

# The health and well-being of older people in Nairobi's slums

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**Background:** Globally, it is estimated that people aged 60 and over constitute more than 11% of the population, with the corresponding proportion in developing countries being 8%. Rapid urbanisation in sub-Saharan Africa (SSA), fuelled in part by rural–urban migration and a devastating HIV/AIDS epidemic, has altered the status of older people in many SSA societies. Few studies have, however, looked at the health of older people in SSA. This study aims to describe the health and well-being of older people in two Nairobi slums.

**Methods:** Data were collected from residents of the areas covered by the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) aged 50 years and over by 1 October 2006. Health status was assessed using the short SAGE (Study on Global AGEing and Adult Health) form. Mean WHO Quality of Life (WHOQoL) and a composite health score were computed and binary variables generated using the median as the cut-off. Logistic regression was used to determine factors associated with poor quality of life (QoL) and poor health status.

**Results:** Out of 2,696 older people resident in the NUHDSS surveillance area during the study period, data were collected on 2,072. The majority of respondents were male, aged 50–60 years. The mean WHOQoL score was 71.3 (SD 6.7) and mean composite health score was 70.6 (SD 13.9). Males had significantly better QoL and health status than females and older respondents had worse outcomes than younger ones. Sex, age, education level and marital status were significantly associated with QoL, while slum of residence was significantly associated with health status.

**Conclusion:** The study adds to the literature on health and well-being of older people in SSA, especially those in urban informal settlements. Further studies are needed to validate the methods used for assessing health status and to provide comparisons from other settings. Health and Demographic Surveillance Systems have the potential to conduct such studies and to evaluate health and well-being over time.

Keywords: *Nairobi; slum settlements; older people; ageing; well-being; quality of life; INDEPTH WHO-SAGE*

Access the supplementary material to this article: INDEPTH WHO-SAGE questionnaire (including variants of vignettes), a data dictionary and a password-protected dataset (see **Supplementary files** under **Reading Tools** online). To obtain a password for the dataset, please send a request with 'SAGE data' as its subject, detailing how you propose to use the data, to [global.health@epiph.umu.se](mailto:global.health@epiph.umu.se)

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The proportion of older people is increasing worldwide. Globally, it is estimated that people aged 60 and over currently constitute more than 11% of the population; over 20% in developed nations and about 8% in developing ones. The proportion of older people globally is expected to double to 22% by 2050 (1). In Africa, people aged 60 and over account for only 5% of the population; this is projected to increase to 11% by 2050 (2). In this study setting, people aged 60 and over constituted 1.6% of the population, and those aged 50

and over constituted 4.9% of the population under surveillance. It is estimated that people aged 60 and over in Kenya as a whole constituted 4.0% of the total population in 2005 and this proportion is expected to increase to 4.5% by 2015 and to 9.3% by 2050 (3). Older people will therefore form an increasingly important subgroup in numeric terms in developing nations.

Older people have traditionally been held in high esteem in many African societies for their wisdom, role as heads of families and roles in conflict resolution. More

recently, older people have been involved in the fight against HIV/AIDS, especially in their role as caregivers for HIV-infected family members and orphans left behind by deceased relatives. On the other hand, older people have not been spared by the direct effects of HIV/AIDS. A recent AIDS indicator survey in Kenya shows that the HIV prevalence among the 50–54 years age group is 8% (similar for both males and females). The prevalence for females is similar to that in the 45–49 age group while for males, the prevalence is higher in the 50–54 age group. The HIV prevalence in urban areas is also higher than in rural areas (8.9% vs. 7.0%) (4) and even higher (11.4%) in the study area according to a recent survey (APHRC, unpublished data). Apart from HIV/AIDS, older people are also most affected by chronic degenerative diseases. This implies that in Kenya and many other countries in sub-Saharan Africa (SSA), older people most probably bear a dual burden of disease.

Population ageing is occurring in a context of rapid urbanisation in SSA. Africa is urbanising at a rate faster than any other region in the world and by 2030 more than half of the SSA population will live in urban areas (5). The pace of urbanisation in many SSA countries has not been matched by economic growth. In fact, in countries like Kenya, urbanisation has been rapid amid economic stagnation. This has resulted in an increase in the number and size of informal settlements or slums in many cities. It is estimated that more than 70% of urban residents in SSA live in slum or slum-like conditions. In Kenya, this percentage is about 71% (6). The informal nature of these settlements means that they are underserved by the public sector in the provision of basic amenities and services including health, education, water and sanitation, and garbage collection services. Slums are also characterised by high levels of unemployment, overcrowding, insecurity, greater involvement in risky sexual practices, social fragmentation, and high levels of mobility (7–9). Studies from different SSA countries have shown that slum residents have worse health outcomes than their rural counterparts (10–13). For example, childhood mortality in poor urban areas of Zambia and Malawi is higher than in rural and peri-urban areas (11, 14). Desperate living conditions and lack of livelihood opportunities could predispose residents to risky health-related behaviours such as high alcohol consumption, unsafe sex, smoking and other substance abuse. All these factors have adverse effects on health which may be compounded by poor access to health services.

Ageing in an urban setting, especially a slum settlement, poses its own challenges. These include weak social networks, neglect and loss of respect and stature that are often accorded older people in more stable communities. It should be expected, therefore, that older people in slum settlements have poor or even poorer health outcomes just like other sub-populations therein.

As the HIV/AIDS pandemic rages in SSA and as slums grow in a rapidly urbanising continent, it is important that the impact of these processes on older people is assessed and addressed. The intersection between the HIV/AIDS pandemic, population ageing and uncontrolled urbanisation in SSA will have far-reaching consequences on the social, economic and health spheres of societies.

Despite the evident need to understand issues that affect older people in SSA, relative to other demographic trends, ageing in Africa has only recently started receiving attention in research and policy-making. There is a near absence of policies and programmes targeting older people in most countries in SSA (15), and Kenya is no exception. Health policies and programmes are geared towards the traditional vulnerable groups of women of reproductive age and children. The current National Health Sector Strategic Plan however recognises that older people have special needs that are different from other adults and hence spells out specific interventions for older people (16). In addition to regular curative and preventive services, such interventions include annual screening and provision of curative services for degenerative diseases, and counselling for lifestyle changes. It remains to be seen whether these interventions have been translated into real programmes that serve older people in health facilities.

The fact that older people have been long neglected in many policies and programmes in Kenya means that there is a dearth of research on their health and well-being. This study therefore aims to fill the gap in ageing research in Africa by describing the health and well-being of older people living in two Nairobi slums.

## Methods

### Study setting

The study was conducted in two slum communities where the African Population and Health Research Centre (APHRC) is implementing the longitudinal Nairobi Urban Health and Demographic Surveillance System (NUHDSS). The NUHDSS covers large parts of the two slums of Korogocho and Viwandani in Nairobi City, Kenya's capital and commercial centre. Both communities are informal settlements located about 5–10 km from the city centre. The population under surveillance as of 1 January 2007 was 59,513 individuals living in 21,993 households.

The NUHDSS started after an initial census in August 2002. Since January 2003, data on core demographic events (births, deaths, in- and out-migrations) have been collected and updated every 4 months during routine Health and Demographic Surveillance System (HDSS) rounds.

## Data collection

Data for this study was collected from all residents of the NUHDSS who were aged 50 years and over as of 1 October 2006. Eligible participants ( $n=2,696$ ) were identified from the most up-to-date NUHDSS database at the time. Data were collected on 2,072 respondents who had complete interviews and only these were included in the analysis. Out of the 624 who were not interviewed, 102 refused to be interviewed, 27 had died, 213 had out-migrated and no contact was made with the rest for various reasons including absence of a competent respondent, entire household absent for prolonged periods and unknown whereabouts. The final response rate was 84.4% after omitting the 240 older people later found to have died or out-migrated.

Data were collected in the framework of a larger study on the linkages between urbanisation, migration, poverty and health over the life course. An interviewer-administered questionnaire was used to collect data. Interviewers had a minimum education level of Form 4 (12 years of schooling) and were residents in the NUHDSS area. They were trained over a five-day period followed by two days of field testing. Each group of five interviewers was supervised by a team leader who manually edited all completed forms, conducted random spot checks on at least 5% of forms filled by each field worker under his/her supervision, and offered additional training whenever necessary.

Self-reported health status was assessed using the short form of the individual SAGE (Study on Global Ageing and Adult Health) questionnaire, available as a Supplementary File to this paper. Details of how this tool was developed, validated and adapted for use in this survey are described elsewhere (17). In brief, this form has sections on health status descriptions in eight domains of health including mobility, self-care, affect, vision, pain and discomfort, sleep/energy, interpersonal activities and cognition. Typically, questions ask about how much difficulty the respondent had had in the preceding 30 days with tasks or activities in the eight domains. Responses range from no difficulty to extreme difficulty on a five-item scale. In addition, the SAGE form has questions on functioning assessment using items in the Activities of Daily Living / Instrumental Activities of Daily Living (ADL/IADL) tool as well as on Subjective Well-being and Quality of Life (QoL).

This paper focuses on two measures of self-reported health status: QoL and health status scores. The QoL was assessed using the World Health Organization Quality of Life tool (WHOQoL) score, on a scale from 0 to 100 where 100 is the best QoL. Details of how this is computed are described elsewhere (17). Health status scores were computed using Item Response Theory (IRT) parameter estimates in Winsteps<sup>®</sup>, a Rasch measurement software package (<http://www.winsteps.com>). More de-

tails on how scores for this study were derived are provided elsewhere (17). In brief, IRT uses Maximum Likelihood Estimation methods to model the relationship between a person's health status and their probability of responding to each question in a multi-item scale. Each item is modelled to have a set of parameters which describe the relationship between the item and the measured construct as well as how the item functions within a population. The health score is then transformed to a scale of 0 to 100 (where 100 is the best health status). More details on the application of the IRT approach to computing patient-reported health outcomes are available in the paper by Chang and Reeve (18).

## Statistical analysis

Descriptive analyses were conducted for both measures of health. For WHOQoL, mean scores were computed for different categories of respondents. The different categories include: sex (male, female), age (age groups: 50–59, 60–69, 70–79, 80+), educational level (no formal education, up to 6 years of formal education, more than 6 years of education), marital status (in current partnership, never married, separated, divorced and widowed), wealth index (quintiles), whether respondent stays alone (Yes, No) and proportion of people aged 50 years and over in the same household (<25%, 25–49%, 50–74%, 75%+). In addition, the proportion of respondents in each category with a WHOQoL score less than the median was computed. For the health status score, mean scores were also calculated and the proportion of respondents falling below the overall median score was calculated for each category of respondents.

Exploratory analyses were conducted to determine the factors associated with poor QoL and poor health status. For both measures of health, respondents who had scores below the median were categorised as having poor QoL or poor health, respectively.

In order to investigate the effect of non-response, we fitted a logistic regression model using response status as the outcome and key socioeconomic and demographic characteristics as explanatory variables. A completed interview was defined as response while an incomplete interview for a participant determined to be resident in the study area at any time during the survey was considered non-response. Gender, education and wealth index were found to be associated with non-response. The predicted probability of responding was calculated for every individual in the data using the fitted model. Once the predicted probability was calculated, its inverse became the weight for that observation. The computed weights were re-adjusted to approximately add up to the sample size. These weights were included in subsequent univariate and multivariable logistic regressions using the categorical health outcomes described above to adjust for non-response. The variables found to be associated with

non-response were also included in the model as predictors. Results are presented for the models adjusted for non-response.

## Results

The descriptive characteristics of the study participants are shown in Table 1. The characteristics of non-respondents are also shown. Demographic characteristics for non-respondents were obtained from the existing

**Table 1.** Background characteristics of study subject (respondents and non-respondents)

Variables	Respondents (N = 2,072)	Non-respondents (N = 384)
Sex (%)		
Men	1,327 (64.4%)	302 (79.1%)
Women	745 (36.0%)	80 (20.9%)
Mean age (SD)	59.2 (9.06)	57.1 (7.5)
Age group		
50–59 years	1,358 (65.4%)	283 (73.9%)
60–69 years	458 (22.1%)	69 (18.0%)
70–79 years	163 (7.9%)	23 (6.0%)
80 years and over	93 (4.5%)	8 (2.1%)
Education level (%)		
No formal education	571 (28.7%)	77 (21.4%)
Less than or equal to 6 years	562 (28.2%)	81 (22.5%)
More than 6 years	858 (43.2%)	202 (56.1%)
Marital status (%)		
Now single	662 (32.0%)	–
In current partnership	1,410 (68.1%)	–
Wealth index (%)		
First quintile (Poorest)	518 (25.0%)	177 (46.3%)
Second quintile	206 (10.0%)	6 (1.6%)
Third quintile	514 (24.8%)	16 (4.2%)
Fourth quintile	453 (21.9%)	69 (18.1%)
Fifth quintile (Least poor)	380 (18.4%)	114 (29.8%)
Mean number of household members (SD)	4.12 (3.19)	3.0 (2.5)
Proportion of household members aged 50 years and over (SD)	0.52 (0.34)	0.62 (0.3)
Stays alone		
Yes	496 (24.0%)	140 (36.5%)
No	1,576 (76.0%)	244 (63.5%)
Site of residence (%)		
Korogocho	1,462 (70.6%)	214 (55.7%)
Viwandani	610 (29.4%)	170 (44.3%)

NUHDSS database. Marital status for non-respondents could not be established since this variable is not routinely collected and may change over time. There were no major differences between respondents and non-respondents except for wealth index, where a larger proportion of non-respondents fell in the poorest wealth quintile compared to respondents, and living arrangements, whereby a quarter of the respondents were staying alone compared to more than a third of non-respondents. These differences were both statistically significant ( $p < 0.001$ ). Among both respondents and non-respondents, there were more males than females and the majority of respondents were in the 50–59 year age group. A majority of the respondents had at least six or more years of schooling. The average number of household members for the respondents was about four members per household compared to about three for non-respondents.

## The distribution of WHOQoL and health status scores

The distribution of WHOQoL and health status scores is shown in Table 2. The median values used as cut-offs were 71.9 for WHOQoL and 67.5 for health status. The higher the WHOQoL score, the better the QoL, and the higher the health status scores, the better the health status. The mean WHOQoL score was lower for older

**Table 2.** Distribution of WHOQoL and Health Status Scores by age and sex

Variables	Men (n = 1,331)	Women (n = 747)
Mean WHOQoL score (SD)		
50–59 years	73.1 (5.8)	70.9 (6.3)
60–69 years	71.9 (6.4)	68.3 (6.6)
70–79 years	71.1 (6.2)	65.7 (7.2)
80 years and over	67.3 (9.1)	63.8 (8.5)
Proportion of respondents with WHOQoL below the median		
50–59 years	32.0%	45.8%
60–69 years	43.9%	64.6%
70–79 years	51.9%	79.8%
80 years and over	71.1%	78.2%
Mean health status score (SD)		
50–59 years	74.7 (13.9)	69.7 (12.5)
60–69 years	71.0 (12.9)	63.9 (10.6)
70–79 years	69.0 (13.3)	60.2 (10.6)
80 years and over	59.3 (15.9)	56.6 (10.9)
Proportion of respondents with health status score below the median		
50–59 years	33.3%	50.8%
60–69 years	49.1%	73.5%
70–79 years	46.8%	83.3%
80 years and over	79.0%	90.9%

respondents but with some sex differences. Female respondents had, on average, appreciably lower WHOQoL scores than their male counterparts in the same age group. Similar effects were observed when the proportions of respondents with a WHOQoL score below the median were considered, with poorer QoL associated with women and older age groups.

A similar pattern to that observed for WHOQoL scores was observed with the health status scores. The average health status scores decreased with increasing age and females have lower scores than males, indicating worse health status. The proportion with health status scores below the median increased with age, particularly among females.

The results for the two measures of self-reported health status consistently showed that health status and QoL deteriorated in both sexes as people got older and that females had significantly worse health outcomes than males.

### Factors associated with poor QoL and poor health status

Both univariate and adjusted logistic regression results using WHOQoL as the outcome are presented in Table 3. Male respondents were significantly less likely to have poor WHOQoL compared to females in the univariate models. However in adjusted models, this effect was attenuated and was of borderline statistical significance. An age gradient, consistent with the descriptive results, is observed in the logistic regression models. In adjusted models, the oldest respondents (80+) had almost three times the risk of having poor QoL as the youngest respondents (50–59 years). An education gradient was also observed whereby individuals with no education or less than 6 years of education were more likely to report poor QoL compared to those with more than 6 years of education. This association was significant in both univariate and adjusted models. Marital status was found to be associated with QoL. Respondents who were in some kind of partnership were least likely to report poor QoL. Separated and widowed respondents had significantly worse QoL than those in partnership. There was no significant relationship between the proportion of older people living in a household and QoL. Wealth index had an inverted-V relationship with QoL. In adjusted models, respondents in the poorest and least poor quintiles had similar odds of reporting poor QoL while those in the second quintile had higher odds of poor QoL. Only the odds ratio for being in the second quintile approached statistical significance.

The results on factors associated with poor self-reported health state are presented in Table 4. Poor health status was associated with gender, age, educational level and marital status among older people. As observed with QoL, male respondents were less likely to report poor

**Table 3.** Factors associated with poor quality of life

Variables	Univariate model (OR and 95% CI)	Multivariate model (OR and 95% CI)
<b>Site</b>		
Viwandani	0.59 (0.49–0.72)	0.85 (0.68–1.07)
Korogocho	1.00	1.00
<b>Sex</b>		
Men	0.44 (0.36–0.53)	0.78 (0.61–1.01)
Women (Ref)	1.00	1.00
<b>Age group</b>		
50–59 years	1.00	1.00
60–69 years	1.97 (1.59–2.45)	1.55 (1.22–1.96)
70–79 years	3.59 (2.48–4.95)	2.06(1.40–3.02)
80 years and over	5.42 (3.33–8.81)	2.94 (1.71–5.02)
<b>Education level</b>		
No formal education	3.07 (2.46–3.82)	1.68 (1.29–2.18)
Less than or equal to 6 years	1.73 (1.39–2.16)	1.25 (0.98–1.60)
More than 6 years (Ref)	1.00	1.00
<b>Marital status</b>		
In current partnership (Ref)	1.00	1.00
Never married	1.63 (1.04–2.54)	1.17 (0.71–1.92)
Separated	2.12 (1.47–3.04)	1.55 (1.04–2.31)
Divorced	2.31 (1.40–3.80)	1.52 (0.87–2.64)
Widowed	2.79 (2.20–3.52)	1.52 (1.12–2.07)
<b>Proportion aged 50 years and over in the same household</b>		
<25%	0.96 (0.76–1.20)	1.03 (0.80–1.34)
25–49%	0.96 (0.76–1.21)	1.01 (0.78–1.31)
50–74%	0.68 (0.53–0.88)	0.72 (0.54–0.96)
≥75% (Ref)	1.00	1.00
<b>Wealth Index</b>		
First quintile	0.96 (0.73–1.26)	1.01 (0.74–1.37)
Second quintile	2.18 (1.61–2.95)	1.37 (0.98–1.91)
Third quintile	1.46 (1.10–1.93)	1.22 (0.90–1.65)
Fourth quintile	1.29 (0.98–1.71)	1.06 (0.78–1.44)
Fifth quintile (Ref)	1.00	1.00

health as compared to female counterparts (Adjusted odds ratio: 0.69, 95% CI: 0.54–0.89) and the oldest respondents were close to six times as likely to report poor health as the youngest in adjusted models. Individuals with no formal education were more likely to report poor health compared to those with more than 6 years of education. Individuals who were never married were almost twice as likely to report poor health status compared to those who were in partnership while

**Table 4.** Factors associated with poor health status

Variables	Univariate model (OR and 95% CI)	Multivariate model (OR and 95% CI)
<b>Site</b>		
Viwandani	0.38 (0.31–0.46)	0.50 (0.40–0.63)
Korogocho	1.00	1.00
<b>Sex</b>		
Men	0.36 (0.30–0.43)	0.67 (0.52–0.86)
Women	1.00	1.00
<b>Age group</b>		
50–59 years	1.00	1.00
60–69 years	2.32 (1.86–2.88)	1.83 (1.43–2.34)
70–79 years	3.06 (2.17–4.31)	1.73 (1.17–2.60)
80 years and over	9.47 (5.20–17.26)	5.66 (3.00–10.69)
<b>Education level</b>		
No formal education	3.27 (2.62–4.08)	1.50 (1.16–1.96)
Less than or equal to 6 years	1.77 (1.42–2.20)	1.19 (0.94–1.52)
More than 6 years	1.00	1.00
<b>Marital status</b>		
In current partnership (Ref)	1.00	1.00
Never married	2.86 (1.79–4.56)	1.88 (1.10–3.19)
Separated	1.91 (1.33–2.74)	1.24 (0.82–1.89)
Divorced	2.42 (1.46–4.01)	1.45 (0.83–2.53)
Widowed	3.48 (2.72–4.43)	1.59 (1.16–2.18)
<b>Proportion aged 50 years and over in the same household</b>		
<25%	1.09 (0.86–1.37)	1.10 (0.80–1.43)
25–49%	1.08 (0.85–1.36)	1.11 (0.85–1.46)
50–74%	0.92 (0.71–1.18)	0.97 (0.72–1.29)
≥75%	1.00	1.00
<b>Wealth index</b>		
First quintile	0.78 (0.60–1.03)	1.02 (0.75–1.40)
Second quintile	1.78 (1.32–2.40)	1.12 (0.80–1.57)
Third quintile	1.31 (1.00–1.73)	1.05 (0.77–1.42)
Fourth quintile	1.16 (0.88–1.52)	0.88 (0.65–1.19)
Fifth quintile	1.00	1.00

widowed individuals were 1.6 times more likely. The wealth index and proportion of people aged 50 years and over in the household were not significantly associated with reported health status.

## Discussion

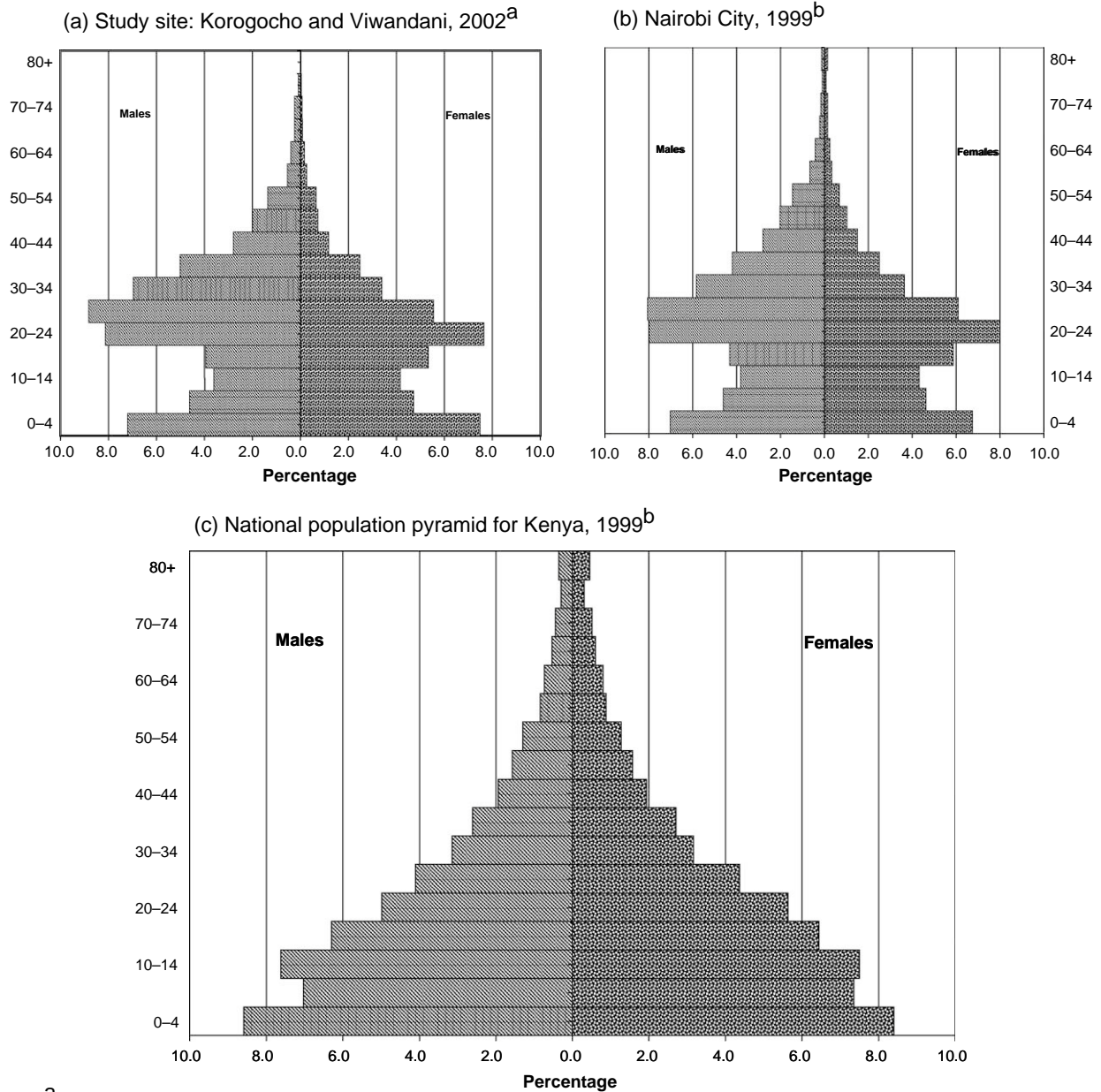
Kenya, like many SSA countries, has been hard hit by the HIV/AIDS epidemic. During the 1980s, Kenya's child mortality declined steadily until the 1990s, when a reversal in the trend was observed (19). The reversal in childhood mortality coincided with an economic crisis

and could have been exacerbated by the growth of the HIV/AIDS epidemic. As a result, Kenya is a country still in the early stages of the health transition. However, as non-communicable diseases gain a foothold in SSA, it is unlikely that the country will follow a uni-directional path towards the second and third stages of the health transition. While there is paucity of data on the magnitude of the non-communicable disease burden in the country, studies show that the prevalence of risk factors for these illnesses is increasing (20). Within the study setting, there is a high mortality burden from HIV/AIDS (21) but in the absence of morbidity studies, it is hard to quantify the extent to which the country could be enduring a dual burden of disease characterised by high mortality and morbidity from both infectious diseases and non-communicable diseases as has been suggested.

The proportion of older people in the study area is lower than the national estimate (3) and this is due to the fact that more young people in the economically productive age groups migrate and stay in the city to find work and economic opportunities. For similar reasons, in all age groups except the population under 15 years, the number of males is more than double that of females in the study area. Since migrants into the NUHDSS constitute a very large proportion of residents, sex differences are even greater at older ages since older females are less likely to migrate and historically, more males migrated to cities. These reasons partly explain why we have a high proportion of older people (25%) staying alone. Other reasons for this observation may include widowhood especially among females, divorce or separation or split households where other family members are left in rural areas while the older person works in the city (22). The study area has a sex and age distribution which is unlike the national one but is similar to the distribution for Nairobi city (Fig. 1). The population pyramids in Fig. 1 (a) and (b) both show a predominance of the 20–29 year age groups among males and females and significant narrowing of the pyramid after the age of 50 years which is more pronounced among females.

The sex and age distribution is also different between the two slums because Viwandani slum, being near the industrial area, is mostly inhabited by migrant male labourers seeking job opportunities in the surrounding industries. Older people who are less likely to find employment in the industries are therefore less likely to reside in Viwandani and prefer Korogocho and other slums where they are mostly engaged in informal businesses.

Qualitative research in the Nairobi slums where the study was conducted shows that older people play several important roles in society. They are considered fair arbitrators in disputes within families and in the community. They are also considered to have a wealth of experience and wisdom and hence their advice is sought



<sup>a</sup>Source: APHRC NUHDSS data.

<sup>b</sup>Source: Ref. (22).

*Fig. 1.* Population pyramids for the study area, Nairobi City and the whole of Kenya

on various issues. Older people are also perceived as important in community development initiatives where they provide leadership and counsel though they are also perceived by some as gatekeepers and impediments to development. During community crises, they play a leading role in mobilising the community (22). These roles are in addition to more traditional roles of heads of household, breadwinners and care givers for grandchildren. However, older people are also more vulnerable in these settings due to altered family structures and

living arrangements. Almost 25% of the respondents live alone and are therefore more likely to be deprived of social support structures. The HIV/AIDS epidemic in SSA has also led to an increased number of orphans, most of whom are cared for by grandparents who are likely to be older people (23). In the study area, 19.5% of respondents were looking after children below the age of 15 years. Out of these 1,019 children, 770 were either orphans or their parents' whereabouts were unknown.

Older people in many parts of SSA have been engaged in efforts to mitigate the effects of HIV/AIDS due to the increased mortality of people in the reproductive and more economically productive age groups. The high HIV/AIDS and tuberculosis burden in the study area (20) means that the chronic ill-health associated with these conditions has led to role reversal whereby older people are providing care to their ill and dying family members. About 7% of respondents were caring for someone with a prolonged illness at the time of the interview while another 6% had cared for someone in the past 3 years. Such responsibilities, coupled with economic adversity, may negatively affect the health and well-being of older people.

With respect to the specific findings, in both univariate and multivariate analysis for the measure of self-reported health, females have worse outcomes than males at all age groups; these deteriorate, as expected, with age. Older female disadvantage in health status has been described in industrialised country settings (24–26), and so our findings add to the body of evidence supporting this association.

Korogocho respondents have significantly worse health outcomes than Viwandani residents. Other studies in the NUHDSS have shown similar findings in other age groups but it is unclear what the underlying reasons are since both slums have poor environmental sanitation and poor access to social services. Viwandani is however inhabited by mostly labour migrants seeking employment in the nearby industrial area and hence there are more employment opportunities. In addition, a larger proportion of residents in Viwandani stay for short periods and then move on compared to Korogocho. It is possible that residents do not stay long enough to be exposed to the hazardous slum environment or that, in the Viwandani cash-based economy, economically unsuccessful migrants, who could potentially have worse outcomes, move elsewhere and leave behind the more successful ones. This is apparent in the characteristics of non-respondents, who are more likely to be from Viwandani and also more likely to be in the poorest wealth quintile. A migrant tracking study that assesses reasons for migration out of the slums and post-migration economic and health status, while logistically extremely challenging, would be helpful in clarifying these issues.

As expected, a clear age gradient is observed for both measures of health status; however the gradient is steeper for the self-reported health status than for QoL. Marital status has a significant effect on health outcomes though the pattern of the effect differs for the two health outcomes. In both cases, married respondents or those in partnership have better health outcomes than other respondents. The relationship between being married and well-being has long been established (26, 27), albeit with other health outcomes, as has the association between poor health outcomes and widowhood and never married status.

The association between wealth index and QoL is an inverted V-shape but this variable had no significant association with reported health status. This could be explained by the lower response rates among the poorest wealth quintiles compared to other quintiles. On the other hand, in an environment with high levels of deprivation, it is possible that differences in wealth are marginal in real terms and have no tangible impact on health outcomes.

Self-reported measures of health status have not been widely used in SSA in general nor in Kenya in particular. Their validity as a measure of health has therefore not been established, but the finding of steep age and education gradients with worse female health scores point to a good degree of internal validity.

It is known that the validity of self-reported measures of health and their reliability are influenced by underlying socio-cultural factors including basic and health literacy, cultural perceptions of illness, disability and health status among others (28, 29). Further studies including vignettes should investigate the influence of such factors on the validity of self-reported health in this population. On the other hand, the longitudinal framework offered by demographic surveillance sites offers a unique opportunity to validate these measures by assessing their performance against objective measures of health and in predicting mortality.

The absence of similar studies in the country and in the region makes it hard to interpret some of the findings. However, comparison with findings from other HDSS sites may shed more light. Other important research questions include the coping strategies and factors associated with resilience and healthy ageing among older people in resource-deprived settings as well as coping strategies in the absence of strong contributory national social security funds.

The study adds to the limited body of literature regarding health and well-being of older people in SSA and especially those in urban informal settlements. Further studies are needed to validate the methods used for assessing health status and to provide comparisons on which the health of the older urban poor can be judged.

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