SCAPE

Singapore Centre for Applied and Policy Economics

Feminization of Ageing and Long Term Care Financing in Singapore

by

Chia Ngee Choon, Shawna Lim Shi'en and Angelique Chan

Feminization of Ageing and Long Term Care Financing in Singapore

Chia Ngee Choon*
Department of Economics
National University of Singapore

Shawna Lim Shi en
Department of Economics
National University of Singapore

Angelique Chan
Department of Sociology
National University of Singapore

March 2008

Abstract

Feminization of ageing leads to issues relating to long term healthcare financing since females are more susceptible to chronic illnesses. This paper assesses the current provision of long-term care (LTC) in Singapore by first examining the health status of elderly female; and then estimates the present value of LTC expenses. We calibrate the LTC costs for institutional nursing homes, community homes and informal home-based care with domestic helper. We next evaluate the comprehensiveness of a private disability insurance scheme in Singapore (Eldershield) in capturing the expected share of LTC expenditures. We compare the policy comprehensiveness of Eldershield payouts for different utilizations of LTC at different levels of means-tested government subsidies. With subsidies, the LTC cost can be adequately covered by Eldershield; without any subsidies, Eldershield is able to capture 25% to 40% of the LTC costs. We also evaluate the LTC financing implications after an osteoporotic hip fracture surgery.

Corresponding Author:
Ngee-Choon Chia, Department of Economics, National University of Singapore,
1 Arts Link, AS2, Level 6, Singapore 117570.
Tel: +65 6516 6020 Fax: +65 6775 2646
Email Address: ecscnc@nus.edu.sg (N.C. Chia)

1.   INTRODUCTION

Singapore has one of the fastest ageing populations in Asia, with low birth rates and long life expectancies.   In 2005, the number of elderly (aged above 65) stood at 296,900 (8% of the population). By 2030, this is expected to increase to 800,000 (19% of the population).[1]   Healthcare costs are expected to rise with an ageing population. In 2004, although only 8% of the population was elderly (age 65 and above), they account for 35.6% of hospital admissions in 2004.[2]

This paper examines the feminization of ageing and its implications on healthcare financing in Singapore.   Feminization of ageing refers to the phenomenon of women outliving men, resulting in a predominance of women among the older population. As of 2005, 4.6% of the total population in Singapore was elderly women while 3.7% was elderly men (MCYS, 2006). In 2004, the life expectancy was 81 years for women and 77 years for men (Department of Statistics (DOS), 2005). Furthermore, women tend to suffer from chronic illnesses while men tend to be inflicted by acute or fatal illnesses (Muller, 1992). Thus women generally have greater need for long-term care (LTC) and higher medical expenditures in their old age.

The framework of a healthcare financing system under a mandatory individual savings account, based on defined contribution has caused a disparity in adequacy of

---

[1] Singapore, Ministry of Community Development, Youth and Sports (MCYS), 2006.
[2] Singapore, Ministry of Health (MOH), 2004

retirement and healthcare financing between males and females[3]. Gender inadequacy is introduced as women work for fewer years and thus have smaller accumulated saving; and they live longer, suffer more chronic and potentially disabling illnesses.

The OECD (2005) report highlights a positive correlation between long term care (LTC) spending and the share of elderly population. Interestingly, Chandra and Samwick (2005) observe that although the prevalence of disability has fallen significantly for elderly men, it has increased for elderly women. In the case of Singapore, the demand for LTC is expected to increase. From 1998-2005, although the elderly population rise by about 1%, there was a 52% increase in the number of elderly utilizing community-based facilities, a 10% increase in beds at sheltered homes for the elderly and a 25% increase in nursing home beds (MCYS, 2006).

A compelling concern is whether the current model of medical saving accounts (MSAs) is adequate to finance healthcare needs of women in Singapore. Chia and Tsui (2005a) evaluated the adequacy of MSAs in financing healthcare over the post-retirement period and found that setting discount rate at 4% and medical growth rates ranging from 4 to 7%, the decreed minimum balance in the MSA ($25,000 in 2004) is inadequate for the female elderly to meet health-care expenditure; although it is adequate for the male elderly. Despite the feminization of ageing, there is thus far no estimate on LTC expenditures for elderly women in Singapore. This paper attempts to assess the LTC financing needs for elderly woman who are inflicted with age-related

---

[3] For details on the use of a defined contribution system under the Central Provident fund (CPF) and the medical savings account as the main pillar of healthcare financing in Singapore, see Chia and Tsui (2003).

chronic female diseases and are dependent on care to carry out their basic activities of daily lives (ADL).

The organization of the paper is as follows: Section 2 describes some of the salient features of the utilization and financing mechanisms for LTC in Singapore. Section 3 examines the health status of women in Singapore. Section 4 calibrates the present value of LTC expenditures. Section 5 concludes with policy recommendations.

2 LONG TERM CARE IN SINGAPORE

LTC usually refers to care provided to those with chronic medical conditions who require medical and palliative care. LTC includes a continuum of medical and social services supporting the needs of people living with chronic health problems that hinder their daily activities. Thus, LTC renders medical care to cope with the irreversible consequences of diseases, rather than curing them; and patients with LTC needs are often unlikely to return to full health and function (Garber, 1996).

2.1 Utilization of LTC services in Singapore

The range of LTC services in Singapore is similar to what most developed nations offer.[4] They include nursing homes, day-cares, home healthcare and hospice care. Perhaps the most common form of LTC is the informal care of the elderly by their adult family members. This is, however, not captured in the market nor measured in the national income accounting. Norton and Houtven (2004) show that an unprecedented growth in the demand for informal care is expected in the next few decades; and that

---

[4] See Mitchell et al. (2004).

informal care will substitute utilization of formal care. Their study shows that a 10% increase in informal care leads to a 0.8% reduction in formal care.[5] Moreover, the OECD (2005) study reports that up to 80% of LTC is in the form of informal care-giving. Family members who take care of the elderly parents or spouses often have to reduce their working hours or leave the labor force. Foregone income can be a sizeable amount if the elderly requires prolonged LTC.

Informal care is prevalent in Singapore. The National Survey of Senior Citizens (NSSC) shows that in 2005, only 5.6% of the elderly lived alone and 6.9% had other living arrangement and the remaining 87% of the elderly lived with their families. About 29% of the elderly depended on one main caregiver for their daily needs (MCYS, 2006, p.7). As shown in Figure 1a, although 20% of the informal care was provided by paid domestic helpers, the remaining was largely provided by family members. 60% of these caregivers were adult children (of which 72% are daughters or daughters-in-law); 12% were wives caring for their spouses, and only 3% were husbands caring for their wives. Figure 1b shows the types of helps rendered by the caregivers.

Insert Figure 1a and 1b

Garber and MaCurdy (1990) and Wingard et al. (1987) show that the major predictors of formal institutionalized cares are advanced age, limitations to activities of daily living (ADLs) or cognitive impairment, poor financial status and absence of family support with care-giving capabilities and the feminine gender. To assess the demands

---

[5] However, other studies have suggested that informal and formal cares are complements. See Langa et al. (2001) and Liu et al. (2001).

for LTC, we examine the trend of health status among the elderly in Singapore in terms of ability to carry out ADLs. Panel survey data conducted by Chan (2001) indicates that controlling for background characteristics between 1995 and 1999, there is an increase in the percentage of respondents reporting at least one ADL (see Figure 2). This implies an increase in functional limitations over time among older Singaporeans. Indeed, data from the NSSC show that over the ten-year period, the proportion of elderly who are ambulant and physically independent have fallen from 92.8% in 1995 to 87% in 2005 (MCYS, 1995 and 2006). With an ageing population, we expect this ratio to fall further.

Insert Figure 2

According to a survey by Yap et al. (2003) on the residents of a voluntary welfare nursing home in Singapore for the period April 2000 to June 2001, more than 50% needed assistance in ADLs. (See Figure 3). Another 32% were admitted because their informal caregivers were unable to cope with looking after them. The study also showed that the majority of residents were single or widowed females above the age of 75 and that women made up about 70% of the nursing home population.

Insert Figure 3

2.2 Financing of Long Term Care

Financing of general healthcare in Singapore is an integrated system of a compulsory medical savings account (Medisave), a catastrophic medical insurance scheme (Medishield) and a means-tested medical expense assistance scheme (Medifund). For details, see Chia and Tsui (2005a). The system is based on subsidies

for the masses and risk pooling for catastrophic illnesses. However, there is no publicly operated comprehensive LTC insurance although there is a private disability insurance scheme under Eldershield and some aged-provisions by the government. Like the 3M system, eldercare system also stresses on individual responsibility together with family responsibility and community support. Brief highlights on the salient features of the healthcare financing framework in Singapore are discussed below.

a. Medisave

Medisave is administered by the Central Provident Fund (CPF) Board which is a compulsory savings scheme for old age introduced in 1955. Under the CPF scheme, both employers and employees are required to contribute a mandated percentage of their monthly wage, which is tax exempt, to the CPF account of the worker. The savings are apportioned to three different amounts – the ordinary, medisave and special accounts[6]. Medisave, which incorporates a system co-payment and deductible, was introduced to help individuals save for medical expenditure. As a pre-funded system, individuals contribute 6% to 8% of their monthly wages to their Medisave accounts, which earn an interest of 4 percent annually. Medisave funds can be withdrawn to finance inpatient and some outpatient expenses but are subjected to withdrawal limits. As of 2005, patients with chronic illnesses (e.g. stroke, hypertension, high cholesterols) are allowed to use Medisave to pay for outpatient expenses. Children are allowed to use their personal Medisave accounts to pay for their elderly parents' medical expenses.

---

[6] The ordinary account can be used for housing, investment and education; the special account for old age or contingencies; and the Medisave account for hospitalization expenses and approved health insurance premiums.

b. Medishield

 Since Medisave is a compulsory self-insurance scheme, it does not allow for risk pooling across individuals, Medishield, a catastrophic health insurance scheme was implemented in 1990, to insure Singaporeans against very large hospital bills. It covers catastrophic illnesses and certain outpatient treatments like kidney dialysis, chemotherapy and radiotherapy for cancer. The maximum coverage is 85 years old. Medishield has in place a system of co-payments and deductibles to address issues relating to third party payments.

c. Medifund

 Medifund is a government endowment fund set up in April 1993. Medifund was set up with an initial capital of $200 million and capital injections are made whenever there are available budget surpluses. Only the interest income from the capital sum can be used. The capital sum currently stands at S$1.4 billion (Singapore Budget 2007). Medifund acts as a last resort for parents who cannot pay for their medical expenses despite Medisave and Medishield. Its use is subjected to means-testing. In 2001, this scheme was extended to residential step-down care facilities.[7] In 2002, about 5% of Medifund assistance was used to aid those in such step-down care facilities. In 2006, a total of $40 million was spent to help 290,000 applications, of which about one third are elderly (Singapore Budget 2007). It is expected that demand for Medifund for the elderly will grow as the population ages. In the recent Parliamentary Budget Debate

---

[7] Some of these are operated by voluntary welfare organizations (VWO). See MOH (2007) for details.

2007, a creation of "Medifund for the Elderly" was proposed by the Health Minister, with plans to set aside $500million in this fund.

d.   <u>Aged Care-Provision</u>

The main aged-care provisions are Eldershield, an Interim Disability Assistance Programme, and Eldercare Fund. Eldershield is a private disability insurance scheme which was introduced in June 2002.   All CPF members who reach the age of 40 are automatically covered by Eldershield and the premiums can be paid out of their Medisave accounts. Eldershield provides basic financial protection for the severely disabled, defined as the inability to perform at least 3 out of the 6 ADLs. The ADLs include washing, dressing, feeding, toileting, mobility and transferring. As a private long term healthcare insurance scheme, Eldershild complements the Medishield, which pays only hospitalization expenses. Eldershield provides monthly cash payouts of $300, for up to a maximum of 60 months.[8] These cash payouts are not tied to reimbursement of institutional care and thus policyholders have the flexibility to use the cash to pay for the specific care they require whether it is informal care, home nursing services, day rehabilitation or in-patient nursing home care. Eldershield aims to help defray out-of-pocket expenses and reduce the financial burden in the event when LTC is needed.

There are currently two different premium plans for Eldershield.   Under the regular premium plan, premiums are paid annually till age 65. The premium payable

---

[8] All dollars in this paper refer to Singapore dollars; S$1.60 approximates US$1. This study was completed before the announcement of changes to the initial Eldershield scheme in September 2007.

depends on the age at which the policyholder joins the scheme.[9] The other alternative is a single premium plan where a lump sum is paid upon joining the scheme.[10] Eldershield also included a non-forfeiture feature that ensures that as long as a minimum number of payments are fulfilled, Eldershield policy will not lapse even if subsequent premiums are not paid, although the cash payouts would be lowered (to a range from $100 to $279). This offers policyholders some protection in circumstances they are unable to pay the premiums.

Before Eldershield was implemented, only about 1000 Singaporeans were covered under some forms of LTC insurance. There are currently close to 750,000 holders of Eldershield (MOH, 2007).[11] However this represents only 47% of the population aged above 40. A considerable high proportion (53%) does not have any LTC insurance. The thinness of LTC private insurance market is attributed to limited consumer rationality, availability of cheaper but imperfect substitutes (such as informal care); and market failures due to transaction costs and adverse selection.[12] The lackluster in demand for Eldershield is due to the strict trigger criteria (inability to perform 3 out of 6 ADLs), low benefit payout and capped benefit duration. The provider's argument for setting a low payout is to ensure affordability of the Eldershield premiums. With an ageing population, disability rates will increase rapidly in the next

---

[9] For example a female who joins Eldershield at 40 will pay $190.63 annually. At her last premium payment at 65 years of age, she will have paid a total of $4956.38. However, if a female joins the scheme at a later age of 55, she would have to pay $462.82 annually, and the total premium payable would be $5091.02.

[10] For a female at age 40, the lump sum is $3031.50, almost 40% lower than if she chooses to pay the regular annual premium.

[11] Of these, 54% were aged below 50; 31% were in the 50-59 age group while those aged 60 and above accounted for only 15% of all policyholders.

[12] See Norton (2000), Cutler (1996) and Brown and Finkelstein (2004) for economic arguments.

few decades, hence more payouts and higher premiums are expected. Since its implementation, Eldershield has made payouts to 2366 members, representing only 3.1% of the total enrollees. (MOH, 2007). 62% of the recipients of the benefit payouts are aged 60 and above. The small numbers of payouts were not unexpected as the current Eldershield members are relatively young. Furthermore, at the launch of Eldershield, high-risk groups were excluded from the program. This high-risk group, which includes elderly aged 70 and above and those with pre-existing disabilities, were placed under another aged provision – the Government's Interim Disability Assistance Programme (IDAP) for the Elderly.

IDAPE is fully funded by the government and eligible Singaporeans need not pay any premiums and is subject to means-testing (monthly per capita household income not exceeding $1000 to qualify). IDAPE payout is half of the Eldershield payout though it has the same benefit period. As of December 2006, there were a total of 8,631 IDAPE applicants (MOH 2007). Thus there are 3.6 times more IDAPE payouts applicants than Eldershield benefits applicants.

Another aged-care provision is Eldercare Fund, which was set up in 2000 to subsidize nursing home care run by voluntary welfare organizations (VWOs). It was later extended to provide subsidies for other long-term care administered by VWOs. Eldercare Fund is topped up whenever there is a budget surplus and is expected to reach $2.5 billion by 2010. As in the case of Medifund, only interest income from this endowment fund is utilized.

3. HEALTH STATUS OF FEMALE ELDERLY

The longer lifespan of women has healthcare financing implications. This is further aggravated by the fact that the incidence of disability increases with age. Elderly women have higher needs for LTC. In the United States, Brown and Finkelstein (2004) estimated that while an elderly man has a 27% chance of entering a nursing home, an elderly woman faces a higher risk of 44%. On average, women spent 2 years in nursing homes while men spent 1.3 years. Although the life expectancy of women is higher, their number of years of ill-health is also higher. According to World Health Report (2004), the number of Healthy Life Expectancy (HALE) years for women in Singapore is 71.3 and 68.8 for men. This translates to 10 years of ill-health for women and 8.6 years for men, given that the average life expectancy was 81 years for women and 77 years for men (DOS, 2005)

Furthermore, there are differences in the severity of immobility by gender. According to Yadav (2001), 11.7% of female elderly Singaporeans had moderate to profound immobility, which was twice that of males (at 5.1%). The results of the study are summarized in Table 1.

Insert Table 1

Women are also at higher risk of suffering from chronic disabling illnesses such as arthritis, which occur more frequently in women than men. In Singapore, arthritis is the leading cause of physical disability among adults (National Arthritis Foundation, 2003). Arthritis includes over 100 kinds of rheumatic diseases, most of which are lifelong ailments.

In the National Health Surveillance Survey conducted by the MOH in 2001, 50.3% of women aged above 65 reported having arthritis compared to 26% of men above 65 in Singapore. As shown in Table 2, there was also a significant increase in arthritis with age. The incidence is 1.5% for women at ages below 45; and 21.4% for women aged 65 to 74 (See MOH, 2002).

Insert Table 2

The longitudinal survey data by Chan (2001) shows that up to 61% of the 603 women with arthritis felt that their normal daily activities were hampered by a considerable amount ("a lot" and "somewhat"). See Figure 4.   Furthermore, the study also shows that, between 1995 and 1999, the prevalence rate of IADLs had increased for both male and female. Table 3 shows that the percentage of elderly with at least one IADL difficulties had increased by almost three-fold; from 14.3% in 1995 to 42.3% in 1999.

Insert Figure 4 and Table 3

Figure 5 identifies the percentage of female elderly with instrumental ADLs and thus is dependent on cares from caregivers. 15% of women with arthritis had difficulty or were completely unable to carry out their daily normal activities. 14% had difficulty preparing their own meals and 19% could not do their own grocery shopping. A much higher percentage of 30% of women had problems using public transport on their own.

These suggest that the demand for informal LTC is especially high among elderly women with arthritis.

Insert Figure 5

Another common condition affecting women is osteoporosis, where a decrease in the mass and strength of the bone makes a person more vulnerable to fractures of the spine, hips and wrist. It is a symptomless and painless disease until a fracture occurs. This can result in serious disabilities, and long term medical care. Osteoporosis affects 20% of women above age 45 and 40% of women above age 75. Women are 4 times more likely to develop osteoporosis than men (Singapore, National Arthritis Foundation, 2003). In Singapore, over the past 3 decades, hip fractures in women above age 50 have increased 5 fold; while they have increased only 1.5 times in men (Koh et al., 2001). Figure 6 shows that the hip fracture incidence rate has increased 40% from 1991-1998. Koh et al. (2001) predicts that by 2025, there would be approximately a three-fold increase if hip fracture incidence rates continued increasing 40% every 8 years.

Insert Figure 6

In 2001, there were 2397 hospital admissions for hip fractures in Singapore. 83% of the admissions were 65 years of age and above, of which 69% were women. Table 4 shows that the probability of a hip fracture occurring for women under the age of 65 fell between the period from 1991 and 1998. However, the probability has increased for women over the age of 65. For women above 75, the probability has increased 10% over the 8 year period.

Insert Table 4

Although the current probability appears small, it is expected to rise in the next few decades as the population ages and the proportion of the "old-old" (85 years and above) increases. In 2005, the "old-old" constituted 0.73% of the resident population and 63% of them were women (DOS, 2005). The growth of the "old-old" population was estimated to be 6.1% per annum.

Merchant et al. (2001) studied the prevalence of postoperative complications after hip surgery in Singapore and found that postoperative complications occur in 1 out of 3 patients[13]. 25.6% of patients had a decline in their mobility status and 31.7% of patients were readmitted to the same acute hospital within 1 year of their fractures. In another study conducted by Wong et al. (2002), of those alive at 1 year, only 28% were walking without aids.[14] The rest experienced a decline in mobility with 33% of them either bedridden or wheelchair-bound (Figure 7). Hence, the LTC needs of women are likely to increase.

Insert Figure 7

---

[13] The study was conducted in a 1100-bedded university affiliated general hospital with a well-established hip fracture care path. The data sample consisted of 180 patients admitted to the hospital from March 2001 to November 2001 for closed hip fractures, and who underwent surgery.

[14] This was a retrospective study carried out on 280 consecutive hip fractures in patients older than 60 years admitted over a 3-year period.

4.   LONG TERM CARE EXPENDITURE

4.1   Institutional and Community-Based Long Term Care Costs

In Singapore, admission to nursing homes are mainly for elderly who do not have families or caregivers to look after them at home; or the caregiver is unable to provide the level of nursing care required.   Charges for nursing homes vary according to bed types and the patients' nursing care 'Category' (from I to IV).   The nursing care category provides an indicator of the skilled nursing care required by individual patients, with Category IV needing the most care, and Category I, the least care.   Nursing homes, together with other step-down care services for the elderly such as community hospitals, are means-tested subsidized medical care services.   The subsidy goes directly to the service providers who will use it to offset the bill.   The rate of subsidy depends on the per capita income of the family, ownership of major assets and insurance claims and savings.   Table 5 shows the subsidy rates which range from 25% to 75%., with zero subsidies when per capita income exceeds $1000 per month.   As of 2007, the average cost of the unsubsidized institutional and community based LTC costs are $1500 per month (for 8-bedder) and $580 per month. [15]

Insert Table 5

In what follows, we will calibrate the expected present value of LTC expenditure for institutional nursing home care and informal home-based care.   In our calibration,

---

[15] See Ministry of Health (2006).

we assume the length of stay in nursing homes to be 5 years. [16]   For comparability, we also compute the expenses for 5 years for alternative cares, such as, informal home-based care with the help of a domestic helper and care from day-care or rehabilitation centre. Furthermore, we assume that the demand for LTC occurs at age 75.

We denote the annual LTC expenditure for the k-type of care as E^k. Annual expenditure is assumed to be made at the beginning of the each period. E^k is also subject to LTC cost inflation (m_k). As we are focusing on LTC expenses, in the calibration, we excluded sudden large hospitalization bill arising from complications during the five year duration.   The survival probability of living for additional t year at age 75 is given by ${}_{75+t}P^s_{75}$. The expected discounted present value of LTC expenditure ($PVLTC$), using discount rate (r), is then given in the equation below:

$$PVLTC = \sum_{t=0}^{4} \frac{1}{(1+r)^t} (1+m_k)^t \, E^k \, {}_{75+t}\, p^s_{75} \tag{1}$$

Table 6 shows the expected $PVLTC$ using different discount rates and inflation rates for LTC and at different level of subsidies.   A 1% increase in the discount rate leads to an approximate 1.7% fall in the expected $PVLTC$; while a 1% rise in medical growth rate leads to a 1.8% rise in the expected $PVLTC$.

Insert Table 6

---

[16] The survival probabilities used in the calculations are lower than the general female population for age 75 to 80. This is because elderly who are admitted to nursing homes face higher mortality risk. Yap et al. (2003) found the median duration of stay in nursing homes before passing on is 59 months, with a range from 3 months to 204 months.

We will next compute the present value of the benefit payouts from Eldershield. As discussed in Section 2.2, Eldershield is an extreme disability insurance scheme with a set maximum benefit period of 5 years and benefit level at a pre-specified, $300 per month and is not price-indexed. The present value of the Eldershield benefit payouts is thus $\sum_{t=0}^{4} \frac{3600}{(1+r)^t}$.

Next the policy comprehensiveness of Eldershield is computed by taking the ratio of the present discounted value of benefits payouts from Eldershield to the expected present value of LTC expenditures. The policy comprehensiveness thus captures the expected share of long-term care expenditures that Eldershield will cover. Figure 8 demonstrates that higher monthly payouts from Eldershield improve the comprehensiveness of the disability insurance for the lower level of subsidies. At 75% subsidies, Eldershield will be able to cover 100% of the expected long term care expenditure. Without any subsidy, monthly payouts of $300 and $450 payouts will cover 25% to 37% of the expected LTC expenses.

We compare the comprehensiveness of Eldershield when other long term cares are utilized. As can be gleaned from Table 7, Eldershield payouts is able to cover the 57% of the informal home-based LTC cost and 63% of the community-based LTC costs; compared to about a quarter of the cost of nursing homes when there is no subsidy and half of the cost of nursing homes with a 50% subsidy. This is not surprising as it is in line with the government's emphasis on family based care. (see MOH (2007).

Insert Figure 8 and Table 7

4.2 An illustrative example: Long term care cost of osteoporotic hip fractures

We will next present an illustrative example of LTC cost after an osteoporotic hip fracture. Donald and Bulpitt (1999) showed that among people ages 75 years and older, those who fall are four to five times more likely to be admitted to a long term care facility for a year or longer. We assume set the incidence of hip fracture to occur at age 75.[17] In our computation of the present value of healthcare expenditure (*PVHE*) of the elderly woman, we discount the annual healthcare expenses (include consultation and drugs and LTC) to age 75. The *PVHE* is also weighted by the survival probability of the elderly ($_t p_d^s$) at *d+t* years of age (where *t* is the number of years after *d*, the age of diagnosis of the medical condition). Empana et al. (2005) studied the effect of hip fracture on mortality of elderly women. Their study showed that the occurrence of a hip fracture is associated with an increased risk of death, even after taking into account pre-fracture health status. Although the effect of the fracture is stronger in the first 6 months, it persists for several years thereafter. After adjusting for age and baseline health status, women with hip fracture were more than twice as likely to die. Wong et al. (2002) showed that the mortality at year one is 22.3%. In our simulation, we set the probability of survival one year after the hip fracture ($_{75+t} p_{75}^s$) to be 0.78 for the first year, compared to 0.858 for the female population at age 76 (Singapore DOS, 2005). We assume the average life expectancy post-surgery to be 5 years.

---

[17] Lau et.al (2001) found that the age-adjusted hip fracture rates to increase exponentially from 75 years of age onwards. In the US, Hong Kong and Singapore, the incidence rates in men and women increased 5 to 8 times after 75 years of age.

Let p^N be the probability that the elderly woman enters a nursing home when she becomes bedridden or wheelchair bound; p^H is the probability that she utilizes informal care through the hiring of a maid.[18] The present value of long term care in the event of sustaining a hip fracture is given by equation (2) as follows:

$$PVHE = p^N E^N + p^H E^H \tag{2}$$

such that

$$P^N + P^H = 1 \tag{3}$$

$$E^N = \sum_{t=0}^{4} \frac{1}{(1+r)^t} \ _{75+t}P_{75}^s \left[C(1+m_C)^t + N(1+m_N)^t \right] \tag{4}$$

$$E^H = \sum_{t=0}^{4} \frac{1}{(1+r)^t} \ _{75+t}P_{75} \left[C(1+m_C)^t + H(1+c)^t \right] \tag{5}$$

where C is the annual medical expenditure for follow-up consultation[19], N is the annual expenditure on nursing home[20], H is the annual expenditure on informal home care with a domestic helper [21]; and c and m are respectively the CPI and the medical inflation rate.

Furthermore, in our simulation, we set p^N to be 0.26.   Wong et al. (2002) shows that for in Singapore, unlike the experience of the Western countries, a greater

---

[18] Figure 7 shows that the after hip surgery, the probability of being wheelchair bound is 0.24, bedridden is 0.09 and walking with aids is 0.39.

[19] Table A1 in the appendix shows the estimation of the follow up costs after osteoporotic hip surgery.

[20] Data obtained from MOH (2006) shows the average monthly cost for nursing homes without subsidy is $1500.

[21] Table A2 shows the estimation of the costs of hiring a domestic helper.

proportion of the patients returned home after hospitalization and only 26% going to a nursing care facility. This may be explained by the higher co-residence living arrangement in Singapore, where elderly parents often live with their children who are also the primary care givers.

Table 8 presents the calibrated *PVHE* using different medical cost growth rates and discount rates. Our results show that Eldershield coverage are inadequate, covering only 41% of *PVHE* using the benchmark parameterization, when there is no LTC subsidy. A 75% government subsidy on LTC will offer more help, covering up to 60% of *PVHE*. Figure 9 shows Eldershield comprehensiveness ratio when the monthly benefit payouts are increased from $300 to $450.

Insert Table 8 and Figure 9

5. CONCLUSION AND POLICY RECOMMENDATION

In the calibration of the expected present value of LTC expenditure, we have assumed a rather "short" duration of needs. As the length of stay in nursing homes increases, given the existing Eldershield benefit cap, the gap between the *PVLTC* and the benefits payouts will increase as shown in Table 9. Based on a 10-year "long-term" care because of an osteoporotic hip fracture, expenses would be more than 4 times the average balance. Even with a 50% LTC subsidy, the *PVLTC* is still 3.9 times more than the expected disability payouts.

Insert Table 9

If Medisave is utilized for financing LTC, without any government subsidies on nursing homes, then the *PVLTC* is 3.4 times the total amount of Medisave balance and insurance disability benefits. The ratio will be 1.7 if nursing home cost is subsidized at 50%.

Garber (1996) opined that increased savings coupled with catastrophic insurance offers the greatest flexibility and limits both risk and moral hazard. The combination of Medisave and Eldershield may thus seem to be the ideal combination as proposed by Garber. However, Medisave amount may be inadequate for women to meet their LTC needs. As it is an unfunded self-insurance scheme, the persistently unemployed will not have enough accumulated savings. Figure 10 shows that the percentage of economically active by age and gender in 2000 and women seems to belong to this group of persistently unemployed. As can be gleaned from the Figure 10, from age 30, while the number of economically inactive male continued to fall and remain at low levels, there was a sharp increase of economically inactive female to 26.4%. Presumably these are female who have exited the labor force to raise families. At age 50, there was another sharp increase in the percentage of the economically inactive for both genders. However, while the percentage only rose to 8.8% for males, it had risen to 53.3% for females. Even at age 70, the percentage of economically inactive women exceeded that of men by 8.7%. It is thus not surprising that survey data from Chan (2001) shows that among elderly women with CPF accounts, more than half of them worked for less than five years.

Insert Figure 10

As long as females are not active labour force participants, it is not possible for them to have "increased savings". Furthermore, they may have opted out of the "catastrophic insurance" as Eldershield premium may be unaffordable to them. To enable "increased savings" for women, policies that provide social and financial protection for women serving as home-makers or care-givers should be put in place to supplement the CPF structure. For example, a mandatory specified percentage of the CPF contribution of husbands can be deposited into the CPF accounts of their wives who are homemakers. This helps to grow the homemakers' Medisave balance when they leave the workforce to care for the family. Alternatively, incentives for spouses to top-up Medisave accounts for their wives who may have little CPF savings can be implemented in the form of greater tax relief or additional top-up schemes from the government. Currently, spouses are eligible to receive top-ups only if they are above the age of 55. The age limit should be removed so that husbands are encouraged to contribute to their wives' savings earlier. This increases the financial security for women especially since widowhood rates are high, and family units are shrinking. The maximum tax relief for topping up a spouse's CPF account is currently $7,000 but this can also be increased to encourage more top-ups. The government can also implement additional top-up schemes for women's Medisave accounts when their husbands deposit a minimum amount in their spouses' Medisave.

The problem with Eldershield, as with most LTC insurances, is that it is not a fully "catastrophic insurance". It has a specific maximum "benefit period" with benefit level set at a pre-specified constant nominal amount and does not insure against risk of

LTC inflation. However this has been a key issue for most LTC insurance as the large inter-temporal risks cannot be diversified by risk pooling since if medical costs rise, the entire insurance pool is affected. (See Cutler, 1996). This also explains why LTC policies are capped. The calibration of *PVHE* with Eldershield coverage are also sensitive to medical cost growth rates, rising significantly with increased in medical costs. It is also influenced by the payout level and payout period. At the time of the numerical simulations (before the Eldershield reform), we set the guaranteed cash payout at $300 per month for a maximum of 60 months. As of September 2007, with the Reform ElderShield Plan, the initial plan was enhanced to provide higher payouts over a longer period. The new scheme will provide $400 a month up to 6 years instead of $300 for 5 years as in the old scheme. However, calibrations of the LTC expenditures seem to be more sensitive to the levels of mean-tested subsidies.

The current entry age for Eldershield is at age 40 and is an opt-out system. To extend the benefit period and the benefit level, it may be necessary to have an earlier enrolment. The problem with this is that there is cognitive bias in that individuals tend to undervalue the expected benefits from enrolment in LTC. Furthermore, if individuals are time-inconsistent, they will tend to procrastinate in preparing for old age needs. As long as the system is not compulsory, more is expected to opt out. It may therefore be necessary to have mandatory enrolment to avoid adverse selection. Premiums can vary for different age groups since the younger cohorts are likely to make a claim. LTC premiums can also be means-tested and those with low income, as well as widows, pay lower premiums.

An alternative approach is to study the Japanese service-based LTC provision funded partially from the general tax revenue. Half of Japan's LTC system is financed by premiums paid by workers 40 and above and the other half is financed by general tax revenue. LTC premiums are means-tested and those with low income, as well as widows, pay lower premiums. To receive LTC benefits, the person must be aged 65 and above and undergo a detailed screening based on income, assets and health before being certified to be in need of LTC (Campbell and Ikegami, 2000). After which, the applicant is grouped into "Care Levels" ranging from 1-5 which determine the benefit entitlements. Co-payments for LTC services are set by service type and do not vary with income levels. After a certain threshold, the patient has to pay 100% of the cost. However, there is a "high-cost LTC service limit" which serves as a stop-loss threshold where additional expenses incurred above this threshold will be covered 100% by the LTC scheme. This stop-loss threshold varies by income and can be up to 50% less for poorer patients. Such LTC scheme thus effectively offers protection against catastrophic LTC costs and address LTC financing needs for women more adequately, especially the widow and the poor. However, there are sustainability issues relating to such a scheme.

Finally, reverse mortgages (RM) which have been studied by Chia and Tsui (2005b) as a retirement financing instrument, may be another viable alternative in financing LTC for the "asset-rich and cash-poor" Singaporean female elderly. RM permits the elderly to borrow against the value of her house to finance current consumption such as LTC (Gibbs, 1992). The role of RM is perhaps limited because most of the elderly do not wish to reduce their housing equity (Venti et al., 1990).

REFERNCES

Brown J.R. and A. Finkelstein (2004). Supply or Demand: Why is the market for long term care insurance so small? *NBER Working Paper No. 10782.*

Campbell J.C. and N. Ikegami (2000). Long-term Care Insurance Comes to Japan. *Health Affairs*, 19(3): 26-39.

Chan A. (2001). Transition in Health, Wealth and Welfare of Elderly Singaporeans: 1995-1999. Unpublished survey data.

Chandra A. and A.A. Samwick (2005). Disability Risk and the Value of Disability Insurance. *NBER Working Paper No. 11605.*

Chia N.C. and A.K.C. Tsui (2003). Life annuities of compulsory savings and income adequacy of the elderly in Singapore. *Journal of Pension Economics and Finance*, March, 41-65.

Chia N.C. and A.K.C. Tsui (2005a). Medical Savings Accounts in Singapore: How much is adequate? *Journal of Health Economics*, 24(5): 855-875.

Chia N.C. and A.K.C. Tsui (2005b). Reverse Mortgages as Retirement Financing Instrument: An option for "Asset-rich and Cash-poor" Singaporeans, *Singapore Centre for Applied and Policy Economics Working Paper No. 2005/03.*

Cutler, D.M. (1996). Why Don't Markets Insure Long-Term Risk? *NBER Working Paper No. 4301.*

Donald I. P and C. J. Bulpitt (1999). The prognosis of falls in elderly people livien g at home. *Age and Ageing* 28(2): 121-125.

Empana J.P., P. Dargent-Molina , G. Breart and EPIDOS Group (2005). Effect of hip fracture on mortality in elderly women: the EPIDOS prospective study. *Journal of American Geriatric Society,* 52(5): 685-90.

Garber A. (1989). Long term care, wealth and health of the disabled elderly living in the community, in D.Wise (ed.), *The Economics of Aging*, University of Chicago Press.

Garber A. and MaCurdy T. (1990). Predicting nursing home utilization among the high-risk elderly, in D.Wise (ed.), *Issues in the Economics of Aging.* University of Chicago Press.

Garber A. (1996). To Comfort Always: The Prospects of Expanded Social Responsibility for Long Term Care, in Fuchs V.R. (ed.), *Individual and Social Responsibility*. University of Chicago Press.

Gibbs I. (1992). A substantial but limited asset: The role of housing wealth in paying for residential care in Morten J. (ed.), *Financing Elderly People in Independent Sector Homes: The Future.* London: Age Concern Institute of Gerontology.

Koh L.K., S.M. Saw, J.J. Lee, K.H. Leong and J. Lee (2001). Hip fracture incidence rates in Singapore 1991-1998. *Osteoporosis International 2001*, 12(4): 311-318.

Langa K.M., M.E. Chernew, M.U. Kabeto and S.J. Katz (2001). The explosion in paid home care in the 1990s: who received the additional services? *Medical Care,* 39(2): 147-157.

Lau E. M. C., Lee J. K., Suriwongpaisal P., Saw S. M., Das De S., A. Khir and P. Sambrook (2001). The Incidence of Hip Fracture in Four Asian Countries: The Asian Osteoporosis Study (AOS), *Osteoporosis International* 12:239–243

Merchant R.A., K.L. Lui, N.H. Ismail, H.P. Wong and Y.Y. Sitoh (2005). The Relationship between Postoperative Complications and Outcomes after Hip Fracture Surgery. *Annals Academy of Medicine*, 34(2): 163-168.

Mitchell O.S., J. Piggott and S. Shimizutani (2004). Aged Care Support in Japan: Perspectives and Challenges. *NBER Working Paper No .10882*.

Muller C.F. (1992). *Health Care and Gender.* New York: Russell Sage Foundation.

Norton E. (2000) Long Term Care, in Culyer and Newhouse (eds.), *Handbook of Health Economics*, Vol. 1B, Chapter 17.

Norton E. and C.H.V. Houtven (2004). Informal care and health care use of older adults. *Journal of Health Economics,* 23(6): 1159-1180.

OECD (2005). *Long Term Care for Older People*, Paris OECD.

Singapore, Department of Statistics (2005). *Yearbook of Statistics Singapore 2005*, National Printers.

Singapore, Department of Statistics. *Statistical Resources*, various years.
Available at http://www.singstat.gov.sg/stats/singstat/internet.html

Singapore, Ministry of Community Development, Youth and Sports (1995). *The National Survey of Senior Citizens in Singapore 1995.* Available at www.mcys.gov.sg

Singapore, Ministry of Community Development, Youth and Sports (1999). *Inter-Ministerial Committee (IMC) Report on the Ageing Population 1999.* Available at www.mcys.gov.sg

Singapore, Ministry of Community Development, Youth and Sports (2006). *Report on the Ageing Population.* Available at www.mcys.gov.sg

Singapore, Ministry of Community Development, Youth and Sports. *Social Statistics in Brief*, various years. Available at www.mcys.gov.sg

Singapore, Ministry of Health (2002). *National Health Surveillance Survey* Epidemiology & Disease Control Division. Available at www.moh.gov.sg

Singapore, Ministry of Health (2002). *State of health 2001* The Report of the Director of Medical Services. Available at www.moh.gov.sg

Singapore, Ministry of Health (2006). *Intermediate and Long Term Care in Singapore,* Information paper, 2006/014.

Singapore, Ministry of Health (2007). *Eldershield Experience 2002-2005.* Information Paper, 2007/021.

Singapore, Ministry of Health. *Hospital Statistics* various years. Available at www.moh.gov.sg

Singapore, National Arthritis Foundation (2003). Website http://www.arthritis.org.sg

World Health Organization. *The World Health Report 2004.* Available at www.who.int

Wingard, L. Deborah, W.J. Denise and M.K. Robert (1987). Institutionalization care by the elderly: a critical review. *Gerontologist,* Vol. 27.

Wong M.K., Arjandas, L.K. Ching, S.L. Lim and N.N. Lo (2002). Osteoporotic Hip Fractures in Singapore - Costs and Patient's Outcome. *Annals Academy of Medicine*, 31(1): 3-7.

Yadav, S.S. (2001). Disability and Handicap among Elderly Singaporeans. *Singapore Medical Journal,* 42(8): 360-367.
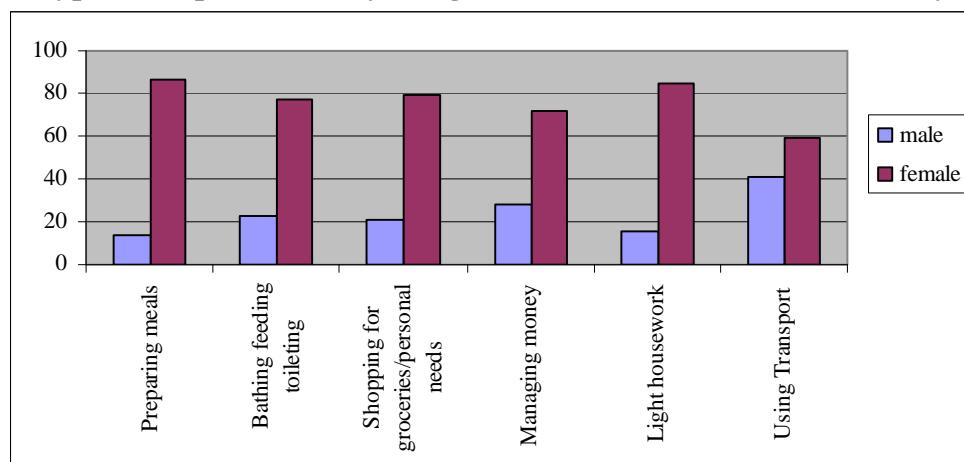
Yap L.K.P., S.Y.L. Au, Y.H. Ang, K.Y. Kwan, S.C. Ng and C.H. Ee (2003). Who are the Residents of a Nursing Home in Singapore? *Singapore Medical Journal*, 44(2): 65-75.

Figure 1a
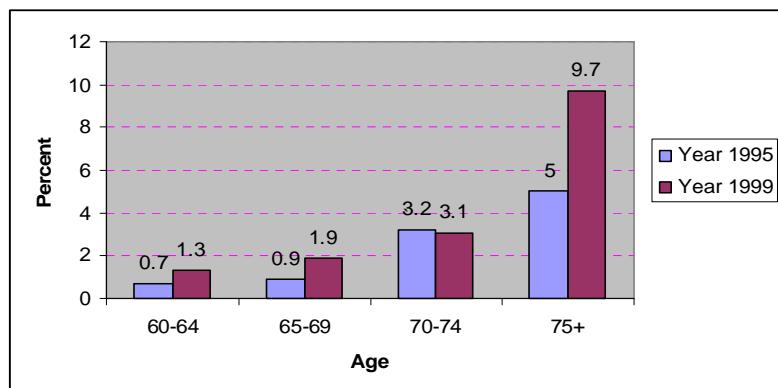**Informal caregivers in Singapore**
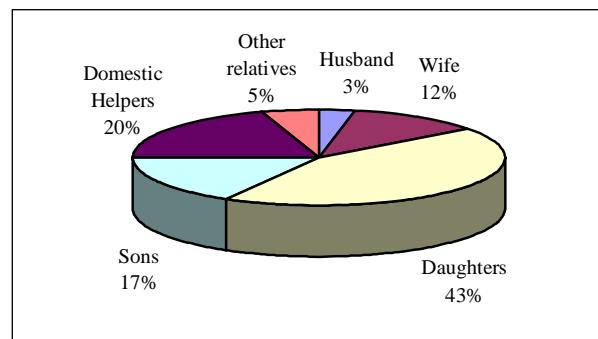
Source: Chan (2001)

Figure 1b
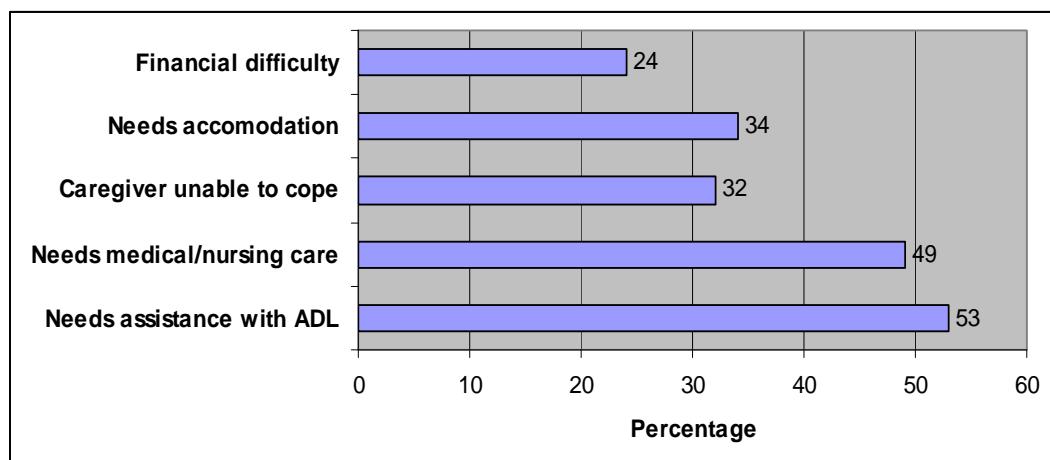**Types of help rendered by caregivers for the male and female elderly**

Source: Chan (2001)

Figure 2
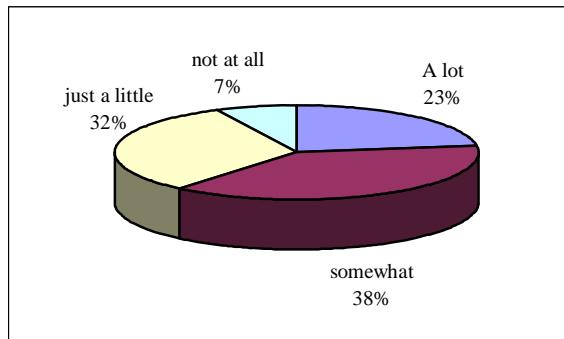**Percent of elderly having at least one ADL difficulty**

Source: Chan (2001)

Figure 3
Reasons for admission to nursing homes (%)
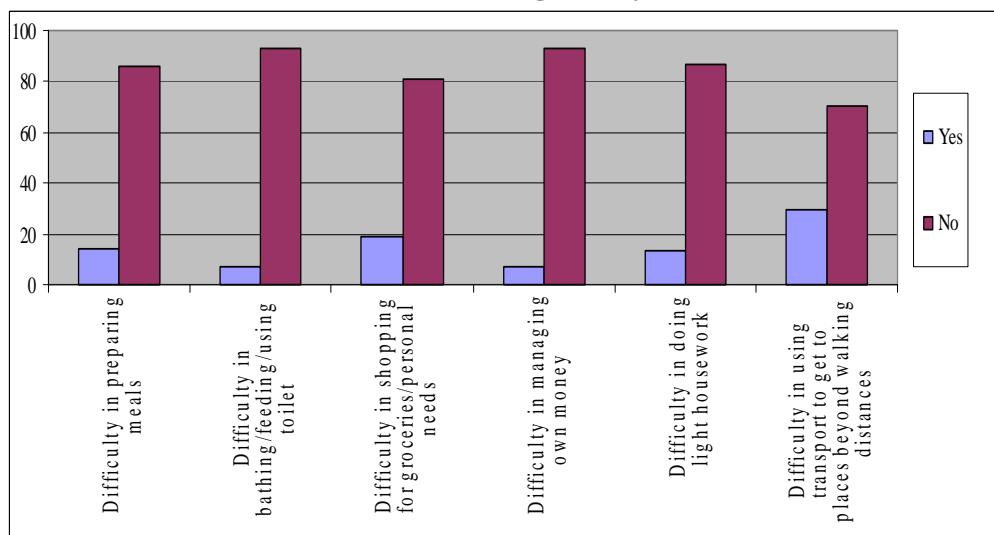

Source: Adapted from Yap et al.(2003), Table II

Figure 4
Limitations of arthritis on daily activities

Source: Chan (2001)

Figure 5
Instrumental ADLS among elderly women

Source: Chan(2001)

Figure 6
Hip Fracture Incidences in Singapore by Gender
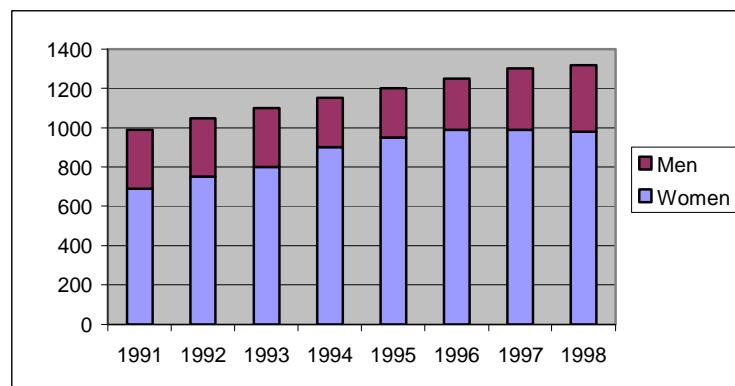
Source: Koh et al. (2001) Figure 1

Figure 7
Mobility status after hip surgery
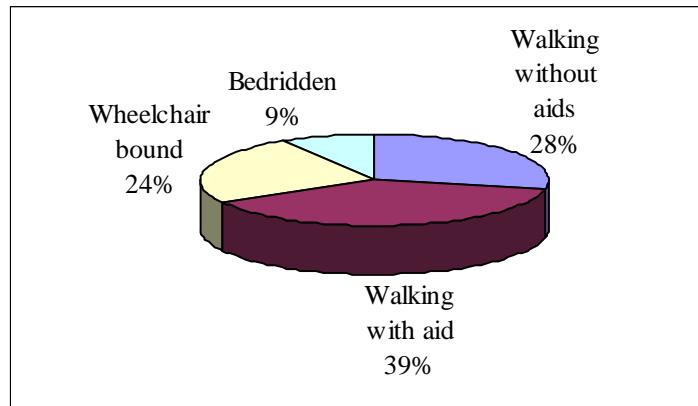
Source: Wong et al. (2002)

Figure 8
PV of disability insurance benefits to expected PV LTC expenses
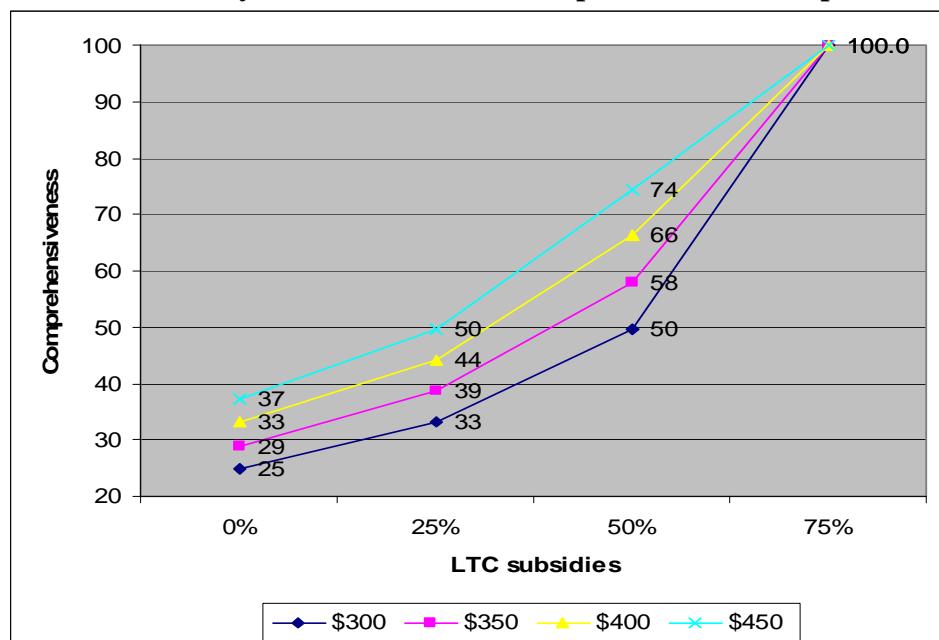
Figure 9
Percentage of PV of Eldershield benefits to *PVHE* at varying monthly benefit payouts and LTC subsidies
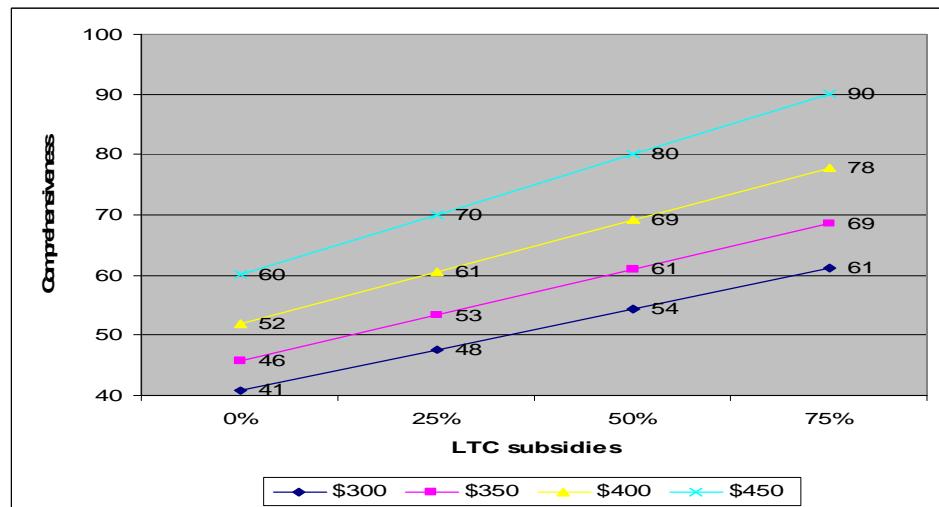
Figure 10
Percentage of Economically Inactive Persons by Gender and Age

Source: Constructed from Population Census 2000 (DOS, 2000, Table 19)

Table 1
Severity of immobility by gender (%)

Severity of Immobility	Male	Female
None	78.4	55.2
Mild	16.6	33.1
Moderate	2.8	7.9
Severe	0.9	1.4
Profound	1.4	2.4

Source: Yadav et al. (2001) Table II

Table 2
Age-specific prevalence (%) of reported arthritis by gender

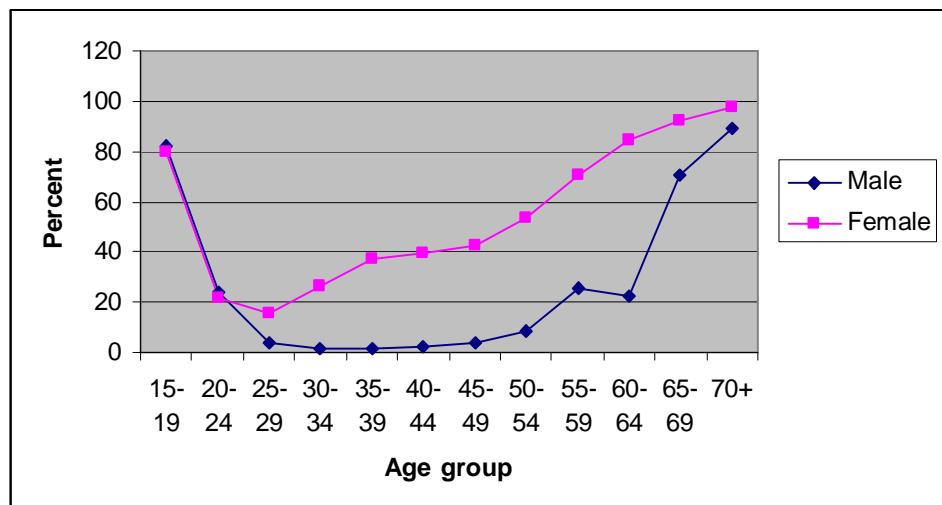| Age (years)	Male	Female
18-24	0.5	-
25-44	1.2	1.5
45-64	3.1	8.2
65-74	9.3	21.4
75 and above	16.7	28.9

Source: MOH (2002), National Health Surveillance Survey 2001

Table 3
Percentage of elderly with IADL difficulties for 1995 and 1999

	1995	1999
Using transportation	7.3	16.8
Shopping	7.3	11.9
Preparing meals	8.4	12.2
Light housework	6.5	8.9
Any one	14.3	42.3

Source: Chan (2001)
Note: Panel sample size = 1977

Table 4
Age-specific probabilities of hip fractures per 100,000 Singapore women

Age	50-54	55-59	60-64	65-69	70-74	75+	Total
1991	20.7	33.5	85.6	218.4	360.0	1237.2	
1998	12.4	33.9	54.2	238.1	384.1	1352.5	
Mean	14.1	34.0	81.1	194.9	408.0	1369.2	401.7

Source: Koh et al. (2001), Tables 1 and 2

Table 5
Government's subsidy for nursing homes

Per Capita Income	Rate of Subsidy
$0 to $300	75%
$301 to $700	50%
$701 to $1000	25%
Over $1000	0%

Table 6
Expected present value of nursing home expenditure (in S$), using different nursing home cost inflation (m), subsidy levels and discount rates (r).

LTC Subsidy	0%	25%	50%	75%
(a) m=0%				
r=2%	68457	51343	34229	17114
r=3%	67258	50443	33629	16814
r=4%	66104	49578	33052	16526
r=5%	64993	48745	32497	16248
(b) m= 1%				
r=2%	69717	52287	34858	17429
r=3%	68481	51361	34241	17120
r=4%	67293	50470	33646	16823
r=5%	66149	49612	33074	16537
(c) m = 2%				
r=2%	71001	53251	35501	17750
r=3%	69729	52297	34864	17432
r=4%	68505	51379	34253	17126
r=5%	67327	50495	33664	16832
(c) m = 3%				
r=2%	72311	54233	36155	18078
r=3%	71001	53251	35501	17750
r=4%	69741	52306	34870	17435
r=5%	68528	51396	34264	17132

Table 7
Policy Comprehensiveness of Eldershield for different long term care utilizations

	Percentage
Informal Care	
Domestic help	57.8
Institutional Care	
Community care	63.0
Nursing home	
0% subsidy	24.8
25% subsidy	33.1
50% subsidy	49.6
75% subsidy	99.2

Table 8
Expected *PVHE* on an Osteoporotic Hip Fracture (in S$)

LTC Subsidy	0%	25%	50%	75%
(a) m=1% ; c= 2%				
r =2%	42413	37881	33350	28818
r=3%	41655	37203	32752	28301
r=4%	40924	36550	32176	27802
r=5%	40221	35922	31622	27322
(b) m= 2% ; c = 2%				
r =2%	42747	38132	33517	28902
r=3%	41979	37447	32914	28382
r=4%	41239	36786	32333	27880
r=5%	40528	36151	31775	27399
(c) m = 3% ; c =2%				
r =2%	43088	38387	33687	28987
r=3%	42310	37695	33080	28464
r=4%	41560	37027	32494	27961
r=5%	40840	36386	31931	27477

Table 9
Financing of different length of stay in nursing homes
using benchmark assumptions
(r=3%, m=1%, Eldershield payouts of $300 for 60 months)

Length of stay in Nursing homes	LTC subsidies			
	0%	25%	50%	75%
a. Present value of nursing homes expenditure (*PVLTC*)				
5 years	$56277	$42208	$28139	$14069
6 years	$68481	$51361	$34241	$17120
10 years	$135137	$101353	$67569	$33784
b. Ratio of *PVLTC* to PV of disability insurance benefits [1]				
5 years	3.3	2.4	1.6	0.8
6 years	4.0	3.0	2.0	1.0
10 years	7.8	5.9	3.9	2.0
c. Ratio of *PVLTC* to Medisave balance [2]				
5 years	2.5	1.9	1.3	0.6
6 years	3.1	2.3	1.5	0.8
10 years	6.1	4.5	3.0	1.5
d. Ratio of *PVLTC* to PV of disability insurance benefits and Medisave balance [3]				
5 years	1.4	1.1	0.7	0.4
6 years	1.7	1.3	0.9	0.4
10 years	3.4	2.6	1.7	0.9

Notes:
1. Average balance of medisave account = $22,292
2. PV of eldershield benefit payouts = $17,308
3. Medisave plus Eldershield payouts = $39,600

APPENDIX

Table A.1
Estimated Annual Costs of Follow-up Treatment of Hip Fracture

Medical Care	Costs
Orthopedic Consultation Fees	$50/visit x 4 visits
Medication	$30/month[1] x 12 months
Total Annual Costs	$560

Source: Prices at Singapore, Osteoporosis Clinic and Orthopedic Surgery
Note:
[1] This is the price of lower-range medication common to many women. The type of medication prescribed varies according to the severity of osteoporosis or loss in bone density.

Table A.2 Estimated Annual Costs of Hiring a Maid

Expenditures	Cost
Foreign Maid Levy	$295/mth x12mths
Maid's Salary	$350[1]/mth x 12mths
Medical checkup	$50/6 mths x 2
Annual air-ticket home	$350
Total Annual Costs	$7590

Source: Expat Singapore (2006) Available at www.expatsingapore.com
Note: [1] Filipinas cost about $350-$400 and Indonesians cost about $280