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Prevalence and Risk Factors for Fall in Older Adults in a Nigerian Urban Community

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Abstract

Background: *Fall represents a major public health problem among older adults in Nigeria. There is a need for information on the prevalence and the risk factors of fall to ascertain the magnitude of the problem among the elderly in Nigeria.*

Objective: *To determine the prevalence and factors associated with falls among older adults in Nigerian Urban Community.*

Methodology: *The study was conducted among older adults in a Nigerian Urban Community. A multi-stage stratified sampling method was used to select persons aged 60 years and above in Ilorin Metropolis, North Central Nigeria.*

Result: *Falls were reported by 24.2% (prevalence) of the sample (n=1750). The prevalence of falls was 18.6% in males and 25.2 % in females. Among fallers, females were more likely than males to sustain injuries, including fractures (46.8% vs. 33.7%; $p < 0.05$). Moreover, a gradual and linear increase in the prevalence of falls was seen as the number of risk factors increased. In the multivariate model, women, subjects with cognitive impairment, those reporting urinary incontinence, and those being physically active during the previous year were found to be independently associated with increased risk of falling among older adults.*

Conclusion: *The present study identified potential risk factors for falls in a representative population-based sample of older adults in a Nigerian Urban Community. It is therefore recommended that these risk factors should be addressed in public health policies through awareness and fall prevention programme. The fall prevention program must focus on females and those with chronic health conditions.*

Keywords: *Falls; Prevalence; Risk Factors; Older persons; Nigeria.*

Introduction

Falls are a marker of frailty, immobility, and acute and chronic health impairment in older persons. Falls in turn diminish function by causing injury, activity limitations, fear of falling, and loss of mobility. Most injuries in the elderly are the result of falls; fractures of the hip, forearm, humerus, and pelvis usually result from the combined effect of falls and osteoporosis. A fall is an unintentional event that results in the person coming to rest on the ground or another lower level. Fall is one of the external causes of unintentional injury. It is coded as E880-E888 in International Classification of Disease-9 (ICD-9), and as W00-W19 in ICD-10. These codes include a wide range of falls including falls on the same level, upper level, and other unspecified fall. A fall is often defined as "inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects". Fall is also defined as accidental event in which a person falls when his/her center of gravity is lost and no effort is made to restore

balance or when this effort is ineffective (Ungar et al, 2013).

It is important to note that there is no universal consensus on the definition of a fall. A recent Cochrane review reported that most studies fail to specify the operational definition of falls, leaving the interpretation to study participants. This leaves room for many different interpretations of a fall, and consequently brings into question the validity of the studies. Older people tend to describe a fall as a loss of balance whereas health care professionals generally refer to the consequence of falling, including injury and reduced quality of life (Ungar et al, 2013). Even a small change in definition may have significant consequences on the results of a study (WHO, 2008). Thus, providing an operational definition of a fall, with explicit inclusion and exclusion criteria, is recommended when conducting research Ungar et al, 2013).

According World Health Organization, falls are considered as the most common cause of injuries among the older population and forty percent of traumatic injuries-related hospitalizations are due to falls (WHO, 2008). It has been reported that the most common fall-related consequences are pain, bruising, lacerations, fractures including upper extremity and hip fractures, and intracranial bleeding in severe cases. Frequent falls in the elderly population can lead to serious health consequences and efforts to reduce their incidence are necessary (Herman et al, 2006; Soriano et al, 2007; Woolcott et al, 2009). Nearly 28-35% of people aged 65 years and above fall each year (Herman et al, 2006; Malasana et al, 2011; Blake et al, 1988) and this percentage increases to 32-42% for those over 70 years of age (Malasana et al, 2011; Blake et al, 1988; Prudham & Evans, 1981). In addition, 20% to 39% of people who fall experience fear of falling, which leads to further limiting of activity, independent of injury (Campbell et al, 1981).

Findings from studies have identified risk factors for falls to include history of falling, use of assistive devices, environmental hazards such as poor lightening, and various health conditions including muscle weakness, vertigo, gait and balance impairments, visual and hearing disorders, cognitive and sensory impairments, orthostatic hypotension, diabetes mellitus and osteoporosis (Tinetti et al, 1988; Downton et al, 1991; Stalenhoef et al, 2002). Study by Scheffer has also associated certain medications with an increased risk of falls among older adults (Scheffer et al, 2008). The most common drugs that increase the risk of falls are different types of psychotropic drugs, such as hypnotics, sedatives, antipsychotics and antidepressants, which can cause sedation, impaired balance and coordination (Woolcott et al, 2009; Leipzig, 1999; Leipzig et al, 1999; Woolf & Akesson, 2003).

Furthermore, cardiovascular drugs such as diuretics and beta-blockers may cause or worsen orthostatic hypotension and falls (Nevitt et al, 1991; Musich et al, 2017). Antihistamines and anticholinergic drugs may affect the cognitive skills of elderly patients and cause blurred vision, thereby increasing the risk of falls (American Geriatrics Society, British Geriatrics Society, American Academy of Orthopaedic Surgeons Panel on Falls, 2001). Again, polypharmacy and the use of psychotropic drugs, especially when combined with cardiovascular medications increase the risk of falls in the elderly ((American Geriatrics Society, British Geriatrics Society, American Academy of Orthopaedic Surgeons Panel on Falls, 2001).

Even though some risk factors cannot be changed, many are modifiable. Many falls result from interactions among multiple risk factors, and the risk of falling increases linearly with the number of risk factors (Tinetti et al, 1988). The incidence of falling changed from 8% among those with no risk factors to 78% among those with 4 or more risk factors according to a previous study (Prudham & Evans, 1981). In Nigeria, there is a dearth of studies on falls in elderly people. Falls are a common public health problem amongst the elderly in many communities in Nigeria. There is a need for information on the causes as well as the impact of this preventable risk on health among the elderly in sub-Saharan Africa. Therefore, this study aims to assess the prevalence of falls and determine the associated risk factors among elderly Nigeria aged 60 years and above. The objective this study is to determine the prevalence and factors associated with falls among a population of elderly persons in Nigeria.

Methodology

Study design

The study used a cross-sectional design method.

Study subject and period

Only elderly aged 60 years and above were included in the study and the study was conducted over a 4 months period (Sept-Dec, 2018).

Study area

The study carried out in Ilorin, the capital of Kwara State.

Questionnaire

The questionnaire consists of 5 sections with 30 questions (a combination of open and closed ended Questions). The questionnaire is designed in both English and local language to collect information on falls and associated risk factors in the elderly. The questionnaire was pre-tested using face-to-face interview among 10 elderly persons in a different location from the study area. The aim of the pre-testing was to assess the face validity of the questionnaire. Result information from the pilot study was considered to develop the final version of the questionnaire. The participants for the pre-test were not included in the actual study. The 5 sections of the questionnaire consist of Socio-demographic characteristics of the participants, health status of the participants, medications used and the number of medications., assessment of fall experience, knowledge about risk factors and the preventive strategies for falls.

Sampling technique

Participants were selected using a multistage stratified area probability sampling of households. In households with more than one eligible person (aged 60 years and above as well as fluent in the local language of the study area), the Kish table selection method was used to select one respondent (Kish, 1995). This method involved the selection of respondents from within households using a table developed to ensure that, following identification of eligible members, selection was done randomly and objectively by the interviewers. After full information about the aims and objectives of the study had been provided, potential respondents were invited to participate. Participants consented by either signing or verbally if they were unable to read or write. Face-to-face interviews were carried out on 1750 respondents who consented (response rate = 92.6%). Non-response was due to non-availability after repeated visits (3.2%), interviewers unable to trace the original address (1.8%), death (0.8%), physical incapacitation (0.4%) and occasionally refusal (1.2%).

The study did not include any sick person and informed consent was sought and granted by all participants after explaining the objective of the study. Participants were assured of confidentiality and anonymity of the responses provided. Persons consented either by signing or verbally if they were unable to read or write. The study was approved by the State Ministry of Health Ethical Review Committee.

Demographic and heath information

To successfully collect information on participants demographic and health information, the study partly adapted method from a previous study (Carlos H. Orces, 2013). Data on age and sex were self-provided by the participants. Participants were asked about their living status (alone versus living with others) and area of residence (urban versus rural). Self-reported general health was defined as excellent, very good, good, fair, or poor. Medical conditions were assessed by asking the participants if they had been diagnosed by a physician with hypertension, diabetes mellitus, chronic obstructive pulmonary disease (COPD), arthritis, stroke, or cataracts. Urinary incontinence was defined as having involuntary incontinence of urine during the previous year. Cognitive status was evaluated using the abbreviated Mini-Mental State Examination (AMMSE), which has been validated in the Chilean population ((Carlos H. Orces, 2013). The AMMSE consists of 9 items and has a score from 0 to 19. A score of 12 or less was defined to identify participants with cognitive impairment (Icaza & Albala, 1999). The Geriatric Depression Scale was used to evaluate the presence of depressive symptoms. This 15-item scale has been validated in Spanish populations with a sensitivity of 81%and a specificity of 76% (Carlos H. Orces, 2013). Respondents with a score of 6 or more are considered to have symptoms of depression (Yesavage et al, 1982; Mart´ınez et al, 2005).

Physical activity was evaluated by the question "do you regularly exercise such as jogging, dance, or perform rigorous physical activity at least three times weekly for the past year." Those participants who responded affirmatively were defined as physically active. Vision was assessed with the use of self-report questions derived from the World Health Organization multi-country World Health Survey questionnaire (Ustun et al, 2003).Chronic medical and pain conditions were also assessed by asking participants if they had any chronic medical conditions like stroke, hypertension, COPD, diabetes, heart disease, cancer etc). Participants were also asked if they had experienced pain in any part of their body in the previous one year. Responses were coded 'yes'or 'no'.

Fall assessment

In order to assess the prevalence of falls and recurrent falls the following questions were asked "have you fallen in the past year" and "how many times have you fallen in the past year," respectively. Participants were characterized as recurrent fallers if they had reported two or more falls in the previous year. Participants who answered affirmatively to the question "did you need medical attention as a result of falls" were considered to sustain a fall-related injury.

Instrument translation

All the instruments were translated using the iterative back translation method. This translation process ensured that particular attention was paid to the cultural applicability of the terms and concepts in the interview schedules (Sartorius et al, 1998).

Data analysis

The data were analysed using the program SPSS version 20 (Chicago, IL, USA). All data are presented as n (%) prevalence and were assessed using descriptive statistics. Proportions were calculated based on the total number of responses for each question. Some participants gave several responses that fitted into one category (different terms with the same meaning), or several responses that were grouped under one category (e.g., 'slippery floor' and 'uneven surfaces' were considered to be 'Environmental hazards').Pearson Chi-squared test was used to identify the influence of socio-demographics on the possibility of falling and differences between participants who experienced falls and those who did not with a significance level of $p<0.05$.

Those variables that are statistically significant (P value < .05) in the univariate analyses were entered into a logistic regression model to evaluate the independent associations between falls and characteristics of the participants. Results of the regression model are presented as odds ratios (ORs) with their 95% confidence intervals (95%CI). The prevalence of falls was also examined according to the number of independent risk factors found in the multivariate model. The prevalence of falls was also examined according to the number of independent risk factors found in the multivariate model. Trend in fall prevalence according to the number of risk factors was examined with the chi-square test for trend.

The odd ratios with their 95% confidence intervals were calculated as estimates of the risk of having falls. The association between frequency of falls and factors like gender, visual impairment, were examined using the two samples t test. In order to take care of the stratified multistage sampling procedure and the associated clustering, weights were derived and applied to the proportions reported in this study. The weights took account of the probability of selection bias as well as non-response. In order to adjust for differences between the sample and the total Nigerian population (according to 2000 United Nations projections) & WHO,1999), post-stratification to the target sex and age range were done. The weight so derived was normalized to reset the sum of weights back to the original sample size of 1890. Of this, a total of 1750 respondents provided information on falls and constitute the sample for the present report.

Result

Out of 2000 questionnaires, a total of 1750 participants completed the questionnaire giving a response rate of 87.5%. Of 1750 participants with complete information on fall status, 24.2% (95% CI, 25.8–29.5) reported to have fallen in the previous year.

The prevalence of falls was 18.6% in males and 25.2 % in females. The majority of participants were females (1150; 65.7%),

married (1200; 68.6%), had tertiary education (114;6.5%), employed for wages (87;5%) and living with family (1380; 78.9%). More than half of the participants were in the age group of 60-64 years age (895; 51.1%). See details in table 1. There was no difference in the mean age between persons who reported having had a fall and persons who had no such report (74.6 vs. 74.5 years; t = 0.29; p = 0.5).

About one-quarter (424; 24.28%) of the respondents reported that they had a fall in the last one year. Table 2 shows the number of falls within the last one year in the elderly population studied. About two thirds (280, 66%) of the participants, who reported a fall, fell 1 or 2 times. More than two-third (293; 69.1%) of the participants who reported a fall visited a hospital after a fall (Table 2). The order of health consequences of the falls was pain (215; 50.7%), bruising (203; 47.9%), discomfort while walking (196; 46.2%), fractures (82, 19.6%) and laceration (56; 13.2%). None of the participants suffered intracranial bleeding during the study period

Almost three quarters (362; 85.4%) of the 424 participants who reported a fall claimed that their illness was the reason for their fall while 245 (57.8%) of them reported experiencing a visual problem. About one-quarter (99; 23.3%) claimed their fall was due to medications they were taking. Environmental condition due to loosen carpets/slippery floors accounted for the falls of more than one quarter (25.5%) of fallers. Other causes of falls are shown in Table 2. The prevalence of falls increased gradually with advancing age and was higher among women (Figure 1). The prevalence of fall-related injuries also increased with age and was higher among women than men. Figure 2 shows the prevalence of falls according to the number of risk factors. Overall, a gradual and linear increase in the prevalence of fall was seen as the number of risk factors increased from 28.9% among persons with no risk factors to 56.1% among those with three or more risk factors (*P* trend < 0.05).

As displayed in Table 3, there is an increased risk of fall with women, residing in rural areas, having poor health status, visual defect, history of previous fall, diabetes, depression, multiple medications, osteoarthritis, osteoporosis and being less physically active. Among chronic conditions, hypertension, stress and diabetes were associated with an almost twofold risk in the likelihood of a fall while osteoarthritis and osteoporosis have greater risk. As shown in Table 3, a statistically significant association was observed between the prevalence of falls and gender, age, education level and the use of assistive devices ($p<0.05$). Falls were more common in females, patients 75 years and above, illiterate respondents and those using assistive devices.

In the final multivariate model, women (OR, 1.73; 95% CI, **1.51–2.75**8), subjects with cognitive impairment (OR, 1.83; 95% CI, **1.25–2.87**), those reporting urinary incontinence (OR, 1.76; 95% CI, **1.38–2.63**), and being physically active during the previous year (OR, 1.59; 95%CI, **1.18–2.16**) were variables found independently associated with increased risk of falling among older adults in Nigeria Stroke (OR, 1,28; 95% CI, 0.74–2.66) and alcohol intake (OR, 1.22; 95% CI,0.68–1.95) were also associated with increased risk of falling but they are less statistically significant (Table 4).

Discussion

In this study, the prevalence of fall among the population of elderly in Nigeria was found to be 24.2%. This result is very similar to some of the results found by Reyes-Ortiz et al (2005), who reported 27% for Uruguay, 28.5% for Argentina. The fall prevalence rate in our study is high when compared with reports from other community studies from Japan and China (Yoshida & Kim, 2006; Chu et al, 2008), with fall rates of about one fifth in the studied populations. Our fall rate is, however, low when compared with fall rates reported from studies in the United States (Ganz et al, 2007), Australia (Gill et al, 2005) , Spain (Varas-Fabra,2006) , Italy (Mancini ,2005) , Brazil and Iran (Perracini et al, 2002; Siqueira, 2007; Abolhassani et al, 2006), which all reported rates closer to a third of their studied population. The reason for these differences is not clear but may be related to socio-cultural or ethnic factors such as lifestyle and level of physical activity, body build and gait. In most traditional and rural African communities, the most common occupation is farming, and this entails considerable physical activity (Bekibele & Gureje, 2009). There are gender and possibly ethnic differences in the susceptibility to develop frailty with age, and this may also have a bearing on the prevalence

of falls in different communities. Higher baseline levels of muscle mass may protect men and possibly some ethnic groups from reaching a threshold of weakness and muscle mass loss that could predispose elderly persons to falls (Walston & Fried, 1999). Many Asian ethnic groups are generally smaller in frame, have higher percentage of body fat for a given body mass index, a higher relative sitting height (shorter legs) and probably have greater agility and stability than Africans and Caucasians and may therefore experience fewer falls (Duncan et al, 2005; Deurenberg et al,199).

Potential risk factors for falls among elderly Nigerian were identified. The study found that advanced age, female sex, marital status, location of residence, poor self-rated health, diabetes mellitus, stroke, osteoarthritis, osteoporosis, urinary incontinence, visual defect (cataracts), depression, and stress were associated with an increased risk of falls. In this study, age was significantly associated with the risk of falls and the finding is consistent with previous studies and systematic reviews (Deandrea et al, 2010; Sheahan et al, 1995; Fletcher & Hirdes, 2002). Several studies have shown clearly the trend for prevalence of falls to increase with age (Siqueira et al, 2007; Lord et al, 2006). Our results show the same positive association between this outcome and increasing age. Our finding revealed that females were at higher risk for falls than males which is consistent with several previous reports that female sex is a significant risk factor for falls (Reyes-Ortiz, et al,2005; Mota et al, 2010; Gill et al, 2005). In contrast to our finding, one community-based study found that the risk of falls was comparable in males and females (Fletcher & Hirdes, 2002). Several factors have been reported to be responsible for the gender difference in the risk of falling, including the reluctance of males to report falling, sex differences in leg muscle strength (Gill et al, 2005; Campel et, 1990), the result of these variables were not examined in our study (i.e., differences in gait, knee action), as well as factors associated with being female, such as osteoporosis (Lin et al, 2014).

This study found that living alone was associated with an increased risk for falls. Previous investigations of the association between living alone and falls have reported inconsistent results (**Eun jin Choi**, et al, 2014). According to Australian researchers, elderly that lived with someone had a low risk for falls (Gill & Taylor, 2005). However other previous studies were in contrast that living alone was not associated with falls (Wu et al, 2013; Tromp et al, 1998). Health status plays an important role in the incidence of fall. Our study participants that rated their health as 'ordinary' or 'poor' were found to be at a high risk for fall. This finding is consistent with previous studies (Fletcher & Hirdes, 2002; Gill et al, 2005; Hedman et al, 2013).

Our study also noted that participants who lived in urban areas were found to be at higher risk for falls than those living in rural areas. Differences in the distribution of known risk factors and environmental conditions may account for this finding (**Eun jin Choi**, et al, 2014). In contrast to our finding, studies from Equador (**Carlos H. Orces,)** and USA (Tiesman et al, 2007) reported that rural residents have higher fall-related injury rates than urban and suburban residents. Again, another community-based study found that older people living in rural areas had a significantly higher number of falls than those living in urban areas (Wojszel & Bień, 2004). The difference in risk of fall between rural and urban areas could be explained with a fact that older people who live in rural areas had poor health and greater physical impairment than those in urban communities. (**Eun jin Choi**, et al, 2014). Another possible explanation for these disparities in fall between urban and rural elderly residents may be associated with high risk occupations such as farming, mining, forestry, and construction among adults residing in rural areas (Tiesman et al, 2007). This study also found a strong and significant association between cognitive impairment and increased fall risk among older adults in Nigeria. This finding is also consistent with previous research studies (Muir et al, 2012; Tinetti et al, 1988).

This study found Urinary incontinence as an independent and significant risk factor for falls. This finding is consistent with the results of a systematic review study (Chiarelli, 2009). Falls have been reported to be related to urinary incontinence. This is generally thought to result from loss of balance when rushing to the toilet (**Carlos H. Orces,2013)**. However, it is unclear whether incontinence is a primary cause of falls

or it is simply a marker of generalized physical frailty (Lord et al, 2011).

Findings from many studies reported that fall risk is closely related to ADLs capability and that difficulty in at least one activity of daily living double the risk of falling (Reyes-Ortiz et al, 2005; Nevitt et al, 1989; Muir et al, 2012; Tinetti et al, 1988; Bloch Bloch et al, 2010). Studies have reported that fall risk is closely related with ADLs capability and that difficulty in at least one activity of daily living double the risk of falling (Reyes-Ortiz et al, 2005; Tinetti et al, 1988; Nevitt et al, 1989; Bloch et al, 2010; Sattin et al, 1998). In Nigeria, the risk of falling was 1.44-fold higher among older adults with any impairment in ADLs which is almost similar with study from Equardor (**Carlos H. Orces, 2013)**.

Our finding is in agreement with the results of a previous study that shows that any ADLs limitation among older adults increases significantly the risk of falling (Reyes-Ortiz et al, 2005). Limitations in ADLs is often a reflection of poor mobility and lower-limb muscle strength, which are major risk factors for falling in older people (Campbell et al, 1990; Lord et al, 1994; den Ouden et al, 2012.

Literature has reported a linear increase in the percentage falls as the number of independent risk factors increases (Tinetti et al, 1988; Nevitt et al, 1989). In Nigeria, the prevalence of falls among older adults with three or more risk factors was 56.1% compared with 28.9% among those with no risk factors. This finding is beneficial in the sense that the risk of falling may be reduced significantly by modifying even a few risk factors as similarly stated in a previous study (Tinetti et al, 1988). This finding is in contrast with study from Equador (**Carlos H. Orces, 2013).**

Our study found that participants who had diabetes mellitus, stroke, osteoarthritis, osteoporosis, cataracts, and depression had an increased risk of falls. This finding is in agreement with systematic reviews that found a number of chronic conditions, including visual impairment, depression, urinary incontinence, diabetes, and arthritis and history of stroke were associated with an increased risk for falls (Deandrea et al, 2010; Tinetti & Kumar, 2010). Our finding is also consistent with a community-based study that found that participants who had diabetes, stroke sequel, cataracts, osteoarthritis, or depression were at an increased risk for falls (Yu et al, 2009). Several previous studies have found that older people who have one or more chronic diseases are at a significantly increased risk of falls (Oches, 2013; Cesari et al, 2002; Fletcher & Hirdes, 2002). This study found that chronic painful conditions, especially Osteoarthritis and osteoporosis, were significantly associated with a history of Falls. These finding complements those of others (Ganz et al, 2007; Azevedo & Alla, 2008). The observations reflect the adverse effect of painful conditions on gait and stability.

This study observed a higher fall rate amongst respondents in the highest economic group. This has been reported to be a reflection of differences in the living conditions of elderly persons from across the socioeconomic spectrum as similarly observed in a previous study (Bekibele & Gureje, 2009). Higher economic status may be associated with more slippery floor finishing, throw rugs, and more furnishings impeding movement in the home as reported in previous studies (Abram et al,1995; Roberts, 1989).

However, a study from Australia has linked lower socioeconomic status with falls (Gill T & Taylor, 2005). Lower socioeconomic status may be associated with poorer health status, possibly decreased level of physical activity and therefore increased predisposition to falls (Kuh et al, 2005). Of note is the importance of physical activity. In this study, the risk of falling was significantly higher among participants who reported intense regular exercise during the previous year compared to those who did not. This finding may be partly explained by reported changes in postural control among older adults following moderate physical exercise, which may be related to fatigue levels (Hegeman et al, 2010). Environmental factors and terrain conditions are also considered as risk factors of moderate exercise-related falls among older adults in Nigeria.

Conclusion

Fall is a serious public health problem among older adults in Nigeria. The study findings may be useful in implementing programmes to address risk factors and preventive strategies for fall.

Limitations of the study

The following recommendations are identified and recognised

1. Use of cross-sectional design: The design study makes it impossible to establish causal relationships between the independent variables and the risk of falls.
2. Self-reporting by participants: Second, we relied on self-reports for the incidence of falls, which may have resulted in underreporting.
3. Recall bias: The study used a 12-month recall period, which is susceptible to recall bias.
4. Non-response bias: Subjects who did not participate in the study may have been older, frailer, and more likely to have fallen, which would result in underestimating falls.
5. Non-consideration of many other known risk factors: Our study did not consider several known risk factors for falls such as gait disorder, orthostatic hypotension, dizziness and use of psychotropic.

Table 1. Demographic characteristics of respondents (n=1750)

Criteria	Frequency	Percentage
Age		
60-64	895	51.1
65-69	275	15.7
70-74	110	6.3
75-79	165	9.4
> 80	305	17.5
Gender		
Male	600	34.3
Female	1150	65.7
Education		
None	490	28
Primary	645	36.9
Secondary	501	28.6
Tertiary	114	6.5
Marital Status		
Single	67	3.8
Married	1200	68.6
Widowed	425	24.3
Divorced	58	3.3
Employment Status		
Self employed	50	2.9
Employed for wages	87	5.0
Retired	711	40.6
Un-employed	902	51.5
Living Condition		
Living alone	50	2.9
Living with own family	1380	78.9
Living with biological children	250	14.3
Living with relations	45	2.5
Living with friends	25	1.4

Table 2. Frequency of falls among the elderly who experience falls in the last one year, their causes and health implications (n=424)

Item	Frequency	Percentage
Number of falls		
1-2	280	66.0
3-4	105	24.7
5 and above	39	9.3
Hospital visit after a fall		
Yes	293	69.1
No	131	30.9
Consequences of fall		
Pain	244	57.5
Bruises	203	47.9
Discomfort while walking	196	46.2
Fracture	83	19.6
Laceration	56	13.2
Causes of fall		
Illness	362	84.5
Visual problem	245	57.8
Medications (multiple)	99	23.3
Foot wears	84	19.8
Environmental conditions (slippery floors, loose carpets)	108	25.5
Gait problems	83	19.6
Postural hypotension	65	15.3

Multiple responses

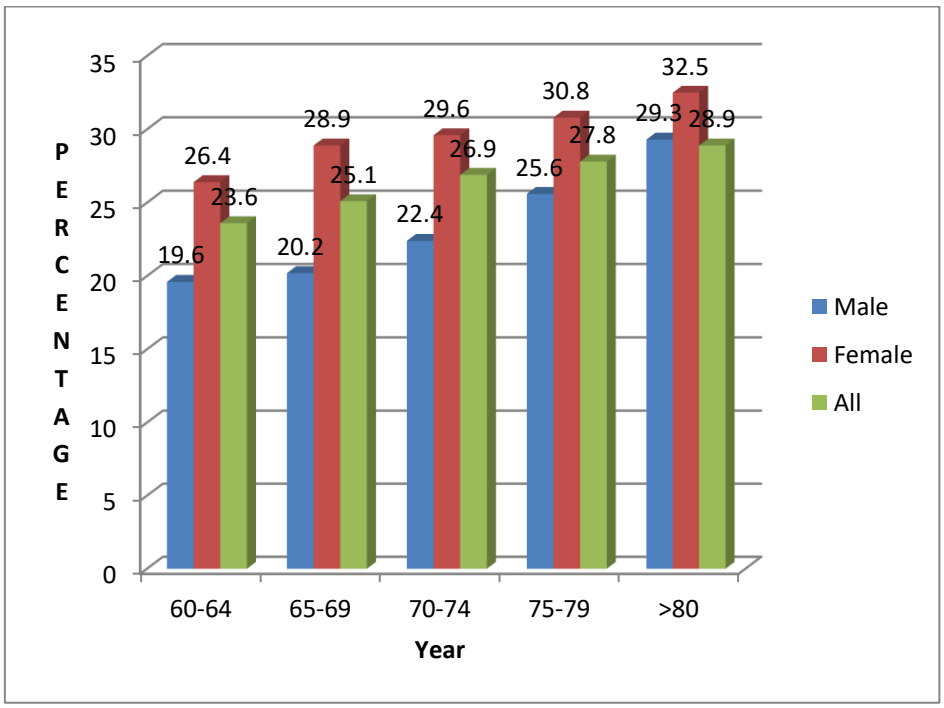

Figure. 1. Prevalence of falling by sex and age group

Table 3. Risk factors for fall (n=1750)

Factors	Rate of fall	SE	OR	95% CI	P-Value
Age					
60-64	23.6	2.2	1.0	(reference)	< **0.05**
65-69	25.1	2.2	1.2	0.7-1.9	
70-74	21.9	3.4	1.4	2.8-2.1	
75-79	24.1	2.5	1.5	0.6-2.3	
>80	30.1	2.4	1.3	0.5- 1.8	
Gender					
Male	18. 6	1.6	1.0	(reference)	< **0.05**
Female	25.2	1.3	1.6	1.2 – 2.2	
Education					
No	6.7	0.3	1.3	0.7-1.8	< **0.05**
Yes	4.3	0.1	1.0	(reference)	
Location of residence					
Urban	19.8	1.3	1.2	(reference)	< **0.05**
Rural	18.6	2.6	1.0	0.8-1.7	
Visual defect					
No	0.7	1.1	1.0	(reference)	< **0.05**
Yes	2.9	1.9	2.8	1.6-4.3	
History of previous fall					
No	0.2	0.9	1.0	(reference)	< **0.05**
Yes	3.1	1.5	2.3	1.9 – 5.2	
Dizziness/Vertigo					
No	0.1	1.3	1.0	(reference)	< **0.05**
Yes	3.7	1.7	1.9	0.8-2.4	
Cognitive Impairment					
No	2.2	1.2	1.0	(reference)	< **0.05**
Yes	10.3	2.4	1,6	1.9-3.1	
Environmental factors					
No	1.3	1.4	1.0	(reference)	< **0.05**
Yes	8.8	1,9	2.6	1.1-3.8	
Multiple Medications					
No	0.8	0.2	1.0	(reference)	< **0.05**
Yes	5.9	0.6	3.3	1.4-6.9	
Self-rated health (good vs ordinary or poor)					
No	0.3	0.2	1.0	(reference)	< **0.05**
Yes	1.8	0.7	2.2	1.9-2.8	
Diabetes Mellitus					
No	0.4	0.7	1.0	(reference)	< **0.05**
Yes	1.6	1.2	1.8	1.1-5.3	
Osteoarthritis					
No	0.3	0.4	1.0	(reference)	< **0.05**
Yes	1.8	1.28	2.5	1.8-3.7	
Osteoporosis					
No	0.1	0.7	1.0	(reference)	< **0.05**
Yes	1.4	1.21	2.2	1.1-3.3	
Depression					
No	9.1	1.6	1.0	(reference)	< **0.05**
Yes	22.4	3.4	1.7	0.9-2.6	

Stress					
No	11.2	0.5	1.0	(reference)	< **0.05**
Yes	26.3	0.3	1.9	1.1-3.2	
Hypertension					
No	2.4	1.2	1.0	(reference)	< **0.05**
Yes	11.2	1.6	1.93	0.5-2.7	
Physical Activity					
No	3.5	1.3	1.0	(reference)	< **0.05**
Yes	6.7	1.9	0.88	0.7-1.66	
Assistive Devise					
No	0.4	0.7	1.0	(reference)	< **0.05**
Yes	1.6	1.2	2.7	1.1-5.3	
Economic Status					
Low	19.1	1.6	1.0	(reference)	< **0.05**
High	22.4	3.4	1,3	0.4-1.8	

Table 4. Association between characteristics of the respondents and self-reported fall

Factors	**Unadjusted OR (95% CI)**	**Adjusted OR (95% CI)**
Sex		
Men	1.0 (Reference)	1.0 (reference)
Women	1.9 (1.35–2.14)	**1.73 (1.51–2.75)**
Age (years)		
60–64	1.0 (Reference)	1.00 (Reference)
65-69	1.10 (0.71 – 1.56)	
70-74	1.44 (1.26–1.98)	1.22(0.77–1.89)
75-79	1.53 (1.37- 2.13)	
≥80	1.60 (1.25–2.34)	1.06 (0.80–1.93)
Live in rural areas		
No	1.0 (Reference)	1.0 (Reference)
Yes	1.48 (1.29–1.72)	1.04 (0.76–1.51)
Alcohol use		
No	1.0 (Reference)	1.0 (Reference)
Yes	0.89 (0.67–1.77)	1.22 (0.68- 1.95)
Self-reported health		
Excellent	1.0 (Reference)	1.0 (Reference)
Very good	0.81 (0.30–2.18)	0.22 (0.19–2.55)
Good	1.31 (0.63 –2.94)	1.11 (0.16– 7.44)
Fair	2.18 (0.87–5.72)	1.35 (0.18– 8.24)
Poor	3.48 (1.73–8.56)	1.63 (0.31–11.7)
Cognitive impairment		
No	1.00 (Reference)	1.0 (Reference)
Yes	2.13 (1.78–3.11)	**1.83 (1.25–2.87)**
Depression		
No	1.00 (Reference)	1.00 (Reference)
Yes	2.16 (1.72–2.93)	1.27 (0.94–1.88)
Hypertension		
No	1.00 (Reference)	1.0 (Reference)
Yes	0.78 (0.65-0.89)	0.89 (0.72-0.95)
Diabetes		
No	1.0 (Reference)	1.00 (Reference)
Yes	1.10 (0.79–1.57)	1. 21 (0.71–1.59)

COPD		
No	1.0 (Reference)	1.00 (Reference)
Yes	1.38 (1.17–2.26)	0.76 (0.51–1.87)
Arthritis		
No	1.00 (Reference)	1.0 (Reference)
Yes	1.68 (1.53–1.98)	1.25 (0.81–1.74)
Stroke		
No	1.0 (Reference)	1.0 (Reference)
Yes	1.74 (1.35–2.78)	1.28 (0.74–2.66)
Urinary incontinence		
No	1.0 (Reference)	1.0 (Reference)
Yes	2.05 (1.78–2.96)	**1.76 (1.38- 2.63**
Visual defect (Cataract)		
No	1.0 (Reference)	1.0 (Reference)
Yes	1.23 (1.08–1.45)	0.82 (0.58- 1.36)
Physical Activity		
No	1.0 (Reference)	1.0 (Reference)
Yes	1.22 (0.84–1.26)	**1.59 (1.18–2.16)**
Lower extremity disability		
No	1.0 (Reference)	1.0 (Reference)
Yes	1.68 (1.34- 1.82)	1.36 (1.16- 1.89)
Limitations in ADLs		
No	1.0 (Reference)	1.0 (Reference)
Yes	2.68 (1.94- 1.62)	1.44 (1.22- 1.96)

Bold numbers represent statistical significance in the final multivariate model.

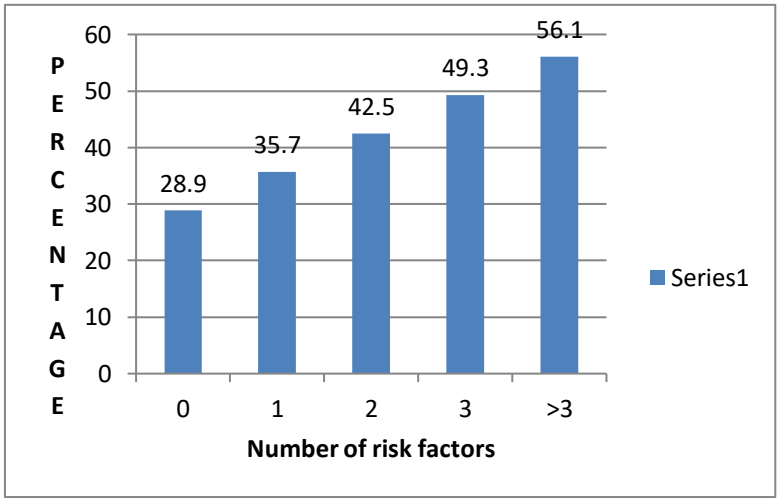

Figure 2. Number of risk factors and prevalence of falls among older adults in Nigeria (P trend < 0.05)

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