



A Study of Female- and Older Adults-Led Households' Telecommunication Expenditure in Digital Malaysia

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Abstract. The telecommunication expenditure patterns of Malaysian households in 2019 were analysed with microdata. Telecommunication expenditure resembles luxury goods spending behaviour. Households headed by older adults, female older adults, or those consisting entirely of older adults when compared to groups not possessing these characteristics, have lower percentage share of monthly telecommunication expenditure over household income. The authors propose that further policies should improve telecommunication equipment and services' affordability to improve the older adults' participation rate in the digital economy which will exist in Malaysia as an aged nation by 2044.

Keywords: Gender · telecommunication expenditure · ICT · older adults · ageing population · Malaysia

1 Introduction

Malaysia experienced rapid economic growth in the 1990s followed by steady gross domestic product (GDP) increases between 3 to 5 percent until recently. The country is committed to the digital agenda, particularly on digital inclusiveness. The national agendas of increasing national output through the adoption of emerging technologies in various sectors and decreasing the digital divide are driven by national policies such as the Malaysia Digital Economy Blueprint [1] National Digital Inclusion Council [2], and National Fiberisation and Connectivity Plan (NFCP) [3]. The last policy led to faster and affordable internet, and an increase in internet subscribers in Malaysia [4, 5] (Raju, 2019; Malaysian Communications and Multimedia Commission [MCMC], 2019). More recently, the Malaysia Digital Network (JENDELA) initiative in 2020 will

improve Internet access coverage and quality, a need that was further accelerated by the Covid-19 pandemic [6, 7].

Malaysia was considered demographically ‘young’ in year 2000, with less than 4 percent of the population aged 65 and above. Between 2006 to 2012, this proportion increased to 5.3 percent. A combination of declining population growth rate, increased life expectancy, older age of first marriage, and fewer children has led Malaysia to achieve ageing nation status rapidly [8, 9]. Based on both the United Nations (UN) World Population Prospects (UNWPP) and Department of Statistics Malaysia (DOSM), Malaysia reached its demographic trajectory to become an ageing society in 2020, with 7 percent or more of the population aged 65 and above [10]. This will increase to 8.2 percent by 2030 [10, 11], and above 20 percent by 2054 [12]. The National Policy for the Elderly and Plan of Action for Older Persons (DPTWEN 2021–2020) was launched by the Malaysian government in 2011, and is aligned with the SDG 11 (Sustainable Cities and Communities) to provide efficient and effective services for individuals, family and society to ensure a conducive environment for older adults to experience healthy ageing [13, 14].

The above policy is needed, as more households headed by older adults¹ face poverty compared to households headed by non-older adults in Malaysia, especially among rural households. Low female labour participation rates in Malaysia lead to low retirement savings among Malaysian women [10]. Although increasing in the last several years, the government’s spending and allocation on aged care is below par when compared to other countries [10]. This has led to concerns on the female older adult-headed households’ ability to experience healthy ageing. However, the nation’s digital inclusivity goals are focused on closing strata and sectoral gaps, with female older adults’ digital economy participation being a secondary concern.

In terms of the United Nations’ Sustainable Development Goals (SDGs), Malaysia’s gender equality (SDG 5) in mobile services is affected by lower average female income, which stood at \$690.03² in year 2020, compared to \$707.70 for males. The 2020 pandemic year figures saw a 26.35% drastic drop in average income for females in Malaysia, while males only experienced less than half the fall at 10.32% (Department of Statistics Malaysia [15]). In addition, there is lower female workforce participation (55.2 percent compared to 81.7 percent for males) in Malaysia [16]. The rural-urban internet access gap among individuals is only thirteen percent (79.4 compared to 92.4 percent) [17], but most of the access is through mobile internet. Only thirty-four percent of Malaysian households access the Internet through wired broadband, compared to almost ninety percent who access through mobile broadband in 2020, making Malaysia a mobile-first nation [18]. SDG 11 calls for communities and cities that are age-friendly, including the ICT sector. Of concern is the proportion of Malaysians aged 60 and above who use the Internet (57 percent). This is significantly lower than the 84.8 percent and higher for the remaining age groups [18]. Malaysia’s 2021 Digital Economy Blueprint (MyDigital) acknowledges that digital divides exist across socioeconomic groups such as income, age, gender, and skill sets [1].

¹ Older adults refer to individuals aged 60 and above (World Bank, 2002). The term older persons, older adults, the elderly refer to ‘older adults’ in this paper.

² Based on an exchange rate of 1MYR (Ringgit Malaysia) to US (Dollars) \$0.24

To achieve the above United Nations' Sustainable Development Goals (SDGs) for healthy ageing [19] in Malaysia where female older adults possess fewer resources than their male counterparts, the state of affairs in Malaysia's rapidly-changing society should be investigated in terms of telecommunication equipment and services expenditure. This paper will perform inferential analysis using microdata to investigate households' telecommunication expenditure by focusing on households that are headed by older adults, female older adults, and those consisting of only older adults. Socio-demographic factors such as urbanisation, education, and income are included as control factors in the analysis on the impact of age and gender on telecommunication expenditures. The following sections consist of the literature review, methodology elaboration, data analysis, and lastly, the discussion and conclusion.

2 Literature Review

2.1 Ageing, Gender, and Telecommunication Use

In the context of ageing in Malaysia, 22.7% households headed by the elderly (aged 65 years and above) have reported the highest incidence of poverty [20]. A study among older adults in Peninsular Malaysia revealed that they receive income mainly from informal sources, which is inconsistent in frequency and uncertain in amounts received [21]. Financial constraint has been cited as one of the main barriers for older adults in Malaysia in using smartphones [22] but it has not distinguished between the difficulties faced by each gender. Research showed that older adults were taken as a homogenous group with the same challenges and preferences without analysing the gender differences of both sexes in using mobile phones (as it is known then) in daily life [23]. By adopting the gender lens, the study revealed that female older adults tend to have fewer sources of income compared to their counterparts, and a majority of the female older adults rely on children's remittance to support their daily expenditure [21]. Part of the reasons that female older adults were found to be financially poorer than male older adults was because women were unemployed during their productive years [24]. This is in line with the low rate of women's participation in the labour force compared to male's labour force participation in Malaysia.

2.2 Digital Divide and Digitalisation in Malaysia

Telecommunications have evolved from being a mere means of communication, to the backbone of the digital economy and society [25–28]. Digital divide is defined by the Organization for Economic Co-operation and Development (OECD) as the differences in access to information and communication technologies (ICT) caused by various socioeconomic factors such as geography and income [29, 30].

As a mobile-first nation, almost ninety percent of Malaysians access Internet through mobile broadband and 96.4% of the population has mobile network coverage [17, 18]. Debate persists on whether mobile Internet access and use could close the digital divide or would the more-expensive mobile access bring less value, especially in using the Internet for "economic value-creating activities" [31]. As mobile devices become more powerful

and computer-like in their functionalities and as coverage gap of mobile networks fall from 10 percent in 2018 to 7 percent in 2020 [32] and the cost of mobile Internet and smartphone ownership fall [32, 33], their importance and prevalence have grown.

Malaysia's increase in fixed broadband access from 2019 to 2020 is higher than the increase in mobile broadband access [18] due to improved affordability brought about by the NFCP, which aimed to make entry-level fixed broadband cost of below than one percent of the Gross National Income (GNI) [3]. Research from South Korea showed that low-income households with high price elasticity are unable to cope with price increases that are inevitable with telecommunication services improvements such as next-generation mobile network rollouts [27]. The rollout of mobile networks to rural and remote areas costs 18 percent and 35 percent more than urban deployment, and will have lower demand levels, which causes telecommunication service providers to hesitate in rolling out services to rural and remote areas [33, 34]. Digitalisation is inevitable, as government services, especially in the education, health, and welfare sectors are increasingly made available online, even in Malaysia [35, 36]. This unfortunately impacts low-income households and individuals more than high-income ones [35].

In particular, the Covid-19 pandemic has underlined the importance and difficulties in accessing telemedicine services by older adults. Telemedicine is vital for this age group as they require regular follow-up visits to healthcare providers, and because older adults are more susceptible to the Covid-19 virus [37]. The Malaysian government deployed the 'MySejahtera' mobile application to assist in managing the Covid-19 outbreak in the country, with functions ranging from check-ins by public patronising businesses and government premises, contract tracing, health assessment, telemedicine links, Covid-19-related information dissemination, to Covid-19 vaccination registration and management for individuals and dependents [38]. A worrying trend of low usage of the MySejahtera app among older adults affected the nation's management of the disease's spread among this age group [39]–[40]. A literature analysis on the socio-demographic factors that affect telecommunication expenditure will shed some light on this trend.

2.3 Telecommunication Expenditure, Price Elasticity and Income Elasticity

One question that arises from the lack of Internet usage among older adults is whether telecommunication expenditure is considered a necessity or luxury. In microeconomics theory, goods that are necessities are usually price inelastic, while normal and luxury goods are price elastic [41]. In literature, price elasticities are higher for mobile lines than residential fixed lines for a cross-section of developed and developing countries [26]. A cross-sectional study of OECD countries showed that demand for Internet is price inelastic, while income elasticity is larger than unity, indicating that Internet service is a 'necessity' [42]. A paper that studied two groups of countries - Latin American together with Caribbean countries and OECD countries confirmed that the former group's Internet services are price inelastic, while it is price elastic for the latter group of countries [43]. In an Australian study, it was found that telecommunications expenditure across income deciles is similar to expenditures on necessities [35]. This paper will study the nature of food and telecommunications expenditure across deciles, in particular amongst households with older adult heads, female older adult heads, and consisting entirely of older adults.

2.4 Socio-demographic Characteristics, Internet Access, and Telecommunication Expenditure

According to [44] and [30], the first level of Internet access analysis focuses on social and demographic characteristics in analysing the digital divide. The other levels of analysis are the second level analysis which centers on skills required to efficiently use the Internet and ICT [30, 44] and the third level analysis of digital divide that deals with the impact of Internet access on users' culture, social, and economic spheres [44].

Income share of telecommunication services expenditure among consumers in a nation indicates how has telecommunication services influence consumers' spending habits [27]. A cross-section study of households, firms, and farms in Western Australia's Northwest region indicated that there is a negative relationship between hourly cost of Internet and hours spent online [45]. Research in South Korea, a newly-industrialised nation which experienced rapid diffusion of telecommunication services in the past two decades showed that low-income households there tend to have a higher share of telecommunication services expenditure [27]. High proportions of incomes are spent on telecommunications in households that are viewed as having "higher disadvantage" traits such as households consisting of youths, minorities, and from rural areas [35].

The higher share of telecommunication expenditure by disadvantaged households could potentially worsen the digital divide. To date, there is no Malaysian analysis on income share of telecommunication expenditure impact by social and demographic characteristics. This paper utilises [44]'s and [30]'s first level Internet access analysis by focusing on older adults households, especially female older adults-headed ones. The authors propose income share of telecommunication expenditure as the outcome variables of this analysis.

3 Research Method

This paper used the monthly Household Income and Expenditure microdata for 2019. The microdata was obtained from the Household Income, Expenditure, and Basic Amenities Survey (HIES) conducted by the Department of Statistics Malaysia (DOSM) once every five years [46]. The HIES' first stage of stratified sampling of enumeration blocks is done by state and urban/rural strata, and the second stage stratified sampling is based on living quarters. One of the author's institutions has a Memorandum of Understanding with DOSM and was supplied with a confidentialised thirty percent sample of the microdata for HIES 2019 consisting of 16,354 households. The SPSS output files are available upon request.

The microdata contains the HIES respondents' demographic information and expenditures across 138 categories of four-digit Classification of Individual Consumption. The Classification of Individual Consumption According to Purpose (COICOP) categories number 0820 (telephone and telefax equipment) and 0830 (telephone and telefax service) [47] were used to measure 2019 telecommunications expenditure. All expenditures are measured in Malaysian Ringgit (MYR). Separate and total percentages for telecommunications equipment and service expenditure of monthly gross household income were calculated in this paper.

Demographic variables were transformed into dummy variables, with '1' representing households where the household heads is a(n):- older adult, female, female older adult, secondary school-educated person, and Bumiputra. Dummy variable '1' also represented households:- in urban area, comprising of all older adults, and with at least one older adult. This paper utilises the WHO's definition of ageing which comprises of adults 60 years and above [19]. Descriptive statistics are presented in the form of frequency (percentage) for categorical variables while mean (standard deviation) measurements were used for continuous variables.

Monthly gross household income in MYR was extracted from microdata and divided into deciles. These were graphed against food expenditure share of income and total telecommunication share of income. The patterns of expenditure for the income deciles are then analysed.

At the univariate level, independent sample t-tests were run to compare telecommunication expenditure share of households that exhibit or otherwise amongst the household characteristics for HIES 2019. At the multivariate level, the shares of telecommunication expenditure, expenditure on telecommunication equipment and on services were regressed against household characteristics using multiple linear regressions for HIES 2019. The telecommunication expenditure variable was natural log-transformed, as was done by [35]. A total of 258 (1.58 percent) households were dropped from the 2019 dataset as they have zero telecommunication expenditure. The zero values will result in incalculable log values. Other variables from the HIES included in our analysis are household income, size, age of household head, gender of household head, ethnicity, strata, and whether all household members are income receivers. The final variable differs from the employment status variable that was used in [35]. All analysis statistical significance was set at 0.05.

4 Results

4.1 Household Characteristics and Income Analysis

Table 1 presents the descriptive statistics of selected household characteristics for HIES 2019. A total of 16,354 households were included in the survey. Almost 20 percent of the households are headed by an older adult, and more than a third has at least an older adult household member. More than half of the households have the following characteristics:- Household head has least secondary education, have a Bumiputra household head and are located in a urban area, respectively.

Independent samples t-test showed that the monthly gross household income for households with the variables of interest is significantly lower compared with households without those variables of interest (Table 1). Households with heads that are both female and an older person have the lowest monthly gross household income. Those households have incomes lower than households which have heads with lower than secondary education, rural households, and households where every member is an older person. It is vital to investigate if these income-disadvantaged households have significantly different telecommunication expenditure share than those without those characteristics.

Table 1. Descriptive statistics of household characteristics of HIES 2019

Variable	Frequency (%) (n = 16,354)	Monthly Gross Household Income Difference
Household size	3.92 (2.00) ⁱ	-
Age of household head	47.40 (13.84) ⁱ	-
Household head is a female	2908 (17.8)	1972.45***
Household head is an older adult (60 years old and above)	3232 (19.8)	2048.84***
Household head is a female older adult	719 (4.4)	3687.98***
Every member of household is older adult	1337 (8.2)	3729.65***
At least one member of household is older adult	6015 (36.8)	1092.05***
Household head has at least secondary education	11120 (68.0)	-3598.09***
Household head is a Bumiputra	10784 (65.9)	1680.87***
Household is in an urban area	12345 (75.5)	-2878.49***
Every member of household is an income receiver	3036 (18.6)	719.24***

ⁱ Mean (Standard deviation)

***Significant at 0.001

4.2 Income Share of Food and Telecommunication Expenditures Among Ageing Households

Our analysis showed that food expenditure behaves like a necessity, where the food expenditure share of income decreased for higher income decile groups (Fig. 1a). Telecommunication expenditure share of income, on the other hand, remains more or less constant, dipping slightly in the 9th and 10th income deciles (Fig. 1b). This is in contrast with a study on developing countries [48] which showed that telecommunication expenditure share rises in higher income deciles, behaving like luxury goods. However, these findings are similar to [35].

4.3 Monthly Telecommunication Expenditure Over Household Income Share Analysis

Independent samples t-tests was conducted on the list of variables found in Table 2, Column (a) to find out the difference in monthly expenditure (Ringgit Malaysia) on telecommunication over household income between respondents who possess the variables' characteristics, and those who do not. The independent t-test statistics shown in Column (b) found that monthly telecommunication expenditure share was significantly

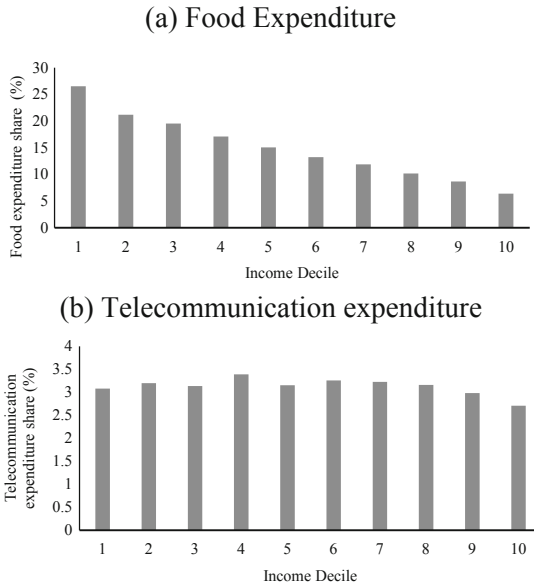


Fig. 1. Expenditure share of monthly household gross income according to income deciles

Table 2. Regression results of the natural log of share percentage of monthly telecommunication expenditure against a variety of household characteristics

Variable (a)	Share (%) of Monthly Telecommunication Expenditure Difference (b)	β (SE) (c)
Household size (continuous)	-	0.010*** (0.003)
Age of household head (continuous)	-	-0.002*** (0.001)
Household head is a female	-0.11**	0.017 (0.017)
Household head is an older adult	-0.21***	0.077*** (0.027)
Household head is a female older adult	-0.57***	-0.056 (0.036)
Every member of household is older adult	-0.61***	-0.187*** (0.028)
At least one member of household is older adult	-0.09**	0.002 (0.016)

(continued)

Table 2. (continued)

Variable (a)	Share (%) of Monthly Telecommunication Expenditure Difference (b)	β (SE) (c)
Household head has at least secondary education	0.23***	0.021 (0.013)
Household head is a Bumiputra	-0.07	-0.039*** (0.013)
Household is in an urban area	0.31***	0.081*** (0.013)
Every member of household is an income receiver	-0.27***	-0.029 (0.017)
Constant		0.918*** (0.042)

Dependent variable: \ln (telecommunication expenditure share).

Note: The asterisks (*, **, ***) indicates significance level at 10%, 5% and 1% respectively.

lower for the following variables: household head is a female, household head is an older adult, household head is a female older adult, every member of the household is an older adult and every member of the household is an income receiver. The share was significantly higher for the following variables: household head has at least secondary education and household is in an urban area.

Table 2 Column (c) shows the regression results of the natural log of share percentage of monthly telecommunication expenditure against a variety of household characteristics. The results revealed that factors associated with increased share percentage of monthly telecommunication expenditure were: household size, household head is an older adult and household is in an urban area. Factors associated with decreased share percentage of monthly telecommunication expenditure were: age of household head, every member of the household is an older adult and household head is a Bumiputra.

5 Discussion and Contributions

In this paper, the authors investigated the telecommunication expenditure patterns of Malaysian households in 2019 through the use of household income and expenditure microdata. Inferential analysis found that households headed by older adults, female older adults, or those consisting entirely of older adults when compared to groups not possessing these characteristics, have lower percentage shares of monthly telecommunication expenditure over household income. The lower expenditure is explained by past studies which found that most Malaysian older adults receive smartphones from their children or spouses as gifts or second-hand devices. This paper's outcomes indicate that the Mandatory Standard on Access Pricing (MSAP) policy which doubled the Internet speed while halving subscription prices had some impact on lower income

groups, but additional policies are needed to increase the affordability of telecommunication equipment and services to these groups for them to fully participate in the digital economy.

In conclusion, this paper provided an in-depth analysis of Malaysian older adults' telecommunication expenditure that has not been attempted elsewhere, and comes after digital economic-building policies such as the MSAP, Universal Service Provision (USP), Strategic Communication Policy (2019–2022), and the Government Transformation Plan that began in 2010 (Prime Minister's Office, 2010; 2014). In addition, this paper also highlighted the telecommunication expenditure gap faced by households headed by female older adults. This restricts their access to telemedicine, online communication, and economic amenities such as e-wallets.

These findings are imperative to inform our Malaysian government and policymakers to revise the National Ageing Policy, and the telecommunications industry to repackage telecommunication services by addressing the needs of older adults in the midst of rapid digital economy transformation.

6 Limitations and Recommendations for Future Studies

This paper studied Malaysia's household income and expenditure microdata from 2019. We were unable to study the impact of the Covid-19 pandemic on patterns of household expenditure on telecommunication. Future research could extend the first-level study to the 2020 microdata set in order to investigate changes in telecommunication expenditure brought about by the pandemic. Research can focus on older adult-headed households in particular, as well as to the second level analysis on Internet and ICT skills and third level analysis on impacts of Internet access on users' culture, social, and economic spheres proposed by [44].

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