ORIGINAL ARTICLE

The Factors Associated With Older Adults Receiving Care in Jamaica

S John-Aloye, C Williams, A Facey, S Priestley

ABSTRACT

Objective: *To ascertain the level of care and the predisposing, enabling and need factors associated with care received by older adults using Andersen's framework.*

Methods: *The 2012 Jamaica Survey of Living Conditions was used to conduct descriptive, bivariate and binary logistic analyses for the receipt of care among older adults defined by activities of daily living (ADL) and the instrumental activities of daily living (IADL) measures. The ADL sample comprised 3152 older adults and the IADL sample comprised 3141 older adults.*

Results: *Approximately 16% of older adults received ADL care and significant binary logistic associations with age, area of residence, living arrangements, source of financial support, disability, and perceived health status were found. Approximately 69% received IADL care and significant binary logistic associations with gender, age, employed, living arrangements, wealth status, source of financial support, satisfaction with life accomplishments, disability and perceived health status were found for those receiving IADL care.*

Conclusion: *Predisposing, enabling and need factors of the Andersen framework predict ADL and IADL care. Therefore, plans for care of older adults must address those 70 years or older who live alone, have a disability, a chronic illness and rate their health poorly.*

Keywords: Activities of daily living, ageing, Andersen's framework, instrumental activities of daily living, older persons, Jamaica

Factores Asociados con los Adultos Mayores que Reciben Cuidados en Jamaica

S John-Aloye, C Williams, A Facey, S Priestley

RESUMEN

Objetivo: *Determinar el nivel de cuidados y los factores predisponentes, capacitantes y de necesidad asociados con el cuidado recibido por los adultos mayores, usando el modelo de Andersen.*

Métodos: *La Encuesta de Condiciones de Vida en Jamaica 2012 fue utilizada para realizar análisis descriptivos, bivariantes y logísticos binarios en relación con el recibimiento de cuidados entre los adultos mayores, definidos por las medidas de las actividades de la vida diaria (AVD) y las actividades instrumentales de la vida diaria (AIVD). La muestra de AVD abarcó 3152 adultos mayores y la muestra de AIVD abarcó 3141 adultos mayores.*

Resultados: *Aproximadamente el 16% de los adultos mayores recibieron cuidados de AVD, y en su análisis se hallaron asociaciones logísticas binarias significativas con la edad, el área de*

From: Department of Sociology, Psychology and Social Work, Kingston 7, Jamaica.

Correspondence: Dr S John-Aloye, Department of Sociology, Psychology and Social Work, Faculty of Social Sciences, Kingston 7, Jamaica. Email: samantha.john-aloye@uwimona.edu.jm

DOI: 10.7727/wimj.2018.165

residencia, la situación de vivienda, la fuente de apoyo financiero, la discapacidad y el estado de salud percibido. Aproximadamente el 69% recibió cuidados de AIVD, y en su análisis se hallaron asociaciones logísticas binarias con el género, la edad, los empleados, la situación de vivienda, la situación económica, la fuente de apoyo financiero, la satisfacción con los logros de vida, la discapacidad, y el estado de salud percibido.

Conclusión: *Los factores predisponentes, capacitantes y de necesidad del modelo de Andersen predicen los cuidados de AVD y AIVD. Por lo tanto, los planes para el cuidado de adultos mayores tienen que abarcar a aquellas personas de 70 años o más que viven solas, tienen una discapacidad, una enfermedad crónica, y valoran su salud como pobre.*

Palabras clave: Actividades de la vida diaria, envejecimiento, modelo de Andersen, actividades instrumentales del cuidado de la vida diaria, personas mayores, Jamaica

West Indian Med J 2018; 67 (5): 421

INTRODUCTION

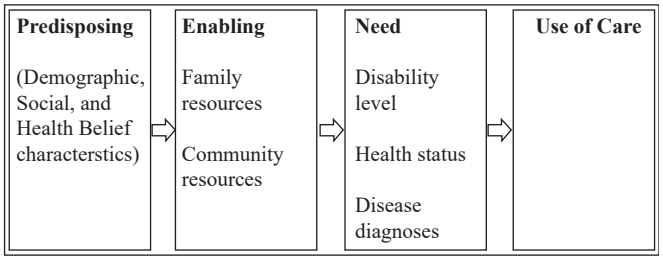
Global life expectancy rates have increased significantly over the decades because of improvements in public health and its social and economic determinants (1). In 2017, the United Nations (UN) estimated the population 60 years and older at 965 million, which comprised 13% of the global population (2). This indicates that the world's population is ageing. Moreover, the world's population is projected to increase to 2.1 billion by 2050 and three billion by 2100, with the Caribbean region showing the fastest growing rate projected to increase from 13% in 2017 to 25% in 2050 (2). In Jamaica, the percentage of persons aged 60 years and older increased from 6.7% (108 463 persons) in 1960 (4) to 11.4% (306 200 persons) in 2011 (3) and was estimated at 14% in 2017, which is higher than the estimate for the Caribbean region (2, 3).

The population aged 60 years and older is a diverse demographic group that comprise persons who are physically and economically active and others who require financial, physical and social care (5–8). An increase in a country's ageing population therefore, would require investments in social, economic and healthcare (5–8). It is important to ascertain the level of care required or received by older adults in Jamaica as well as the factors associated with receiving care.

Indices that assess the degree of care required and/or received by older adults include the instrumental activities of daily living (IADL) and the activities of daily living (ADL) measures. The IADL refers to the care required or received by the older adults for their basic personal care such grooming, dressing, feeding and walking. Instrumental activities of daily living on the other hand, refers to the care required or received by the older adult such as transportation and shopping, taking medication, preparing meals, communicating with others (10). In Jamaica few studies have examined IADL or ADL (9).

The Andersen framework of healthcare has been widely used to examine the factors associated with use of healthcare (11–14). The framework, which was developed by Ronald Andersen in 1968, has undergone subsequent revisions, although the 1995 version is commonly used (8, 11, 13). The premise of the Andersen framework of healthcare use is determined by the individual and the contextual environment (11, 13, 14), and is typically used in general populations but is increasingly used for sub-populations such as older adults (10, 11, 15, 16).

Anderson framework modified for use of care for older adults



The framework, as presented in the Figure above identifies three main components: predisposing, enabling and need factors. In the context of the older adults, the predisposing factors are their socio-demographic, social and health belief characteristics that may exist before receipt of care (10–14). The enabling factors are the family and community resources influencing the quantity and quality of care received by older adults. However, enabling factors are a necessary but not

sufficient condition for receiving care (10–14). Third, the need factors comprise illness elements (such as disability, health status and diagnoses) and must be defined for care to be received (10–14).

In Jamaica, limited publications exist on the use of the Andersen framework for healthcare as well as its application to use of services of care among older adults (17). This paper aims to identify the level of care and the predisposing, enabling and need factors associated with receipt of care among older adults using the Andersen model, where receipt of care is defined as care for ADL and IADL and older adults are defined as persons aged 60 years and older.

SUBJECTS AND METHODS

This paper utilized data from the 2012 Jamaica Survey of Living Conditions (JSLC). In that year, there was a special module used to collect data on the characteristics of older persons and measure the extent to which they require assistance for IADL and ADL care in the year prior to the survey. The JSLC was designed as a two-stage stratified random sample, using probability proportionate to size. The sample of older adults in the JSLC consisted of 2378 persons. The data reflect cases weighted to correct for oversampling at the parish level. No primary data collection occurred and so the study was exempt from full review by the University Hospital of the West Indies/ The University of the West Indies, Faculty of Medical Sciences, Mona, Ethics Committee. The statistical package for the social sciences (PASW) software version 22 was used for analysis.

Data

The receipt of care for older adults was measured by two dependent variables, ADL and IADL. Activities of daily living refers to whether respondents received assistance with personal care such as bathing and dressing whereas, IADL refers to whether respondents received assistance with housework, yardwork, grocery shopping and accessing transportation from family, friends or others. These dependent variables were categorized as dichotomous variables with categories received care and did not receive care.

Descriptive analysis was first used to provide characteristics of the ADL and IADL samples. This preceded the multivariate analysis in which two logistic regression models were proposed to predict the likelihood of receiving care. The analyses included 12 variables that described the characteristics of the older adults: age group, gender, area of residence, employment status, wealth status, living arrangements, source of financial support, satisfaction with life accomplishment, disability status, chronic illness status, perceived health status and the type of care received. The binary logistic regression analyses covered all the variables mentioned with the exception of employment status and satisfaction with life accomplishment which were not included for ADL care.

Predisposing factors of the sample included current age, gender, area of residence and employment status. For descriptive analyses, five categories of age in years were utilized (60–64, 65–59, 70–74, 75–79 and 80^{+}) while for the multivariate analyses age was dichotomised into two groups: 60–69 years, and 70 years and older. For area of residence, the three categories (KMA) Kingston Metropolitan Area, other towns and rural were utilized. Employment status was treated as dichotomous with Yes - employed and No - not employed.

The enabling factors were wealth status, living arrangement, main source of financial support and satisfaction with life accomplishments. The wealth status was derived from population quintiles (*ie*, per capita consumption expenditure), and was classified into poor, middle and wealthy. Living arrangements of the household reflected members' availability to provide care for the older persons and were classified as living alone, living with spouse only, living with others, and those living with spouse, adult children and/or grandchildren. The main source of financial support for the older person was categorized as self, support from relatives in other households in Jamaica, from others (social organisations, relatives or other households overseas), with support from the respondent's household and community members. The older person's satisfaction with her accomplishments in life was organized into three groups: low satisfaction (not satisfied or very dissatisfied), medium (satisfied enough) and high satisfaction (mostly or very satisfied).

The need factors were having a chronic illness, disability and perceived health status. Having a chronic illness included asthma, diabetes mellitus, hypertension, arthritis, a mental illness, heart disease or some other specified chronic disease. Disability consisted of persons with sight, hearing, speech disabilities, a physical disability and multiple disabilities. Chronic illness and disability were categorized as dichotomous variables. Self-reported health status of older persons was added to capture the perceptions respondents had about their own health which could motivate how they fulfilled their need for care. Respondents were classified according to

whether they considered their health to be poor, average or good.

RESULTS

Description of ADL and IADL samples

Table 1 shows the characteristics of the older adults who received ADL and IADL care. There were 512 adults 60 years or older who received ADL care. Among these older adults, 57% were females and included mainly the oldest-olds (those who were 80 years or older, *ie*, 36%).

Those older adults who were 65–69 years were least likely to have received such type of care (13%). The older persons who received ADL care were mostly from the rural areas (48%) with 27% residing in the KMA. Approximately, 50% of the older adults were wealthy.

Those who received ADL care resided mostly with other adults (spouse, children and/or grandchildren) in their household (50%) and were least likely to reside with others or to live alone. The main sources of financial support were from self or from household and/or community members (40% and 35%, respectively). Almost a third of older adults who received ADL care had a disability (32%). Approximately, 83% had a chronic illness. These older adults mostly perceived that their health was average (36%).

The sample consisted of 2207 older adults who received IADL care. There were mostly females (56%) who were primarily from the oldest-olds; those 80 years or older (24%) and least likely from those 70–74 years and those 75–79 years with approximately 17% each. Most of these individuals were unemployed (71%). Additionally, the majority resided in the rural areas (52%) followed by KMA (30%). The majority of those who received IADL care was wealthy (53%).

Like those receiving ADL care, a higher proportion (47%) of these older adults resided in households with another adult (spouse, children and/or grandchildren) and were least likely to live alone (17%) or with others (12%). Most persons reported that they were the main source of their financial support (53%). Approximately, 47% were highly satisfied with their accomplishments. Among these older adults, 76% had a chronic illness and approximately 16% had a disability. These older adults were mostly of the perception that they were in good health (44%). Their main mode of transportation was public transportation (68%).

The findings from the descriptive analyses show that the majority of older persons who received ADL or IADL care had several similarities. They were mostly females 80 years or older, from the rural areas, not

Table 1: Characteristics of older who received ADL (n = 512) and IADL Care (n = 2207), 2012 JSLC

	ADL Care (%)	IADL Care (%)
Predisposing factors		
Age		
60–64	14.6	21.0
65–69	12.5	21.3
70–74	18.5	17.0
75–79	18.4	16.8
80^{+}	36.0	23.9
Gender		
Female	56.8	55.7
Male	43.2	44.3
Area of residence		
KMA	38.7	30.0
Other Towns	13.2	18.4
Rural	48.1	51.6
Employment status		
Not Employed	-	71.3
Employed	-	28.7
Enabling Factors	-	
Wealth status		
Poor	31.6	28.5
Middle	18.5	19.0
Wealthy	49.9	52.5
Living arrangement		
Reside alone	10.1	16.8
Reside with spouse only	29.8	25.0
Reside with spouse, adult children or grandchildren	50.3	46.6
Other	9.8	11.6
Financial support	**n = 502**	**n = 2196**
Self	39.6	52.5
Household and community members	35.1	27.6
Relatives living in Jamaica	13.6	11.0
Others	11.6	8.9
Satisfaction with accomplishments	**-**	**n = 2205**
Low	-	47.2
Medium	-	32.2
High	-	20.6
Need Factors		
Disability		
Yes	32.1	15.7
No	67.9	84.3
Chronic illness	**n = 508**	**n = 2190**
Yes	82.8	75.6
No	17.2	24.4
Perceived health status	**n = 509**	**n = 2184**
Poor	31.3	18.8
Average	36.1	37.5
Good	32.6	43.7

employed, wealthy, resided with other adults in their households, with themselves as their main source of financial support, had no disability but had a chronic illness. However, those adults who received ADL care had an average perception of their health while on the other hand, those who received IADL care had a good perception of their health. Additionally, the main mode of transportation of those who received IADL care was public transportation.

Logistic regression analyses

Table 2 shows the odds ratios and related confidence intervals for each predisposing, need factor and enabling factor for having received ADL care and IADL care in the past 12 months. The binary logistic regression models were of good fit evident by the log-likelihood ratio tests which were statistically significant at p-value < 0.0001, though not shown. The independent variables were examined for multicollinearity and the findings indicated low multicollinearity as variance inflation factor was less than two.

Gist: The Andersen (1995) framework identifying predisposing, enabling and need factors is used to analyse the receipt of care for activities of daily living, and instrumental activities of daily living among older adults, utilizing data from the 2012 Jamaica Survey of Living Conditions.

ADL care

The results indicate that age group, area of residence, living arrangements, source of financial support, disability and perceived health status were significantly associated with ADL care. Adults aged 60–69 years reported 56.2% lower odds of having received ADL care than those adults aged 70 years and older. Lower odds of receiving ADL care were reported for older adults residing in other towns (60.4%) and those residing in rural areas (42.8%), when compared with their counterparts residing in the KMA. Older adults residing alone reported 68.2% lower odds and those older adults residing in households with others reported 32.2% lower odds of having received ADL care than their counterparts residing with their spouse or adult children, or adult grandchildren in the household. Moreover, older adults who were the main source of financial support for themselves, reported 25.9% lower odds of having received ADL care than those with household and community members as their main source of financial support.

Table 2: Odd ratios for binary logistic regression models of receiving ADL care and IADL care for older adults, 2012 JSLC.

Independent variables	ADL care (n = 3152) Odds Ratios	IADL care (n = 3141) Odds Ratios
Predisposing factors		
Gender		
Female (ref)		
Male	0.858	0.782*
Age group		
70 years and older (ref)		
60–69 years	0.438***	0.517***
Area of residence		
KMA (ref)		
Other towns	0.396***	1.064
Rural	0.572***	1.109
Employed		
No (ref)		
Yes		0.687**
Enabling factors		
Living arrangements		
Reside with spouse, adult children or grandchildren (ref)		
Reside with spouse only	1.156	0.679**
Reside with other household members	0.678*	0.602**
Reside alone	0.318***	0.286***
Wealth status		
Wealthy (ref)		
Middle	0.840	0.701*
Poor	0.877	0.660**
Main source of financial support		
Household and community members (ref)		
Relatives in other households	1.013	1.138
Other	1.102	0.623*
Self	0.741*	0.769*
Satisfaction with life accomplishments		
High (ref)		
Medium		1.118
Low		
Need factors		
Disability		
Yes (ref)		
No	0.322***	0.356***
Chronic illness		
Yes (ref)		
No	0.923	0.916
Perceived health status		
Poor (ref)		
Average	0.468***	0.474***
Good	0.407***	0.395***

N.B. ref = reference group; *** $p < 0.0001$, ** $p < 0.001$, * $p < 0.05$, † $p < 0.10$

Older adults without a disability reported 64.4% lower odds of having received ADL care than those with a disability. Moreover, older adults who perceived their health status to be average reported 53.2% lower odds of having received ADL care than those with a poor perception of their health status. Similarly, those adults with a good perception of their health status reported 59.3% lower odds of having received ADL care than their counterparts with a poor perception of their health status. This indicates that the more favourable the perception of one's health status the lower the odds of receiving ADL care.

IADL care

The results of the binary logistic regression model indicate that gender, age group, living arrangements, employed, wealth status, source of financial support, satisfaction with life accomplishments, disability and perceived health status were significantly associated with IADL care. For the predisposing factors, males reported 21.8% lower odds of having received IADL care than females, and adults aged 60–69 years reported 48.3% lower odds of having ever received IADL care than adults aged 70 years and older. Employed older adults reported 31.3% lower odds of having received IADL care than their unemployed counterparts.

For the enabling factors, older adults residing alone reported 71.4% lower odds, those older adults residing only with their spouse reported 32.1% lower odds and older adults residing in other household types reported 39.8% lower odds of having received IADL care than their counterparts residing with their spouse or adult children, or adult grandchildren. Older adults of a middle wealth status reported 29.9% lower odds of having received IADL care than their counterparts of a wealthy status. However, poor older adults reported 34.0% lower odds of having received IADL care than their counterparts of a wealthy status. These results indicate that as the wealth status of older adults increased, their odds for receipt of IADL care also increased.

Similarly, older adults who were the main source of financial support for themselves, reported 23.1% lower odds of having received IADL care than those older adults with household and community members as their main source of financial support. However, older adults who relied on other sources as their main source of financial support, reported 37.7% lower odds of having received IADL care than those older adults with household and community members as their main source of financial support. Older adults with a low satisfaction level with their life accomplishments reported 23.1% lower odds of having received IADL care.

For the need factors, older adults without a disability reported 64.4% lower odds of receiving IADL care than their counterparts with a disability. Moreover, older adults with an average perception of their health status reported 52.6% lower odds and those with a good perception of their health status reported 60.4% lower odds of receiving IADL care than their counterparts with a poor perception of their health status.

The findings of the binary logistic regression models indicate the predisposing, enabling, and need factors of the Andersen framework predict ADL and IADL care. The findings also indicate that these models produced statistically significant findings for all variables except for gender and wealth status for ADL care, area of residence for IADL care, and chronic illness for both ADL and IADL care.

DISCUSSION

In this exploratory analysis we have uncovered several correlates which help to explain the likelihood of older Jamaicans receiving care for ADLs and IADLs utilizing a large population-based sample. A modified Andersen framework has been used to highlight predisposing, need and enabling factors associated with receiving care for the completion of tasks considered both basic and crucial for successful living today. We found that the predisposing factor age group consistently predicted receiving care for ADLs and IADLs, with persons 60–69 years being less likely to receive care than those 70 years or older. This is in keeping with the findings in developed and developing countries that at older ages, persons may increasingly face deteriorating cognition, functional limitations, and are at risk of other non-communicable disease for which they need and seek care (18, 19). This is occurring at a time in their lives when their dignity and value may be eroded by the encroaching physical, mental and emotional limitations. It is therefore, important for persons to prepare for ageing by paying attention to their physical, mental and emotional health from much earlier in the developmental life cycle and addressing susceptibilities early, thereby building resilience for later years. We note also that persons residing outside of the KMA were less likely to receive ADL care, but this may be an artefact of the small ADL subsample requiring further exploration.

The need factors exhibited strong effects as two of the three need variables - disability status and perceived health status - consistently predicted the likelihood of

receiving care across the two models. As expected, older persons who were without a physical disability or without multiple disabilities, as well as those who considered their health to be average or better were less likely to receive care. However, having a chronic illness did not significantly affect receiving care for ADLs or IADLs. This is not surprising as the majority of the sample had a chronic illness.

Living arrangements and main source of financial support were the enabling factors that consistently predicted the receipt of care for ADLs and IADLs. In fact, older adults residing alone, treated in the literature as representing vulnerability on several levels (18, 20) made the older persons 68.2% less likely to receive ADL care and 71.4% less likely to receive IADL care than those residing with a spouse or adult children or grandchildren in the household. Older persons with low satisfaction with their life accomplishments were also less likely to receive IADL care.

While we are aware that the level of social isolation faced by the elderly impacts care, we should bear in mind that older persons living on their own are not a homogenous group for there are variations in the strength of support and care they receive from immediate and extended family, friends, neighbours and other community members in churches and senior citizen groups, who provide practical formal and informal care for them (19, 20).

We also found that older persons who were the main source of financial support for themselves were less likely to receive both forms of care. Yet older persons who were poor or middle wealth status were less likely to receive IADL care, indicating that access to resources is quite critical for receipt of care beyond basic personal grooming. This also points to the necessity of financial preparation for ageing, and that consideration be given to the strength and changing dynamics of family relationships as shifting norms related to the source of pensions in old age emerge. Both quantitative and qualitative research is needed in this area (22).

The article has also highlighted the usefulness of the modified Andersen model in classifying and identifying the factors that impinge on older persons receiving care for ADLs and IADLs in Jamaica – a model traditionally used to measure the utilisation of health services. It is essential for health policy-makers to be aware of the ways in which plans for care of the elderly must address those who need care but are likely not to receive it – the unmet need for care among older persons (21). Persons 70 years or older, who have a physical disability, or a chronic illness that limits physical functioning, who rate their health poorly, who are poor and live alone are especially vulnerable.

We also recognize that this study has limitations. The source of care for older persons receiving care was not explored in our models and this is a critical mediating factor pointing to the availability of persons to provide care. We also know that analysis of the well-being of the elderly should extend beyond physical care to include emotional support. This may be considered an invisible need but detailed questions probing factors related to social isolation, the strength of social networks and quality of relationships are not included and should not be expected in the 2012 JSLC, being better suited for small studies focussed on older persons. This survey also does not include coverage of the institutionalized population, *ie*, the population in nursing homes, homes for the aged, or in prison which are special sub-groups that may require attention in the future. The ability of older persons to access care was also not explored. Including these variables in future research would allow planners to develop profiles of older persons most needing care for ADLs and IADLs which would help physicians, social workers and others providing healthcare to address needs before they exacerbate. The reduction in total fertility from the early 1980s in Jamaica has resulted in a slower pace of population growth and increases in the proportion of the population at older ages (2). Accompanying increases in life expectancy because of improvements in infant and child survival and mortality at older ages have brought into focus questions of the quality of life, care and well-being of the older adults. Given that "population ageing is projected to have a profound effect on societies, underscoring the fiscal and political pressures that the healthcare, old age pension and social protection systems of many countries are likely to face in the coming decades" (2), we believe that filling the gaps in research in this area will go a far way in increasing our understanding of the circumstances of older persons within the changing context of health service delivery.

REFERENCES

1. Riley JC. Rising life expectancy: a global history. New York: Cambridge University Press; 2001.
2. United Nations, Department of Economic and Social Affairs, Population Division. World population prospects: The 2017 revision, key findings and advance tables [Working Paper No. ESA/P/WP/248]. New York: UN; 2017.
3. Statistical Institute of Jamaica [Internet]. [cited 2018 Apr 11]. Available from: http://statinja.gov.jm/Popcensus.aspx.
4. Department of Statistics. Census of Jamaica: 7th April, 1960. Kingston, Jamaica: Department of Statistics; 1963.

5. Cloos P, Allen CF, Alvarado BE, Zunzegui MV, Simeon DT, Eldemire-Shearer D. Active ageing: A qualitative study in six Caribbean countries. Ageing Soc 2010; **30:** 79–101.
6. Eldemire-Shearer D, Mitchell-Fearon K, Laws H, Waldron N, James K, Holder-Nevins D. Ageing of Jamaica's population - what are the implications for healthcare? West Indian Med J 2014; **63:** 3–8.
7. James K, Holder-Nevins D, Morris C, Eldemire-Shearer D, Powell J, Laws H. Ageing in place: implications of morbidity patterns among older persons--findings from a cross-sectional study in a developing country (Jamaica). Australas J Ageing 2012; **31:** 170–75.
8. Mitchell-Fearon K, Waldron N, Laws H, James K, Holder-Nevins D, Willie-Tyndale D et al. Non-communicable diseases in an older, aging population: a developing country perspective (Jamaica). J Health Care Poor Underserved 2015; **26:** 475–87.
9. Morris C, James K, Laws H, Eldemire-Shearer D. Health status and health-seeking behaviour of Jamaican men fifty-five years and over. West Indian Med J 2011; **60:** 322–29.
10. Masuy AJ. How does the family care evolve over time? An analysis of the care provided to the elderly by their spouse and children in the 1992-2002 Panel Study of Belgian Households. Louvain-la-Neuve, Paris: University Press of Louvain n ° 660/2011; 2011
11. Babitsch B, Gohl D, von Lengerke T. Re-revisiting Andersen's behavioral model of health services use: a systematic review of studies from 1998–2011. GMS Psychosoc Med 2012; **9:** Doc11.
12. Andersen RM. Behavioral model of families' use of health services [Research Series No. 25]. Chicago, IL: Center for Health Administration Studies, University of Chicago; 1968.
13. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? J Health Soc Behav 1995; **36:** 1–10.
14. Andersen RM, Newman JE. Societal and individual determinants of medical care utilisation in the United States. Milbank Q 1973; **51:** 95–124.
15. Fu YY, Guo Y, Bai X, Chui EWT. Factors associated with older people's long-term care needs: a case study adopting the expanded version of the Anderson Model in China. BMC Geriatr 2017; **17:** 38.
16. Liu T, Hao X, Zhang Z. Identifying community healthcare supports for the elderly and the factors affecting their aging care model preference: evidence from three districts of Beijing. BMC Health Serv Res 2016; **16 (Suppl 7):** 83–92.
17. Willie-Tyndale D, McKoy Davis J, Holder-Nevins D, Mitchell-Fearon K, James K, Waldron NK et al. Predictors of health service utilization among older men in Jamaica. J Gerontol B Psychol Sci Soc Sci 2018 Jan 3. doi: 10.1093/geronb/gbx168. [Epub ahead of print].
18. Christensen K, Doblhammer G, Rau R, Vaupel JW. Ageing populations: the challenges ahead. The Lancet 2009; **374:** 1196–208.
19. Eldemire-Shearer D, James K, Morris C, Holder-Nevins D, Lawes H, Harris M. Chronic disease and ageing in the Caribbean: opportunities knock at the door. West Indian Med J 2011; **60:** 471–7.
20. Kemper P. The use of formal and informal home care by the disabled elderly. Health Serv Res 1992; **27:** 421.
21. Lynn J, Adamson DM. Living well at the end of life. Adapting health care to serious chronic illness in old age. Santa Monica, CA: Rand Corp; 2003.
22. Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys: Results from two population-based studies. Res Aging 2004; **26:** 655–72.