

Risk factors for non-communicable diseases among older adults in rural Africa

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Summary

OBJECTIVE To expand the evidence base on the prevalence of non-communicable disease (NCD) risk factors in rural Africa, in particular among older adults aged 50 and older.

METHODS Cross-sectional study in three rural sites in Malawi, Rwanda and Tanzania. One person was interviewed from each of 665 households selected through a stratified random sampling procedure across the three sites. The questionnaire included socio-demographic characteristics, smoking and alcohol intake as well as a food frequency questionnaire.

RESULTS Smoking rates among older men and women were higher than among adults under 50. While only 2.3% of women under 50 were current smokers, 21.0% of older women smoked ($P < 0.0001$). Among men, 19.0% of men under 50 smoked versus 36.6% of older men ($P = 0.001$). Alcohol consumption among older women aged 50 and older (45.0%) was more common ($P = 0.005$) than among women under 50 (27.6%). Examining a set of five risk factors, more men aged 50 and older (49.5%) had two or more risk factors than men under 50 (25.5%) ($P < 0.0001$). Similarly, 52.0% of women aged 50 and older had two or more risk factors, versus 24.1% of women under 50 ($P < 0.0001$).

CONCLUSION Contrary to what is seen in developed country settings, this study reveals high rates of smoking and alcohol consumption among men and women aged 50 years and older in rural Africa that puts them at risk of NCDs. The health of older adults in rural Africa has been neglected, and these findings highlight the importance of reaching out to older adults with messaging regarding diet, smoking, alcohol use and general health.

keywords Africa, alcohol, non-communicable disease, risk factors, smoking

Introduction

The health of older people in sub-Saharan Africa (SSA) has largely been neglected (Cohen & Menken 2006; Ferreira & Kowal 2006; Kimokoti & Hamer 2008). This is despite the fact that the percentage growth in the number of those aged 50 and over in SSA from 2005 to 2030 will be the highest of any region of the world with an expected increase of 108% (76–157 million) (United Nations 2009). Part of this neglect is because of the major global emphasis given to addressing pressing priorities among the young including undernutrition and preventable child deaths, the recent focus on maternal mortality, and the scale-up of interventions to address HIV and AIDS. There are major gaps in data on the health of Africa's elderly (Zimmer & Dayton 2005). For example, Demographic and Health Surveys do not include female participants over the age of

49 and often only include men up to age 54 or 59 (Negin & Cumming 2010).

There has been increasing recognition of the burden of non-communicable diseases (NCDs) in SSA which disproportionately affect people over 50 (Kengne & Anderson 2006; Holmes *et al.* 2010; Mbanya *et al.* 2010). Globally, more than 70% of cardiovascular mortality, 40% of chronic respiratory disease deaths, 34% of cancer mortality and about 50% of all chronic disease deaths are attributable to a small number of known modifiable risk factors (Ezzati *et al.* 2003).

Data on the prevalence of some NCD risk factors – including tobacco use, alcohol consumption, overweight, low fruit/vegetable intake, and physical inactivity – are lacking for some parts of SSA despite the availability of some World Health Organization's STEPwise approach to surveillance (STEPS) surveys (World Health Organization

2010a). In particular, the NCD evidence from rural parts of sub-Saharan Africa is limited with more detailed research, including some STEPS surveys, having been conducted only in urban areas (Bovet *et al.* 2002; Ministry of Health [Zambia] and World Health Organization 2008; Tesfaye *et al.* 2008; Njelekela *et al.* 2009). The risk factor evidence for many countries is lacking. Surprisingly, some of the chronic disease risk factor research that has been conducted in SSA has focused on adolescents rather than those at higher risk of NCDs (Kitange *et al.* 1993; Muula *et al.* 2008).

The aim of this paper is to expand the evidence base on the prevalence of NCD risk factors in rural SSA, in particular among older adults aged 50 and over. The objective is to examine NCD risk factors by drawing from cross-sectional data collected from rural sites in three African countries.

Methods

This cross-sectional study was conducted in three Millennium Villages Project (MVP) sites in East Africa. The MVP is a multi-sectoral health and development initiative launched in 2004 that aims to demonstrate that achievement of Millennium Development Goals in rural Africa is possible through community-based, coordinated delivery of science-based interventions at the village level in agriculture, health, education and infrastructure (Sanchez *et al.* 2007). The project is implemented in 14 rural sites in ten sub-Saharan African countries and operated under a strict costing model consistent with the internationally accepted target of 0.7% of rich world's gross national income. This study was conducted in the project's sites in Malawi (Mwandama), Rwanda (Mayange) and Tanzania (Mbola) from January to March 2007.

The detailed methods employed in this sub-study have been described elsewhere in a study on the prevalence of hypertension and its correlates in the study population (de Ramirez *et al.* 2010). Briefly, three hundred households were selected in each project site using a stratified random sampling procedure taking into account household income and gender of the head of household to ensure accurate representation of the larger village population. Of 2091 eligible adults aged 18 and older, 1485 (71%), representing 665 households, were available at home when the enumerators arrived and completed the survey. Enumerators visited homes three times before removing the individual from the survey list. One adult from each household was selected to respond to a food frequency questionnaire including dietary and alcohol intake that is reported in this paper. Those who completed the food questionnaire were

similar to those who did not in terms of sex, age and type of dwelling. Informed consent was obtained from each study participant, and ethical approval was obtained from Malawi's National Health Sciences Research Committee, the Institut National de la Statistique du Rwanda, Tanzania's National Institute for Medical Research and the institutional review board of Columbia University, New York, USA.

Data on socio-demographic characteristics and smoking habits were collected using standardized questionnaires. Physical activity was measured using the World Health Organization's Global Physical Activity Questionnaire (World Health Organization 2006). Health professionals with additional training measured height and weight for body mass index calculations.

Statistical analysis was conducted using SPSS 17.0 (Chicago, IL, USA) and SAS 9.2 (Cary, NC, USA). Continuous variables such as alcohol, fat, dairy and meat consumption that were heavily skewed were re-categorized as 'no consumption' for those who did not consume any and 'consumption' for those that did. Heterogeneity across study sites was assessed using the Breslow-Day tests for categorical variables and using regression procedures for continuous variables. A *P*-value of 0.05 was used to indicate statistical significance.

Results

Of the 654 respondents for whom age was recorded, 193 (29.5%) were aged 50 years and older with the oldest respondent being 97 years of age. In total, 361 respondents were women (55.2%) including 100 (51.8%) of those aged 50 years and older (Table 1). Respondents in the Mwandama, Malawi site comprised 286 (43.7%) of the total study sample, with 194 (29.7%) coming from the Mbola, Tanzania site and 174 (26.6%) from the Mayange, Rwanda community. Of those aged 50 years and older, 72 (37.3%) were from the Malawian village, 65 (33.7%) from the Rwandan village and 56 (29.0%) from the Tanzanian community.

Using the Breslow-Day test and logistic regression models, there was no strong evidence of heterogeneity ($P < 0.05$) across the three countries for differences in risk factors between those aged 50 and older and those aged under 50 thus suggesting appropriateness of pooling the data across the three sites. Doing so, alcohol consumption among older women (45.0%) was significantly ($P = 0.005$) more common than among women under 50 (27.6%). Drinking of alcohol among men aged 50 and older (36.6%) was higher than among men under 50 (27.0%); though, this difference was not statistically significant ($P = 0.25$) (Table 2).

Table 1 Study population characteristics

		Age						Total
		17–29	30–39	40–49	50–59	60–69	70+	
Mwandama, Malawi	Female	61	42	20	17	14	10	164
	Male	32	38	21	12	11	8	122
Mayange, Rwanda	Female	34	20	23	17	14	11	119
	Male	21	6	5	7	5	11	55
Mbola, Tanzania	Female	31	18	12	7	5	5	78
	Male	32	30	15	17	12	10	116
	Total	211	154	96	77	61	55	654

Table 2 Distribution of NCD risk factors by age and gender

		Female			Male		
		<50	≥50	<i>P</i> -value	<50	≥50	<i>P</i> -value
N		261	100		200	93	
Alcohol intake	No alcohol consumption	189 (72.4)	55 (55.0)	0.005	146 (73.0)	59 (63.4)	0.25
	One or fewer drinks per day	65 (24.9)	39 (39.0)		48 (24.0)	30 (32.3)	
	More than one drink per day	7 (2.7)	6 (6.0)		6 (3.0)	4 (4.3)	
Smoking	Yes, current smoker	6 (2.3)	21 (21.0)	<0.0001	38 (19.0)	34 (36.6)	0.001
Vigorous physical activity	Yes	164 (62.8)	61 (61.0)	0.72	144 (72.0)	50 (64.5)	0.04
Hypertension	Yes	28 (10.7)	41 (41.0)	<0.0001	29 (14.5)	34 (36.6)	<0.0001
Overweight	N	248	94		189	91	
	Yes	30 (12.1)	14 (14.9)	0.49	14 (7.4)	7 (7.7)	0.93

NCD, non-communicable disease.

Smoking rates among older men and women were higher than among adults under 50. While only 2.3% of women under 50 were current smokers, 21.0% of older women smoked ($P < 0.0001$). Among men, 19.0% of men under 50 smoked compared to 36.6% of older men ($P = 0.001$) (Table 2).

Men aged 50 and older were less physically active than men under 50 ($P = 0.039$) but there was no difference in physical activity between older and younger women (Table 2). Hypertension rates were significantly higher in older men than men under 50 and in older than younger women, as reported in more detail elsewhere (de Ramirez *et al.* 2010). There were no statistically significant differences in the prevalence of overweight (BMI ≥ 25) between younger men and older men and between younger women and older women (Table 2). The prevalence of overweight in women aged 50 and older (14.9%) was almost double that among men aged 50 and older (7.7%) ($P = 0.123$). This was particularly pronounced in the Malawi and Tanzanian sites.

Examining these five risk factors further, those aged 50 and above were more likely to have multiple risk factors than those aged under 50. Of the men aged 50 and older,

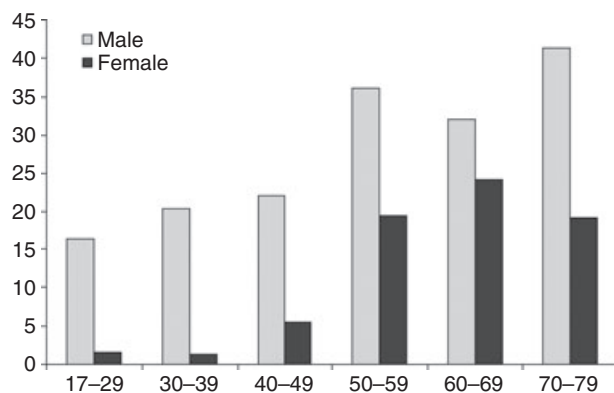
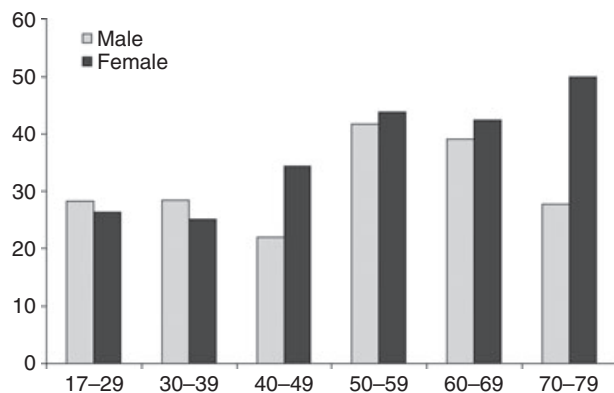
49.5% had two or more risk factors compared to 25.5% of men under 50 ($P < 0.0001$). Similarly, 52.0% of women aged 50 and older had two or more risk factors compared to 24.1% of women under 50 ($P < 0.0001$). One-quarter of women aged 50 and older had three or more risk factors.

Further breakdown of age groups into 10-year bands revealed additional insights (Figures 1 and 2). While alcohol consumption among men peaked at the age of 50–59, drinking among women increased with age, with the highest prevalence of alcohol drinking (50%) being among women aged 70 years and older. The highest prevalences of smoking were seen among men aged 70 years and older (41.4%) and among women aged 60–69 years (24.2%). BMI among men gradually decreased with age; men aged 70 and older had the lowest mean BMI of any age group (18.87).

Analysis of data from the food frequency questionnaire (Table 3) showed that a large number of respondents did not consume any dairy (73% of women over 50) and quite a few (up to 43% of women over 50) did not consume any meat. Consumption of meat was lower among older adults, both men and women, than among adults under 50 ($P = 0.0014$ for women and $P = 0.0305$ for men). Additionally, women aged 50 and over consumed fewer fruits

Table 3 Food consumption by age and gender

		Female			Male		
		<50	≥50	<i>P</i> -value	<50	≥50	<i>P</i> -value
<i>N</i>		261	100		200	93	
Fruit and vegetables	Median daily intake, number of times consumed	11.65	10.49	0.10	11.32	11.66	0.66
Fat consumption	Yes – percentage who consumed fat that day	88.0%	87.1%	0.44	80.5%	84.0%	0.83
Dairy consumption	Yes – percentage who consumed dairy that day	35.2%	27.0%	0.14	45.0%	37.6%	0.24
Meat consumption	Yes – percentage who consumed meat that day	74.3%	57.0%	0.001	83.0%	72.0%	0.03

**Figure 1** Percentage of respondents who are current smokers by gender and age band.**Figure 2** Percentage of respondents who consume alcohol by gender and age band.

and vegetables than women under 50 and fewer than men of any age. Dairy consumption among older adults was also lower than among younger adults. These differences in dietary intake were not statistically significant.

The only evidence of cross-site difference (heterogeneity of $P < 0.05$) was for vigorous physical activity among men

(P for heterogeneity = 0.08). Whereas older men in Malawi were less physically active than those aged under 50, older men in Rwanda were considerably more active than men under 50 and there was almost no difference in Tanzania.

Discussion

The study reveals that men and women aged 50 years and older in rural Africa engage in a number of behaviours that put them at high risk of NCDs. While it is well known that hypertension rates generally increase with age, smoking rates and alcohol consumption among older adults were significantly higher than among those aged under 50 contrary to the pattern seen in a number of developed countries (Scollo & Winstanley 2008; Robinson & Bugler 2010; United States Department of Health and Human Services 2010). More than half of those aged 50 and older had two or more NCD risk factors, suggesting that there is need for urgent action to address NCDs.

While no STEPS surveys have been conducted for Rwanda and Tanzania, the 2009 Malawi STEPS Survey provides some similar data to that presented here (Ministry of Health [Malawi] and World Health Organization 2010). The STEPS survey revealed that more men and women aged 55–64 smoked than younger age brackets, confirming the data found in our study. The rates of smoking among Malawian women aged 50 and older in our study were considerably higher than the national figures found in the STEPS survey – some of which might be accounted for by the higher rates of smoking in rural compared to urban areas found in the STEPS report. The Malawi STEPS study confirmed that current drinking was more frequent among older than younger women. Rates of overweight in the Malawian respondents in our study were lower than in the national STEPS data but this can likely be explained by the lower rates of overweight in rural areas confirmed by STEPS.

African studies in younger age groups generally confirm the findings presented in this paper. The large disparity in smoking rates between men and women has been found in

various studies including Demographic and Health Surveys (DHS). The Tanzania DHS of 2004–05 shows that 0.5% of rural women and 22% of rural men aged 15–49 currently smoke cigarettes (National Bureau of Statistics [Tanzania] and ORC Macro 2005), which matches quite closely to the data presented here from Mbola. Rwanda's 2005 DHS revealed that while only 3% of women 20–34 smoked, 11% of those 35–49 did (Institut National de la Statistique du Rwanda and ORC Macro 2006). Smoking in Rwanda is also more common in rural areas. The 2000 Malawi DHS showed that only 2% of women aged 15–49 smoked compared to 25% of men aged 15–54 (National Statistical Office [Malawi] and ORC Macro 2001).

The percentage of current alcohol drinkers in our study was at the high end of that seen in a recent cross-Africa study among those aged 18 and older in 20 countries (Clausen *et al.* 2009). In that study, those who had had a drink in the previous week did not exceed 33% in any country with abstention rates as high as 80% for women. Contrary to our findings, some African studies have found that younger women are more likely to drink than older women (Mamman *et al.* 2002).

Our study found lower rates of obesity than in studies with data from urban areas. A Tanzania study found obesity rates of 13% in men and 35% in women in urban areas with correspondingly high rates of NCDs (Njelekela *et al.* 2009). In another urban Tanzania study, levels of BMI increased up to the age of 45–54 years and dropped slightly thereafter in both men and women (Bovet *et al.* 2002). Another study also found low rates of obesity in rural areas of Tanzania but higher rates in women than men (Njelekela *et al.* 2001).

The majority of work conducted on NCD risk factors in Africa has not been conducted among older people. Across SSA, the health of older adults has by and large been neglected. At the same time, NCDs have not received sufficient attention by the global community. Older adults in SSA, who are more likely to have higher rates of NCDs, play a significant role as productive labour, as carers and as community leaders and therefore need to be included in health interventions.

The findings reported here highlight the importance of reaching out to older adults with messaging regarding diet, smoking, alcohol use and general health. The higher rates of smoking and alcohol use revealed in these sites have important implications for the health of older people. Beyond putting older Africans at higher risk of NCDs, alcohol consumption is also associated with HIV transmission (Fritz *et al.* 2010), tuberculosis (Rehm *et al.* 2009) and intimate partner violence (Ntaganira *et al.* 2009).

Prevention of NCDs as well as treatment needs to be integrated into rural primary care (Maher *et al.* 2009,

2010a). Rather than developing vertical NCD programs, policymakers and governments should focus on developing chronic care delivery systems that can leverage the investment in management of chronic HIV and tuberculosis (Setel *et al.* 2004; Janssens *et al.* 2007; Bischoff *et al.* 2009).

This paper fills a gap in the data by focusing on NCD risk factors in remote, impoverished communities in SSA including in two countries where STEPS surveys have not been conducted. The survey covers multiple risk factors and uses validated tools across countries. Despite this, the measures of dietary intake using the food frequency questionnaire are likely to be crude and might misrepresent true consumption. Recent studies have suggested that the internationally established BMI cut-offs for overweight and obesity may not be appropriate indicators of NCD risk in some African populations with waist circumference perhaps being a more sensitive measure (Steyn *et al.* 2005; Maher *et al.* 2010b).

More information on NCDs and risk factors will increasingly become available as STEPS surveys are completed but STEPS generally only interview individuals aged up to 64 years of age. More recently, WHO studies on global ageing and adult health (SAGE) have been conducted in countries including Ghana and South Africa and will provide robust data on the health of older people including on NCD risk factors (World Health Organization 2010b). The United Nations General Assembly has agreed to hold a special session on NCDs in September 2011, marking global recognition of the emerging health crisis. It is important that the meeting does not ignore older people in developing countries. In advance of that meeting and the global action that must ensue, it is hoped that the findings of this study will help put NCDs in older adults in SSA in greater focus and help contribute to the required development of appropriate health planning and implementation strategies (Beaglehole *et al.* 2007).

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