3 is as follows. The coefficient of poor health gives the effect of poor health on employment when the respondent has zero arrears (and also when educated, a home owner, and not isolated). In a linear probability model, the coefficient size of -0.18 shows that poor health of such a profile of respondent decreases the likelihood of employment by 18%. However, this effect is not statistically significant. Then, going from zero arrears to positive arrears, we add the coefficient of the interaction term; thus, an additional dollar of arrears changes the effect of poor health on employment by 17% (-0.18 + 0.011*1) This is one percentage point less than when arrears is zero.

Table 5: Household Income

	(1)	(2)	(3)
Poor Health	-0.14	-0.20	-0.39
	(0.10)	(0.10)	(0.23)
Age	-0.007	-0.009	-0.010
	(0.006)	(0.006)	(0.006)
Malay	-0.007	0.009	0.010
	(0.10)	(0.10)	(0.10)
Male	0.34	0.40	0.40
	(0.13)*	(0.12)*	(0.12)*
Single	-0.52	-0.42	-0.42
	(0.11)*	(0.11)*	(0.11)*
Sec Ed. & Below		-0.15	-0.16
		(0.10)	(0.14)
Not Home Owner		-0.45	-0.43
		(0.11)*	(0.14)*
Isolated		-0.36	-0.39
		(0.10)*	(0.14)*
Total Arrears		-0.003	-0.013
		(0.004)	(0.006)*
Poor Health X Sec Ed. & Below			0.048
			(0.20)
Poor Health X Not Home Owner			-0.023
			(0.20)
Poor Health X Isolated			0.066
			(0.20)
Poor Health X Total Arrears			0.019
			(0.009)*
Constant	1.90	2.55	2.64
	(0.26)*	(0.28)*	(0.29)*
R^2	0.08	0.15	0.16
N	471	471	471

Notes: * denote statistical significant at 5%; standard errors are in parentheses. Values of "*Total Arrears*" and "*Household Income*" are in thousands.

Table 5 shows that there is no statistically significant correlation between poor health and household income, and thus no mediating effect of assets on the relationship between poor health and household income. This can be explained by the need for household income regardless of one's health status.

However, there are some independent effects of assets on household income. There is a statistically significant positive correlation between home ownership and household income, possibly because people who own homes tend to have higher household income. Similarly, those who are not isolated have higher household income.

When the interaction terms are added in column 3, the coefficient for total arrears become statistically significant, and so does the interaction term between poor health and total arrears. This means that poor health is a mediator of the effect between arrears and household income. In the absence of poor health, an additional thousand dollar of arrears decreases household income by $13. In the presence of poor health, an additional thousand dollar of arrears increases (instead of decreases) household income by $6 (-0.013 + 0.019*1). When one is in poor health, household income is now increased with each additional thousand dollar of arrears.

Mirroring the above effect in terms of the medicating effect of arrears between poor health and household income, when respondents have zero arrears, there is no statistically significant relationship between poor health and household income. However, when arrears increase by $1000, poor health increases household income by $280 [(-.30+. 019)*1,000].

Table 6: Life Satisfaction

	(1)	(2)	(3)
Poor Health	-0.10	-0.10	0.12
	(0.19)	(0.19)	(0.44)
Age	-0.010	-0.012	-0.009
	(0.011)	(0.012)	(0.012)
Malay	0.39	0.39	0.38
	(0.19)*	(0.19)*	(0.19)*
Male	0.19	0.43	0.26
	(0.24)	(0.23)	(0.24)
Single	-0.37	-0.41	-0.39
	(0.20)	(0.21)*	(0.21)
Sec Ed. & Below		0.39	0.39
		(0.19)*	(0.26)
Not Home Owner		-0.024	0.49
		(0.20)	(0.27)
Isolated		-0.37	-0.68
		(0.19)	(0.26)*
Total Arrears		-0.023	-0.017
		(0.009)*	(0.012)
Poor Health X Sec Ed. & Below			-0.014
			(0.37)
Poor Health X Not Home Owner			-0.93
			(0.37)*
Poor Health X Isolated			0.64
			(0.38)
Poor Health X Total Arrears			-0.014
			(0.017)
Constant	5.91	6.07	5.90
	(0.49)*	(0.53)*	(0.55)*
R^2	0.03	0.06	0.08
N	471	471	471

Notes: * denote statistical significant at 5%; standard errors are in parentheses. Values of "*Total Arrears*" are in thousands.

Table 6 shows that poor health is not significantly correlated to life satisfaction. However, there are some statistically significant correlations between assets and life satisfaction. The change in the coefficient of "Isolated" from not significance in Model 2 to significant in Model 3 suggests that social support is not related to life satisfaction for the overall sample, but for respondents in the base case

of possessing all the assets, being isolated decreases life satisfaction by 0.68 points. In the reverse, an additional $1,000 of arrears significantly decreases life satisfaction for the overall sample (Model 2), but not those who possess assets (Model 3).

In terms of interaction terms, interestingly, only the interaction between poor health and home ownership is statistically significant. The negative sign suggests that the effect of poor health on life satisfaction is smaller when one is not a homeowner (or that the effect of poor health on life satisfaction is bigger when one is a home owner). Indeed, the coefficient of "poor health" changes from negative in Models 1 and 2 to positive in Model 3. However, the effect of poor health on life satisfaction is still statistically insignificant. Similarly, the effect of home ownership on life satisfaction changes direction from Model 2 to Model 3, but the coefficient remains insignificant.

In summary, the findings from regression analysis reflect three key findings. Firstly, the total amount of arrears was found in Table 4 to be a significant mediating variable in the relationship between poor health and employment. As the total amount of arrears increases, the impact of poor health on employment decreases. Secondly, poor health mediates the relationship between total arrears and household income. We found that when a poor health status is added as an interaction term into the relationship between total arrears and household income, the impact of total arrears on household income is reduced. Thirdly, home ownership makes the effect of poor health on life satisfaction more positive. When one has a home, poor health does not decrease life satisfaction as much.

4. DISCUSSION

In the previous sections, we studied the vulnerability or resilience of a person in poor health, as influenced by various assets in the form of human, physical, financial and social capital. Most of the assets presented no statistically significant mediating effects on the relationship between poor health and livelihood outcomes, except in three cases.

Poor Health, Arrears, Employment and Household Income

The finding that arrears decreases the negative impact of poor health on employment may because the healthcare measures available to support individuals in poor health and prevent one's health condition from negatively impact their livelihood outcomes are not sufficient on its own. The findings show that the relationship between poor health and employment is significantly mediated by the amount of total arrears that the individual and his family has. The higher the amount of household arrears, given poor health, the more likely one is employed. This need to work when one has arrears might be why poor health also increases the effect of arrears on family earnings.

One's poor health status often comes with physical limitations, thus the effect that poor health decreases employment. However, individuals with debt may push themselves to work beyond their capacity, because of the need to clear the debt.

The determinants of health by the World Health Organization (2017) include physical environment, which is the workplace. Poor working conditions may lead to poor health, yet debt statuses may spur one to work more to finance the debts. This results in a vicious cycle where one's poor health deteriorates at a faster rate.

More holistic policies targeting the range of needs of low-income families may be in order. First, we should consider improving employment arrangements for low-income individuals in poor health to make a living. More than working to improve their skills, it is more important and critical that these individuals are matched with employment that is suitable for their physical and medical capacities. One important aspect is more flexibility job schedules that can accommodate to the medical treatments that the individual may have to undergo.

Second, policies to provide welfare to low-income individuals with health problems for a longer duration, especially for individuals with arrears, so that they do not have to return to work too quickly may help better help health recovery.

Poor Health, Home Ownership and Life Satisfaction

The findings also suggest that home ownership acts as a buffer to the negative impacts of poor physical health on psychosocial wellbeing, as measured by life satisfaction. The effect of this important asset was not direct; home ownership does not improve life satisfaction. However, its effect was indirect, as a mediator of the effects of poor health.

This finding introduces broader perspectives on population health to the psychosocial wellbeing of individuals. Here, we are able to see that home ownership, which is a non-traditional factor of psychosocial wellbeing, may open a new area of exploration to enhance population health.

A potential implication derived from this finding is that more efforts may be placed into assisting the low-income population to own their homes so as to advance the society's well being as a whole. In Singapore, the Home Ownership Scheme has been introduced since 1964, where it was then used to help citizens take up

ownership of the country as a result of having a physical asset (Housing Development Board, 2015). It was evident that the scheme helped to improve the overall economic, social and political stability in Singapore (HDB, 2015). Fast forward to this day, about 80% of the country's population (HDB, 2015) lives in public housing, also known as Housing Development Board (HDB) flats. Out of the population living in HDB flats, 90% are homeowners.

The present housing schemes such as various CPF Housing Grants, Parenthood Priority Scheme, Married Child Priority Scheme and Fresh Start Housing Scheme (HDB, 2015) are all targeted towards building strong families. The vast increase in citizens with home ownership is definitely a factor that contributed to Singapore's overall growth and stability over the years. A study by the National Association of Realtors (2012) found that families in stability and have a place to call home are much more likely to succeed that those without.

With home being an important aspect of need based on Maslow's hierarchy of needs (1943), home ownership is thus viewed as an asset that can mediate and cushioning the impact of low-income and poor health on the livelihood outcomes of these individuals.

The Independent Effects of Poor Health

We hypothesized that assets are mediators between health and outcomes. However, the results showed that for our low-income sample, there are hardly any mediating effects, apart from the cases as discussed above. This might show that (a) when income is low and life is already hard, the effect of poor health on livelihood outcome might not be significant; and (b) low-income families might not have sufficient buffer assets to mediate impact of poor health.

Not ruling out the possibility that some of the assets discussed may be present in families, these assets may be weak and insufficient to buffer against poor livelihood outcomes. We need to acknowledge that not all families have sufficient assets to overcome life adversities, such as the onset of poor health.

On the other hand, the capacity approach by Sen (1993) offers a different perspective. As discussed in the literature review, Sen proposes that the functioning of an individual is dependent on the capabilities he has, which is the freedom to achieve one's effectively possible potential. Hence, the goal of social policy should be to develop the capabilities of individuals and their families.

Indeed, the strength perspective (Saleebey, 1992) in social work trains us to assess families by searching for their "frequently unappreciated reservoirs of … energies, resources and competencies" (Saleebey, 1992).

There are two implications that can be derived from Sen's philosophy of social welfare. First, poverty should not be defined solely by an individual's income level. It is the amount of capabilities an individual has that will lead to social functioning and ultimate success. Hence, poverty should be defined as a deprivation of capabilities and assets. Secondly, the pursuit of social welfare should be towards analysing and increasing capabilities of individuals. This allows individuals to have opportunities to pursue the activities and person they want to be. Social policies should thus be evaluated according to their impact on the person's "actual ability to achieve various valuable functioning as a part of living" (Sen, 1993). Social welfare should also be targeted at removing any existing obstacles to give people the freedom to realize their capabilities.

In general, the respondents of the study have poorer capabilities compared to the general population as well as another study on multi-stressed low-income

families. They are much less able to function effectively in the society. This could be due to the higher amount of obstacles presented in this group of respondents, who are in debts and have a higher percentage of individuals in poor health. They are thus handicapped in their capabilities and freedom to realize their potential. To incorporate the capabilities approach by Sen (1993), we can suggest that individuals in debt and in poor health are in poverty as they are deprived of the freedom to achieve due to the absence of assets. Simply put it, they have limited capabilities and need help.

Social policy in Singapore is based on four principles – 'self-reliance', 'encouraging individuals to work', 'family as the first line of support' and the 'many helping hands approach' (Ministry of Family and Social Development, 2008). Of course, one would rebut that there is no one-size-fits-all policy. However, three out of the four pillars of social policy principles in Singapore – 'self-reliance', 'encouraging individuals to work' and 'family as the first line of support', assumes that every individual and his family has the capabilities needed to function in the society. Similarly, Russell's model (2008) of coping with the costs of illness adopts this perspective. The model assumes that families have certain household assets such as education, home ownership and social support to cope with the illness.

According to the principles of Singapore's social policy, an individual in poor health would be encouraged to be self-reliant, continue employment, and seek help from his family. True enough, the pillars for social policy may be effective for an average household in Singapore.

However, what happens to low-income households with debt and in poor health? They are limited in their capabilities due to the various obstacles such as

poor health, debt and low-income. We should not assume that people would be self-sufficient solely within the family unit to have enough to recover from poverty.

The current philosophy of social policy in Singapore leaves the most vulnerable population relying on the last principle of social policy – the many helping hands approach. Indeed, a multi-faceted approach has to be taken to ensure that the social safety net in Singapore is sufficient and to reduce the chances of individuals falling through the gaps of the social nets. The aim of social welfare in Singapore should be targeted at strengthening the capabilities of individuals and build sustainability such that the individual will progress to be self-sufficient.

In other words, the implications from the study reflected a need to change the way policies are developed. We should be looking towards building assets for the low-income population to help them gain social mobility and buffer against unforeseen life circumstances.

Policy Implications

From the findings, we identify that arrears and home ownership are statistically significant assets that can impact the livelihood outcomes in the event of poor health. The results also reflect a need to improve employment assistance to low-income individuals in poor health due to the insufficient assets to buffer the impact of poor health. Three recommendations will be made to improve the livelihood outcomes of this disadvantaged population.

Firstly, the negative impact of arrears on livelihood outcomes suggests a need for a debt management or relief programme for the low-income individuals. Based on the socio-economic situation of the family, such as poor health, a debt management plan may be designed for the individual to facilitate the servicing of

arrears within the means of the individual. This may relieve the constant pressure to repay the debts, which puts the individuals under high levels of stress and limiting their mental bandwidth in decision-making.

Secondly, homeownership buffers the impact of poor health on life satisfaction. Efforts could be made to ensure that low-income families purchase housing insurance upon ownership of a house. This allows the families to retain homeownership in the event of life-changing events that they are unable to continue to service their house mortgage, such as the onset of poor health. In addition, housing assistance should be provided to low-income families without homeownership to buffer the impact on livelihood outcomes such as life satisfaction.

Thirdly, improving buffering assets in low-income individuals may remain insufficient in the event of poor health. Hence, we can target ways to improve livelihood outcomes for the low-income individuals. The government may incorporate unemployment insurance for low-income individuals through the Central Provident Fund, with the option of opting out. Families in low-income are less resilient to a fall in household income, which may occur if the breadwinner of the family has an onset of poor health. With the unemployment insurance incorporated into the CPF account, it may act similar to MediShield Life, where premiums for the unemployment insurance may be deducted from the Ordinary Account of the individual's CPF. With the unemployment insurance in place, individuals who suffer from catastrophic health events that prevents them from working will be able to receive monthly pay-out in the period of unemployment.

Directions for the future

This study only considers the population of individuals and their families who are low-income and have existing financial arrears. The measures available in the data may also be over simplified. Future studies may examine mediating effects of assets on livelihood outcomes across a wide spectrum of individuals of varying household income. The bigger studies could also use more targeted instruments. This wider spectrum of understanding may allow future policy makers to appreciate and acknowledge the difference in nature of the low-income population from the general population. With this, they might reconsider the implementation of policies for the general population that might have dire consequences for the vulnerable low-income population.

In addition, the impact of poor health, accompanied by total arrears, on employment may be explored. A longitudinal study can be conducted to determine if increased employment in low-income individuals in poor health and in debt, indeed leads to worsening poor health outcomes. This would lead to greater justification for the need to manage the employment choices that this population makes. Similarly, more studies can be done to focus on the impact of homeownership on the low-income population in Singapore. Future studies may examine if home ownership indeed has more bane than boon, as suggested by the findings in this study.

Finally, this study adopts a quantitative methodology to understand the relationship between poor health and livelihood outcomes, as well as possible mediating factors. However, we are short of qualitative examples to explain the findings. Future qualitative studies may provide stories for us to understand how poor health and assets interact to result in livelihood outcomes in low-income

individuals/families. This will support the discussion about in the necessity for a new approach towards social welfare and policy in Singapore.

5. CONCLUSION

The results of this study suggest that low-income families tend to have insufficient assets to cope with poor health, resulting in poorer livelihood outcomes. The exploration of philosophies of social policy in this paper have pointed towards the need to reflect on the assumptions we make in the design of social policies. Widening income gaps and rising living costs is evident worldwide. With the effects of poverty, poor health and financial arrears compounded, more attention should be placed towards this vulnerable group.

The recommendations made in this paper – debt management, housing assistance and unemployment insurance, aim to empower the vulnerable population, as well as to remove the obstacles present in their lives. It is evident that inter-ministerial collaborations will be required to streamline the policies targeted at different aspects of an individual's well being. The support for low-income families will then be effective in improving their livelihood outcomes.

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APPENDIX A

List of participating agencies

1. AMKFSC – Seng Kang
2. AMKFSC – Cheng San
3. AMKFSC – Punggol
4. AMKFSC – Ang Mo Kio
5. Kampong Kapor FSC
6. Trans Family Service
7. South Central Community FSC
8. FSC @ Tanjong Pagar
9. MWS Tampines FSC
10. MWS Covenant FSC
11. MWS Daybreak FSC
12. Feiyue FSC
13. Children Society
14. Rotary FSC
15. Tamar Village
16. Sembawang FSC THK
17. THK FSC @ Bukit Panjang
18. THK FSC @ MacPherson
19. THK FSC @ Jurong
20. Serangoon Moral
21. Lakeside FSC
22. Yong-En Care Centre
23. Care Corner FSCs

24. Hougang Shenghong

25. AWWA

26. MSF – Social Service Offices

27. Caritas