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QUALITY OF LIFE AND ASSOCIATED FACTORS OF OLDER ADULTS IN GHANAIAN URBAN SLUMS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective This study provides insight into the QoL of older adults living in Ghanaian urban slums.

Design The study employed a community-based cross-sectional design study, to assess QoL among older adults in two slums between April and May 2020. QoL was assessed using the WHOQOL-BREF questionnaire.

Settings Participants were recruited from one slum in a fishing dominated community and another slum in an industrial community in Ghana.

Participants Four hundred participants 60 years and above living in either slum for at least one month and able to communicate verbally took part in this study.

Results Participants had a moderate level of QoL in the psychological (mean score 45.7), social (mean score 57.0) and environmental (mean score 51.6). The physical QoL of the older adults was 43.3 which denotes a poor QoL. When looking at the differences between male and female participants, statistically significant differences were found in general QoL ($p<0.001$), general satisfaction with health ($p=.017$), the psychological ($p=.019$), and the environmental domain ($p=.001$). In all domains, male participants have a significantly higher QoL compared to their female counterparts. This study revealed that as age increased, QoL decreased significantly in the physical and environmental domains. However, in the psychological domain, older adults 76-80 years had a better psychological QoL compared to those 66-70 years. An ANOVA for regression analysis revealed that QoL was influenced mostly by the environmental domain (46.2%), followed by the psychological (43.7%), physical (31%) and social domain (20.4%).

Conclusions The findings from this study show that older adults living in slums had a moderate psychological, social, and environmental QoL and a poor physical QoL. Although this finding is better than anticipated, health policy development must consider the specific needs of older adults in slums and direct policies to meet these needs to further improve their overall QoL.

Keywords: Quality of Life, Older adult, Slums, WHOQOL-BREF

STRENGTHS AND LIMITATIONS

- This is the first study assessing the QoL of older adults in two different slum communities in Ghana.
- Nonetheless, the data collected from specific slums in Ghana makes it difficult to generalize results.
- A 100% response rate and absence of missing data is a strength for this study. The 100% response rate can be attributed to the breakfast packages given to participants after completing the questionnaires.
- The findings from this study can assist in policy development to include strategies to further improve the QoL of older adults in slums.
- Another limitation can be ascribed to the crowded nature of the slum: there was no privacy during data collection and other slum dwellers were often listening to the interviews.

Introduction

The difference in the life expectancy of people living in developed countries and people living in African countries is approximately ten years [1]. Various factors causing these differences include demographic differences, varying family and social structures, social security arrangements, health infrastructure, and spiritual beliefs [2,3,4]. These factors can influence the actions a person takes to address health issues and other aspects of life. In line with global trends, and despite these differences, the life expectancy of people living in Africa is increasing. However, an increased life expectancy is not necessarily accompanied by an improved quality of life (QoL). Ageing often comes with problems affecting the quality of life, such as loneliness, ill health, and depression [5,6,52]. Therefore, as people in African societies are ageing, the QoL of older adults in African countries is becoming an increasingly important issue [7,8].

The World Health Organisation defines the quality of life as “an individual's perception of their position in life in the context of the culture and value systems in which they live and with their goals, expectations,

standards and concerns" [9]. Older adults are vulnerable people, who are especially sensitive to poor QoL, as a result of changes and events in their physical health, psychological state, social circumstances and relationship to their environment [7,10,11]. With the physiological changes of the human system, as people age, most body functions decrease, and therefore they may become frail and dependent on others. Moreover, frailty may express itself also in the psychological and social domains. When this is combined with deplorable living conditions the quality of life of these older adults becomes an issue of concern.

Slums are pictorial evidence of deplorable living conditions. In developing countries, mainly African countries, rural-urban migration is one of the causes of slum communities [12,13,14,15].

Slums often lack basic amenities, are overcrowded, polluted and show threats of violence, disrespect and aggression [13,16]. Additionally, the overall health status of older adults in slums is low compared to older adults living in formal settlements [17,18,19]. Due to unsanitary conditions, in slums, older adults are susceptible to all forms of communicable and non-communicable diseases and often lack access to healthcare [13,14,20,21].

Supporting older people in slums is an important objective of the WHO Global strategy and action plan on ageing and health 2016-2030 [22] aims at "Strengthening long-term care (supporting supporters of older people)". One of the targets of the Sustainable Development Goal (SDG) 11, is to achieve a significant improvement in the lives of at least 100 million slum dwellers worldwide by 2020. However, there haven't been any changes in Ghanaian slums currently [23,24].

Many studies have been conducted globally, on the QoL of older adults either in the community or in care homes [25,26], and also in those with different health conditions [27,28,29]. However, there is a lack of research on the Qol of older adults in developing countries and those living in slums in particular. Therefore, by assessing the level of quality of life of older adults living in two Ghanaian slums, this study aims to raise awareness and provide insight into the QoL of these older adults.

Methods

Study design and study population

A community-based cross-sectional study was conducted between April and May 2020. The population under consideration involved older adults living in two urban slums in the Greater Accra region of Ghana. These slums are in the Ashaiman and Teshie communities. The reason for including these two specific slums is that the level of education is comparable, but differences exist in the type of housing structures and socioeconomic activities in these communities. Ashaiman is located close to an industrial city in Ghana and consists of people from different regions and tribes in Ghana. Teshie is mainly a fishing community with a majority of the population being indigenous.

Participants were included if they were older adults (60 years [retirement age] or older), living in slums in Ashaiman or Teshie for at least one month and were able to communicate verbally. Critically, ill older adults and people with speech impairments who were not able to express themselves verbally were excluded from the study.

Study Instrument

The primary outcome measure of this study is quality of life, assessed using the World Health Organisation Quality of Life -brief version (WHOQOL-BREF) (Field trial WHO, 2014). This instrument was chosen based on the results of a scoping review of instruments assessing QoL in African countries [30]. Detailed information on psychometric properties is lacking from previous studies, but the included domains, the feasibility and the length of the instrument nevertheless, convinced the authors to use the WHOQOL-BREF in this study.

The WHOQOL-BREF consists of four domains. The questions in each domain vary from 3 to 7 questions. Every question in each domain is rated on a 5-point Likert scale, where 1 represents 'very poor' and 5 represents 'very good'. The first domain is the 'Physical Health' domain. This includes seven (7) questions related to sleep, energy, mobility, the extent to which pain prevents performance of necessary tasks, the need for medical treatment to function in daily life, and level of satisfaction with their work capacity. The second domain is the 'Psychological' domain with six (6) questions, focusing on the ability to concentrate, self-esteem, body image, spirituality, and the frequency of positive or negative feelings. The third domain covers 'Social relationships' and includes three (3) questions related to satisfaction with personal relationships, social support systems and sexual satisfaction. The fourth is the 'Environmental' domain, which comprises eight (8) questions related to safety and security, satisfaction with one's home and physical environment satisfaction, finances, availability of health and /social care availability, access to general information and leisure activities accessibility and satisfaction with transportation.

In addition to the 4 domains, the WHOQOL-BREF includes two general questions, one about the respondents' rated QoL, and one related to their satisfaction with health. These questions also have five response options varying from 1 'very poor' to 5 'very good' for rating the QoL and 'very dissatisfied' (1) to 'very satisfied' (5) for rating the satisfaction with health. Besides using the WHOQOL-BREF, demographic characteristics of subjects (gender, age, educational level, religion, and marital status) were collected. In addition, data on access to health care, current health condition, health services patronized, living arrangements, social support, and sources of income were gathered.

Data collection

The WHOQOL-BREF questionnaire was used to conduct face-to-face interviews during data collection, given difficulties with reading (caused by both difficulties in reading and/or poor vision) in

the population under consideration. The interviews were done by the first author, PYAA and 4 research assistants' undergraduates of the University of Ghana. The interviewers all have a background in nursing and were trained before the commencement of data collection. During the training, they were introduced to the WHOQOL-BREF and taken through the process of intended data collection. The interviewers needed to be conversant with the questions in two local languages (Twi and Ga). During the face-to-face interviews with subjects, interviewers read the questions out loud and filled in the responses of participants. The original English version of the instrument was translated and administered to participants in the local languages (Ga and Twi). We used the STROBE cross-sectional checklist when writing our report [53].

Sampling method and sample size

Recruitment took place by involving a key informant in each slum. This key informant was a person working at the Municipal Assembly of the specific community and visiting the slums very often due to the nature of their work. The key informant used a convenient sampling method to select participants living in the slums. After selecting participants, the snowballing technique was used to increase the participation rate. The key informant also familiarized the research team with the slum community. The research team provided study-specific information in person to the participant. Written informed consent, either by signing or thumb-printing (in the case of those unable to sign) was required for participation. The sample size was calculated to give an estimate of how many participants will be needed as a representation of the total population. The sample size calculation was done using the Yamane formula [31]. The two slums under consideration consist of approximately 6,000 older inhabitants. Filling in the formula gave an estimated sample size of 375 participants [31].

Ethical Approval

Ethical clearance (37MH-IRB IPN 199/2018) was obtained from the 37 Military Hospitals Institutional Review Board. Permission to perform this study in Ashaiman and Teshie was provided by the Municipal Assemblies of the selected slums.

Data Analysis

The data were analysed using Statistical Package for Social Sciences (IBM SPSS) version 24.0. Domain scores were scaled in a positive direction (i.e., higher scores denote higher QOL). The mean score of items within each domain is used to calculate the domain score. An Excel sheet calculator created by Skvarc [32] was used to transform the different WHOQOL-BREF domain scores to a 0-100-scale. Cut-off points for QoL in this study were determined based on the literature by Silva and colleagues (2014). According to Silva and colleagues [33], a score ≤45 is considered poor QoL, 46-64 is considered moderate QoL and any score >65 is recorded as a high QoL.

In further analysis, the demographic data served as independent variables and the domains of the WHOQOL-BREF as dependent variables. Gender and place of residence were depicted as a binominal variable where '1' is male/Teshie and '2' is female/Ashaiman respectively. All other demographic data are categorical variables. Educational level was categorized into four groups: no formal education, elementary school, high school and above high school. Marital status comprised of single, married, divorced and widowed depicted with numbers. Age was grouped into five categories (60-65, 66-70,71-75, 76-80, >81) also depicted with numbers. Finally, the place of residence: Teshie or Ashaiman, was documented.

Descriptive analyses were performed to describe the background characteristics, as well as the domain scores of the WHOQOL-BREF. To compare the mean distribution of participants' characteristics and their QOL per domain, an independent *t*-test and analysis of variance (ANOVA) were used. ANOVA for regression analysis was done to indicate which domains influence QoL in the various sociodemographic characteristics. Transformed scores -to 100%- were used for statistical analyses in four domains. In this study, the level of significance was set at $P < 0.05$ for all analyses.

Results

Background Characteristics of Participants

In total, 400 people were approached for this study and they all agreed to participate. This means that a 100% response rate was achieved. Three subjects were excluded from the analysis as they were below the age of 60 years, resulting in a total sample of 397 respondents.

In Table 1 the background characteristics can be found. Of all participants who participated, 240 persons (60.5%) were female, and the largest age group was 60-65 years (47.6%). The majority of the older adults in this population were widowed (38.5%), followed by participants being married (31.7%). In total 44.8% of the participants had no formal education. When asked about their current illnesses/diseases, 25.2% had osteoarthritis, followed by 19.2% with fibromyalgia (pains all over the body), 17.1% had high blood pressure. Participants were also asked about their source of income. Most participants (31.5%) received their income from their children, 22.9% were into trading, 2.0% were either mechanics, electricians, or welders. On the sources of healthcare utilized, most participants 39.8% patronized pharmacies, with herbal preparations being the least accessed 4.5%. When asked the living arrangements of participants lived with, an equal number (33.5%) either lived alone or with extended family members. Those who lived with their children were 17.1% of the total sample population while 2.5% lived with others which include friends and church members. Daughters were the biggest form of social support (28.7%) followed by siblings of older adults (17.4%) and then sons, 16.9% (See Table 2 in Appendix).

The outcome of the WHOQOL BREF is described in Table 3. When looking at the total population, the perceived overall QoL is neither poor nor good and they are neither satisfied nor dissatisfied with their health. According to Silva and colleagues [33], there is a moderate level of QoL in the psychological (mean score 45.7), social (mean score 57.0) and environmental (mean score 51.6) domains of the WHOQOL-BREF. The physical QoL of the older adults in these slums recorded a mean score of 43.3. Transformed QoL scores were rated poor, moderate and high, based on the literature by Silva and colleagues [33]. Although the means of the transformed scores for all participants were poor on the physical and psychological domains, they were moderate across all other domains.

When looking at the differences between male and female participants, statistically significant differences were found in general quality of life ($p<.001$), general satisfaction with health ($p=.017$), the psychological domain (($p=.019$), and the environmental domain ($p=.001$). In all of these domains, male participants have a significantly higher quality of life compared to their female counterparts.

In the analysis of the various age groups, there were significant differences in the psychological ($p=.036$), physical ($p=.003$) and environmental ($p=.003$) domains.

From Table 3, it appears that as age increased, QoL decreased significantly in the physical and environmental domains. Yet, in the psychological domain, those between 76-80 years had a better psychological QoL compared to those 66-70 years.

For marital status, significant differences in the various domains were seen, in the perceived QoL ($p<0.001$), psychological ($p<0.001$), social ($p<0.001$), and environmental($p=0.001$) domains. Participants who are married had the highest scores in these domains, followed by participants who are divorced, widowed, and single.

In an examination of differences in QoL among the various educational levels, there were significant differences in all domains, except for the social domain. In general, QoL was significantly higher among participants with a higher educational status. Lastly, when looking at the difference in QoL between the place of residence, older adults in the Ashaiman slum showed a statistically significant difference in perceived QoL ($p<0.001$), psychological QoL($p=0.004$) and environmental QoL($p<0.001$).

In a one-way analysis of variance (ANOVA) of the mean differences in QoL of participants with different sources of income, there was a statistical significance in the satisfaction with health domain only. Participants who received pensions had higher means in most domains (overall QoL, satisfaction with health, physical QoL) followed by participants who had financial support from family/siblings (higher scores on the environmental and psychological domains). Participants who received financial support from friends had the highest QoL score in the social QoL domain.

An ANOVA comparing mean QoL scores of participants, with different sources of social support showed no statistical differences in scores between different sources of social support (Table 2). An ANOVA analysis comparing the living arrangements of participants showed that people who lived with extended family had high environmental QoL scores, overall QoL scores and satisfaction with health scores. Those who lived with their children had high psychological QoL scores.

An analysis of variance for regression analysis of QoL scores and the demographic characteristics was done to show if certain domains are influencing QoL to a higher extent than other domains (see Table 4). Variances between the various domains showed that the environmental domain had the highest influence of 46.2%, followed by the psychological domain (43.7%), the physical domain (31%) and the social domain (20.4%). When looking at the variances between domains, calculated with the adjusted r square, for females at a significance $p<.001$, the environmental domain had the greatest influence (36.3% variance in QoL), followed by the psychological domain (30.8%), then the physical domain (26.0%) and the social domain (12.9% variance in QoL). Among males at a significance of $p<.001$, the psychological

domain has a 59.3% influence on total QoL followed by the environmental domain (58.3%), then the physical domain (37.3%) and the social domain (33.2%).

For older adults in the age category 60-65years, environmental QoL has the highest influence (adjusted r^2=0.488) on their QoL at a significance of p<.001, followed by psychological quality of life with an adjusted r^2=0.469 and then physical QoL (adjusted r^2=0.279) and lastly the social QoL (adjusted r^2=0.210). From Table 4, environmental QoL has a greater influence on the general QoL of older adults between 60-75 years and the psychological QoL has a greater influence on the QoL of participants ≥76 years. The QoL of participants with no formal education was likely to be influenced 45.7% by the environmental QoL (adjusted r^2=0.457) while those who attained education above the high school had their QoL being impacted 54.4% by the psychological QoL (adjusted r^2=0.544). The environmental QoL had a 33.9% influence on the QoL of participants living in slums in the Teshie community (adjusted r^2=0.339) while the QoL of participants in Ashaiman was influenced 72.3% by the psychological QoL (adjusted r^2=0.723). Results from other subgroup analyses on variance can be found in Table 4.

DISCUSSION

This study aimed to assess the QoL of older adults living in two Ghanaian slums using the WHOQOL-BREF questionnaire. Results show that older adults living in slums have a poor to moderate QoL. A moderate QoL was seen in the environmental QoL of the older adults in these slums. This is surprising: in slums, one would have expected a poor environmental QoL because of the lack of safety and security, poor quality of housing, overcrowding, and unavailability of health and /social care. However, a moderate level of QoL was reported. An explanation of this finding could be that most older adults have adapted to their environment and try to make the most of what is at their disposal. Another explanation could be that slum amenities and living conditions are not much worse than prior living arrangements of these older adults

In the current study, females constituted the majority (240) of the population, similar to the study by Akosile et.al., [25]. This is expected as females are estimated to live longer than their male counterparts [34,35]. Additionally, the ages of this study population ranged between 60-98 years with a mean age of 68.89. Similar to most studies carried out in Africa among older adults, the greater number of participants was between 60-69 years [36]. This is indicative of an increasing life expectancy and the need to promote interest in older adults. Participants in this study mostly had no formal education and this also agrees with

studies conducted in slums from various countries like; India [37], Iran [38], Bangladesh [39] and sub-Saharan Africa [40,36,41,42].

Low QoL scores were seen for all participants in the physical and psychological domains. This result is in agreement with a study by Alaazi, and colleagues [18] comparing slum and non-slum dwellers, where participants had low QoL mean scores in both psychological and physical health domains. Poor health conditions and increased dependency, as well as low self-esteem and frequency of negative feelings, could account for the low scores. Although older adults may receive social support from their family members, older adults might feel as if they pose a burden on their children. This may also account for low scores in the psychological QoL domain.

Furthermore, males scored higher than females in all domains of the WHOQOL-BREF which is similar to Vietnamese findings by van Nguyen and colleagues [43]. The psychological and environmental domains had statistically significant differences for gender on QoL. This is consistent with the findings of Alaazi, and colleagues [18]. The gender differences could be attributed to the roles males and females play in society. Anecdotal evidence suggests that males show dominance and supremacy in Ghanaian culture. Therefore, when it comes to issues of safety and money, they portray confident capabilities compared to females. For females, the lowest mean score was shown in the psychological health domain (mean = 41.95), implying negative feelings, low self-esteem, low body image and appearance. Females living in slum communities might feel they have not achieved much and feel demeaned because of the stigma of living in slums [44] and societal upbringing [45].

The highest overall QoL score was found for the social relationship domain (mean= 57.77) an indication of relative satisfaction of both males and females with personal relationships and support received. A reason for this could be that the extended family system is still playing a big role in slum settings, and children offer support to their older family members.

QoL of participants generally decreased with age similar to previous studies [7,18,25,46,47,48]. This could be attributed to the gradual degeneration and weakness of the human body as individuals age. This makes older adults more dependent on others. However similar to findings of Charles, & Kulandai [49], the psychological QoL participants between 76-80 years had a better psychological QoL compared to those 66-70 years, implying they had better self-esteem, body image, spirituality, and the frequency of positive or negative feelings. This could be attributed to older adults at this stage feeling they are preparing to exit the world content with their previous life, they usually may not have considerable doubts and are living their life with a lot of insight [6,15,18,40,41].

With the sociodemographic characteristics of the current study population, both the marital status and educational level of participants had a significant effect on the QoL of participants. Married participants had higher means in all domains compared to all the other categories especially the single participants. This confirms findings of studies by Lee, Xu, & Wu, [50] and Yaya, Idriss-Wheeler, Vezina, & Bishwajit, [47]. Except for the physical health domain, higher educational levels could be equated to better QoL in the other domains similar to findings by Ejiakor, et.al., [51].

Comparing the two slums, older adults in Ashaiman had a better QoL in the perceived overall QoL, psychological and environmental domains. This could be attributed to the proximity of Ashaiman to the industrial city and therefore inhabitants could get access to the resources the non-slum dwellers in the industrial city enjoy. Additionally, caregivers of these older adults engage in various economic activities compared to the restricted/narrower options (fishing, fish mongering and small-scale trading) of those in Teshie. However, there were no significant differences in the physical and social relationship domains possibly because they share similar characteristics in these domains.

CONCLUSION

By assessing QoL in this target group, groups with physical, psychological, social, or environmental health problems can be identified. Male older adults reported better QoL than women in all domains, and quality of life deteriorated with advancing age. The findings from this study show that older adults living in slums in Ghana had a moderate psychological, social, and environmental quality of life and a poor physical quality of life. Although this finding is better than anticipated, health policy development must consider the specific needs of older adults in slums and direct policies to meet these needs to further improve their overall QoL.

IMPLICATIONS FOR PRACTICE AND RESEARCH

In all domains, females have a lower quality of life than males. There should be a continuous focus on helping women get better self-esteem. Education of females is being encouraged but attention to the psychological aspect is necessary to improve their QoL in that domain. Also, poor scores in physical QoL among study participants are observed. Further research, is needed to assess which factors could contribute to the poor physical QoL in old people in slums.

List of Abbreviations

QoL: Quality of Life

SDG: Sustainable Development Goal

WHOQOL-BREF: World Health Organisation Quality of Life -brief version

SPSS: Statistical Package for Social Sciences

ANOVA: Analysis of variance analysis

Declarations:

Ethics approval and consent to participate: Ethics approval was received from the Institutional review board of the 37 Military Hospital. Participants also signed or thumb printed to show consent.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: Authors have no conflicts of interest.

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Authors' contributions: PYAA, IHJE, CL and JMGAS conceptualized the study. PYAA collected data. PYAA, IHJE and AAA analysed the data. All authors reviewed the literature and read through the final manuscript before submission.

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TABLES

Table 1: Background characteristics of participants by residence

Characteristics	Teshie	Ashaiman	Total n (%)
Gender			
Male	43(21.6)	114(57.6)	157(39.5)
Female	156(78.4)	84(42.4)	240(60.5)
Age group (in years)			
60-65	90(45.2)	99(50.0)	189(47.6)
66-70	36(18.1)	39(19.7)	75(18.9)
71-75	32(16.1)	23(11.6)	55(13.9)
76-80	18(9.0)	20(10.1)	38(9.6)
>81	23(11.6)	17(8.6)	40(10.1)
Marital Status			
Single	28(14.1)	9(4.5)	37(9.3)
Married	41(20.6)	85(42.9)	126(31.7)
Divorced	25(12.6)	56(28.3)	81(20.4)
Widowed	105(52.7)	48(24.3)	153(38.5)
Education			
No formal	82(41.2)	96(48.5)	178(44.8)
Elementary	38(19.1)	56(28.3)	94(23.7)
High School	73(36.7)	24(12.1)	97(24.4)
Above High School	6(3.0)	22(11.1)	28(7.1)

Table 2

Characteristics	Frequency	%
Current Illness		
Body Pains	76	19.2
Diabetes	19	4.8
Difficulty Walking	33	8.3
High Blood Pressure	68	17.1
Joint Pains	100	25.2
Old Age	26	6.5
Poor EyeSight	43	10.8
Others	32	8.1
Sources of Income		
Children	125	31.5
Farming	38	9.6
Fishing	52	13.1
Friends	37	9.3
Pension	27	6.8
Siblings	19	4.7
Trading	91	22.9
Others	8	2.0
Source of healthcare		
Clinic	63	15.9
Drug Ped	37	9.3
Herbalist	18	4.5
Hospital	121	30.5
Pharmacy	158	39.8
Source of Social Support		
Sibling	69	17.4
Daughter	114	28.7
Son	67	16.9
Grandchild	44	11.1
Other	21	5.3

Table 3: Participants Mean scores and Association of background characteristics with QoL scores

	General QoL	General Health	Psychological domain **	Physical domain**	Social domain**	Environmental domain**
Total group (n=397)	2.73	2.90	45.07[b]	43.25[a]	56.97[b]	51.63[b]
Gender						
Female	2.53	2.78	41.95 [a]	44.63 [a]	56.44 [b]	49.21 [b]
Male	3.04	3.09	45.22 [b]	45.75[b]	57.77 [b]	55.30 [b]
Mean difference	.515	.310	3.27	1.11	1.33	6.09
p-value	.000*	.017*	.019*	.611	.506	.001*
Age group						
60-65 years	2.08	2.98	45.44	49.14	57.11	54.41
66-70 years	2.84	3.04	41.89	43.65	58.48	51.69
71-75 years	2.80	2.95	40.31	42.49	57.47	49.75
76-80 years	2.58	2.66	42.34	40.11	53.97	48.95
>80 years	2.25	2.45	40.30	36.89	55.60	43.26
F	2.139	1.966	2.600	4.180	.397	4.111
p-value	.075	.099	.036*	.003*	.811	.003*
Marital status						
Single	2.43	2.54	35.97	37.46	48.41	46.89
Married	3.00	3.02	47.44	47.66	62.18	56.13
Divorced	2.95	2.95	44.52	46.05	49.57	52.34
Widowed	2.47	2.86	40.88	44.27	58.66	48.69
F	6.370	1.420	9.861	2.359	10.385	5.583
p-value	.000*	.237	.000*	.071	.000*	.001*
Education						
No formal education	2.61	2.66	39.51	40.73	54.76	47.71
Elementary school	2.78	2.96	45.81	46.73	57.63	52.19
High school	2.72	3.14	45.02	50.23	58.60	54.41
Above high school	3.39	3.43	52.25	49.25	63.14	64.86
F	3.498	4.990	10.938	5.084	1.982	10.241
p-value	.016*	.002*	.000*	.002*	.116	.000*
Residence						
Teshie slum	2.29	2.87	41.28	45.99	58.19	47.59
Ashaiman slum	3.18	2.93	45.22	44.15	55.74	55.71
Mean difference	-.885	-.065	-3.94	1.84	2.44	-8.12

p-value	.000*	.618	.004*	.389	.211	.000*
Sources of Income						
Pension	3.04	3.33	44.96	50.96	56.52	53.56
Fishing/Farming	2.76	2.81	42.39	44.00	56.09	49.47
Trading	2.48	2.58	41.75	41.47	54.55	49.74
Children	2.86	3.06	44.88	44.79	58.49	53.22
Friends	2.65	3.24	41.97	49.92	59.27	52.62
Family/Siblings	2.90	3.05	46.35	50.70	59.10	55.45
Other	2.25	1.75	37.00	46.13	56.25	51.75
F	1.500	3.434	1.118	1.389	.518	.842
p-value	.177	.003*	.351	.218	.794	.538
Source of Social Support						
Sibling	2.72	2.88	44.06	43.62	53.35	52.93
Daughter	2.61	2.74	42.73	42.21	57.16	49.07
Son	2.84	3.07	42.52	48.87	58.03	54.09
Grandchild	2.66	2.68	41.86	44.61	55.18	50.64
Other	2.86	3.38	47.05	53.95	62.19	53.48
F	.481	1.761	.695	2.134	1.049	1.192
p-value	.749	.137	.596	.076	.382	.314
Living Arrangements						
Extended family	3.10	3.10	45.15	46.28	56.92	54.59
Family	2.45	2.60	42.87	36.08	56.57	48.70
Alone	2.41	2.81	40.27	47.21	55.96	49.36
Children	2.91	2.96	45.37	46.62	58.53	52.18
Others	2.50	2.70	45.10	37.80	62.40	54.33
F	7.080	1.72	2.747	3.275	.396	2.067
p-value	.000*	.144	.028*	.012*	.811	.084

**All raw scores are transformed to a 1-100 score, *Significant p-value ≤0.05, [a] =poor QoL, [b] = moderate QoL

Table 4: ANOVA for Regression analysis showing the influence of demographic characteristics and Participants QoL in the 4 domains of the WHOQOL-BREF

	Psychological domain Mean	Physical domain Mean	Social domain Mean	Environmental domain Mean
Total group (n=397)	45.07	43.25	56.97	51.63
Gender				
Female	41.95	44.63	56.44	49.21
Difference in means	F(3,235)=36.118; p<.001	F(3,235)=28.856; p<.001	F(3,235)=12.619; p<.001	F(3,235)=46.237; p<.001
Adjusted R square	.307	.260	.128	.363
Male	45.22	45.75	57.77	55.30
Difference in means	F(3,153)=76.702; p<.001	F(3,153)=31.965; p<.001	F(3,153)=26.887; p<.001	F(3,153)=73.828; p<.001
Adjusted R square	.593	.373	.345	.583
Age group				
60-65 years	45.44	49.14	57.11	54.41
Difference in means	*F(3,185)=56.458; p<.001*	*F(3,185)=25.285; p<.001*	*F(3,185)=17.656; p<.001*	*F(3,185)=60.383; p<.001*
Adjusted R square	*.469*	*.279*	*.210*	*.488*
66-70 years	41.89	43.65	58.48	51.69
Difference in means	*F(3,71)=14.223; p<.001*	*F(3,71)=12.154; p<.001*	*F(3,71)=6.713; p<.001*	*F(3,71)=16.341; p<.001*
Adjusted R square	*.349*	*.311*	*.188*	*.383*
71-75 years	40.31	42.49	57.47	49.75
Difference in means	*F(3,51)=12.850; p<.001*	*F(3,51)=5.413; p=.003*	*F(3,51)=2.143; p=.106*	*F(3,51)=15.914; p<.001*
Adjusted R square	*.397*	*.197*	*.112*	*.453*
76-80 years	42.34	40.11	53.97	48.95
Difference in means	*F(3,34)=7.977; p<.001*	*F(3,34=2.285; p=.096*	*F(3,34)=12.850; p=.002*	*F(3,34)=6.295; p=.002*
Adjusted R square	*.361*	*.094*	*.288*	*.300*
>80 years	40.30	36.89	55.60	43.26
Difference in means	*F(3,35)=13.315; p<.001*	*F(3,35)=11.896; p<.001*	*F(3,35)=7.288; p=.001*	*F(3,35)=10.753; p<.001*
Adjusted R square	*.493*	*.462*	*.332*	*.435*
Marital status				
Single	35.97	37.46	48.41	46.89
Difference in means	*F(3,33)=13.087; p<.001*	*F(3,33)=3.797; p=.019*	*F(3,33)=1.971; p=.137*	*F(3,33)=17.165; p<.001*
Adjusted R square	*.502*	.189	.075	.573
Married	47.44	47.66	62.18	56.13
Difference in means	*F(3,122)=47.457; p<.001*	*F(3,122)=18.805; p<.001*	*F(3,122)=32.156; p<.001*	*F(3,122)=49.601; p<.001*
Adjusted R square	*.527*	.299	.428	.538
Divorced	44.52	46.05	49.57	52.34
Difference in means	*F(3,76)=30.952; p<.001*	*F(3,76)=18.004; p<.001*	*F(3,76)=9.245; p<.001*	*F(3,76)=39.434; p<.001*

Adjusted R square	*.532*	.392	.238	.593
Widowed	40.88	44.27	58.66	48.69
Difference in means	*F(3,76)=18.283; p<.001*	*F(3,149)=20.969; p<.001*	*F(3,149)=8.231; p<.001*	*F(3,149)=25.410; p<.001*
Adjusted R square	*.254*	.283	.125	.330
Education				
No formal education	39.51	40.73	54.76	47.71
Difference in means	*F(3,173)=36.902; p<.001*	*F(3,173)=25.547; p<.001*	*F(3,173)=16.669; p<.001*	*F(3,173)=50.371; p<.001*
Adjusted R square	*.380*	.295	.211	.457
Elementary school	45.81	46.73	57.63	52.19
Difference in means	*F(3,90)=32.867; p<.001*	*F(3,90)=20.298; p<.001*	*F(3,90)=11.102; p<.001*	*F(3,90)=24.730; p<.001*
Adjusted R square	*.507*	.384	.246	.433
High school	45.02	50.23	58.60	54.41
Difference in means	*F(3,93)=16.478; p<.001*	*F(3,93)=10.946; p<.001*	*F(3,93)=3.902; p=.011*	*F(3,93)=21.936; p<.001*
Adjusted R square	*.326*	.237	.083	.396
Above high school	52.25	49.25	63.14	64.86
Difference in means	*F(3,24)=11.757; p<.001*	*F(3,24)=4.401; p=.013*	*F(3,24)=7.112; p=.001*	*F(3,24)=4.333; p=.014*
Adjusted R square	*.544*	.274	.404	.270
Residence				
Teshie slum	41.28	45.99	58.19	47.59
Difference in means	*F(3,195)=11.276; p<.001*	*F(3,195)=28.819; p<.001*	*F(3,195)=6.570; p<.001*	*F(3,195)=34.911; p<.001*
Adjusted R square	*.135*	.297	.078	.339
Ashaiman slum	45.22	44.15	55.74	55.71
Difference in means	*F(3,193)=171.779; p<.001*	*F(3,193)=56.292; p<.001*	*F(3,193)=47.252; p<.001*	*F(3,193)=113.083; p<.001*
Adjusted R square	*.723*	.458	.414	.644

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Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	#3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	#4	Present key elements of study design early in the paper	4
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5

		selection of participants.	
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	N/A
Bias	#9	Describe any efforts to address potential sources of bias	14
Study size	#10	Explain how the study size was arrived at	7
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	8
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	8
Statistical methods	#12c	Explain how missing data were addressed	13
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	7

Statistical methods	#12e	Describe any sensitivity analyses	N/A
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7-8
Participants	#13b	Give reasons for non-participation at each stage	N/A
Participants	#13c	Consider use of a flow diagram	N/A
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	n/a
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	23

Main results	#16b	Report category boundaries when continuous variables were categorized	8
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	#18	Summarise key results with reference to study objectives	13
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	13-14
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	13
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
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QUALITY OF LIFE AND ASSOCIATED FACTORS OF OLDER ADULTS IN GHANAIAN URBAN SLUMS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective This study provides insight into the QoL of older adults living in Ghanaian urban slums.

Design A community-based cross-sectional design study, assessed QoL among older adults in two slums using the WHOQOL-BREF questionnaire.

Settings Participants were recruited from one slum in a fishing dominated community and another slum in an industrial community in Ghana.

Participants Four hundred participants 60 years and above living in either slum for at least one month and able to communicate verbally took part in this study.

Results Participants had a moderate level of QoL in the psychological (mean score 45.7), social (mean score 57.0) and environmental (mean score 51.6). The physical QoL of the older adults was 43.3 which denotes a poor QoL. Between male and female participants, statistically significant differences were found in general QoL ($p<0.001$), general satisfaction with health ($p=.017$), the psychological ($p=.019$), and the environmental domain ($p=.001$). In all domains, male participants have a significantly higher QoL compared to their female counterparts. In the psychological domain, older adults 76-80 years had a better psychological QoL compared to those 66-70 years. An ANOVA analysis showed that people who lived with extended family members had high scores in the environmental QoL, overall QoL scores and satisfaction with health scores. Those who lived with their children had higher psychological QoL scores. An ANOVA for regression analysis revealed that QoL was influenced mostly by the environmental domain (46.2%), followed by the psychological (43.7%), physical (31%) and social domain (20.4%).

Conclusions The findings show that older adults living in slums had a moderate psychological, social, and environmental QoL and a poor physical QoL. Although findings are better than anticipated, health policy development on the specific needs of older adults in slums and direct policies to meet these needs to further improve their overall QoL.

Keywords: Quality of Life, Older adult, Slums, WHOQOL-BREF

Introduction

The difference in the life expectancy of people living in developed countries and people living in African countries is approximately ten years [1]. Various factors causing these differences include demographic differences, varying family and social structures, social security arrangements, health infrastructure, and spiritual beliefs [2-4]. These factors can influence the actions a person takes to address health issues and other aspects of life. In line with global trends, and despite these differences, the life expectancy of people living in Africa is increasing. However, an increased life expectancy is not necessarily accompanied by an improved quality of life (QoL). Ageing often comes with problems affecting the quality of life, such as loneliness, ill health, and depression [5, 6, 7]. Therefore, as people in African societies are ageing, the QoL of older adults in African countries is becoming an increasingly important issue [8,9].

The World Health Organisation defines the quality of life as "an individual's perception of their position in life in the context of the culture and value systems in which they live and with their goals, expectations, standards and concerns" [10]. Older adults are vulnerable people, who are especially sensitive to poor QoL, as a result of changes and events in their physical health, psychological state, social circumstances and relationship to their environment [8, 11, 12]. With the physiological changes of the human system, as people age, most body functions decrease, and therefore they may become frail and dependent on others. Moreover, frailty may express itself also in the psychological and social domains. When this is combined with deplorable living conditions the quality of life of these older adults becomes an issue of concern.

Slums are pictorial evidence of deplorable living conditions. In developing countries, mainly African countries, rural-urban migration is one of the causes of slum communities [13-16].

Slums often lack basic amenities, are overcrowded, polluted and show threats of violence, disrespect and aggression [14, 17]. Due to unsanitary conditions, in slums, older adults are susceptible to all forms of communicable and non-communicable diseases and often lack access to healthcare [14, 15, 18, 19]. Hence the overall health status of older adults in slums has been reported to be lower than older adults living in formal settlements [20-22].

Supporting older people in slums is an important objective of the WHO "Global strategy and action plan on ageing and health 2016-2030" [23]. One of the targets of the Millennium Development Goals (MDG) 7, is to achieve a significant improvement in the lives of at least 100 million slum dwellers worldwide by 2020. However, there haven't been any changes in Ghanaian slums currently [24,25].

Many studies have been conducted globally, on the QoL of older adults either in the community or in care homes [26, 27], and also in those with different health conditions [28-30]. To improve the lives of slum dwellers, it is necessary to assess their QoL to ascertain which aspects need improvement for an overall QoL improvement. However, there is a lack of research on the Qol of older adults in developing countries and those living in slums. Therefore, by assessing the level of quality of life of older adults living in two Ghanaian slums, this study aims to raise awareness and provide insight into the QoL of these older adults.

Methods

Study design and study population

A community-based cross-sectional study was conducted between April and May 2020. The population under consideration involved older adults living in two urban slums in the Greater Accra region of Ghana. These slums are in the Ashaiman and Teshie communities. The reason for including these two specific slums is that the level of education is comparable, but differences exist in the type of housing structures and socioeconomic activities in these communities. Ashaiman is located close to an industrial city in Ghana and consists of people from different regions and tribes in Ghana. Teshie is mainly a fishing community with a majority of the population being indigenous.

Participants were included if they were older adults (60 years [retirement age] or older), living in slums in Ashaiman or Teshie for at least one month and were able to communicate verbally. Critically ill older adults and people with speech impairments who were not able to express themselves verbally were excluded from the study.

Study Instrument

The primary outcome measure of this study is quality of life, assessed using the World Health Organisation Quality of Life -brief version (WHOQOL-BREF) [31]. This instrument was chosen based on the results of a scoping review of instruments assessing QoL in African countries [32]. Detailed information on psychometric properties is lacking from previous studies, but the included domains, the feasibility and the length of the instrument, nevertheless, convinced the authors to use the WHOQOL-BREF in this study.

The WHOQOL-BREF consists of four domains. The questions in each domain vary from 3 to 7. Every question in each domain is rated on a 5-point Likert scale, where 1 represents 'very poor' and 5 represents 'very good'. The first domain is the 'Physical Health' domain. This includes seven (7) questions related to sleep, energy, mobility, the extent to which pain prevents performance of necessary tasks, the need for medical treatment to function in daily life, and level of satisfaction with their work capacity. The second domain is the 'Psychological' domain with six (6) questions, focusing on the ability to concentrate, self-esteem, body image, spirituality, and the frequency of positive or negative feelings. The third domain covers 'Social relationships' and includes three (3) questions related to satisfaction with personal relationships, social support systems and sexual satisfaction. The fourth is the 'Environmental' domain, which comprises eight (8) questions related to safety and security, satisfaction with one's home and physical environment satisfaction, finances, availability of health and /social care availability, access to general information and leisure activities accessibility and satisfaction with transportation.

In addition to the 4 domains, the WHOQOL-BREF includes two general questions, one about the respondents' own QoL in general, and one related to their satisfaction with health. These questions also have five response options varying from 1 'very poor' to 5 'very good' for rating the QoL and 'very dissatisfied' (1) to 'very satisfied' (5) for rating the satisfaction with health. Besides using the WHOQOL-BREF, demographic characteristics of subjects (gender, age, educational level, religion, and marital status) were collected. In addition, data on access to health care, current health condition, health services patronized, living arrangements, social support, and sources of income were gathered.

Data collection

The WHOQOL-BREF questionnaire was used to conduct face-to-face interviews during data collection, given difficulties with reading (caused by both difficulties in reading and/or poor vision) in the population under consideration. The interviews were done by the first author, PYAA and 4 research assistants' undergraduates of the University of Ghana. The interviewers all have a background in nursing and were trained before the commencement of data collection. During the training, they were introduced to the WHOQOL-BREF and taken through the process of intended data collection. The interviewers needed to be conversant with the questions in two local languages (Twi and Ga). During the face-to-face interviews with subjects, interviewers read the questions out loud and filled in the responses of participants. The original English version of the instrument was translated and administered to participants in the local languages (Ga and Twi). Local language experts translated and back-translated the WHOQOL-BREF questionnaire to be sure that the intended meaning of the original content was intact. Additionally, a pretest of the questionnaire was carried out in a nearby slum and no changes were made afterwards. We used the STROBE cross-sectional checklist when writing our report [33].

Sampling method and sample size

Recruitment took place by involving a key informant in each slum. This key informant was a person working at the Municipal Assembly of the specific community and visiting the slums very often due to the nature of their work. The key informant used a convenient sampling method to select participants living in the slums. After selecting participants, the snowballing technique was used to increase the participation rate. This technique is not new as previous QoL studies involving older adults also used the snowballing sampling techniques during sample recruitment [21, 34]. The key informant also familiarized the research team with the slum community. The research team provided study-specific information in person to the participant. The sample size was calculated to get the number of participants that will be representative of the entire population of older adults in the slums. The sample size is an estimate of how many participants will be needed as a representation of the total sample population. The sample size calculation was done using the Yamane formula [35]. The two slums under consideration consist of approximately 6,000 older inhabitants. Filling in the formula gave an estimated sample size of 375 participants [35].

Ethical Approval

Ethical clearance (37MH-IRB IPN 199/2018) was obtained from the 37 Military Hospitals Institutional Review Board. Permission to perform this study in Ashaiman and Teshie was provided by the Municipal Assemblies of the selected slums. Written informed consent, either by signing or thumb-printing (in the case of those unable to sign) was required for participation.

Patient and Public Involvement

Patients and the public were not involved in the development of the research questions, the design, and the conduct of the study. However, paticipants were involved in the recruitment of others through the snowball method. The study results will be shared with the participants and other relevant stakeholders through various social media handles and conferences.

Data Analysis

The data were analysed using Statistical Package for Social Sciences (IBM SPSS) version 24.0. Domain scores were scaled in a positive direction (i.e., higher scores denote higher QOL). The mean score of items within each domain is used to calculate the domain score. An Excel sheet calculator created by Skvarc [36] was used to transform the different WHOQOL-BREF domain scores to a 0-100-scale. Cut-off points for QoL in this study were determined based on the literature by Silva and colleagues[37]. According to Silva and colleagues [37], a score ≤45 is considered poor QoL, 46-64 is considered moderate QoL and any score >65 is recorded as a high QoL.

In further analysis, the demographic data served as independent variables and the domains of the WHOQOL-BREF as dependent variables. Gender and place of residence were depicted as a binominal variable where '1' is male/Teshie and '2' is female/Ashaiman respectively. All other demographic data are categorical variables. Educational level was categorized into four groups: no formal education, elementary school, high school, and above high school. Marital status comprised of single, married, divorced, and widowed depicted with numbers. Age in years was grouped into five categories (60-65, 66-70,71-75, 76-80, >81) also depicted with numbers. Finally, the place of residence: Teshie or Ashaiman, was documented.

Descriptive analyses were performed to describe the background characteristics, as well as the domain scores of the WHOQOL-BREF. To compare the mean distribution of participants' characteristics and their QOL per domain, an independent *t*-test and analysis of variance

(ANOVA) were used. ANOVA for regression analysis was done to indicate which domains influence QoL in the various sociodemographic characteristics. Transformed scores -to 100%- were used for statistical analyses in four domains. In this study, the level of significance was set at $P < 0.05$ for all analyses.

Results

Background Characteristics of Participants

In total, 400 people were approached for this study and they all agreed to participate. This means that a 100% response rate was achieved. Three subjects were excluded from the analysis as they were below the age of 60 years, resulting in a total sample of 397 respondents.

In Table 1 the background characteristics can be found. Of all participants who participated, 240 persons (60.5%) were female, and the largest age group was 60-65 years (47.6%). The majority of the older adults in this population were widowed (38.5%), followed by participants being married (31.7%). In total 44.8% of the participants had no formal education. When asked about their current illnesses/diseases, 25.2% had osteoarthritis, followed by 19.2% with body pains (pains all over the body), 17.1% had high blood pressure. Participants were also asked about their source of income. Most participants (31.5%) received their income from their children, 22.9% were into trading, 2.0% were either mechanics, electricians, or welders. On the sources of healthcare utilized, most participants 39.8% patronized pharmacies, with herbal preparations being the least accessed 4.5%. When asked about the living arrangements of participants, 33.5% each either lived alone or with extended family members. Those who lived with their children were 17.1% of the total sample population while 2.5% lived with others which include friends and church members. Daughters were the biggest form of social support (28.7%) followed by siblings of older adults (17.4%) and then sons, 16.9% (See Appendix Table 1).

The outcomes of the WHOQOL BREF are described in Table 2. When looking at the total population, the perceived overall QoL is neither poor nor good and they are neither satisfied nor dissatisfied with their health. According to Silva and colleagues [37], there is a moderate level of QoL in the psychological (mean, 45.7), social (mean, 57.0) and environmental (mean, 51.6) domains of the WHOQOL-BREF. The

physical QoL of the older adults in these slums recorded a mean score of 43.3. Transformed QoL scores were rated poor, moderate and high, based on the literature by Silva and colleagues [37]. Although the means of the transformed scores for all participants were poor on the physical and psychological domains, they were moderate across all other domains.

When looking at the differences between male and female participants, statistically significant differences were found in general quality of life (p<.001), general satisfaction with health (p=.017), the psychological domain ((p=.019), and the environmental domain (p=.001). In all of these domains, male participants have a significantly higher quality of life compared to their female counterparts.

In the analysis of the various age groups, there were significant differences in the psychological (p=.036), physical (p=.003) and environmental (p=.003) domains.

From Table 2, it appears that as age increased, QoL decreased significantly in the physical and environmental domains. Yet, in the psychological domain, those between 76-80 years had a better psychological QoL compared to those 66-70 years.

For marital status, significant differences in the various domains were seen, in the perceived QoL (p<0.001), psychological (p<0.001), social (p<0.001), and environmental(p=0.001) domains. Participants who are married had the highest scores in these domains, followed by participants who are divorced, widowed, and single.

In an examination of differences in QoL among the various educational levels, there were significant differences in all domains, except for the social domain. In general, QoL was significantly higher among participants with a higher educational status. Lastly, when looking at the difference in QoL between the place of residence, older adults in the Ashaiman slum showed a statistically significant difference in perceived QoL (p<0.001), psychological QoL(p=0.004) and environmental QoL(p<0.001).

In a one-way analysis of variance (ANOVA) of the mean differences in QoL of participants with different sources of income, there was a statistical significance in the satisfaction with health domain only. Participants who received pensions had higher means in most domains (overall QoL, satisfaction with health, physical QoL) followed by participants who had financial support from family/siblings (higher scores on the environmental and psychological domains). Participants who received financial support from friends had the highest QoL score in the social QoL domain.

An ANOVA comparing mean QoL scores of participants, with different sources of social support showed no statistical differences in scores between different sources of social support (Table 2). An ANOVA analysis comparing the living arrangements of participants showed that people who lived with extended family had high environmental QoL scores, overall QoL scores and satisfaction with health scores. Those who lived with their children had high psychological QoL scores.

An analysis of variance for regression analysis of QoL scores and the demographic characteristics was done to know if certain domains are influencing QoL to a higher extent than other domains (see Table 3). Variances between the various domains showed that the environmental domain had the highest influence of 46.2%, followed by the psychological domain (43.7%), the physical domain (21%) and the social domain (20.4%). When looking at the variances between domains, calculated with the adjusted r square, for females at a significance $p<.001$, the environmental domain had the greatest influence (36.3% variance in QoL), followed by the psychological domain (30.8%), then the physical domain (26.0%) and the social domain (12.9% variance in QoL). Among males at a significance of $p<.001$, the psychological domain has a 59.3% influence on total QoL followed by the environmental domain (58.3%), then the physical domain (37.3%) and the social domain (33.2%).

For older adults in the age category 60-65years, environmental QoL has the highest influence (adjusted $r^2=0.488$) on their QoL at a significance of $p<.001$, followed by psychological quality of life with an adjusted $r^2=0.469$ and then physical QoL (adjusted $r^2=0.279$) and lastly the social QoL (adjusted $r^2=0.210$). From Table 3, environmental QoL has a greater influence on the general QoL of older adults between 60-75 years and the psychological QoL has a greater influence on the QoL of participants ≥76 years. The QoL of participants with no formal education was likely to be influenced 45.7% by the environmental QoL (adjusted $r^2=0.457$) while those who attained education above the high school had their QoL being impacted 54.4% by the psychological QoL (adjusted $r^2=0.544$). The environmental QoL had a 33.9% influence on the QoL of participants living in slums in the Teshie community (adjusted $r^2=0.339$) while the QoL of participants in Ashaiman was influenced 72.3% by the psychological QoL (adjusted $r^2=0.723$). Results from other subgroup analyses on variance can be found in Table 3.

DISCUSSION

This study aimed to assess the QoL of older adults living in two Ghanaian slums using the WHOQOL-BREF questionnaire. Results indicate that more attention is needed in the environmental QoL of the older adults in the Teshie slum and the psychological QoL of those in the Ashaiman slums. Overall, older adults living in slums have a poor to moderate QoL. A moderate QoL was also seen in the environmental QoL of the older adults in these slums. This is remarkable because, in slums, one would have expected a very poor environmental QoL due to confirmed [38-40] well-known characteristics of slums such as the lack of safety and security, poor quality of housing, overcrowding, and unavailability of health and /social care. An explanation of this finding could be that most older adults might have adapted to their environment and tried to make the best of what is at their disposal. Another explanation could be that slum amenities and living conditions are not much worse than the prior living arrangements (rural life) of these older adults.

In the current study, females constituted the majority (240) of the population, similar to the study by Akosile et al., [26]. This is expected as females are estimated to live longer than their male counterparts [41, 42] even in underdeveloped countries. Additionally, the ages of this study population ranged between 60-98 years with a mean age of 68.89. Similar to most studies carried out in Africa among older adults, the age of most participants was between 60-69 years [43]. This is indicative of an increasing life expectancy and the need to promote interest in older adults. Participants in this study mostly had no formal education and this also agrees with studies conducted in slums from various countries like; India [44], Iran [45], Bangladesh [46] and sub-Saharan Africa [43, 47-49].

Low QoL scores were seen for all participants in the physical and psychological domains. This result is in agreement with a study by Alaazi, and colleagues [21] comparing slum and non-slum dwellers, where participants had low QoL mean scores in both psychological and physical health domains. Poor health conditions and increased dependency, as well as low self-esteem and frequency of negative feelings, as postulated by Pathak, Deshpande, & Manapurath [50] could account for the low scores. Although older adults may receive social support from their family members, older adults might feel more comfortable if this support is from their children. This may also account for low scores in the psychological QoL domain of those living with their extended family compared to high psychological scores of those living with their children.

Males scored higher than females in all domains of the WHOQOL-BREF which is similar to Vietnamese findings by van Nguyen and colleagues [51]. They suggested that similarities of their results to other studies could be that their research settings were comparable in terms of cultural, economic and environmental characteristics. The psychological and environmental domains had statistically significant differences for gender on QoL, where males showed higher QoL compared to females. In the psychological domain, males in the slum have better self-esteem and often have positive feelings as they try to make ends meet in their current settlement. The gender differences could be attributed to the roles males and females play in Ghanaian society. Anecdotal evidence suggests that males show dominance and supremacy in Ghanaian culture. Additionally, most males in the slums first migrated from the village and brought their spouses to live with them after they settled in the slums [52, 53]. In the environmental domain, males who often leave the slums to work are more financially sound and have access to general information compared to females. Moreover, as the breadwinners' Ghanaian men usually put up the expression of "all is well" even when it is not therefore do not easily admit failure compared to females. Moreover, when it comes to issues of safety and money, females are often dependent on their husbands. For females, the lowest mean score was shown in the psychological health domain (mean = 41.95), implying negative feelings, low self-esteem, low body image and appearance. Females living in slum communities might feel they have not achieved much and feel demeaned because of the stigma of living in slums [54] and societal upbringing [55]. This is consistent with the findings of Alaazi, and colleagues [21].

The highest overall QoL score was found for the social relationship domain (mean= 57.77) an indication of relative satisfaction of both males and females with personal relationships and support received. A reason for this could be that the extended family system in Ghana, is still playing a big role in slum settings, and children offer support to their older family members. Children were the highest sources of income for the older adults in this study. Nonetheless, older adults in this study who received pensions were most satisfied with their health. This could be attributed to the ability of such individuals to access and afford healthcare when ill as their previous employers will usually, refund hospital bills.

QoL of participants generally decreased with age similar to previous studies [8, 21, 26, 56-58]. This could be attributed to the gradual degeneration and weakness of the human body as individuals age. Diagnosed osteoarthritis was the prevalent condition among the study population. Considering the uneven walkways in the slums the degeneration of joint cartilage and the underlying bone causes pain especially

in the hip, and knee older adults are more dependent on others. However similar to findings of Charles, & Kulanda [59], participants between 76-80 years had a better psychological QoL compared to those 66-70 years, implying they had better self-esteem, body image, spirituality, and the frequency of positive or negative feelings. Spirituality in the Ghanaian culture is very prevalent most especially among older adults as they draw closer to their Maker as they feel the end is nearby. This could account partly for this result as older adults at this stage feel they are ready to exit the world accepting their previous life, by which they may not have considerable doubts anymore [6,16, 21, 47, 48].

With the sociodemographic characteristics of the current study population, both the marital status and educational level of participants had a significant effect on the QoL of participants. Married participants had higher means in all domains compared to all the other categories especially the single participants. This confirms findings of studies by Lee, Xu, & Wu, [60] and Yaya, Idriss-Wheeler, Vezina, & Bishwajit, [57]. Except for the physical health domain, higher educational levels could be equated to better QoL in the other domains similar to findings by Ejiakor, et.al., [61].

Comparing the two slums, older adults in Ashaiman showed a better QoL in the perceived overall QoL and the psychological and environmental domains. This could be attributed to the proximity of Ashaiman to the industrial city and therefore inhabitants could more easily get access to the resources the non-slum dwellers in the industrial city enjoy. Additionally, caregivers of these older adults engage more frequently in various economic activities compared to the restricted/narrower options (fishing, fish mongering and small-scale trading) of those in Teshie. However, there were no significant differences in the physical and social relationship domains between participants of both slums.

STRENGTHS AND LIMITATIONS

A strength of this study is that it is the first study assessing the QoL of older adults in two different slum communities in Ghana.

A 100% response rate and there was no data missing, which contributes to the methodological strength of this study. However, what could have biased our results is the fact that a convenient sampling technique was used to select participants, instead of a probability sampling method. The reason for this is the nature of the slum set-up and the frail population involved. It was not possible to obtain a sampling frame of the older adults living in the slums, and therefore, convenience sampling was used. This could influence the generalizability of our results.

However, the results of our analyses, therefore, indicate associations and should be treated with caution. Nonetheless, when comparing the background characteristics with other studies focused on older adults in slum settings [21, 51], they seem rather comparable.

Another limitation could be ascribed to the crowded nature of the slum setting: there was no privacy during data collection and other slum dwellers were often listening to the interviews. This could have influenced the answers given by participants. Lastly, even though the WHOQOL-BREF questionnaire is validated in various languages, this is not the case for the languages used in this study. We did perform a translation–back translation procedure, and the instrument was pre-tested in a neighbouring slum, we expect this did not influence our results to a large extent.

IMPLICATIONS FOR PRACTICE AND RESEARCH

In all domains, females have a lower quality of life than males. Therefore, we advise governmental and non-governmental agencies to focus on helping women get better self-esteem and increase the frequency of positive feelings. An important method to achieve this is generally through education. Also, poor scores in physical QoL among study participants are observed. Further research is needed to assess which factors could contribute to the poor physical QoL in old people in slums. The findings from this study can assist in policy development to include strategies to further improve the QoL of older adults in slums.

CONCLUSION

The findings from this study show that older adults living in slums in Ghana had a moderate psychological, social, and environmental quality of life and a poor physical quality of life. Therefore, health policy development must consider the specific needs of older adults in slums and direct policies to meet these needs to further improve their overall QoL.

List of Abbreviations

QoL: Quality of Life

MDGs: Millennium Development Goals

WHOQOL-BREF: World Health Organisation Quality of Life -brief version

SPSS: Statistical Package for Social Sciences

ANOVA: Analysis of variance analysis

Declarations:

Ethics approval and consent to participate: Ethics approval was received from the Institutional review board of the 37 Military Hospital. Participants also signed or thumb printed to show consent.

Consent for publication: Not applicable

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Authors' contributions: PYAA, IHJE, CL and JMGAS conceptualized the study. PYAA collected data. PYAA, IHJE and AAA analysed the data. All authors reviewed the literature and read through the final manuscript before submission.

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TABLES

Table 1

Background characteristics of participants by residence

Characteristics	Teshie	Ashaiman	Total n (%)
Gender			
Male	43(21.6)	114(57.6)	157(39.5)
Female	156(78.4)	84(42.4)	240(60.5)
Age group (in years)			
60-65	90(45.2)	99(50.0)	189(47.6)
66-70	36(18.1)	39(19.7)	75(18.9)
71-75	32(16.1)	23(11.6)	55(13.9)
76-80	18(9.0)	20(10.1)	38(9.6)
>81	23(11.6)	17(8.6)	40(10.1)
Marital Status			
Single	28(14.1)	9(4.5)	37(9.3)
Married	41(20.6)	85(42.9)	126(31.7)
Divorced	25(12.6)	56(28.3)	81(20.4)
Widowed	105(52.7)	48(24.3)	153(38.5)

Education			
No formal	82(41.2)	96(48.5)	178(44.8)
Elementary	38(19.1)	56(28.3)	94(23.7)
High School	73(36.7)	24(12.1)	97(24.4)
Above High School	6(3.0)	22(11.1)	28(7.1)

Table 2

Participants Mean scores and Association of background characteristics with QoL scores

	General QoL	General Health	Psychological domain **	Physical domain**	Social domain**	Environmental domain**
Total group (n=397)	2.73	2.90	45.07[b]	43.25[a]	56.97[b]	51.63[b]
Gender						
Female	2.53	2.78	41.95 [a]	44.63 [a]	56.44 [b]	49.21 [b]
Male	3.04	3.09	45.22 [b]	45.75[b]	57.77 [b]	55.30 [b]
Mean difference	.515	.310	3.27	1.11	1.33	6.09
p-value	.000*	.017*	.019*	.611	.506	.001*
Age group						
60-65 years	2.08	2.98	45.44	49.14	57.11	54.41
66-70 years	2.84	3.04	41.89	43.65	58.48	51.69
71-75 years	2.80	2.95	40.31	42.49	57.47	49.75
76-80 years	2.58	2.66	42.34	40.11	53.97	48.95
>80 years	2.25	2.45	40.30	36.89	55.60	43.26
F	2.139	1.966	2.600	4.180	.397	4.111
p-value	.075	.099	.036*	.003*	.811	.003*

Marital status						
Single	2.43	2.54	35.97	37.46	48.41	46.89
Married	3.00	3.02	47.44	47.66	62.18	56.13
Divorced	2.95	2.95	44.52	46.05	49.57	52.34
Widowed	2.47	2.86	40.88	44.27	58.66	48.69
F	6.370	1.420	9.861	2.359	10.385	5.583
p-value	.000*	.237	.000*	.071	.000*	.001*
Education						
No formal education	2.61	2.66	39.51	40.73	54.76	47.71
Elementary school	2.78	2.96	45.81	46.73	57.63	52.19
High school	2.72	3.14	45.02	50.23	58.60	54.41
Above high school	3.39	3.43	52.25	49.25	63.14	64.86
F	3.498	4.990	10.938	5.084	1.982	10.241
p-value	.016*	.002*	.000*	.002*	.116	.000*
Residence						
Teshie slum	2.29	2.87	41.28	45.99	58.19	47.59
Ashaiman slum	3.18	2.93	45.22	44.15	55.74	55.71
Mean difference	-.885	-.065	-3.94	1.84	2.44	-8.12
p-value	.000*	.618	.004*	.389	.211	.000*
Sources of Income						
Pension	3.04	3.33	44.96	50.96	56.52	53.56
Fishing/Farming	2.76	2.81	42.39	44.00	56.09	49.47
Trading	2.48	2.58	41.75	41.47	54.55	49.74
Children	2.86	3.06	44.88	44.79	58.49	53.22
Friends	2.65	3.24	41.97	49.92	59.27	52.62
Family/Siblings	2.90	3.05	46.35	50.70	59.10	55.45
Other	2.25	1.75	37.00	46.13	56.25	51.75
F	1.500	3.434	1.118	1.389	.518	.842
p-value	.177	.003*	.351	.218	.794	.538
Source of Social Support						
Sibling	2.72	2.88	44.06	43.62	53.35	52.93
Daughter	2.61	2.74	42.73	42.21	57.16	49.07
Son	2.84	3.07	42.52	48.87	58.03	54.09
Grandchild	2.66	2.68	41.86	44.61	55.18	50.64
Other	2.86	3.38	47.05	53.95	62.19	53.48
F	.481	1.761	.695	2.134	1.049	1.192
p-value	.749	.137	.596	.076	.382	.314
Living Arrangements						
Extended family	3.10	3.10	45.15	46.28	56.92	54.59
Family	2.45	2.60	42.87	36.08	56.57	48.70
Alone	2.41	2.81	40.27	47.21	55.96	49.36

Children	2.91	2.96	45.37	46.62	58.53	52.18
Others	2.50	2.70	45.10	37.80	62.40	54.33
F	7.080	1.72	2.747	3.275	.396	2.067
p-value	.000*	.144	.028*	.012*	.811	.084

**All raw scores are transformed to a 1-100 score, *Significant p-value ≤0.05, [a] =poor QoL, [b] = moderate QoL

Table 3

ANOVA for Regression analysis showing the influence of demographic characteristics and Participants QoL in the 4 domains of the WHOQOL-BREF

	Psychological domain Mean	Physical domain Mean	Social domain Mean	Environmental domain Mean
Total group (n=397)	45.07	43.25	56.97	51.63
Gender				
Female	41.95	44.63	56.44	49.21
Difference in means	F(3,235)=36.118; p<.001	F(3,235)=28.856; p<.001	F(3,235)=12.619; p<.001	F(3,235)=46.237; p<.001
Adjusted R square	.307	.260	.128	.363
Male	45.22	45.75	57.77	55.30
Difference in means	F(3,153)=76.702; p<.001	F(3,153)=31.965; p<.001	F(3,153)=26.887; p<.001	F(3,153)=73.828; p<.001
Adjusted R square	.593	.373	.345	.583
Age group				
60-65 years	45.44	49.14	57.11	54.41
Difference in means	*F(3,185)=56.458; p<.001*	*F(3,185)=25.285; p<.001*	*F(3,185)=17.656; p<.001*	*F(3,185)=60.383; p<.001*
Adjusted R square	*.469*	*.279*	*.210*	*.488*
66-70 years	41.89	43.65	58.48	51.69
Difference in means	*F(3,71)=14.223; p<.001*	*F(3,71)=12.154; p<.001*	*F(3,71)=6.713; p<.001*	*F(3,71)=16.341; p<.001*
Adjusted R square	*.349*	*.311*	*.188*	*.383*
71-75 years	40.31	42.49	57.47	49.75
Difference in means	*F(3,51)=12.850; p<.001*	*F(3,51)=5.413; p=.003*	*F(3,51)=2.143; p=.106*	*F(3,51)=15.914; p<.001*
Adjusted R square	*.397*	*.197*	*.112*	*.453*
76-80 years	42.34	40.11	53.97	48.95
Difference in means	*F(3,34)=7.977; p<.001*	*F(3,34=2.285; p=.096*	*F(3,34)=12.850; p=.002*	*F(3,34)=6.295; p=.002*
Adjusted R square	*.361*	*.094*	*.288*	*.300*
>80 years	40.30	36.89	55.60	43.26
Difference in means	*F(3,35)=13.315; p<.001*	*F(3,35)=11.896; p<.001*	*F(3,35)=7.288; p=.001*	*F(3,35)=10.753; p<.001*
Adjusted R square	*.493*	*.462*	*.332*	*.435*
Marital status				
Single	35.97	37.46	48.41	46.89
Difference in means	*F(3,33)=13.087; p<.001*	*F(3,33)=3.797; p=.019*	*F(3,33)=1.971; p=.137*	*F(3,33)=17.165; p<.001*
Adjusted R square	*.502*	.189	.075	.573
Married	47.44	47.66	62.18	56.13
Difference in means	*F(3,122)=47.457; p<.001*	*F(3,122)=18.805; p<.001*	*F(3,122)=32.156; p<.001*	*F(3,122)=49.601; p<.001*
Adjusted R square	*.527*	.299	.428	.538
Divorced	44.52	46.05	49.57	52.34
Difference in means	*F(3,76)=30.952; p<.001*	*F(3,76)=18.004; p<.001*	*F(3,76)=9.245; p<.001*	*F(3,76)=39.434; p<.001*

Adjusted R square	*.532*	.392	.238	.593
Widowed	40.88	44.27	58.66	48.69
Difference in means	*F(3,76)=18.283; p<.001*	*F(3,149)=20.969; p<.001*	*F(3,149)=8.231; p<.001*	*F(3,149)=25.410; p<.001*
Adjusted R square	*.254*	.283	.125	.330
Education				
No formal education	39.51	40.73	54.76	47.71
Difference in means	*F(3,173)=36.902; p<.001*	*F(3,173)=25.547; p<.001*	*F(3,173)=16.669; p<.001*	*F(3,173)=50.371; p<.001*
Adjusted R square	*.380*	.295	.211	.457
Elementary school	45.81	46.73	57.63	52.19
Difference in means	*F(3,90)=32.867; p<.001*	*F(3,90)=20.298; p<.001*	*F(3,90)=11.102; p<.001*	*F(3,90)=24.730; p<.001*
Adjusted R square	*.507*	.384	.246	.433
High school	45.02	50.23	58.60	54.41
Difference in means	*F(3,93)=16.478; p<.001*	*F(3,93)=10.946; p<.001*	*F(3,93)=3.902; p=.011*	*F(3,93)=21.936; p<.001*
Adjusted R square	*.326*	.237	.083	.396
Above high school	52.25	49.25	63.14	64.86
Difference in means	*F(3,24)=11.757; p<.001*	*F(3,24)=4.401; p=.013*	*F(3,24)=7.112; p=.001*	*F(3,24)=4.333; p=.014*
Adjusted R square	*.544*	.274	.404	.270
Residence				
Teshie slum	41.28	45.99	58.19	47.59
Difference in means	*F(3,195)=11.276; p<.001*	*F(3,195)=28.819; p<.001*	*F(3,195)=6.570; p<.001*	*F(3,195)=34.911; p<.001*
Adjusted R square	*.135*	.297	.078	.339
Ashaiman slum	45.22	44.15	55.74	55.71
Difference in means	*F(3,193)=171.779; p<.001*	*F(3,193)=56.292; p<.001*	*F(3,193)=47.252; p<.001*	*F(3,193)=113.083; p<.001*
Adjusted R square	*.723*	.458	.414	.644

Table 1

Characteristics	Frequency	%
Current Illness		
Body Pains	76	19.2
Diabetes	19	4.8
Difficulty Walking	33	8.3
High Blood Pressure	68	17.1
Joint Pains	100	25.2
Old Age	26	6.5
Poor Eyesight	43	10.8
Others	32	8.1
Sources of Income		
Children	125	31.5
Farming	38	9.6
Fishing	52	13.1
Friends	37	9.3
Pension	27	6.8
Siblings	19	4.7
Trading	91	22.9
Others	8	2.0
Source of healthcare		
Clinic	63	15.9
Drug Ped	37	9.3
Herbalist	18	4.5
Hospital	121	30.5
Pharmacy	158	39.8
Source of Social Support		
Sibling	69	17.4
Daughter	114	28.7
Son	67	16.9
Grandchild	44	11.1
Other	21	5.3

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	#3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	#4	Present key elements of study design early in the paper	4
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5

		selection of participants.	
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	N/A
Bias	#9	Describe any efforts to address potential sources of bias	14
Study size	#10	Explain how the study size was arrived at	7
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	8
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	8
Statistical methods	#12c	Explain how missing data were addressed	13
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	7

Statistical methods	#12e	Describe any sensitivity analyses	N/A
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7-8
Participants	#13b	Give reasons for non-participation at each stage	N/A
Participants	#13c	Consider use of a flow diagram	N/A
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	n/a
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	23

Main results	#16b	Report category boundaries when continuous variables were categorized	8
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	#18	Summarise key results with reference to study objectives	13
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	13-14
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	13
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	n/a

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QUALITY OF LIFE OF OLDER ADULTS AND ASSOCIATED FACTORS IN GHANAIAN URBAN SLUMS: A CROSS-SECTIONAL STUDY

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QUALITY OF LIFE OF OLDER ADULTS AND ASSOCIATED FACTORS IN GHANAIAN URBAN SLUMS: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective This study provides insight into the QoL of older adults living in urban slums in Ghana**.**

Design The study employed a community-based cross-sectional design study to assess QoL among older adults in two slums between April and May 2020. QoL was assessed using the WHOQOL-BREF questionnaire.

Settings Participants were drawn from two slums in Ghana, one in a fishing-dominated community and the other in an industrial community.

Participants This study included 400 participants aged 60 and above who had lived in either slum for at least one month and were able to communicate verbally.

Results Although the means of all participants' transformed scores were poor in the physical and psychological domains, they were moderate in all other domains. When viewed as a whole, the perceived overall QoL is neither poor nor good and participants are neither satisfied nor dissatisfied with their health. Participants had a moderate level of QoL in the WHOQOL-BREF psychological (mean score 45.7), social (mean score 57.0) and environmental (mean score 51.6) domains. The mean score for physical QoL of the older adults was 43.3 which denotes a poor QoL. In all domains, male participants have a significantly higher mean QoL than their female counterparts. An ANOVA analysis comparing the living arrangements of participants showed that those who lived with extended family had high mean scores in the environmental QoL, overall QoL and satisfaction with health. Regression analysis revealed that QoL was influenced mostly by the environmental (46.2%), followed by the psychological (43.7%), physical (31%) and social domain (20.4%).

Conclusions The findings from this study show that older adults living in slums had moderate psychological, social, and environmental QoL and a poor physical QoL. Although the mean scores for QoL are higher than anticipated, health policy development must take into account the specific needs of older adults.

Keywords: Quality of Life, Older adult, Slums, WHOQOL-BREF

Article Summary

Strengths and limitations of this study

- This is the first study assessing the QoL of older adults in two different slum communities in Ghana.

- A 100% response rate and there was no data missing, which contributes to the methodological strength of this study. The 100% response rate can be attributed to the fact that all participants were approached personally and the presence of the first author and research assistants' encouraged respondents.

- The findings from this study can assist in policy development to include strategies to further improve the QoL of older adults in slums.

- There was no privacy during data collection due to the crowded nature of the slum and this could be a limitation as other slum dwellers were often listening to the interviews.

- Another limitation could be ascribed to the crowded nature of the slum setting: there was no privacy during data collection and other slum dwellers were often listening to the interviews. This could have influenced the answers given by participants.

Introduction

The difference in life expectancy of people in developed countries and people living in African countries is approximately ten years [1]. These differences are caused by a variety of factors, including demographic differences, varying family and social structures, social security arrangements, health infrastructure, and spiritual beliefs [2 - 4]. These factors impact how a person addresses health issues and other aspects of their life. Life expectancy in Africa is rising, in line with global trends and despite regional differences. However, an increased life expectancy does not always imply an improved quality of life (QoL). Ageing often comes with problems affecting the quality of life, such as loneliness, ill health, and depression [5, 6, 7]. As a result, as people in African societies are ageing, the QoL of older adults in African countries is increasingly becoming an important issue [8,9].

Quality of life is defined by the World Health Organization as "an individual's perception of their position in life in the context of the culture and value systems in which they live and with their goals, expectations, standards and concerns" [10]. Older adults are particularly vulnerable to poor QoL as a result of changes and events in their physical health, psychological state, social circumstances and relationship to their environment [8, 11, 12]. Ageing may decrease human vitality, which leads to frail health and dependency. Moreover, frailty may express itself as cognitive impairment and neglect in the psychological and social domains respectively. When this is combined with deplorable living conditions, the quality of life of these older adults can be affected.

Slums are a visible evidence of deplorable living conditions. Slums often lack basic amenities, are overcrowded, and polluted [13,14]. In developing countries, mainly African countries, rural-urban migration is one of the causes of slum communities [13-17]. Slum-dwelling older adults are predisposed to non-communicable diseases as they age. They are also susceptible to different forms of communicable diseases due to unsanitary conditions and lack of access to healthcare. [14, 15, 18, 19]. As a result, the overall health status of older adults in slums has been reported to be lower than that of older adults living in formal settlements [20-22].

Supporting older people in slums is an important objective of the WHO "Global strategy and action plan on ageing and health 2016-2030" [23]. One of the targets of the Millennium Development Goals (MDG) 7, was to achieve a significant improvement in the lives of at least 100 million slum dwellers worldwide by 2020. However, there have not been any marked improvements in Ghanaian slums as of yet [24, 25,].

Many studies have been conducted globally, on the QoL of older adults either in the community or in care homes [26, 27], and also in those with different health conditions [28- 30]. However, there is a dearth of research on the QoL of older adults living in slums in developing countries. It is hypothesized that older adults living in slums generally have a poor QoL. To improve the lives of slum dwellers, it is necessary to assess their QoL to determine which aspects require improvement. Therefore, this exploratory study aims to provide insight into the QoL of slum-dwelling older adults using the WHOQOL-BREF questionnaire to assess the QoL of older adults living in two Ghanaian slums. Additionally, associated factors which influence their QoL were explored post-hoc.

Methods

Study design and study population

A community-based cross-sectional study was conducted between April and May 2020. The population under consideration involved older adults living in two urban slums in the Greater Accra region of Ghana. These slums are in the Ashaiman and Teshie communities. The two slums were adopted for this study due to the comparable literacy rates, despite the prevailing disparities in the type of housing structures and socio-economic activities.

Ashaiman is located close to an industrial city in Ghana and consists of people from different regions and tribes in Ghana. Teshie is mainly a fishing community with a majority of the population being indigenous.

Participants were included if they were older adults aged 60years (retirement age) or older, who have lived in the slums of Ashaiman or Teshie for at least one month and could communicate verbally. Critically ill older adults and people with speech impairments who were not able to express themselves verbally were excluded from the study.

Study Instrument

The primary outcome measure of this study is quality of life, assessed using the World Health Organisation Quality of Life -brief version (WHOQOL-BREF) [31]. This instrument was chosen based on the results of a scoping review of instruments assessing QoL in African countries [32]. Detailed information on psychometric properties, related to the use for the slum population, is lacking from previous studies, but the included domains, the feasibility and the length of the instrument, nevertheless, convinced the authors to use the WHOQOL-BREF in this study.

The WHOQOL-BREF consists of four domains. The questions in each domain vary from 3 to 7. Every question in each domain is rated on a 5-point Likert scale, where 1 represents 'very poor' and 5 represents 'very good'. The first domain is the 'Physical Health' domain. This includes seven (7) questions related to sleep, energy, mobility, the extent to which pain prevents performance of necessary tasks, the need for medical treatment to function in daily life, and level of satisfaction with their work capacity. The second domain is the 'Psychological' domain with six (6) questions, focusing on the ability to concentrate, self-esteem, body image, spirituality, and the frequency of positive or negative feelings. The third domain covers 'Social relationships' and includes three (3) questions related to satisfaction with personal relationships, social support systems and sexual satisfaction. The fourth is the 'Environmental' domain, which comprises eight (8) questions related to safety and security, satisfaction with one's home and physical environment satisfaction, finances, availability of health and /social care availability, access to general information and leisure activities accessibility and satisfaction with transportation.

In addition to the 4 domains, the WHOQOL-BREF includes two general questions, one about the respondents' QoL in general, and one related to their satisfaction with health. These questions also have five response options varying from 1 'very poor' to 5 'very good' for rating the QoL and 'very dissatisfied' (1) to 'very satisfied' (5) for rating the satisfaction with health. Besides using the WHOQOL-BREF, demographic characteristics of subjects (gender, age, educational level, religion, and marital status) were collected. In addition, data on access to health care, current health condition, health services patronized, living arrangements, social support, and sources of income were gathered.

Data collection

The WHOQOL-BREF questionnaire was used to conduct face-to-face interviews during data collection, given difficulties with reading (caused by both difficulties in reading and/or poor vision) in the population under consideration. The interviews were done by the first author, PYAA and 4 research assistants' undergraduates of the University of Ghana. The interviewers all have a background in nursing and were trained before the commencement of data collection. During the training, they were introduced to the WHOQOL-BREF and taken through the process of intended data collection. The interviewers needed to be conversant with the questions in two local languages (Twi and Ga). During the face-to-face interviews with subjects, interviewers read the questions out loud and filled in the responses of participants. The original English version of the instrument was translated and administered to participants in the local languages (Ga and Twi). Local language experts translated and back-translated the WHOQOL-BREF questionnaire to be sure that the intended meaning of the original content was intact. Additionally, a pretest of the questionnaire was carried out in a nearby slum and no changes were made afterwards. We used the STROBE cross-sectional checklist when writing our report [33].

Sampling method and sample size

Recruitment took place by involving a key informant in each slum. This key informant was a person working at the Municipal Assembly of the specific community and visiting the slums very often due to the nature of their work. The key informant used a convenient sampling method to select participants living in the slums. After selecting participants, the snowballing technique was used to increase the participation rate. This technique is not new as previous QoL studies involving older adults also used snowballing sampling techniques during sample recruitment [21, 34]. The key informant also familiarized the research team with the slum community. Eligible participants were invited and the research team provided study-specific information personally to the participant. The sample size was calculated to get the number of participants that will be representative of the entire population of older adults in the slums. The sample size is an estimate of how many participants will be needed as a representation of the total sample population. The sample size calculation was done using the Yamane formula [35]. The two slums under consideration consist of approximately 6,000 older inhabitants. Filling in the formula gave an estimated sample size of 375 participants [35].

Ethical Approval

Ethical clearance (37MH-IRB IPN 199/2018) was obtained from the 37 Military Hospitals Institutional Review Board. Permission to perform this study in Ashaiman and Teshie was provided by the Municipal Assemblies of the selected slums. Written informed consent, either by signing or thumb-printing (in the case of those who were unable to sign) was required for participation.

Patient and Public Involvement

Patients and the public were not involved in the development of the research questions, the design, and the conduct of the study. However, participants were involved in the recruitment of others through the snowball method. The study results will be shared with the participants and other relevant stakeholders through various social media handles and conferences.

Data Analysis

The data were analysed using Statistical Package for Social Sciences (IBM SPSS) version 24.0. Domain scores were scaled in a positive direction (i.e., higher scores denote higher QOL). The mean score of items within each domain is used to calculate the domain score. An Excel sheet calculator created by Skvarc [36] was used to transform the different WHOQOL-BREF domain scores to a 0-100-scale. Cut-off points for QoL in this study were determined based on the literature by Silva and colleagues [37]. According to Silva and colleagues [37], a score ≤45 is considered poor QoL, 46-64 is considered moderate QoL and any score >65 is recorded as a high QoL.

In further analyses, the demographic data served as independent variables and the domains of the WHOQOL-BREF as dependent variables. Gender and place of residence were depicted as a binominal variable where '1' is male/Teshie and '2' is female/Ashaiman respectively. All other demographic data were categorical variables. Educational level was categorized into four groups: no formal education, elementary school, high school, and above high school. Marital status comprised of single, married, divorced, and widowed depicted with numbers. Age was grouped into five categories (60-65, 66-70,71-75, 76-80, >81) also depicted with numbers. Finally, the place of residence: Teshie or Ashaiman, was documented.

Descriptive analyses were performed to describe the background characteristics, as well as the domain scores of the WHOQOL-BREF. To compare the mean distribution of participants' characteristics and their QoL per domain, an independent *t*-test and analysis of variance (ANOVA) were used. Regression

analysis was done to assess the relationship between sociodemographic characteristics and the QoL domains. Analyses of QoL scores in the four domains were performed after transformation to a 0-100% scale. For the primary hypothesis in this study, the level of significance was set at $P < 0.05$. For all other analyses, p-values are reported for generating hypotheses and high false positives were controlled for using multiple comparison adjustments. Nonetheless results should be interpreted with caution.

Results

Background Characteristics of Participants

In total, 400 people were approached for this exploratory study and they all agreed to participate. This means that a 100% response rate was achieved. Three subjects were excluded from the analysis as they were below the age of 60 years, resulting in a total sample of 397 respondents.

In Appendix:Table 1 the background characteristics can be found. Of all participants who participated, 240 persons (60.5%) were female, and the largest age group was 60-65 years (47.6%). The majority of the older adults in this population were widowed (38.5%), followed by participants being married (31.7%). In total 44.8% of the participants had no formal education. When asked about their current illnesses/diseases, 25.2% had osteoarthritis, followed by 19.2% with body pains, 17.1% had high blood pressure. Participants were also asked about their source of income. Most participants (31.5%) received their income from their children, 22.9% were into trading, 2.0% were either mechanics, electricians, or welders. On the sources of healthcare utilized, most participants 39.8% patronized pharmacies, with herbal preparations being the least accessed 4.5%. When asked about the living arrangements of participants, 33.5% each, either lived alone or with extended family members. Those who lived with their children were 17.1% of the total sample population while 2.5% lived with others, which include friends and church members. Daughters were the biggest form of social support (28.7%), followed by siblings of older adults (17.4%), and then sons, 16.9% (See Table 2 in Appendix).

The outcomes of the WHOQOL-BREF are described in Appendix: Table 3. When looking at the total population, the perceived overall QoL is neither poor nor good, with participants neither satisfied nor dissatisfied with their health. Transformed QoL scores were rated poor, moderate and high, based on the literature by Silva and colleagues [37]. According to Silva and colleagues [37], the participants in these slums recorded a moderate level of QoL in the psychological (mean, 45.7), social (mean, 57.0) and environmental (mean, 51.6) domains of the WHOQOL-BREF. The physical QoL of the older adults in these slums recorded a mean score of 43.3.

When looking at the differences between male and female participants, statistically significant differences were found in general quality of life (p<.001), general satisfaction with health (p=.017), the psychological domain (p=.019), and the environmental domain (p=.001). In all of these domains, male participants showed a significantly higher quality of life compared to their female counterparts.

In the analysis of the various age groups, there were significant differences in the psychological (p=.036), physical (p=.003) and environmental (p=.003) domains.

From Appendix: Table 3, it appears that as age increased, QoL decreased significantly in the physical and environmental domains. Yet, in the psychological domain, those between 76-80 years had a better psychological QoL compared to those 66-70 years.

For marital status, significant differences in the various domains were seen, in the perceived QoL (p<0.001), psychological (p<0.001), social (p<0.001), and environmental(p=0.001) domains. Participants who are married had the highest scores in these domains, followed by participants who are divorced, widowed, and single.

In an examination of differences in QoL among the various educational levels, there were significant differences in all domains, except for the social domain. In general, QoL was significantly higher among participants with a higher educational status. Lastly, when looking at the difference in QoL between the place of residence, older adults in the Ashaiman slum showed a statistically significant difference in perceived QoL (p<0.001), psychological QoL(p=0.004) and environmental QoL(p<0.001).

In a one-way analysis of variance (ANOVA) of the mean differences in QoL of participants with different sources of income, there was a statistical significance in the satisfaction with health domain only. Participants who received pensions had higher means in most domains (overall QoL, satisfaction with health, physical QoL) followed by participants who had financial support from family/siblings (higher scores on the environmental and psychological domains). Participants who received financial support from friends had the highest QoL score in the social QoL domain.

An ANOVA comparing mean QoL scores of participants, with different sources of social support showed no statistical differences in scores between different sources of social support (See Table 2 in Appendix).

An ANOVA analysis comparing the living arrangements of participants showed that people who lived with extended family had high environmental QoL scores, overall QoL scores and satisfaction with health scores. Those who lived with their children had high psychological QoL scores.

An analysis of variance for regression analysis of QoL scores and the demographic characteristics was done to show if certain domains are influencing QoL to a higher extent than other domains (see Appendix: Table 4). Variances between the various domains showed that the environmental domain had the highest influence of 46.2%, followed by the psychological domain (43.7%), the physical domain (31%) and the social domain (20.4%). When looking at the variances between domains, calculated with the adjusted r square, for females at a significance p<.001, the environmental domain had the greatest influence (36.3% variance in QoL), followed by the psychological domain (30.8%), the physical domain (26.0%) and the social domain (12.9% variance in QoL). Among males at a significance of p<.001, the psychological domain has a 59.3% influence on total QoL followed by the environmental domain (58.3%), the physical domain (37.3%) and the social domain (33.2%).

For older adults in the age category 60-65years, environmental QoL had the highest influence (adjusted r^2=0.488) on their QoL at a significance of p<.001, followed by psychological quality of life with an adjusted r^2=0.469 and then physical QoL (adjusted r^2=0.279) and lastly the social QoL (adjusted r^2=0.210). Environmental QoL has a greater influence on the general QoL of older adults between 60-75 years and the psychological QoL has a greater influence on the QoL of participants ≥76 years (See Appendix: Table 4). The QoL of participants with no formal education was likely to be influenced 45.7% by the environmental QoL (adjusted r^2=0.457), while those who attained education above the high school had their QoL being impacted 54.4% by the psychological QoL (adjusted r^2=0.544). The environmental QoL had a 33.9% influence on the QoL of participants living in slums in the Teshie community (adjusted r^2=0.339), while the QoL of participants in Ashaiman was influenced 72.3% by the psychological QoL (adjusted r^2=0.723). Results from other subgroup analyses on variance can be found in Appendix: Table 4.

DISCUSSION

This study aimed to assess the QoL of older adults living in two Ghanaian slums using the WHOQOL-BREF questionnaire. It was hypothesized that older adults living in slums generally have a poor QoL. Overall, there is an indication that older adults living in slums have a poor to moderate QoL indeed. As previously indicated, this study is exploratory and additional hypotheses were generated post-hoc. The first is that the physical QoL of older adults in slums is poor. Secondly, males have higher mean scores on all domains than females. Thirdly, educational level and marital status influence the QoL of older adults in most domains. Additionally, receiving financial support positively impacts QoL. Also, the population recorded an average rating of neither poor nor good in the overall QoL question and neither

satisfied nor dissatisfied for the health satisfaction question. Finally, results from a comparison of the two slums, underscore the need to pay particular attention to the environmental QoL of older adults in the Teshie slum and the psychological QoL domain of those in the Ashaiman slums.

Overall, there is an indication that older adults living in slums have a moderate QoL in the environmental QoL domain. The results underscore the need to pay particular attention to the environmental QoL of older adults in the Teshie slum and the psychological QoL domain of those in the Ashaiman slums to improve the QoL in total. Overall, there is an indication that older adults living in slums have a poor physical QoL. Averagely, a moderate QoL level was observed in the environmental QoL domain of the older adults in the slums. This is remarkable because, in slums, one would have expected a very poor QoL in the environmental domain due to confirmed [38-40] well-known characteristics of slums such as the lack of safety and security, poor quality of housing, overcrowding, and unavailability of health and social care. An explanation of this finding could be that most older adults might have adapted to their environment and tried to make the best of what is at their disposal. Another explanation could be that slum amenities and living conditions are not much worse than the prior living arrangements (rural life) of these older adults.

In the current study, females constituted the majority (61%) of the population, similar to the study by Akosile et.al., [26]. This was expected as females are estimated to live longer than their male counterparts [41,42] even in underdeveloped countries. Additionally, the ages of this study population ranged between 60-98 years with a mean age of 68.89. Similar to most studies carried out in Africa among older adults, the age of most participants was between 60-69 years [43]. This is indicative of an increasing life expectancy and the need to promote interest in older adults. Participants in this study mostly had no formal education and this is consistent with studies conducted in slums from various countries like India [44], Iran [45], Bangladesh [46] and sub-Saharan Africa [43,47 - 49 -].

Low QoL scores were observed for all participants in the physical and psychological domains. This result affirms a study by Alaazi, and colleagues [21] comparing slum and non-slum dwellers, where participants had low QoL mean scores in both psychological and physical health domains. Poor health conditions and increased dependency, as well as low self-esteem and frequency of negative feelings, as postulated by Pathak, Deshpande, and Manapurath [50] could account for the low scores. Although older adults may receive social support from their family members, older adults might feel more comfortable if this support is from their children. This may also account for low scores in the psychological QoL domain of those

living with their extended family compared to high psychological scores of those living with their children.

Males recorded higher means than females in all domains of the WHOQOL-BREF. This is similar to findings by van Nguyen and colleagues [51], who suggested comparable cultural, economic and environmental contexts could yield a similar outcome. The psychological and environmental domains had statistically significant differences for gender on QoL, where males showed higher QoL compared to females. In the psychological domain, males in the slum have better self-esteem and often have positive feelings as they try to make ends meet in their current settlement. The gender differences could be attributed to the roles males and females play in the Ghanaian society. Anecdotal evidence suggests that males show dominance and supremacy in Ghanaian culture. Additionally, most males in the slums first migrated from the village and brought their spouses to live with them after settling in the slums [52, 53]. In the environmental domain, males who often leave the slums to work are more financially sound and have access to general information compared to females. Moreover, as breadwinners, Ghanaian men usually put up the expression of "all is well" even when it is not, and, therefore do not easily admit failure compared to females. In addition, when it comes to issues of safety and money, females are often dependent on their husbands. For females, the lowest mean score was shown in the psychological health domain (mean = 41.95), implying negative feelings, low self-esteem, low body image and appearance. Females living in slum communities might feel they have not achieved much and feel demeaned because of the stigma of living in slums [54] and societal upbringing [55]. This is consistent with the findings of Alaazi, and colleagues [21].

The highest overall QoL score was found for the social relationship domain (mean= 57.77), an indication of relative satisfaction of both males and females with personal relationships and support received. This may be attributed to the potential role of the Ghanaian extended family system, in which children offer support to their older family members even in the slum. Children were the highest sources of income for the older adults in this study. Nonetheless, older adults in this study who received pensions were most satisfied with their health. This could be attributed to the ability of such individuals to access and afford healthcare when ill as their previous employers will usually, refund hospital bills.

QoL of participants generally decreased with age similar to previous studies [8, 21, 26, 56 - 58]. This could be attributed to the gradual degeneration and weakness of the human body as individuals age. Medically diagnosed osteoarthritis was the prevalent condition among the study population. Considering the uneven walkways in the slums, the degeneration of joint cartilage and the underlying bone causes

pain especially in the hip, and knee making older adults more dependent on others. Participants between 76-80 years had a better psychological QoL compared to those 66-70 years, implying they had better self-esteem, body image, spirituality, and the frequency of positive or negative feelings similar to a study by Charles, & Kulandai [59]. Spirituality in the Ghanaian culture is very prevalent most especially among older adults as they draw closer to their Maker. This could account partly for this result as older adults at this stage feel they are ready to exit the world accepting their previous life, by which they may not have considerable doubts anymore [6, 16, 21, 47, 48].

With the sociodemographic characteristics of the current study population, both the marital status and educational level of participants had a significant effect on the QoL of participants. Married participants had higher means in all domains compared to all the other categories, especially the single participants. This confirms findings of studies by Lee, Xu, & Wu, [60] and Yaya, Idriss-Wheeler, Vezina, & Bishwajit, [57]. Except for the physical health domain, higher educational levels could be equated to better QoL in the other domains similar to findings by Ejiakor, et.al., [61].

Comparing the two slums, older adults in Ashaiman showed a better QoL in the perceived overall QoL and the psychological and environmental domains. This could be attributed to the proximity of Ashaiman to the industrial city and therefore inhabitants could more easily get access to the resources the non-slum dwellers in the industrial city enjoy. Additionally, caregivers of these older adults engage more frequently in various economic activities compared to the restricted/narrower options (fishing, fish mongering and small-scale trading) of those in Teshie. However, there were no significant differences in the physical and social relationship domains between participants of both slums.

STRENGTHS AND LIMITATIONS

A strength of this study is that this is the first study assessing the QoL of older adults in two different slum communities in Ghana.

A 100% response rate and there was no data missing, which contributes to the methodological strength of this study. The 100% response rate can be attributed to the fact that all participants were approached personally and the presence of the first author and research assistants' encouraged respondents. Additionally, breakfast packages given to participants after completing the questionnaires could have contributed to the 100% response rate. However, what could have biased our results is the fact that a convenient sampling technique was used to select participants, instead of a probability sampling method. The reason for this is the nature of the slum set-up and the frail population involved. It was not possible to apply a probability sampling method among the older adults living in the slums, and therefore,

convenience sampling was used. Additionally, when comparing the background characteristics with other studies focused on older adults in slum settings [21, 51], they are comparable to our findings, which makes it likely that our convenience sampling method did not affect the generalizability of our results.

Another limitation could be ascribed to the crowded nature of the slum setting: there was no privacy during data collection and other slum dwellers were often listening to the interviews. This could have influenced the answers given by participants. Lastly, even though the WHOQOL-BREF questionnaire is validated in various languages, this is not the case for the languages used in this study. We did perform a translation–back translation procedure and the instrument was pre-tested in a neighbouring slum, we therefore expect that this did not influence our results to a large extent.

IMPLICATIONS FOR PRACTICE AND RESEARCH

In all domains of the WHOQOL-BREF, females have a lower quality of life than males. Therefore, we advise governmental and non-governmental agencies to focus on helping women in slums get better self-esteem and increase the frequency of positive feelings. An important method to achieve this is generally through education. Also, poor scores in physical QoL among study participants are observed. Further research is needed to determine what could account for the moderate QoL recorded in this slum setting. Additionally, assessing which factors could contribute to the poor physical QoL of old people in slums. Policymakers on health are also encouraged to incorporate structures to assist community health workers to strategize home visits to these older adults. Establishment of community facilities well equipped to meet the QoL in totality. The findings from this study can assist in policy development to include strategies to further improve the QoL of older adults in slums.

CONCLUSION

The findings from this study show that older adults living in slums in Ghana had a moderate psychological, social, and environmental quality of life and a poor physical quality of life. Therefore, health policy development must consider the specific needs of older adults in slums and direct policies to meet these needs to further improve their overall QoL.

List of Abbreviations

QoL: Quality of Life

MDGs: Millennium Development Goals

WHOQOL-BREF: World Health Organisation Quality of Life -brief version

SPSS: Statistical Package for Social Sciences

ANOVA: Analysis of variance analysis

Declarations:

Ethics approval and consent to participate: Ethics approval was received from the Institutional review board of the 37 Military Hospital. Participants also signed or thumb printed to show consent.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Authors' contributions: PYAA, IHJE, CL and JMGAS conceptualized the study. PYAA collected data. PYAA, IHJE and AAA analysed the data. All authors reviewed the literature and read through the final manuscript before submission.

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Appendix:Table 1: Background characteristics of participants by residence

Characteristics	Teshie	Ashaiman	Total n (%)
Gender			
Male	43(21.6)	114(57.6)	157(39.5)
Female	156(78.4)	84(42.4)	240(60.5)
Age group (in years)			
60-65	90(45.2)	99(50.0)	189(47.6)
66-70	36(18.1)	39(19.7)	75(18.9)
71-75	32(16.1)	23(11.6)	55(13.9)
76-80	18(9.0)	20(10.1)	38(9.6)
>81	23(11.6)	17(8.6)	40(10.1)
Marital Status			
Single	28(14.1)	9(4.5)	37(9.3)
Married	41(20.6)	85(42.9)	126(31.7)
Divorced	25(12.6)	56(28.3)	81(20.4)
Widowed	105(52.7)	48(24.3)	153(38.5)
Education			
No formal	82(41.2)	96(48.5)	178(44.8)
Elementary	38(19.1)	56(28.3)	94(23.7)
High School	73(36.7)	24(12.1)	97(24.4)
Above High School	6(3.0)	22(11.1)	28(7.1)

Appendix: Table 2: Associated factors

Characteristics	Frequency	%
Current Illness		
Body Pains	76	19.2
Diabetes	19	4.8
Difficulty Walking	33	8.3
High Blood Pressure	68	17.1
Joint Pains	100	25.2
Old Age	26	6.5
Poor EyeSight	43	10.8
Others	32	8.1
Sources of Income		
Children	125	31.5
Farming	38	9.6
Fishing	52	13.1
Friends	37	9.3
Pension	27	6.8
Siblings	19	4.7
Trading	91	22.9
Others	8	2.0
Source of healthcare		
Clinic	63	15.9
Drug Ped	37	9.3
Herbalist	18	4.5
Hospital	121	30.5
Pharmacy	158	39.8
Source of Social Support		
Sibling	69	17.4
Daughter	114	28.7
Son	67	16.9
Grandchild	44	11.1
Other	21	5.3

Appendix: Table 3: Participants Mean scores and Association of background characteristics with QoL scores

	General QoL	General Health	Psychological domain **	Physical domain**	Social domain**	Environmental domain**
Total group (n=397)	2.73	2.90	45.07[b]	43.25[a]	56.97[b]	51.63[b]
Gender						
Female	2.53	2.78	41.95 [a]	44.63 [a]	56.44 [b]	49.21 [b]
Male	3.04	3.09	45.22 [b]	45.75[b]	57.77 [b]	55.30 [b]
Mean difference	.515	.310	3.27	1.11	1.33	6.09
p-value	.000*	.017*	.019*	.611	.506	.001*
Age group						
60-65 years	2.08	2.98	45.44	49.14	57.11	54.41
66-70 years	2.84	3.04	41.89	43.65	58.48	51.69
71-75 years	2.80	2.95	40.31	42.49	57.47	49.75
76-80 years	2.58	2.66	42.34	40.11	53.97	48.95
>80 years	2.25	2.45	40.30	36.89	55.60	43.26
F	2.139	1.966	2.600	4.180	.397	4.111
p-value	.075	.099	.036*	.003*	.811	.003*
Marital status						
Single	2.43	2.54	35.97	37.46	48.41	46.89
Married	3.00	3.02	47.44	47.66	62.18	56.13
Divorced	2.95	2.95	44.52	46.05	49.57	52.34
Widowed	2.47	2.86	40.88	44.27	58.66	48.69
F	6.370	1.420	9.861	2.359	10.385	5.583
p-value	.000*	.237	.000*	.071	.000*	.001*
Education						
No formal education	2.61	2.66	39.51	40.73	54.76	47.71
Elementary school	2.78	2.96	45.81	46.73	57.63	52.19
High school	2.72	3.14	45.02	50.23	58.60	54.41
Above high school	3.39	3.43	52.25	49.25	63.14	64.86
F	3.498	4.990	10.938	5.084	1.982	10.241
p-value	.016*	.002*	.000*	.002*	.116	.000*
Residence						
Teshie slum	2.29	2.87	41.28	45.99	58.19	47.59
Ashaiman slum	3.18	2.93	45.22	44.15	55.74	55.71
Mean difference	-.885	-.065	-3.94	1.84	2.44	-8.12

p-value	.000*	.618	.004*	.389	.211	.000*
Sources of Income						
Pension	3.04	3.33	44.96	50.96	56.52	53.56
Fishing/Farming	2.76	2.81	42.39	44.00	56.09	49.47
Trading	2.48	2.58	41.75	41.47	54.55	49.74
Children	2.86	3.06	44.88	44.79	58.49	53.22
Friends	2.65	3.24	41.97	49.92	59.27	52.62
Family/Siblings	2.90	3.05	46.35	50.70	59.10	55.45
Other	2.25	1.75	37.00	46.13	56.25	51.75
F	1.500	3.434	1.118	1.389	.518	.842
p-value	.177	.003*	.351	.218	.794	.538
Source of Social Support						
Sibling	2.72	2.88	44.06	43.62	53.35	52.93
Daughter	2.61	2.74	42.73	42.21	57.16	49.07
Son	2.84	3.07	42.52	48.87	58.03	54.09
Grandchild	2.66	2.68	41.86	44.61	55.18	50.64
Other	2.86	3.38	47.05	53.95	62.19	53.48
F	.481	1.761	.695	2.134	1.049	1.192
p-value	.749	.137	.596	.076	.382	.314
Living Arrangements						
Extended family	3.10	3.10	45.15	46.28	56.92	54.59
Family	2.45	2.60	42.87	36.08	56.57	48.70
Alone	2.41	2.81	40.27	47.21	55.96	49.36
Children	2.91	2.96	45.37	46.62	58.53	52.18
Others	2.50	2.70	45.10	37.80	62.40	54.33
F	7.080	1.72	2.747	3.275	.396	2.067
p-value	.000*	.144	.028*	.012*	.811	.084

**All raw scores are transformed to a 1-100 score, *Significant p-value ≤0.05, [a] =poor QoL, [b] = moderate QoL

Appendix: Table 4: ANOVA for Regression analysis showing the influence of demographic characteristics and Participants QoL in the 4 domains of the WHOQOL-BREF

	Psychological domain Mean	Physical domain Mean	Social domain Mean	Environmental Mean
Total group (n=397)	45.07	43.25	56.97	51.63
Gender				
Female	41.95	44.63	56.44	49.21
Difference in means	F(3,235)=36.118; p<.001	F(3,235)=28.856; p<.001	F(3,235)=12.619; p<.001	F(3,235)=46.
Adjusted R square	.307	.260	.128	.363
Male	45.22	45.75	57.77	55.30
Difference in means	F(3,153)=76.702; p<.001	F(3,153)=31.965; p<.001	F(3,153)=26.887; p<.001	F(3,153)=73.
Adjusted R square	.593	.373	.345	.583
Age group				
60-65 years	45.44	49.14	57.11	54.41
Difference in means	*F(3,185)=56.458; p<.001*	*F(3,185)=25.285; p<.001*	*F(3,185)=17.656; p<.001*	*F(3,185)=60.*
Adjusted R square	*.469*	*.279*	*.210*	*.488*
66-70 years	41.89	43.65	58.48	51.69
Difference in means	*F(3,71)=14.223; p<.001*	*F(3,71)=12.154; p<.001*	*F(3,71)=6.713; p<.001*	*F(3,71)=16.3*
Adjusted R square	*.349*	*.311*	*.188*	*.383*
71-75 years	40.31	42.49	57.47	49.75
Difference in means	*F(3,51)=12.850; p<.001*	*F(3,51)=5.413; p=.003*	*F(3,51)=2.143; p=.106*	*F(3,51)=15.9*
Adjusted R square	*.397*	*.197*	*.112*	*.453*
76-80 years	42.34	40.11	53.97	48.95
Difference in means	*F(3,34)=7.977; p<.001*	*F(3,34=2.285; p=.096*	*F(3,34)=12.850; p=.002*	*F(3,34)=6.29*
Adjusted R square	*.361*	*.094*	*.288*	*.300*
>80 years	40.30	36.89	55.60	43.26
Difference in means	*F(3,35)=13.315; p<.001*	*F(3,35)=11.896; p<.001*	*F(3,35)=7.288; p=.001*	*F(3,35)=10.7*
Adjusted R square	*.493*	*.462*	*.332*	*.435*
Marital status				
Single	35.97	37.46	48.41	46.89
Difference in means	*F(3,33)=13.087; p<.001*	*F(3,33)=3.797; p=.019*	*F(3,33)=1.971; p=.137*	*F(3,33)=17.1*
Adjusted R square	*.502*	.189	.075	.573
Married	47.44	47.66	62.18	56.13
Difference in means	*F(3,122)=47.457; p<.001*	*F(3,122)=18.805; p<.001*	*F(3,122)=32.156; p<.001*	*F(3,122)=49.*
Adjusted R square	*.527*	.299	.428	.538
Divorced	44.52	46.05	49.57	52.34
Difference in means	*F(3,76)=30.952; p<.001*	*F(3,76)=18.004; p<.001*	*F(3,76)=9.245; p<.001*	*F(3,76)=39.4*
Adjusted R square	*.532*	.392	.238	.593
Widowed	40.88	44.27	58.66	48.69
Difference in means	*F(3,76)=18.283; p<.001*	*F(3,149)=20.969; p<.001*	*F(3,149)=8.231; p<.001*	*F(3,149)=25.*
Adjusted R square	*.254*	.283	.125	.330
Education				
No formal education	39.51	40.73	54.76	47.71
Difference in means	*F(3,173)=36.902; p<.001*	*F(3,173)=25.547; p<.001*	*F(3,173)=16.669; p<.001*	*F(3,173)=50.*
Adjusted R square	*.380*	.295	.211	.457
Elementary school	45.81	46.73	57.63	52.19
Difference in means	*F(3,90)=32.867; p<.001*	*F(3,90)=20.298; p<.001*	*F(3,90)=11.102; p<.001*	*F(3,90)=24.7*
Adjusted R square	*.507*	.384	.246	.433
High school	45.02	50.23	58.60	54.41
Difference in means	*F(3,93)=16.478; p<.001*	*F(3,93)=10.946; p<.001*	*F(3,93)=3.902; p=.011*	*F(3,93)=21.9*
Adjusted R square	*.326*	.237	.083	.396

Above high school	52.25	49.25	63.14	64.86
Difference in means	*F(3,24)=11.757; p<.001*	*F(3,24)=4.401; p=.013*	*F(3,24)=7.112; p=.001*	*F(3,24)=4.33*
Adjusted R square	*.544*	.274	.404	.270
Residence				
Teshie slum	41.28	45.99	58.19	47.59
Difference in means	*F(3,195)=11.276; p<.001*	*F(3,195)=28.819; p<.001*	*F(3,195)=6.570; p<.001*	*F(3,195)=34.*
Adjusted R square	*.135*	.297	.078	.339
Ashaiman slum	45.22	44.15	55.74	55.71
Difference in means	*F(3,193)=171.779; p<.001*	*F(3,193)=56.292; p<.001*	*F(3,193)=47.252; p<.001*	*F(3,193)=11*
Adjusted R square	*.723*	.458	.414	.644

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

		Reporting Item	Page Number
Title and abstract			
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	#3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	#4	Present key elements of study design early in the paper	4
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of	5

		selection of participants.	
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	N/A
Bias	#9	Describe any efforts to address potential sources of bias	14
Study size	#10	Explain how the study size was arrived at	7
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	8
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
Statistical methods	#12b	Describe any methods used to examine subgroups and interactions	8
Statistical methods	#12c	Explain how missing data were addressed	13
Statistical methods	#12d	If applicable, describe analytical methods taking account of sampling strategy	7

Statistical methods	#12e	Describe any sensitivity analyses	N/A
Results			
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	7-8
Participants	#13b	Give reasons for non-participation at each stage	N/A
Participants	#13c	Consider use of a flow diagram	N/A
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
Descriptive data	#14b	Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	n/a
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	23

Main results	#16b	Report category boundaries when continuous variables were categorized	8
Main results	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	#18	Summarise key results with reference to study objectives	13
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	13-14
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	13
Generalisability	#21	Discuss the generalisability (external validity) of the study results	14
Other Information			
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	n/a