

## SEX AND RURAL-URBAN DISPARITIES IN SELF-REPORTED CHRONIC NON-COMMUNICABLE DISEASES AND HEALTH RISKS AMONG OLDER ADULTS IN GHANA: IMPLICATIONS FOR THE NATIONAL AGING POLICY

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### Abstract

**Objective:** Differences exist in the composition and morbidity/mortality patterns of older persons. This analysis determined sex differences and rural-urban disparities in common chronic diseases and health risks among older persons in Ghana.

**Methods:** This work was based on World Health Organization's (WHO) multi-country Study on global AGEing and adult health (SAGE), conducted in six countries including Ghana. Nationally representative sample of 4725 persons  $\geq 50$  years was involved in this analysis. Data were obtained on eight self-reported chronic diseases and analysed by sex and location.

**Results:** Women  $\geq 50$  years in rural-urban locations self-reported more ill-health than men of comparable age. Educational levels, household incomes and possession of health insurance were lower among rural residents. Alcohol and tobacco use were significantly

higher in rural locations (61% vs. 55.3%) and (29.6% vs. 20.9%) respectively, while obesity was significantly higher among urban residents (17.5% vs. 4.5%). Sex differences in prevalence of chronic conditions were statistically significant for-Angina (F:M 1.8), Arthritis (F:M 1.7), Depression (F:M 2.9), Diabetes (F:M 1.3), Hypertension (F:M 1.8) and Stroke (F:M 1.2). Urban-rural disparities were significant for chronic lung disease (1% vs. 0.4%), diabetes (6.4% vs. 2.2%), hypertension (22.8% vs. 7.3%) and stroke (4% vs 1.7%).

**Conclusions:** Preventive health programmes and provision and targeting of social protection (improved access to health care and pensions) should consider sex and location of vulnerable older persons as the country implements the national aging policy.

**Key Words:** *older adults, chronic diseases, sex differences, rural-urban differences, national ageing policy.*

### Introduction

Trends in aging have been increasing in all regions of the world, including sub-Saharan Africa. The older adult population has increased steadily since 1950 in all six WHO regions of the world. In sub-Saharan Africa the projected older adult population (aged 60 years and older) will exceed 10% of the total population by 2050<sup>1</sup>. In Ghana, the older adult population is projected to almost double from 6% in 2013 to 12% in 2050<sup>2</sup>.

Globally, significant sex differences exist in the composition of the older adult population, the so-called 'feminization' of aging<sup>1,3-6</sup>. Sex differences in morbidity and mortality are influenced by multiple factors, including a variety of biological and

behavioural differences between men and women. Sex differences in behaviour are linked to gendered roles such as social roles, behaviours, attitudes and psychosocial characteristics that are more common, more expected and more accepted for one sex or the other<sup>7-9</sup>. These differences also contribute to disparities in health outcomes: where prevalence and impacts of chronic non-communicable diseases may contribute to lower healthy life expectancy – with these differences having implications for health and quality of life at the individual level and how gender is included in policies on aging at the community level<sup>3, 10, 11</sup>.

Aside sex differences in the prevalence of chronic non-communicable diseases, place of residence (rural or urban) are important. Differences in levels of awareness, access and utilization of health services vary between rural and urban locations. Population based hypertension surveys and a systematic review on hypertension have indicated rural urban differences; prevalence of hypertension was higher in urban than rural areas in Ghana<sup>12, 13</sup>. A rural-urban assessment of hypertension in one of the regions of Ghana (Ashanti region) also indicated that the age-adjusted mean systolic and diastolic blood pressure levels were lower

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in rural men and women than in urban men and women<sup>14</sup>.

In Ghana, the numbers of older adults is growing, however the health and care of this segment of the population has not been accorded optimal attention<sup>15</sup>. Ghana has a national aging policy prepared in 2002 by the Ministry of Employment and Social Welfare (MESW) and launched in 2010<sup>15</sup>. The national policy recognized old age and health challenges, aging and the living environment and aging and gender as three of the seven main policy challenges confronting older persons in Ghana. The policy document suggested improving health, nutrition and well-being of older persons, improving housing and living environment of older persons and providing adequate attention to gender variations in aging among others as strategies to overcome these challenges<sup>15</sup>. The implementation of the policy is beset with many challenges including inadequate funds and budgetary allocation to support planned activities, multiple lead agencies involving different government ministries and departments, and thus limited focused leadership. In addition, the paucity of evidence-based national level data on older adults in Ghana, is an inhibitory factor to the provision of targeted interventions within limited national resources.

This analysis is based on a nation-wide survey data from the World Health Organization's (WHO) Study on global AGEing and adult health (SAGE) Wave 1 in Ghana, and is aimed at determining sex differences and rural and urban disparities in common self-reported chronic non-communicable diseases and health risks among older persons in Ghana. It is also aimed to contribute evidence based data to guide the process of implementing the national aging policy.

## Methods

SAGE Wave 1 was undertaken in Ghana in a partnership between the University of Ghana's Department of Community Health, the Ministry of Health and WHO, as part of a multi-country longitudinal study to complement existing aging data sources to inform policy and programmes<sup>16</sup>. SAGE Wave 1 used nationally representative samples of persons aged 50+ years, with comparison samples of younger adults aged 18–49 years in Ghana. The face-to-face interview was conducted in Ghana (2007–08). Multistage cluster sampling strategies were used where households were classified into one of two mutually exclusive categories:

(1) All persons aged 50 years and older were selected from households classified as '50+ households'; and

(2) One person aged 18–49 years was selected from a household classified as an '18–49 household' (i.e. a household without a person  $\geq$  50 years).

Household enumerations were carried out in the final sampling units. One household questionnaire was

completed per household where a household informant and individual respondent need not be the same individual. One individual was selected from 18–49 households, whereas for 50+ households all individuals aged 50+ were invited to complete the individual interview. Household-level analysis of weights and person-level analysis of weights were calculated, which included sample selection and a post-stratification factor. Post stratification correction techniques used the most recent population estimates provided by the Ghana Statistical Service<sup>16</sup>. Details on subject selection and instruments used for the SAGE Wave 1 survey in Ghana have been provided in the Ghana National SAGE Wave 1 Report<sup>16</sup>.

Respondents were interviewed regarding their household characteristics, socio-demographic and work history, perceived health status, risk factors and preventive health behaviours, chronic diseases and health services coverage, health care utilization, subjective well-being and quality of life, and social cohesion. Field work and data entry were undertaken between May 2007 and June 2008. SAGE was approved by the World Health Organization's Ethical Review Board as well as a national approval in Ghana. Informed consent has been obtained from all study participants. For this analysis, 4725 respondents  $\geq$  50 years were involved (respondents 18–49 years were excluded).

## Variables

Sociodemographic and socioeconomic variables included sex, age, marital status, highest educational level completed, health insurance status and household income levels. Ghana operates a social health insurance policy- the National Health Insurance Scheme- introduced in 2003 and became operational in most health public and private health facilities in 2005. There are a few private, voluntary and mutual health insurance schemes operated by health and corporate organizations in the urban centres<sup>17</sup>. Health insurance status of older persons was based on this.

Wealth or income quintiles were derived from the household ownership of durable goods, dwelling characteristics and access to services (improved water, sanitation and cooking fuel) for a total of 21 assets. Wealth levels were generated through a multi-step process, where asset ownership was converted to an asset ladder, Bayesian post-estimation method was used to generate raw continuous income estimates, and then income transformed into quintiles, Q1 to Q5; Q1 as lowest income and Q5 as highest income<sup>18,19</sup>.

## Health Risk indices

Tobacco use: Lifetime tobacco use was assessed with the question 'Have you ever smoked tobacco or used smokeless tobacco?' SAGE Wave 1 included other questions on the type of tobacco used (such as cigarettes, cigars, pipes, chewing tobacco, or snuff) and the pattern of tobacco consumption<sup>18,19</sup>.

Alcohol use: Lifetime alcohol use was assessed with the question 'Have you ever consumed a drink that contains alcohol (such as beer, wine, spirits, etc.)?' Response options were 'Yes' or 'No, never'. In the survey both commercially available and home-brewed beverages were quantified in terms of alcohol content and quantity (i.e. a "standard drink") for comparability to other health surveys<sup>18,19</sup>.

Body Mass Index (BMI): was derived from the measured weight and height of respondents.

Chronic diseases: SAGE gathered evidence on a selected range of chronic diseases typically more prevalent among older adults and that contribute to a large portion of non-communicable disease burden. In this analysis, data are presented for eight chronic diseases; angina, asthma, chronic lung disease, depression, diabetes mellitus, hypertension, osteoarthritis and stroke. The prevalence rates for these chronic disease conditions were based on responses to the question "Has a health care professional ever told you, you have...?".

Four disease conditions (angina, arthritis, asthma, and depression) have symptoms with sufficient specificity and sensitivity to improve estimation of prevalence by using established algorithms based on results from the symptom-reporting and this is described in another paper on SAGE Wave 1 by Kowal et al, 2012<sup>18</sup>. Although SAGE Wave 1 assessed measured hypertension, the focus of this analysis was on self-reported chronic disease conditions.

### Data analysis

Outcomes of interest for this analysis included rural-urban disparities and sex differences in the burden of these eight chronic diseases among older adults  $\geq 50$  years in Ghana. Sociodemographic and socioeconomic variables analysed included age (50-59, 60-69 and 70-plus years), educational level, marital status, income levels (high-Q4 and Q5, or low-Q1, Q2 and Q3) and health insurance status (insured indicates respondent has mandatory or voluntary insurance or both and uninsured status indicates respondent has no insurance). Health risks such as alcohol use (yes or no), tobacco use (ever or never), obese (Yes or No) were assessed by location of residents (rural or urban).

Descriptive measures (frequencies, ratios, and percent) were used for the analysis and Chi-square test was used to determine significant sex differences and rural-urban disparities in the prevalence of selected chronic diseases among older persons at the 95% significance level,  $p < 0.05$ . Data analysis was conducted using SPSS version 21.

## Results

### *Sociodemographic/ socioeconomic characteristics and health risks indices of older adults by location (rural and urban)*

Among the 4725 older persons, 50.3% were women. Relatively higher proportions of urban residents (54.3%) were women while men formed the majority among older persons in rural locations (52.4%). Urban locations had higher proportion of younger older adults, 50-59 years (43.1% vs 37.7%) while rural locations had relatively higher proportion of the very old, 70 years and above (34.2% vs 30%).

There was a significant difference in the distribution of educational level by location; close to a third of all rural residents (62.7%) had no formal education compared to urban residents (43.2%). In addition, a higher proportion of urban residents had secondary level education or higher compared to those in rural locations.

Considering the marital status of the older persons, the currently married/ cohabiting were in the majority in both rural and urban locations. The proportion of older persons living with partners was relatively higher among rural residents (61.4% vs 53.8%), i.e. more older persons living without partners (widowed, separated or divorced) were in urban locations.

Over half of all older persons (in both locations) had low household incomes (Q1, Q2 and Q3). The proportion of older persons with low household incomes and without health insurance were significantly higher in rural locations i.e. (62.5% vs 55.3%) and (34.1% vs 44.8%) respectively.

Health risk assessment of older persons indicated significant disparities in alcohol and tobacco use by location; was higher in rural locations (61% vs 55.3% for alcohol) and (29.6% vs 20.9% for tobacco). Obesity however, was significantly higher among urban residents (17.5% vs 4.5%).

### *Sex differences and rural -urban disparities in prevalence of eight chronic diseases in older persons in Ghana*

Table 2, demonstrates that the prevalence of all eight chronic diseases were higher among urban residents than rural residents. To illustrate this rural-urban disparity more clearly with hypertension (the most prevalent self-reported chronic condition), urban prevalence was 22.8 compared to 7.3 in rural locations. Self-reported hypertension was thus three times higher in urban than rural locations. Similarly, urban prevalence of stroke was more than double that in rural locations (4.0 vs. 1.7).

**Table 1: Sociodemographic/ socioeconomic characteristics and health risks indices among persons  $\geq 50$  years by location ((rural and urban)), SAGE Wave 1, Ghana**

Characteristics		Urban	Rural	Total N= 4725	Chi square (p-value)
<b>Sex</b>	Male	881 (45.7)	1466 (52.4)	2347 (49.7)	20.1 (0.001)
	Female	1045 (54.3)	1333 (47.6)	2378 (50.3)	
	Total	1926 (100)	2799 (100)	4725 (100)	
<b>Age</b>	50-59	829 (43.1)	1054 (37.7)	1883 (39.9)	15.2 (0.001)
	60-69	519 (26.9)	787 (28.1)	1306 (27.6)	
	70 and above	578 (30)	958 (34.2)	1536 (32.5)	
	Total	1926 (100)	2799 (100)	4725 (100)	
<b>Educational Level</b>	No education	832 (43.2)	1744 (62.7)	2576(54.7)	255.7 (0.001)
	Primary school completed	412 (21.3)	570 (20.4)	982 (20.8)	
	Secondary school completed	569 (29.9)	432 (15.2)	1001 (21.2)	
	Tertiary (college/university/postgraduate)	120 (6)	46 (1.7)	163 (3.3)	
	Total	1933 (100)	2792 (100)	4722 (100)	
<b>Marital status</b>	Never married	32 (1.5)	32 (1)	64 (1.2)	30.1 (0.001)
	Married/cohabiting	1032 (53.8)	1715 (61.4)	2747 (58.3)	
	Separated/divorced	299 (15.5)	332 (11.8)	632 (13.3)	
	widowed	562 (29.2)	721 (25.7)	1282 (27.2)	
	Total	1925 (100)	2800 (100)	4725 (100)	
<b>Household Income</b>	Low income	1065 (55.3)	1747 (62.5)	2812 (59.6)	24.2 (0.001)
	High income	862 (44.7)	1051 (37.5)	1913 (40.4)	
	Total	1927 (100)	2798(100)	4725 (100)	
<b>Health insurance status</b>	Yes (mandatory, voluntary or both)	862 (44.8)	955 (34.1)	1817 (38.5)	54.8 (0.001)
	No insurance	1063 (55.2)	1845 (65.9)	2908 (61.5)	
	Total	1925 (100)	2800 (100)	4724 (100)	
<b>Health Risks</b>					
<b>Tobacco use</b>	Yes	478 (20.9)	861 (29.6)	1329 (26)	40.8 (0.001)
	No	1500 (79.1)	1896 (70.4)	3396 (74)	
	Total	1978(100)	2747 (100)	4725 (100)	
<b>Alcohol use</b>	Yes	1079 (55.3)	1656 (61)	2735 (58.7)	14.0 (0.001)
	No	893 (44.7)	1097 (39)	1990 (41.3)	
	Total	1972 (100)	2753 (100)	4725 (100)	
<b>Obesity</b>	Yes	1549 (82.5)	2504 (95.5)	4053 (90.2)	192.2 (0.001)
	No	430 (17.5)	242 (4.5)	672 (9.8)	
	Total	1979 (100)	2746 (100)	4725 (100)	

These urban and rural disparities were statistically significant for four chronic disease conditions- chronic lung disease (1% vs. 0.4% ; p-value= 0.004), diabetes (6.4% vs 2.2%; p-value= 0.001), hypertension (22.8% vs 7.3%; p-value= 0.001) and stroke (4% vs1.7%; p-value= 0.008).

In both locations, self-reported prevalence of chronic disease were higher among females for all eight chronic diseases analysed, except chronic lung disease. Sex differences in self-reported prevalence of the chronic disease conditions were statistically significant for- Angina (F:M 1.8; p-value= 0.001), Arthritis (F:M 1.7; p-value= 0.001), Depression (F:M 2.9; p-value= 0.001), Diabetes (F:M 1.3; p-value= 0.020),

Hypertension (F:M 1.8; p-value= 0.001) and Stroke (F:M 1.2; p-value= 0.040 ).

The overall sex differences indicated that, depression had the highest F: M ratio of 2.9 followed by angina and hypertension (F: M of 1.8 respectively). Sex differences existed among older persons in urban as well as rural locations. In both locations females self-reported higher prevalence for all eight conditions, except chronic lung disease for urban and stroke for rural residents. Within each location, self-reported depression had the highest sex differential (F: M ratio 2.3 for urban and 3.3 for rural) i.e. relatively higher proportions of rural dwelling older women self-reported depression.

Table 2: Prevalence of chronic diseases by location (rural and urban), sex and sex ratio, among persons  $\geq 50$  years, SAGE Wave 1, Ghana.

Location	Sex (N=4725)	Chronic Disease prevalence (%)							
		Angina	Arthritis	Asthma	*Chronic Lung Dx	Depression	*Diabetes	*Hyper-tension	*Stroke
Urban	M	2.5	10.4	3.8	1.3	1.2	5.7	18.3	3.6
	F	4.6	15.7	4.4	0.8	2.7	7.0	27.0	4.4
	F: M	1.8	1.5	1.2	0.6	2.3	1.2	1.5	1.2
Urban Prevalence		3.6	13.2	4.1	1.0	2.0	6.4	22.8	4.0
Rural	M	2.4	9.7	3.1	0.3	0.6	1.9	4.9	1.8
	F	4.0	17.1	4.0	0.4	2.0	2.5	10.3	1.7
	F: M	1.7	1.8	1.3	1.3	3.3	1.3	2.1	0.9
Rural Prevalence		3.1	13.0	3.5	0.4	1.3	2.2	7.3	1.7
<b>Overall F:M Ratio</b>		<b>1.8</b>	<b>1.7</b>	<b>1.2</b>	<b>0.9</b>	<b>2.9</b>	<b>1.3</b>	<b>1.8</b>	<b>1.2</b>
<b>Overall National Prevalence</b>		<b>3.3</b>	<b>13.1</b>	<b>3.7</b>	<b>0.6</b>	<b>1.6</b>	<b>3.9</b>	<b>13.6</b>	<b>2.7</b>

\* rural and urban differences in self-reported prevalence of these chronic disease conditions were statistically significant (Chronic lung disease p-value= 0.004, Diabetes p-value= 0.001, hypertension p-value= 0.001 and stroke p-value= 0.008) ; were higher among urban residents.

\* sex differences in self-reported prevalence of these chronic disease conditions were statistically significant ( Angina p-value= 0.002, Arthritis p-value= 0.001, Depression p-value= 0.001, Diabetes p-value= 0.020, Hypertension p-value= 0.001, and Stroke p-value= 0.040

## Discussion

The analysis of SAGE Wave 1 data in Ghana demonstrates clear sex differences and rural-urban disparities in the prevalence of self-reported chronic non-communicable diseases among older persons in Ghana.

Women (50 years or more) self-reported more chronic non-communicable diseases than men of comparable age. This is in agreement with findings from the 2003 World Health Survey (WHS) in Ghana, where there was a higher prevalence of similar chronic conditions (angina, arthritis, asthma, diabetes and depression) among women<sup>20</sup>.

Women self-reported more depression compared to men (F: M ratio of 2.3 in urban and 3.3 in rural location), this implies higher proportions of rural dwelling older women self-reported depression. SAGE Wave 1 however, did not assess the potential socioeconomic, cultural, religious and probable gender factors that could account for this. For effective implementation of interventions to improve health and social wellbeing of older adults, these factors may need further exploration.

Although the prevalence of self-reported chronic lung disease (CLD) was very low between the sexes and across locations, fewer women in urban locations self-reported CLD (F: M ratio of 0.6). These findings conform to the WHO Global burden of disease

estimates which demonstrates higher disability adjusted life years (DALYs) of depression for women and higher DALYs of CLD for men. Potential explanations for the observed higher prevalence of self-reported ill-health in women may be due to their relatively higher life expectancy, gendered patterns of assessment of personal health status, socioeconomic status, gendered roles and cultural and sociological influences<sup>1, 21, 22</sup>.

As the nation's aged population increases, sex disparities in chronic conditions need to be given serious national health and social policy attention. The implication of this sex difference in self-reported ill-health for monitoring policy goals and programmes is extremely important especially regarding the strategy of bridging the gender disparities and gaps in the health of older women as outlined in the national aging policy document<sup>15</sup>.

The analysis indicated clear disparities in prevalence of some health risks, alcohol and tobacco use were more prevalent in rural locations while obesity was higher in urban locations. Urban residents had higher rates of self-reporting for all eight chronic diseases e.g. urban prevalence for hypertension was three times higher than the rural prevalence. Addo and colleagues in their review of population based hypertension surveys in Ghana from 1973 to 2009, showed the prevalence of hypertension ranged from 19.3% in rural to 54.6% in urban locations<sup>12</sup>. A rural-

urban assessment of hypertension in one of the regions of Ghana (Ashanti region) indicated that the age-adjusted mean systolic and diastolic blood pressure levels were lower in rural men and women than in urban men and women<sup>14</sup>. Most of these studies were in specific locations and regions, however the SAGE Wave 1 is a nationwide survey data which provides empirical evidence on the rural-urban disparities in health risks and self-reported ill-health among older persons in the whole country.

Efficient use and allocation of the limited health budget targeted at these conditions, is essential if the health of the older person in Ghana is to improve.

It is important to note that, hypertension, diabetes and stroke which have dietary factors and sedentary lifestyle as strong associated risk factors<sup>23</sup> were more prevalent among older adults in urban locations where these risks are known to be higher.

The urban resident may be more aware with increased exposure to both print and electronic media and may have increased access to and utilization of health services compared to the rural resident. This difference may also be due to more urbanized lifestyles with increased tendency to sedentary work, easy access to transport and fast foods (energy dense diet) compared to the rural residents. Most rural Ghanaians are engaged in farming as the major occupation<sup>2, 24-26</sup>, a physically taxing activity.

Health education and health promotion activities should be targeted at these risks and specific disease conditions in health facilities and within communities supported and promoted in line with the Ministry of Health's (MoH) Regenerative Health policy<sup>27</sup>. The regenerative health policy of the MoH seeks to promote good eating habits, drinking adequate clean water, maintaining clean personal and environmental hygiene, regular exercises and having adequate rest<sup>27</sup>. Targeted promotion of this will be beneficent to the older population.

This analysis again demonstrates rural-urban disparities in important sociodemographic and socioeconomic factors which have direct influence on the health and well being of older persons. Educational levels, household incomes and possession of health insurance which improve financial access to health care and social well-being were lower among rural residents. Improving health, nutrition, well-being, housing and living environment of older persons are important strategies outlined in the national aging policy of Ghana<sup>15</sup>. It is critical that Government's social intervention programmes such as the Livelihood empowerment against poverty (LEAP) and the national health insurance scheme (NHIS) be well targeted to identify the most vulnerable older persons especially in rural locations<sup>28</sup>. LEAP is the provision of stipends from Government to support extremely poor and vulnerable households in all the regions of Ghana<sup>28</sup>, while the NHIS aims to exempt persons 70 years and above from premium payments<sup>17</sup>. The targeting and

identification of these households and older persons have been difficult to attain. Government departments and agencies in health and social services should coordinate their activities to streamline the targeting of poor households. In implementing the national aging policy, efforts to provide basic living skills for older persons (those young enough, 50-59 years to work and support themselves and their families) at the local government level should be considered. A structured social intervention strategy (involving home-based and community care) to make older persons as independent as possible should be pursued.

It is indeed clear from the analysis that disparities in living arrangements exist. Relatively higher proportion of older persons live without partners (i.e. widowed and separated or divorced) in urban locations. Spousal support is pivotal to living arrangements, financial wellbeing and social relationships of older people but in divergent ways for older women and men<sup>29</sup>. Widowhood represents the loss of a partner of many years who may have been the main source of companionship and support as well as a primary confidante<sup>30, 31</sup>. Therefore, the widowed among older persons in both rural and urban locations may form a vulnerable group who should be included as beneficiaries of the national social intervention strategies indicated above. It is critical not to ignore urban dwelling widows during such national targeting of beneficiaries.

It is important to note also that in most developed and developing countries income and pension inequalities exist between men and women and by location; women have lower personal incomes than men in later life due mainly to smaller pensions<sup>32</sup> with a direct consequence for risk of poverty in later life. Older persons in rural locations may not have pensions at all, since most are in the informal sector. Older men and women with relatively lower incomes may be socially disadvantaged due to their inability to perform expected gender-based social roles and may not attract social contact from family and friends<sup>33, 34</sup>. Providing and improving pensions for older persons are imperative. The implementation of the New Pensions Act of the Republic of Ghana<sup>35</sup> which among others aim overall to diversify the sources and increase quantum of pensions will have beneficial effects on the health and social wellbeing of the aged in Ghana. Older persons outside the formal sector ought to be protected by other social interventions e.g. LEAP and NHIS.

Limitation: The self-report of health conditions, such as angina, depression and hypertension, is likely an underestimate of prevalence rates which is a potential limitation for this analysis<sup>36</sup>. However, the WHO SAGE survey employed measures to improve estimates which are not presented here. It is important to note that per the objective of this analysis, prevalence of only self-reported hypertension (not measured blood pressure) in older adults were

considered, although SAGE Wave 1 has data on measured hypertension.

**Summary:** Analysis of SAGE Wave 1 data in Ghana demonstrates clear sex differences (women  $\geq 50$  years in rural and urban locations self-reported more chronic non-communicable diseases than men of comparable age) and rural-urban disparities in health risks and prevalence of self-reported ill-health among older persons in Ghana. Educational levels, household incomes and possession of health insurance (which improves financial access to health care and social well-being) were lower among older persons in rural locations.

As Ghana's population ages, a general trend towards increase prevalence of non-communicable diseases, and need for careful consideration of sex and rural-urban disparities in health risk in the older adult is inevitable. Preventive health programmes and provision of social protection (improved access to health care and pensions) need national attention through consideration of gender and location disparities among older adults in Ghana. Importantly, SAGE can be used to further document impact and also as a monitoring mechanism for the 2010 National Aging Policy with SAGE Ghana Wave 2 planned for 2013/14 and Wave 3 two years after this. A stitch in time saves nine!

#### Competing interests

The authors declare no competing interest. The views expressed in this paper are those of the authors. No official endorsement by the World Health Organization or Ministry of Health of Ghana/ Ghana Health Service is intended or should be inferred.

#### Authors' contributions

AE Yawson, P Dako-Gyeke, NA Hagan-Seneadza and KL Malm developed the concept, AE Yawson, G Mensah, N Minicuci, N Naidoo, S Chatterji, P Kowal and RB Biritwum are members of the WHO Multi-country SAGE Study Team involved in the conduct and analysis of the SAGE survey in Ghana. S Hewlett, BNL Calys-Tagoe, KL Malm, NA Baddo, P Martey, P Dako-Gyeke, NA Hagan-Seneadza and AE Yawson contributed to the writing and reviewing of the various sections of the manuscript. All the authors reviewed the final version of the manuscript before submission.

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