# Direct and Indirect Income Support and Their Determinants: Developing an Income Profile for Older Adults in Sri Lanka

Chandhi Shyama[1] and Tiloka de Silva[1*]

[1] Department of Decision Sciences, University of Moratuwa, Katubedda, Sri Lanka
* Tiloka de Silva, corresponding author. Email: tilokad@uom.lk
Submitted: 19 June 2021, Accepted: 14 October 2021, Published: 15 March 2022
Volume 30, 2022. pp. 463–487. http://doi.org/10.25133/JPSSv302022.027

## Abstract

Given the rapid increase in population aging and older population dependency rates, a sound understanding of old-age income support systems is vital for formulating effective policy responses. This research studies old-age income sources to develop an income profile for older adults in Sri Lanka, measuring direct and indirect income sources using nationally representative survey data from Household Income and Expenditure Surveys 1995/1996 and 2016. In the absence of direct information on intergenerational transfers, we investigate the material support older adults receive from their families, an essential source of income in many developing countries. We found that while indirect income support, cash transfers, and employment are vital sources of old-age income, there have been significant changes in the composition of old-age income over time. Indirect income support is becoming less important, and income from employment and formal cash transfers is becoming more prominent. These results highlight potential avenues to improve the economic well-being of older adults, such as increasing the mandatory retirement age and taking measures to provide decent employment opportunities for older adults while also expanding pension coverage to all types of workers and access to social security for vulnerable groups such as women or the poor.

## Keywords

Indirect income sources; formal cash transfers; old-age income support; older adults employment; population aging

# Introduction

Population aging, which is the increase in the proportion of older people in a population, is considered the final stage of the demographic transition and is a phenomenon that will have a global impact (Kohsaka, 2012). It was estimated by the United Nations (2019) that by 2050, one in six people in the world will be over the age of 65, even though there is considerable variation in the degree to which different regions and countries are experiencing population aging.

While it is not necessarily the case that population aging leads to macroeconomic decline, it will inevitably give rise to increased pressure on old-age support systems. Older adults have several avenues for income support, including government transfers, pensions, accrued savings and wealth, employment income, and informal intrafamily or intergenerational support (Holzmann & Hinz, 2005). While the importance of these sources vary by country, given the rapid socioeconomic changes that have taken place in many countries over the last few decades, the contributions of different sources of income are likely to have also changed within countries (e.g., El-Mekkaoui de Freitas & Martins, 2008; Kumagai, 2015; Ladusingh & Maharana, 2018; Tilakaratna et al., 2019).

In contrast to many of its South Asian neighbors, Sri Lanka has one of the fastest aging populations in the developing world (Siddhisena, 2005; Tilakaratna et al., 2019). It was estimated that the share of the population aged 60 years and above to the total population would increase from 13.9% in 2015 to 21% in 2030 and 28.6% by 2050 (Samarakoon & Arunatilake, 2015). Given that Sri Lanka's experience of population aging is similar to that of a developed country, albeit at a much lower level of income, ensuring the welfare of older adults is and will be a challenge for the country in the years to come.

Family support has historically been the primary source of old-age support in Sri Lanka (Kaluthantiri, 2014; Perera, 2017; World Bank, 2008). However, with traditional family support systems weakening and inadequate savings among older adults, formal, old-age income support systems such as government transfers and pensions are expected to become crucial for ensuring the well-being of older adults (Asian Development Bank, 2019; De Silva, 2013; Perera, 2017). However, most of the existing literature on older adults in Sri Lanka focuses on one or a few old-age income support systems. For example, Tilakaratna et al. (2019) and Senanayaka and Sisira Kumara (2015) studied the labor force participation of older adults, while Kaluthantiri (2014) focused on intergenerational transfers. Moreover, the only nationally representative survey of older adults in Sri Lanka, the World Bank Sri Lanka Aging Survey 2006 (World Bank, 2008), is relatively outdated.

This paper aims to develop an income profile for older adults in Sri Lanka using Household Income and Expenditure Survey (HIES) data from 1995/1996 and 2016. In particular, we use the subsample of 18,671 individuals aged 60 and above from the two surveys to directly measure income received by older adults through public transfers, pensions, remittances, employment, and accumulated wealth. In the absence of direct information about intergenerational transfers, we constructed the difference between per capita household consumption and income as a residual that measures indirect income support and incorporate this into the income profile of older adults. Given that this residual is, at best, a crude measure of informal support for older adults from their families, we further investigate the role of material contributions by family members by focusing on older persons co-residing with their

children or other relatives and constructing the contribution to household income made by these older persons. We then used multivariate regression models to identify the determinants of the three most significant sources of old-age income support (cash transfers from the government, employment, and indirect income support) and how these determinants have changed over time.

The results presented in this paper are essential for understanding the extent of old-age income support for older adults in Sri Lanka and the potential direction of change in the old-age income profile. This is a critical first step when designing systems to ensure the well-being of older adults. Given the rising older population share, it is also crucial for managing the overall macroeconomic implications of population aging within a developing country context.

# Related literature

A large body of literature details the different sources of income in old age, with important distinctions related to the differences in cultural norms and development levels between countries. In most Western economies, pensions and social security payments are the primary income source in old age (Australian Institute of Health and Welfare, 2021; Federal Statistical Office, 2016; OECD, 2017; O'Sullivan & Layte, 2011; United Nations, 2017). For instance, the Organization for Economic Co-operation and Development (OECD) (2017) estimated that public transfers accounted for 58% of the total income of older adults in OECD countries, while employment accounted for 24%.

On the other hand, in most Asian countries, even developed ones, the family is a vital source of old-age support, with most older adults living with their adult children (United Nations, 2017). Studies based in Korea and Singapore, for example, consistently find that co-residence with, or financial or in-kind transfers from, adult children is a primary source of support for older adults with a limited contribution from government transfers or support systems (Hoe et al., 2019; Lee & Phillips, 2011). However, with low fertility, changing social structures, and underdeveloped social security systems, it is observed in many developing countries that older adults engage in informal sector employment as a means of supplementing their income (Barrientos et al., 2003; Giles et al., 2011; Paweenawat & Liao, 2021; Reddy, 2016; Tilakaratna et al., 2019).

The trade-offs between different income sources and the channels by which these sources change in importance have been explained using economic theories. For developed countries, savings and retirement decisions are discussed together with the role of pensions and social security. For instance, it was found that generous retirement systems induce early retirement in many Western countries (Cremer et al., 2008; Gustman & Steinmeier, 2004), while driving savings below what would be expected within a framework of consumption smoothing over the life cycle (El-Mekkaoui de Freitas & Martins, 2008).

The developing country literature incorporates the role of intergenerational transfers into the analysis. Cameron and Cobb-Clark (2001) developed a labor supply model, co-residence, and intergenerational transfers within the Indonesian context of limited pension systems. They found that intergenerational transfers do not always substitute for older adults labor force participation. Galasso et al. (2009) studied the interaction between pension spending and fertility. They showed how increased pension spending could lower fertility in countries with underdeveloped financial markets that deter household savings. Choukhmane et al. (2013)

also built on the idea of children as retirement insurance, highlighting the steep increase in aggregate savings following the imposition of the one-child policy in China. Coeurdacier et al. (2014) took the argument further by maintaining that with the expansion of social security benefits, the relaxation of the one-child policy is unlikely to have the expected effect on increasing fertility.

Each of these old age income sources is associated with its problems. While countries reliant on pensions or government transfers for older adults' income support face issues of transfer adequacy and fiscal sustainability, the main challenges faced by countries dependent on intergenerational transfers are the reductions in fertility and changes in lifestyle that are becoming incompatible with the traditional means of old-age support (Clements et al., 2014; Department of Economic and Social Affairs, 2007; European Commission, 2010; Tanyi et al., 2018). Accordingly, multi-pillared retirement systems, which incorporate aspects of government-funded social security, contributory pensions, individual savings, and intergenerational transfers with decent working conditions for those older adults who wish to continue working, are posited to ensure the effectiveness and efficiency of old age income through diversification (Holzmann & Hinz, 2005; Samorodov, 1999).

# Data and methods

## Data

This paper aimed to identify the key sources of old-age income support to describe the income profile of older adults in Sri Lanka, making comparisons between Household Income and Expenditure Surveys (HEIS) from 1995/1996 and 2016. For this purpose, we used nationally representative survey data obtained from the HIES from 1995/1996 and 2016, collected by the Department of Census and Statistics of Sri Lanka (1995, 2016a). The HIES collects information on income, by source, at the individual level, and expenditure on food and non-food items at the household level.

While the sampling methodology and questionnaire remained relatively unchanged between 1996 and 2016, two main differences are relevant to this analysis. The first relates to coverage. The HIES 1995/1996 sample excluded the Northern and Eastern Provinces districts, which were affected by the civil war, whereas the 2016 survey covered all the districts in Sri Lanka. Thus, we excluded the Northern Province and Eastern Province districts for both years for comparison purposes. The second difference is in relation to the categorization of income from government transfers. The 1995/1996 survey grouped pension payments with several other government allowances (such as disability and relief payments) and collected information on the total income received from these transfers. In contrast, the 2016 survey gathered information on each transfer scheme separately. As such, we cannot directly compare income from pensions over time.

## Definitions and measures

There are several definitions and concepts that we used in this paper. First, we considered the population aged 60 years and over as an older population, since the mandatory retirement age of the public and private sectors lies between 55 and 60 years, respectively. Following the

conventions in the literature, we further categorize the older population into two groups: "young-old" who are below 70 years of age and "old-old" whose age is greater than or equal to 70 (Perera, 2017).

We considered three direct income sources for this analysis: 1) cash transfers (pension payments, government allowances, remittances, etc.), 2) employment (including paid employment and engaging in agricultural and non-agricultural activities as an employer or own account worker), and 3) income from accumulated wealth (property rents, dividends, interest on and withdrawal of savings, etc.). Since the HIES collects information on these income sources at the individual level, we can measure income received by older adults through these channels directly.

We completed the income profile of older adults by incorporating indirect income, measured as the difference between household per capita consumption (measured as total per capita household expenditure, including the value of freely received goods and services but excluding expenditure for educational purposes) and the older person's total direct income. Whether this value is positive or negative, an older individual can be considered a net dependent or net provider. Since intergenerational transfers are not directly recorded in the HIES, we assumed that this indirect income might capture some part, at least, of the informal transfers from children or other family members. This measure assumes that household expenditure is equally distributed among all household members.

While excluding education expenditures, which are very unlikely to be consumed by older adults, is a step towards refining this estimate, this residual is still a crude measure of family support. As such, we further investigated the role of intergenerational support by assessing the contribution to household income among older adults living with their adult children. For this purpose, we calculate the ratio of the income of an older individual *i* to household income earned per working-age member (aged 15 and above, in line with the definition used by the Department of Census and Statistics of Sri Lanka (2016b) in household *j* as:

$$Income\ contribution\ ratio\ (ICR)_{ij} = \frac{\text{Individual income}_{ij}}{\left(\frac{\sum_i \text{Individual income}_{ij}}{n_j}\right)}$$

where $n_j$ is the number of working-age members of household *j*.

Older adults are categorized into income quintiles based on household income per capita to examine differences across income groups throughout the analysis. In what follows, individuals from the lowest income quintile are referred to as poor, while those who belong to the highest income quintile are referred to as rich.

## Methods

The results presented in this paper are in two parts. The first provides descriptive statistics about the different direct and indirect income sources, highlighting changes between 1996 and 2016, and concludes by compiling an income profile for older adults in Sri Lanka. The second part of the results focuses on the key old-age income sources identified in the first part. It examines the socio-economic determinants of these income sources using multivariate regression. All monetary values are adjusted for inflation using the Colombo Consumer Price Index (CCPI) for 1996 and 2016 (Central Bank of Sri Lanka, 2016) to allow for comparisons

over time. All results are computed using sampling weights to ensure national representativeness.

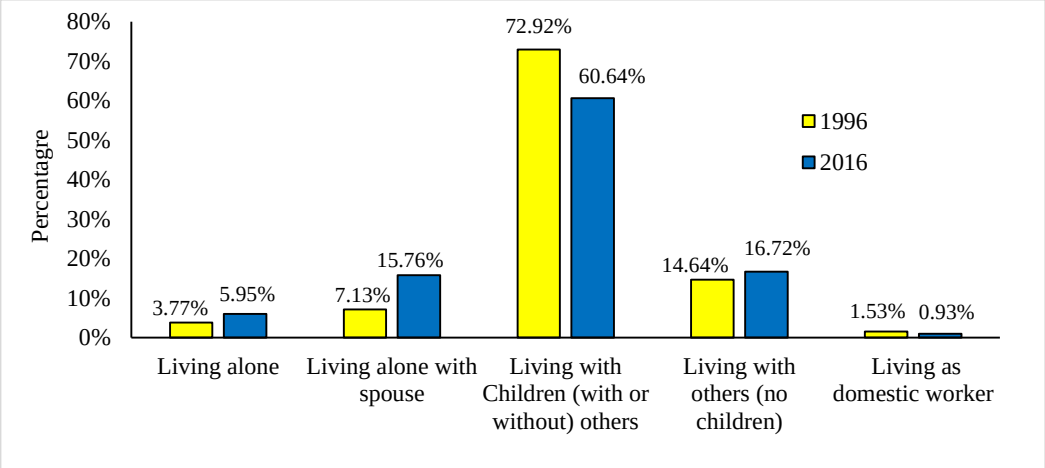
# Results

## Overview of the aging population

The share of the older population increased from 9% to 16% between 1996 and 2016. The majority of older adults (60.8%) were aged between 60 and 70 years in 2016. While there was an approximately equal share of older males and females in 1996, by 2016, the majority (55%) of older adults were female, consistent with the higher life expectancy of females (Menike, 2014). Nearly half of the older population (49.75%) received primary and secondary education, while approximately 29% of the older persons reported below-primary education. However, comparison over time shows that the share of older persons with less than primary education has decreased by 20% since 1996. The percentage of more-educated older persons having completed the Advanced Level or more has increased by 6%. In terms of economic activity, 46% of older adults reported being unable to work or retired, while nearly a third were employed in 2016. This finding was driven mainly by the young-old, who accounted for 81% of employed older persons.

Examination of the living arrangements of older adults was also essential, given the role of the family in old-age income support in Sri Lanka. As Figure 1 shows that 61% of older persons in Sri Lanka lived with their children, a reduction of 12% from 1996. Whereas 6% of older adults lived alone, increasing 2% over time, while the share of older adults living alone with their spouse doubled. The role of family support will be further quantified and analyzed in a later section.

**Figure 1:** Living Arrangements of the Older Adults




## Direct income sources of older adults

We now examined the direct income sources of older adults, including income from cash transfers, employment, and accumulated wealth.

**Income from cash transfers**

We started with income from cash transfers from formal and informal sources. Table 1 shows the share of cash transfer income accounted for by different sources. Formal cash transfers, including pension payments, transfers from the government's flagship poverty alleviation programs Samurdhi/Janasaviya, and other allowances granted by the state accounted for the bulk of total cash transfers in 2016. However, there was a reduction, with 70.5% of total cash transfers from formal sources in 2016, down from 84.6% in 1996. The largest share of cash transfers was accounted for by pension payments (31%), followed by Samurdhi payments (21%), and remittances from within and outside the country (20%). Compared to 1996, the share of income received from Samurdhi was substantially reduced through offset by introducing the allowance for poor older persons.

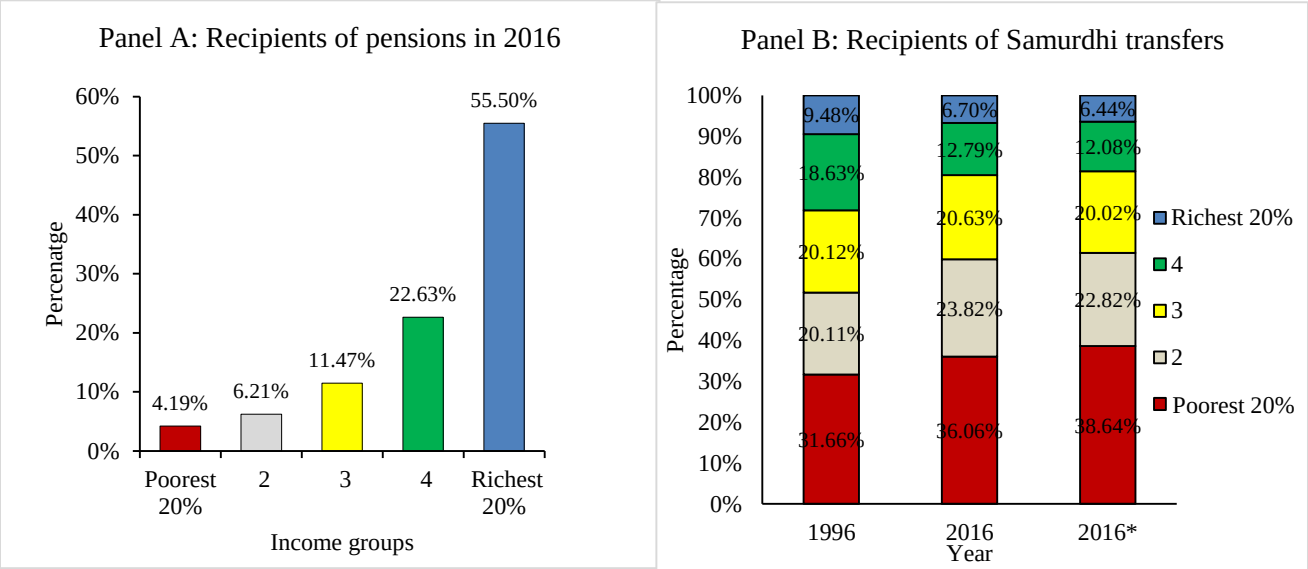
**Table 1:** Distribution of Income From Cash Transfers of the Older Adults

| Types of Cash Transfers | Year 1996 | 2016 |
|---|---|---|
| Pension | | 31.23% |
| Disability payments | 34.32% | 0.53% |
| Relief payments | | 0.18% |
| Samurdhi/Janasaviya | 48.81% | 20.90% |
| Elderly allowance | - | 16.42% |
| Other allowances | 1.14% | 1.52% |
| Remittances | 9.99% | 19.79% |
| Other | 5.74% | 9.43% |

*Note: Authors' calculations using data from HIES 1995/1996 and 2016.*

Despite the significant contribution of pensions to income from cash transfers, only 12.6% of older adults reported receiving pension benefits in 2016 (comparison over time cannot be conducted because receipts from pensions were not separately recorded in 1996). Analysis of the distribution of pension recipients among income groups showed that the majority of pension recipients (55.5%) were from the richest income group (see Figure 2 - Panel A). The share of older persons who received cash transfers from the Samurdhi poverty alleviation program was approximately 11%, reducing by more than 50% since 1996. In contrast to pensions, the income from Samurdhi payments is more pro-poor (as it should be), though there is still room for improvement in targeting. Among Samurdhi recipients, more than 55% of the recipients were from the two lowest income quintiles in 2016, an increase over time (see Figure 2 - Panel B). A sizeable share of the richest older persons (7%) still received Samurdhi benefits, though the percentage decreased slightly since 1996.

**Figure 2:** Distribution of Cash Transfer Recipients Among Income Groups




## Income from employment

In 2016, more than one-fourth of older adults reported being employed, an increase of 2% over the past 20 years. Among the employed older persons, the majority (54.53%) were own-account workers, while over one-third of older adults reported working in the private sector. However, most of the increase in paid employment was driven by the latter; the decline in the share of own account work between 1996 and 2016 was caused by the decrease in the percentage of older adults engaged in agriculture (Figure 3).

**Figure 3:** Distribution of Employed Older Adults by Employment Type

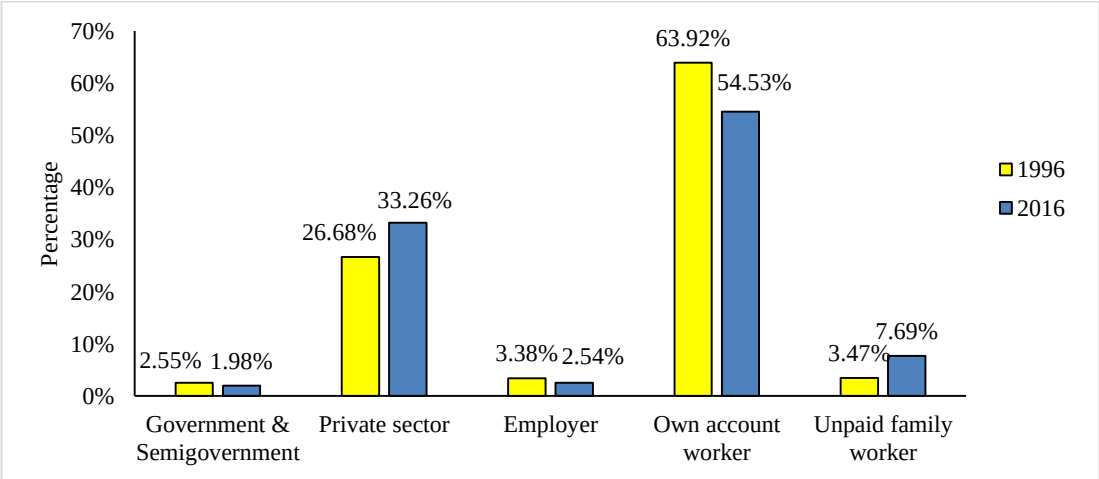
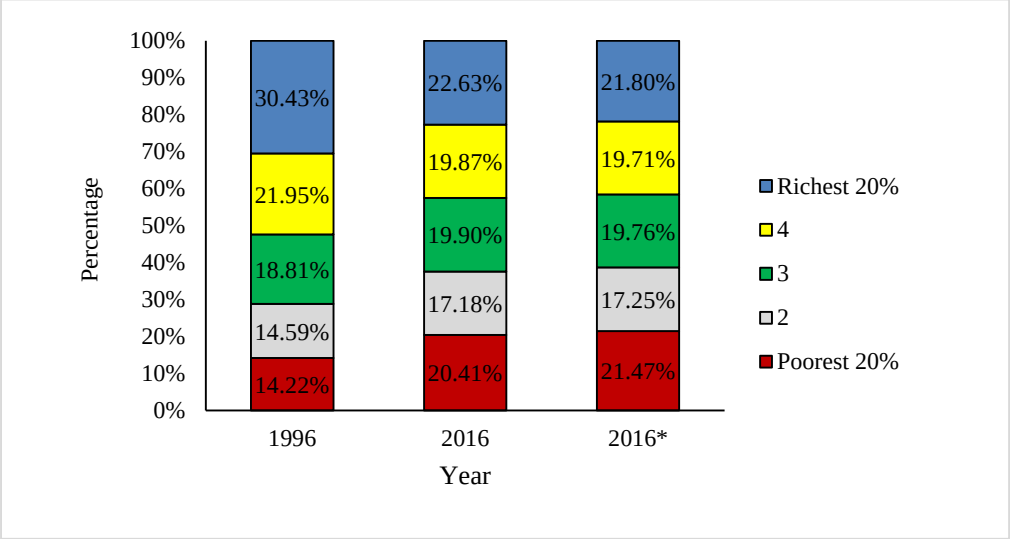



Figure 4 shows the distribution of the employed older adults over income groups. While paid employment was relatively more common among the richer older persons in 1996, by 2016, the distribution of employed older persons over the income groups became more uniform, with a 6% increase in the share of employed older persons who belonged to the lowest income quintile and an 8% decrease in the percentage of employed older persons from the highest

income quintile. These results suggest that the poorest older persons increasingly turned to paid employment as a means of income support.

**Figure 4:** Distribution of Employed Older Adults Among Income Groups




**Income from accumulated wealth**

Of the direct income sources, income from accumulated wealth, including interest from savings, dividends, rental income, etc., was least prevalent among older adults in Sri Lanka. Most older adults (91.7%) did not receive any income from savings in 2016, whereas most older persons who did tend to be from the top income quintile. The main component of income from accumulated wealth was income from property rents.

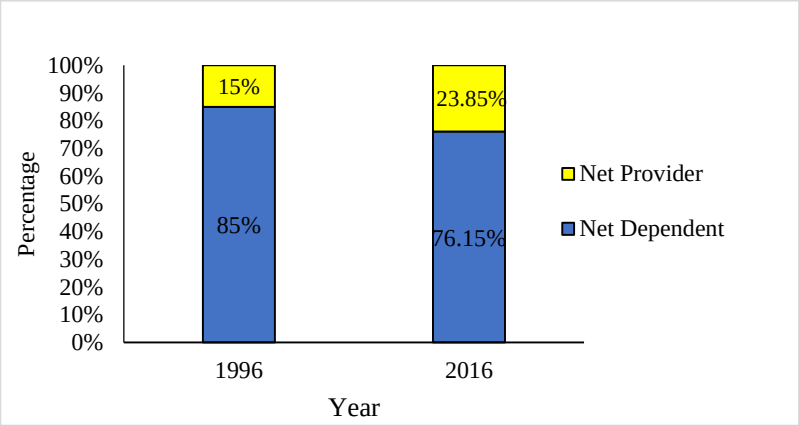
The results in this section highlight the challenges older adults face in the poorer segments. Pro-poor public transfers have reduced in significance within the income basket of older adults. In contrast, pension payments were concentrated among the higher-income groups. Income received from accumulated wealth tended to be relatively less important. The increase in employment and informal transfers through remittances suggest mitigation measures taken by older adults and their families.

## Indirect income support

To complete the income profile of older adults, we measured the material benefit (cost) indirectly obtained by older adults as the difference between household per capita consumption (payments for goods and services as well as the value of freely received goods and services, excluding educational expenditures) and the older person's total income.

Based on this measure, we found that, on average, the difference between per capita consumption and individual income was positive in both years among older adults, indicating that the average older adults individual was a recipient of indirect material support. However, we saw that there had been an 8.8% decline in the share of older adults net dependents in Sri Lanka over time (see Figure 5).

**Figure 5:** Distribution of the Dependent Status of the Older Adults




**Support from the family**

Family support has historically been the primary source of old-age support in Sri Lanka and remains so, as observed by the large (though declining) share of older adults living with their children. However, there has been little current evidence on the support received by older adults from their families in Sri Lanka. Given that our measure of indirect income support could not identify the source of support, we attempted to quantify further the indirect benefit (or cost) received (incurred) by older adults living with their children or other relatives by measuring the income contribution ratio of older adults (the ratio of income of older adults individual to household income earned per working-age member). Based on this measure, we found that the average income contribution ratio of an older person living with their children was roughly 79% of household income per working-age member in 2016, while nearly 93% in 1996.

**Figure 6:** Income Contributions of the Older Adults Living With Their Children

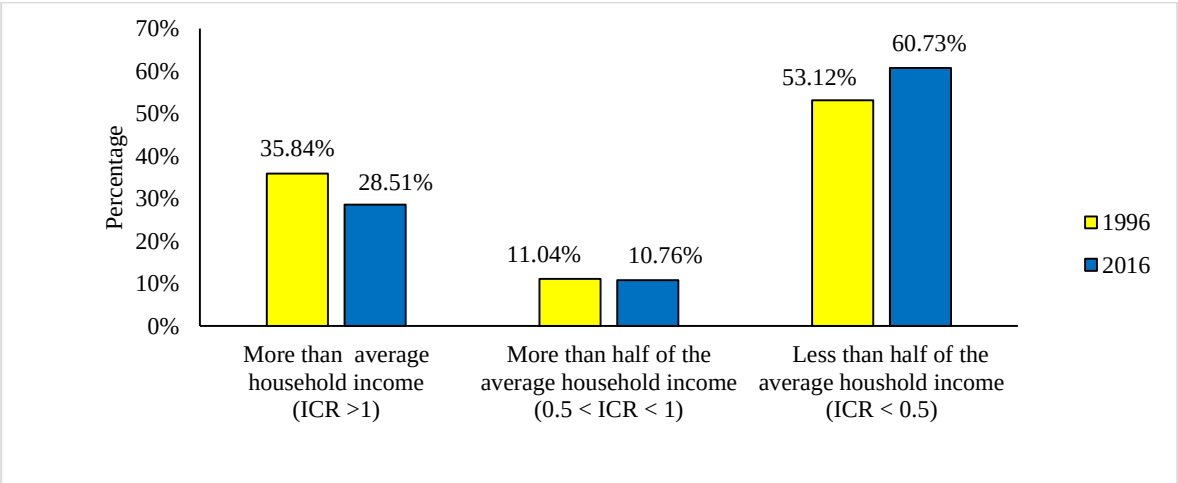



Figure 6 shows the distribution of the income contribution ratio among older adults living with their children. Most older adults cohabiting with their children (61%) contributed less than half of the household's income per working-age member, while 28% contributed more

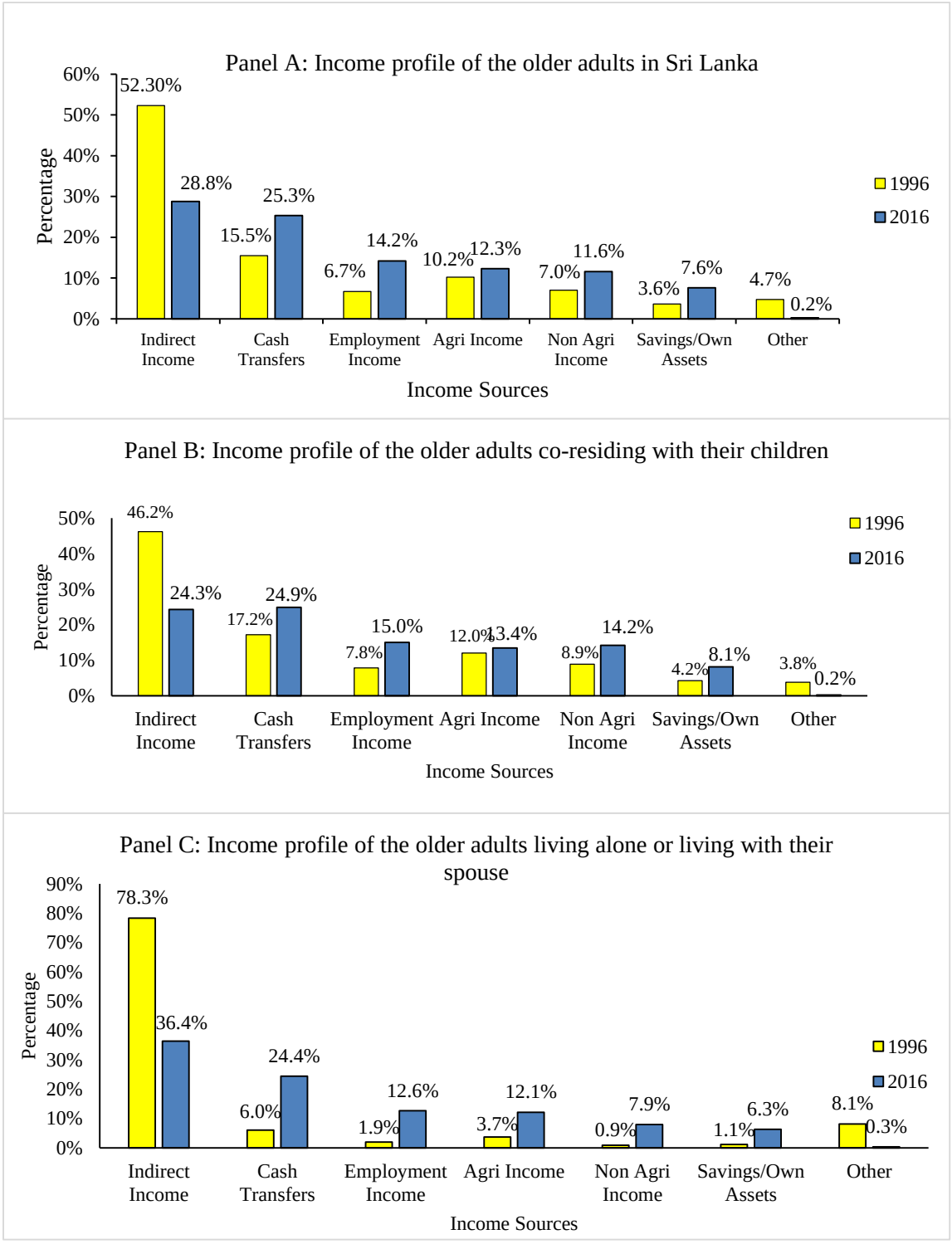
in 2016. The latter share decreased over time, indicating that the income contribution of older adults living with their children even reduced while the percentage of older adults living with their children has declined. While the high level of dependency among older adults suggested by these results is consistent with those based on the residual of consumption and income, these results indicated that dependence has increased over time among older adults living with their children.

## Income profile of older adults in Sri Lanka

We now combine direct and indirect income sources to construct an overall income profile for older adults in Sri Lanka. The combination of direct and indirect sources confirmed the importance of indirect support for older adults in Sri Lanka, which accounted for 30% of the total income, on average, of an older adults individual in 2016. However, compared to 1996, the share of income received from indirect sources has dramatically declined (Figure 7 - Panel A).

Indirect support appears to be relatively more important for older adults who live alone or live alone with their spouse, highlighting that when co-residence with children is not taking place, older adults are compensated indirectly. However, there have been significant changes over time. In 1996, older adults who lived alone or with only their spouse depended very heavily on indirect income support (see Figure 7 - Panel C), but there has been a sizeable reduction in the share of indirect income over the last twenty years.

**Figure 7:** Income Profile of the Older Adults in Sri Lanka




It should be noted again that the indirect support measure assumes that household per capita consumption is equally distributed among all household members. This assumption is less problematic for the households consisting of older adults individuals living alone or with their spouses. The problem of intergenerational disparities in resource allocation does not arise. Accordingly, the income profile developed for this group is likely to be the most accurate representation among those presented here.

Of the direct income sources, cash transfers accounted for the largest share, followed by paid employment and agricultural and non-agricultural work. The percentage of indirect support declines over time is offset by the increasing percentages of these direct income sources. Over time, there has also been a significant increase in income from accumulated wealth. Taken together, the income profile highlights substantial changes in the composition of old-age income over the 20 years considered.

## Determinants of old-age income sources

We now extend the analysis of the key income sources of older adults using multivariate regression to identify the factors influencing the value of indirect support among older adults (Model 1), the income contribution ratio of older adults living with their children (Model 2), the probability of being employed (Model 3 [estimated using logistic regression]), and the value of formal cash transfers (Model 4). Given the wide variation in the values of indirect support and formal cash transfers, we standardized these two dependent variables before estimation. In all regressions, we included as regressors demographic and socio-economic characteristics that are standard in the literature (Senanayaka & Sisira Kumara, 2015; Tilakaratna et al., 2019; Vodopivec & Arunatilake, 2011). (Summary statistics of the variables used for this analysis are given in the Appendix [Table 4]) We also used the regression models to examine whether the role of these determinants has changed over time by interacting all explanatory variables with a dummy variable for 2016. The estimated coefficients and survey weighted standard errors are presented in Table 2 and Table 3.

The results indicated that different factors contributed to the determination of different income sources. For instance, older women were significantly more likely than men to receive indirect support. Still, they were less likely to be employed and received fewer formal cash transfers, resulting in a significantly lower contribution to household income. The estimated effects were not significantly different over time. On the other hand, there was a significant change over time among the "old-old," with the value of formal cash transfers they received and their income contribution increasing significantly compared to the younger older persons. However, the probability of being employed became significantly lower by 2016.

**Table 2:** Determinants of Indirect Support and Income Contribution Ratio

| Variables | Model 1 Indirect support (Standardized) (Rs.) | | | | Model 2 Income Contribution Ratio | | | |
|---|---|---|---|---|---|---|---|---|
| | 1996 | | Change in slope in 2016 | | 1996 | | Change in slope in 2016 | |
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| **Age Group (Base: Young-old)** | | | | | | | | |
| Old-Old | 0.03 | 0.02 | -0.04 | 0.04 | -0.16*** | 0.03 | 0.16*** | 0.04 |
| **Gender (Base: Male)** | | | | | | | | |
| Female | 0.17*** | 0.03 | 0.06 | 0.04 | -0.45*** | 0.03 | 0.03 | 0.04 |
| **Marital Status (Base: Unmarried)** | | | | | | | | |
| Married | 0.00 | 0.07 | -0.02 | 0.09 | 0.10 | 0.18 | 0.08 | 0.25 |
| **Ethnicity (Base: Sinhala)** | | | | | | | | |
| Sri Lankan Tamil | -0.04 | 0.08 | 0.06 | 0.10 | -0.23*** | 0.07 | 0.18* | 0.09 |
| Indian Tamil | 0.17 | 0.13 | -0.15 | 0.14 | -0.27** | 0.11 | 0.12 | 0.13 |
| Sri Lanka Moors | -0.12* | 0.06 | 0.12 | 0.08 | 0.36*** | 0.09 | -0.24* | 0.10 |
| Malay | -0.05 | 0.32 | 0.32 | 0.34 | 0.64* | 0.31 | -0.79* | 0.35 |
| Burgher | 0.97 | 0.59 | -1.24 | 0.78 | -0.18 | 0.29 | 0.35 | 0.44 |
| Other | -0.68** | 0.12 | 0.54 | 0.48 | -0.75** | 0.27 | 0.82** | 0.26 |
| **Sector (Base: Urban)** | | | | | | | | |
| Rural | -0.07 | 0.07 | -0.08 | 0.08 | -0.21*** | 0.05 | 0.15** | 0.06 |
| Estate | -0.14 | 0.10 | -0.06 | 0.12 | -0.14 | 0.10 | 0.06 | 0.12 |
| **Education (Base: Below Primary)** | | | | | | | | |
| Below secondary | 0.04 | 0.03 | -0.01 | 0.03 | 0.11*** | 0.03 | -0.04 | 0.04 |
| Passed O/L | -0.22** | 0.08 | 0.20* | 0.10 | 0.60*** | 0.08 | -0.35*** | 0.09 |
| Passed A/L | -0.13 | 0.17 | 0.03 | 0.19 | 0.82*** | 0.19 | -0.41* | 0.20 |
| Degree & above | -0.99* | 0.45 | 0.49 | 0.52 | 0.42* | 0.21 | 0.43* | 0.23 |
| **Employment Status (Base: employed)** | | | | | | | | |
| Not Employed | 0.26*** | 0.04 | 0.08 | 0.05 | -1.09*** | 0.05 | 0.22*** | 0.06 |
| **Agricultural Status (Base: Farming)** | | | | | | | | |
| Not farming | 0.09* | 0.04 | 0.05 | 0.06 | -0.34*** | 0.05 | 0.03 | 0.07 |

| Variables | Model 1 Indirect support (Standardized) (Rs.) | | | | Model 2 Income Contribution Ratio | | | |
|---|---|---|---|---|---|---|---|---|
| | 1996 | | Change in slope in 2016 | | 1996 | | Change in slope in 2016 | |
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| **Living Status (Base: With Children)** | | | | | | | | |
| Without Children | 0.08* | 0.03 | 0.08* | 0.04 | | | | |
| **Samurdhi Status (Base: Receive)** | | | | | | | | |
| Not Receive | 0.06* | 0.02 | -0.03 | 0.03 | -0.46*** | 0.04 | 0.33*** | 0.05 |
| **Remittance Status (Base: Receive)** | | | | | | | | |
| Not Receive | 0.26*** | 0.05 | -0.10 | 0.06 | -0.94*** | 0.11 | 0.14 | 0.12 |
| Number of Observations | 18,671 | | | | 12,323 | | | |
| R Squared | 0.0736 | | | | 0.4040 | | | |

*Note: *a < 5%, **a < 1%, ***a < 0.1% computed based on Taylor linearized standard errors accounting for HIES survey design; SE = Standard Errors*

**Table 3:** Determinants of Employment Status and Formal Cash Transfers

| Variables | Model 3 Employed (=1) | | | | Model 4 Formal cash transfers (Standardized) (Rs.) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1996 | | Change in slope in 2016 | | 1996 | | Change in slope in 2016 | |
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| **Age Group (Base: Young-old)** | | | | | | | | |
| Old-Old | -1.19*** | 0.09 | -0.32** | 0.11 | -0.09 | 0.07 | 0.26** | 0.09 |
| **Gender (Base: Male)** | | | | | | | | |
| Female | -1.60*** | 0.09 | 0.14 | 0.11 | -0.48** | 0.08 | 0.03 | 0.09 |
| **Marital Status (Base: Unmarried)** | | | | | | | | |
| Married | -0.07 | 0.21 | 0.09 | 0.26 | 0.40*** | 0.15 | -0.21 | 0.18 |
| **Ethnicity (Base: Sinhala)** | | | | | | | | |
| Sri Lankan Tamil | 0.26 | 0.20 | 0.19 | 0.26 | -0.18 | 0.17 | -0.11 | 0.22 |
| Indian Tamil | 0.29 | 0.21 | 0.23 | 0.30 | -0.42*** | 0.07 | 0.14 | 0.11 |

| Variables | Model 3 Employed (=1) | | | | Model 4 Formal cash transfers (Standardized) (Rs.) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1996 | | Change in slope in 2016 | | 1996 | | Change in slope in 2016 | |
| | Coefficient | SE | Coefficient | SE | Coefficient | SE | Coefficient | SE |
| Sri Lanka Moors | -0.25 | 0.23 | 0.05 | 0.27 | -0.34** | 0.13 | 0.04 | 0.15 |
| Malay | 0.08 | 0.97 | 0.49 | 1.04 | 1.07** | 0.44 | -1.66*** | 0.51 |
| Burgher | -0.85 | 0.74 | 0.11 | 0.99 | -1.50* | 0.65 | 1.10 | 0.87 |
| Other | 1.77 | 0.89 | 3.30 | 1.18 | 0.05 | 1.24 | 3.24 | 3.94 |
| **Sector (Base: Urban)** | | | | | | | | |
| Rural | 0.21 | 0.14 | -0.20 | 0.16 | -0.38*** | 0.12 | 0.35** | 0.14 |
| state | -0.15 | 0.29 | -0.32 | 0.36 | -0.52*** | 0.14 | 0.47*** | 0.17 |
| **Education (Base: Below Primary)** | | | | | | | | |
| Below secondary | 0.07 | 0.08 | -0.09 | 0.11 | 0.43*** | 0.06 | -0.19** | 0.06 |
| Passed O/L | 0.06 | 0.16 | -0.43* | 0.19 | 3.83*** | 0.24 | -2.59*** | 0.25 |
| Passed A/L | 0.36 | 0.34 | -0.94** | 0.36 | 5.18*** | 0.68 | -2.65*** | 0.70 |
| Degree & above | 1.23** | 0.50 | -1.86*** | 0.54 | 6.61*** | 1.00 | -1.37 | 1.02 |
| **Employment Status (Base: employed)** | | | | | | | | |
| Not Employed | | | | | 0.51*** | 0.08 | 0.23* | 0.10 |
| **Agricultural Status (Base: Farming)** | | | | | | | | |
| Not farming | -2.33*** | 0.11 | 0.44*** | 0.13 | -0.40*** | 0.08 | 0.18 | 0.10 |
| **Living Status (Base: With Children)** | | | | | | | | |
| Without Children | 0.15 | 0.09 | 0.18 | 0.11 | -0.05 | 0.07 | 0.17* | 0.08 |
| **Samurdhi Status (Base: Receive)** | | | | | | | | |
| Not Receive | -0.17 | 0.10 | -0.20 | 0.13 | -0.31*** | 0.05 | 0.24*** | 0.06 |
| **Remittance Status (Base: Receive)** | | | | | | | | |
| Not Receive | 0.15 | 0.15 | 0.39* | 0.18 | -0.13 | 0.13 | 0.28 | 0.15 |
| N | 18,671 | | | | 18,671 | | | |
| R Squared: | | | | | 0.2567 | | | |

*Note: *a < 5%, **a < 1%, ***a < 0.1% computed based on Taylor linearized standard errors accounting for HIES survey design; SE=Standard Errors*

The estimated effects of education also highlighted differences in the importance of different income sources. There was a clear positive relationship between the level of education and formal cash transfers, most probably driven by the pension payments received predominantly by more educated older persons in the higher income groups. However, this effect weakened over time (except for the most highly educated group), suggesting a more pro-poor distribution of formal cash transfers. In terms of being employed, in 1996, only the most educated (those with an undergraduate degree or higher) had a significantly higher probability of being employed than the least educated. As observed in the univariate analysis, this has changed over time, with the least educated are now significantly more likely to be working than the more educated categories. Subsequently, we also saw that the income contribution ratio (indirect support) increased (decreased) significantly with the level of education in 1996. However, the effect has become less pronounced over time, at least in the case of the income contribution.

The estimated coefficients on ethnicity highlight potential cultural differences among older adults. The estimated effects of ethnicity on the formal cash transfers received were particularly revealing. Most ethnic groups reported lower formal cash transfers than the majority Sinhalese, with the effects unchanged over time. This highlights possible ethnic disparities in access to government-provided cash transfers targeting older adults.

The final set of regressors that indicated the receipt of income from different sources highlighted the connections between decisions of older adults to work, the decisions of adult children or others to provide indirect material support, and the decisions of both children and older adults whether to cohabit. For instance, indirect support was higher for older adults who were not employed or farming, did not live with their children, and did not receive remittances or transfers from the government. Similarly, formal cash transfers were higher among older adults who were not employed in agriculture and those who received Samurdhi, with these effects growing more robust over time. Cohabitation and receipt of remittances and Samurdhi did not seem to bear the probability of employment. It should be noted that, given these interdependencies, the regression results presented here cannot be interpreted as causal and only serve to highlight the characteristics associated with different types of income.

# Discussion and conclusion

A stable and adequate income is essential to ensure the economic well-being of older adults. This paper examines the different income sources from formal and informal channels to develop an income profile of older adults in Sri Lanka. We find that indirect support constructed as the residual between per capita consumption and income, cash transfers, and income from work are the key income sources for older adults through significant changes to the contribution of these different sources have occurred over time. Income from savings or accumulated wealth is still relatively less important among older adults in Sri Lanka.

The income profile developed in this paper can be compared with those designed for other countries while considering that different methodologies are used to measure different types of income across countries and studies. For instance, in most developed countries as well as in Latin America and the Caribbean, private transfers from children or relatives are negligible; therefore, accumulated wealth and savings are a vital source of income among older adults (National Transfer Accounts Project, 2016; OECD, 2017). On the other hand, in most of Asia, including developed countries such as South Korea or Japan, co-residence with or financial or

in-kind transfers from adult children play an important role (Kumagai, 2015; Ladusingh & Maharana, 2018; Lee & Phillips, 2011; Racelis et al., 2012; Serrano et al., 2017; Zhang et al., 2005).

While our measure of indirect material support cannot be directly attributed to adult children or other family members, given the importance of family support for older adults in Sri Lanka (Asian Development Bank, 2019; United Nations, 2017; World Bank, 2008), and the detailed collection of income from other sources, this premise does not seem unreasonable. Indeed, our findings on the declining role of indirect support are consistent with those from other Asian countries where the prevalence of extended joint families and reliance on children is declining (Kumagai, 2015; Ladusingh & Maharana, 2018; Racelis et al., 2012). When co-residence is a primary source of support among older adults, these changes are likely to adversely affect older adults in the future. Indeed, given the social norms on family support for older people in much of Asia, filial support laws have been implemented in some Asian countries such as China, India, Bangladesh, and Singapore to reinforce the importance of these informal support structures and protect the well-being of older adults (Serrano et al., 2017). However, with low fertility and increasing longevity, the sustainability of these informal support measures remains a concern.

As informal support from families declines, the role of formal support systems gains importance for ensuring the income security of older adults. While formal cash transfers still accounted for most of the total cash transfers among the Sri Lankan older adults in 2016, there has been a dramatic decline in the share of income received from the formal cash transfers due to the substantial reduction of the percentage of income from payments from the country's primary poverty alleviation program. The older persons' allowance, launched in 2012 to support individuals aged over 70, and the significant reductions in absolute poverty rates observed during the last 20 years are possible reasons behind the decreasing share of Samurdhi recipients (Asian Development Bank, 2019; Perera, 2017).

Moreover, despite the significant burden of pension payments for the government, with government expenditure on the public servants' pension scheme alone accounting for 1.5% of GDP in 2016 (Ministry of Finance, 2017), our results suggest that only a small percentage of older adults receive pension benefits. Consistent with reports by the World Bank (2016), most of the pension recipients are from higher-income groups. The regression analysis also shows that even though the effect has dampened somewhat over time, less educated older persons tend to receive less income from formal cash transfers, as do older women, who will account for increasing shares of older adults given higher life expectancy. This data highlights concerns that older adults are poor and older women lack social security coverage and are particularly vulnerable. On the other hand, the formal transfers received by the "old-old" have increased significantly over time, perhaps due to the launch of the older persons' allowance. However, Sri Lanka compares poorly with other countries regarding pension and social security coverage, even other developing countries. While countries in Europe and North America have pension coverage exceeding 90% of the population above statutory pensionable age, developing countries in Latin America, North Africa, and the Middle East, and sub-Saharan Africa all record higher rates of coverage than Sri Lanka, at 56%, 30%, and 17%, respectively (UNDESA, 2017).

An alternative to private or public transfers is paid employment, at least among the younger, healthier older persons. Income from agriculture and paid employment accounted for 31% of the direct income of older adults in Sri Lanka, with more than one-fourth of older adults reporting being employed despite being well over the mandatory retirement age. This is

similar to other Asian countries such as South Korea and Indonesia, where participation rates of older adults in the labor force are relatively high (Flochel et al., 2015; Lee & Phillips, 2011). Conversely, in much of the developed West, where pensions and public transfers are the primary sources of old-age income, labor force participation among older adults is very much lower (OECD, 2021). While there are concerns that enabling employment among older adults may crowd out or reduce employment opportunities for younger workers, evidence from other Asian and OECD countries indicate that this does not occur for two reasons. First, the jobs held by older workers are not substitutes for those sought by younger workers. Second, the boost to aggregate demand caused by increasing labor force participation with older adults results in more jobs for everyone, including younger workers (Asian Development Bank, 2019).

Suppose the potential of older adults willing to participate in the labor force is harnessed. In that case, measures to prevent exploitative or unsafe working conditions must be set in place. Our regression results show that the probability of employment has increased over time among the less educated, suggestive of the more needy older adults being forced to work to account for the reduction in intergenerational transfers. Indeed, the adverse labor market conditions experienced by older adults in Sri Lanka have been flagged by several researchers. Vodopivec and Arunatilake (2008) found that despite the long hours they work, the majority of older Sri Lankan employees are paid less than younger workers, while research by Tilakaratna et al. (2019) and Asian Development Bank (2019) highlighted how informal sector employment among older adults results in their lack of access to social security benefits.

Taken together, the results presented in this paper have numerous policy implications. Given the increasing reliance on the labor market for supplementing income in old-age, measures to improve the working conditions of older adults, such as increasing the statutory age of retirement and minimizing labor market rigidities to provide decent employment opportunities for older adults, could relieve the burden on children as well as on the formal social security schemes in the country. However, prolonged labor market participation is not viable for all older adults. Accordingly, a diversified approach, such as the multi-pillared system proposed by Holzmann & Hinz (2005), would be required to safeguard the well-being of older adults in general. Possible options include expanding pension coverage through contributory schemes outside the public and formal sectors and providing old-age allowances (at least for vulnerable groups). However, given fiscal sustainability issues, any expansions will likely have to be combined with reforms to the existing state-funded pension scheme.

# Limitations and future work

The approach we use for quantifying indirect income support, while being relatively simple to implement, has several limitations. First, we do not have a way of verifying the source of informal support. However, as mentioned previously, given that the HIES collects relatively comprehensive information on income from different sources, it does not seem unreasonable to assume that the residual between consumption and income is funded informally by children or other relatives. Further research involving primary data collection would be required to fully validate the importance of the family in providing income support for older adults.

Second, while we attempt to refine the estimate by excluding expenses that older adults are unlikely to consume (e.g., education), we still assume an equal distribution of other food and

non-food resources within the household. While there is some evidence of unequal intra-household allocations by gender in the Sri Lankan context (Banu, 2016; Dharmadasa et al., 2020), there is little evidence of unequal intra-household allocations by age group. Work by the World Bank (2008) and Siddhisena (2005) showed that older adults in Sri Lanka actively participated in family resource allocation decisions and determine their own basic needs, which, at least, rules out the possibility that older adults are marginalized within the household. The international evidence is also inconclusive. Ladusingh (2013) found that older adults do not benefit from intra-household family support in India. Their contribution (usually childcare) exceeds their benefit from intra-household transfers. On the other hand, studies based in East Asia suggest that the net flow of intergenerational support remains from adult children to parents (Lin & Yi, 2013). Further study on intergenerational flows within the household would be an interesting area for future research.

Finally, this analysis focuses entirely on the material well-being of older adults in terms of monetary income or material support. Other important aspects of the well-being of older adults in which children, decent employment opportunities, and income security can play a role are the physical and emotional aspects, which are beyond the scope of this study.

The results we present in this paper show how key decisions affecting the income security of older adults, such as the decision to work, cohabit with children, or receive informal transfers, are intertwined. As such, the policy options targeting specific aspects of older adults' well-being are likely to have knock-on effects in others. In future work, we plan to incorporate the descriptive analysis in this paper into a general equilibrium framework, within which the economic impacts of population aging and the consequences of different policy options available to the government to ensure the well-being of older adults can be assessed.

# Acknowledgments

We gratefully acknowledge the support provided by staff at the Statistical Division, Department of Census and Statistics of Sri Lanka. We thank Prof. Amala De Silva, Dr. Indra Mahakalanda, Dr. Venura Welagedara, Mr. Sithira Prabash, and the anonymous referees for their helpful comments and suggestions. We acknowledge financial support from the University of Moratuwa SRC (Grant SRC/LT/2020/44).

# References

Asian Development Bank. (2019, December). *Growing old before becoming rich: Challenges of an aging population in Sri Lanka*. https://doi.org/10.22617/TCS190612-2

Australian Institute of Health and Welfare. (2021). *Older Australians*. Australian Government. https://www.aihw.gov.au/getmedia/a49cf1b5-0a25-46a1-804b-ef38fa805af4/Older-Australians.pdf.aspx?inline=true

Banu, A. (2016). *Human development, disparity and vulnerability: Women in South Asia*. United Nations Development Program. http://hdr.undp.org/sites/default/files/latest_edited_banu_template_gl_1_august.pdf

Barrientos, A., Gorman, M., & Heslop, A. (2003). Old age poverty in developing countries: Contributions and dependence in later life. *World Development*, *31*(3), 555–570. https://doi.org/10.1016/S0305-750X(02)00211-5

Cameron, L. A., & Cobb-Clark, D. A. (2001, April). *Old-age support in developing countries: Labor supply,*

*intergenerational transfers and living arrangements* (IZA Discussion Paper No. 289). https://docs.iza.org/dp289.pdf

Central Bank of Sri Lanka. (2016). *Annual Report 2016.* https://www.cbsl.gov.lk/en/publications/economic-and-financial-reports/annual-reports/annual-report-2016

Choukhmane, T., Jin, K., & Coeurdacier, N. (2013, February 8). *The one-child policy and household savings in China* (Meeting Paper No. 790). Society for Economic Dynamics. https://economicdynamics.org/meetpapers/2013/paper_790.pdf

Clements, B. J., Eich, F., & Gupta, S. (2014). *Equitable and Sustainable Pensions*. International Monetary Fund. https://doi.org/10.5089/9781616359508.071

Coeurdacier, N., Guibaud, S., & Jin, K. (2014). Fertility policies and social security reforms in China. *IMF Economic Review*, *62*(3), 371–408. https://doi.org/10.1057/imfer.2014.19

Cremer, H., Lozachmeur, J.-M., & Pestieau, P. (2008). Social security and retirement decision: A positive and normative approach. *Journal of Economic Surveys*, *22*(2), 213–233. https://doi.org/10.1111/j.1467-6419.2007.00528.x

Department of Census and Statistics of Sri Lanka. (1995). *Household Income and Expenditure Survey 1995-1996.* https://catalog.ihsn.org/catalog/3247/related-materials

Department of Census and Statistics of Sri Lanka. (2016a). *Household Income and Expenditure Survey 2016: Final Report.* http://www.statistics.gov.lk/IncomeAndExpenditure/StaticalInformation/HouseholdIncomeandExpenditureSurvey2016FinalReport

Department of Census and Statistics of Sri Lanka. (2016b). *Sri Lanka Labour Force Survey: Annual Report-2016.* http://www.statistics.gov.lk/LabourForce/StaticalInformation/AnnualReports/2016

Department of Economic and Social Affairs. (2007). *World Economic and Social Survey 2007: Development in an ageing world* (E/2007/50/Rev.1: ST/ESA/314). United Nations. https://doi.org/10.5860/choice.45-2157

De Silva, W. I. (2013). The age structure transition and the demographic dividend: An opportunity for rapid economic take-off in Sri Lanka. *Sri Lanka Journal of Advanced Social Studies*, *2*(1), 3–46. http://dx.doi.org/10.4038/sljass.v2i1.5117

Dharmadasa, R. A. P. I. S., Rathnayake, K. K. H. M., & Samaraweera, W. G. R. L. (2020). Impact of remittances and gender on expenditure patterns: An insight into intra-household resource allocation of rural sector households in Sri Lanka. *Kelaniya Journal of Management*, *9*(1), 87–114. https://doi.org/10.4038/kjm.v9i1.7624

El-Mekkaoui de Freitas, N., & Martins, J. O. (2008). *Consumption structure, welfare goods and retirement income: Linking the ageing puzzles* (Working Paper 2008/2) https://basepub.dauphine.fr/handle/123456789/2343

European Commission. (2010, November). *Progress and key challenges in the delivery of adequate and sustainable pensions in Europe* (Occasional Paper No. 71). https://ec.europa.eu/economy_finance/publications/occasional_paper/2010/pdf/ocp71_en.pdf

Federal Statistical Office. (2016, October). *Older people in Germany and the EU*. Federal Statistical Office of Germany. https://www.bmfsfj.de/resource/blob/113952/83dbe067b083c7e8475309a88da89721/aeltere-menschen-in-deutschland-und-in-der-eu-englisch-data.pdf

Flochel, T., Ikeda, Y., Moroz, H., & Umapathi, N. (2015, October). *Macroeconomic implications of aging in East Asia Pacific: Demography, labor markets and productivity* (Report No.: 99401-EAP). World Bank Group. https://openknowledge.worldbank.org/bitstream/handle/10986/23026/Macroeconomic00ts0and0productivity.pdf;sequence=1

Galasso, V., Gatti, R., & Profeta, P. (2009). Investing for the old age: Pensions, children and savings. *International Tax and Public Finance*, *16*(4), 538–559. https://doi.org/10.1007/s10797-009-9104-5

Giles, J., Wang, D., & Cai, W. (2011, October). *The labor supply and retirement behavior of China's older workers and elderly in comparative perspective* (Working Paper No. 5853). World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/3619/WPS5853.pdf?sequence=1&isAllowed=y

Gustman, A. L., & Steinmeier, T. L. (2004). Social security, pension and retirement behaviour within the

family. *Journal of Applied Econometrics*, *19*(6), 723–737. https://doi.org/10.1002/jae.753

Hoe, N. K., Yenn, T. Y., Wei, N. Y., Maulod, A., & Ting, T. Y. (2019, May). *What older people need in Singapore: A household budgets study*. https://whatsenoughsg.files.wordpress.com/2019/05/what-older-people-need-in-singapore-a-household-budgets-study-full-report.pdf

Holzmann, R., & Hinz, R. (2005). *Old-age income support in the 21st century: An International perspective on pension systems and reform* (Report No. 32672). World Bank. https://openknowledge.worldbank.org/bitstream/handle/10986/7336/32672.pdf?sequence=1&isAllowed=y

Kaluthantiri, K. D. M. S. (2014). *Ageing and the changing role of the family in Sri Lanka* [Unpublished doctoral thesis]. The University of Adelaide. https://digital.library.adelaide.edu.au/dspace/bitstream/2440/93498/4/01front.pdf

Kohsaka, A. (Ed.). (2012). *Aging and Economic Growth in the Pacific Region* (1st ed.). Routledge. https://doi.org/10.4324/9780203076446

Kumagai, F. (2015). *Family issues on marriage, divorce, and older adults in Japan: With special attention to regional variations*. Springer, Singapore. https://doi.org/10.1007/978-981-287-185-5

Ladusingh, L. (2013). Lifecycle deficit, intergenerational public and familial support system in India. *Asian Population Studies*, *9*(1), 78–100. https://doi.org/10.1080/17441730.2012.714671

Ladusingh, L., & Maharana, B. (2018). How sustainable is the familial support of elderly in Asia? *Journal of Population Ageing*, *11*(4), 349–366. https://doi.org/10.1007/s12062-017-9192-4

Lee, J., & Phillips, D. (2011, April). *Income and poverty among older Koreans relative contributions of and relationship between public and family transfers*. (Working Papers No. WR-852). RAND Labor and Population. https://www.rand.org/content/dam/rand/pubs/working_papers/2011/RAND_WR852.pdf

Lin, J. P., & Yi, C. C. (2013). A comparative analysis of intergenerational relations in East Asia. *International Sociology*, *28*(3), 297–315. https://doi.org/10.1177/0268580913485261

Menike, H. R. A. (2014). Important features of the elderly population in Sri Lanka. *Research Process*, *2*(2), 29–38. http://srfaurangabad.org/journals/4thissue/3.pdf

Ministry of Finance [Sri Lanka]. (2017). *Annual Report 2016*. https://www.treasury.gov.lk/documents/publications/anualReports/2016/2016.pdf

National Transfer Accounts Project. (2016). *National Transfer Accounts: Data sheet*. https://www.eastwestcenter.org/system/tdf/private/ntadatasheet.pdf?file=1&type=node&id=35755

OECD. (2017). *Pensions at a glance 2017: OECD and G20 Indicators*. OECD Publishing. https://doi.org/10.1787/pension_glance-2017-en

OECD. (2021). *Employment* [Data set]. https://doi.org/10.1787/a452d2eb-en

O'Sullivan, V., & Layte, R. (2011). Income and asset levels of older people. In A. Barrett, G. Savva, V. Timonen & R. A. Kenny (Eds.), *Fifty plus in Ireland 2011: First results from the Irish longitudinal study on ageing* (pp. 244–264). Trinity College Dublin. https://www.doi.org/10.38018/TildaRe.2011-00.c9

Paweenawat, S. W., & Liao, L. (2021, March). *Labor supply of older workers in Thailand: The role of co-residence, health, and pensions* (ADBI Working Paper Series No. 1224). Asian Development Bank Institute. https://www.adb.org/sites/default/files/publication/687656/adbi-wp1224.pdf

Perera, E. L. S. J. (2017). *Ageing population of Sri Lanka: Emerging issues, needs and policy implications: Thematic report based on Census of Population and Housing 2012*. United Nations Population Fund, Sri Lanka. https://srilanka.unfpa.org/sites/default/files/pub-pdf/UNFPA%20Ageing%20Monograph%20Report_0.pdf

Racelis, R. H., Abrigo, M. R. M., & Salas, J. M. I. S. (2012, October). *Filipino elderly living arrangements, work activity, and labor income as old-age support* (Discussion Paper Series No. 2012-31). Philippine Institute for Development Studies. https://dirp3.pids.gov.ph/ris/dps/pidsdps1231.pdf

Reddy, A. B. (2016). Labour force participation of elderly in India: Patterns and determinants. *International Journal of Social Economics*, *43*(5), 502–516. https://doi.org/10.1108/IJSE-11-2014-0221

Samarakoon, S., & Arunatilake, N. (2015). *Income security for older persons in Sri Lanka*. (SDD-SPPS Project Working Papers Series). UNESCAP. https://www.unescap.org/sites/default/d8files/knowledge-products/SDD Working Paper Ageing Income Sri Lanka v2-5.pdf

Samorodov, A. (1999, February). *Ageing and labour markets for older workers* (Employment and Training Papers No. 33). International Labour Office Geneva. https://www.ilo.org/employment/Whatwedo/Publications/WCMS_120333/lang--en/index.htm

Senanayaka, W. G. T. S., & Sisira Kumara, M. H. A. (2015). The employment status of the elderly in Sri Lanka: Emerging patterns and determinants. *Vidyodaya Journal of Management*, *1*(1), 25–46. https://doi.org/10.31357/vjm.v1i1.3651

Serrano, R., Saltman, R., & Yeh, M. J. (2017). Laws on filial support in four Asian countries. *Bulletin of the World Health Organization*, *95*(11), 788–790. https://doi.org/10.2471/BLT.17.200428

Siddhisena, K. A. P. (2005). *Socio-economic implications of ageing in Sri Lanka: An overview* (Working Paper No. WP105). Oxford Institute of Ageing. http://www.ageing.ox.ac.uk/files/workingpaper_105.pdf

Tanyi, P. L., André, P., & Mbah, P. (2018). Care of the elderly in Nigeria: Implications for policy. *Cogent Social Sciences*, *4*(1), Article 1555201. https://doi.org/10.1080/23311886.2018.1555201

Tilakaratna, G., Sooriyamudali, C., & Perera, A. (2019). *Working beyond the age of retirement: Patterns and determinants of elderly labour force participation in Sri Lanka*. Institute of Policy Studies of Sri Lanka. http://hdl.handle.net/11540/12478

UNDESA. (2017). *Economic inequalities in old age*. United Nations. https://www.un.org/development/desa/ageing/wp-content/uploads/sites/24/2016/08/Briefing-Paper_Economic-Inequalities_Final.pdf

United Nations. (2017, October). *Addressing the challenges of population ageing in Asia and the Pacific*. https://doi.org/10.18356/32056b9e-en

United Nations. (2019). *World population ageing 2019* (ST/ESA/SER.A/444). https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Report.pdf

Vodopivec, M., & Arunatilake, N. (2011). Population aging and labour market participation of old workers in Sri Lanka. *Journal of Population Ageing, 4*(3), 141–163.

World Bank. (2008). *Sri Lanka: Addressing the needs of an aging population*. http://hdl.handle.net/10986/8105

World Bank. (2016). *Sri Lanka - Social Safety Nets Project*. https://www.worldbank.org/en/news/loans-credits/2016/12/02/sri-lanka-social-safety-nets-project

Zhang, W., Li, S., & Silverstein, M. (2005). The effects of inter-generational support on the mortality of older people in rural China. *Asian Population Studies*, *1*(3), 325–338. https://doi.org/10.1080/17441730500441202

# Appendix

**Table 4:** Summary Statistics

| Study Variables | Year=1996 | | | | Year=2016 | | | |
|---|---|---|---|---|---|---|---|---|
| | n | % | Mean | SD | n | % | Mean | SD |
| Value of indirect support (Standardized) | 7,835 | | 0.15 | 0.02 | 10,836 | | 0.11 | 0.01 |
| Formal cash transfers (Standardized) | 7,835 | | 0.87 | 0.05 | 10,836 | | 0.61 | 0.03 |
| Income contribution ratio | 7,835 | | 0.93 | 0.02 | 10,836 | | 0.79 | 0.01 |
| **Income sources** | | | | | | | | |
| Indirect Income | | | 707.60 | 103.87 | | | 6,501.57 | 473.30 |
| Cash Transfers | | | 593.58 | 23.98 | | | 4,520.79 | 134.50 |
| Employment Income | | | 205.34 | 16.81 | | | 1,969.99 | 137.69 |
| Agri Income | | | 352.28 | 21.33 | | | 1,832.00 | 140.86 |
| Non-Agri Income | | | 173.91 | 20.40 | | | 2,352.45 | 224.27 |
| Savings/Own Assets | | | 144.98 | 22.70 | | | 2,125.49 | 210.92 |
| **Age Group** | | | | | | | | |
| Young-Old | 4,510 | 57.6% | | | 6,612 | 61.0% | | |
| Old-Old | 3,325 | 42.4% | | | 4,224 | 39.0% | | |
| **Gender** | | | | | | | | |
| Male | 3,845 | 49.1% | | | 4,846 | 44.7% | | |
| Female | 3,990 | 50.9% | | | 5,990 | 55.3% | | |
| **Marital Status** | | | | | | | | |
| Unmarried | 255 | 3.3% | | | 420 | 3.9% | | |
| Married | 4,899 | 62.5% | | | 6,749 | 62.3% | | |
| Widowed | 2,615 | 33.4% | | | 3,463 | 32.0% | | |
| Divorced | 17 | 0.2% | | | 54 | 0.5% | | |
| Separated | 49 | 0.6% | | | 151 | 1.4% | | |
| **Ethnicity** | | | | | | | | |
| Sinhala | 6,619 | 84.5% | | | 8,240 | 76.0% | | |
| Sri Lankan Tamil | 456 | 5.8% | | | 1,480 | 13.7% | | |

| Study Variables | Year=1996 | | | | Year=2016 | | | |
|---|---|---|---|---|---|---|---|---|
| | n | % | Mean | SD | n | % | Mean | SD |
| Indian Tamil | 376 | 4.8% | | | 357 | 3.3% | | |
| Sri Lanka Moors | 33 | 0.4% | | | 724 | 6.7% | | |
| Malay | 22 | 0.3% | | | 15 | 0.1% | | |
| Burgher | 22 | 0.3% | | | 13 | 0.1% | | |
| Other | 7 | 0.1% | | | 8 | 0.1% | | |
| **Sector** | | | | | | | | |
| Urban | 1,650 | 21.1% | | | 1,844 | 17.0% | | |
| Rural | 5,724 | 73.1% | | | 8,574 | 79.1% | | |
| Estate | 461 | 5.9% | | | 418 | 3.9% | | |
| **Education** | | | | | | | | |
| Below Primary | 3,993 | 51.0% | | | 3,289 | 30.4% | | |
| Below secondary | 3,086 | 39.4% | | | 5,455 | 50.3% | | |
| Passed O/L | 588 | 7.5% | | | 1,296 | 12.0% | | |
| Passed A/L | 101 | 1.3% | | | 563 | 5.2% | | |
| Degree & above | 67 | 0.9% | | | 233 | 2.1% | | |
| **Employment Status** | | | | | | | | |
| Employed | 2,137 | 27.3% | | | 3,173 | 29.3% | | |
| Not Employed | 5,698 | 72.7% | | | 7,663 | 70.7% | | |
| **Agricultural Status** | | | | | | | | |
| Farming | 2,226 | 28.4% | | | 1,639 | 15.1% | | |
| Not farming | 5,609 | 71.6% | | | 9,197 | 84.9% | | |
| **Living Status** | | | | | | | | |
| With Children | 5,718 | 73.0% | | | 6,491 | 59.9% | | |
| Without Children | 2,117 | 27.0% | | | 4,345 | 40.1% | | |
| **Samurdhi Status** | | | | | | | | |
| Receive | 1,825 | 23.3% | | | 1,285 | 11.9% | | |
| Not Receive | 6,010 | 76.7% | | | 9,551 | 88.1% | | |
| **Remittance Status** | | | | | | | | |
| Receive | 438 | 5.6% | | | 1,198 | 11.1% | | |
| Not Receive | 7,397 | 94.4% | | | 9,689 | 89.4% | | |

*Note: SD = Standard Deviation*