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A Rural-Urban comparison of the prevalence and factors associated with unintentional home fall injuries in South Western Nigeria

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Abstract

Background: Unintentional home fall injuries contribute to the morbidity and mortality burden in developing countries. Rural-Urban variation on the burden of unintentional home fall injuries in Africa is poorly documented. We compared the prevalence and factors associated with unintentional home fall injuries among household members in rural and urban areas of South Western Nigeria.

Methods: We conducted a community-based cross sectional survey using a three-stage cluster sampling technique to select 4433 individuals from 1015 households from selected settlements in a rural and urban Local Government Areas (LGAs). A structured questionnaire was used to obtain information on household members' characteristics, individual injury experience and nature of injury experienced. Chi square test and logistic regression were used to determine factors associated with unintentional home fall injuries.

Results: Overall, the incidence of unintentional home falls injury was 171/1000 per year with a significantly higher incidence in the urban (195/1000 per year) compared to rural (150/1000 per year) areas. The odds of experiencing unintentional home fall injuries was 1.47 times higher in household members living in urban areas compared to their rural counterparts (OR=1.47; 95%CI: 1.13-1.92).

Conclusion: The burden of unintentional home fall injuries is high with a significantly higher urban preponderance. Enforcement of building codes to ensure safety of the home environment especially in urban areas is also recommended for resource poor countries like Nigeria.

Keywords: *unintentional injury, rural-urban, home injury, falls*

Résumé

Contexte: Les traumatismes involontaires causés par les chutes à domicile contribuent au fardeau de la morbidité et de la mortalité dans les pays en voie de développement. La variation rurale-urbaine du fardeau des traumatismes involontaires dus aux chutes à domicile en Afrique est peu documentée. Nous avons comparé la prévalence et les facteurs associés aux blessures non intentionnelles à la maison chez des membres de ménage dans les zones rurales et urbaines du sud-ouest du Nigeria.

Méthodes: Nous avons mené une enquête transversale en utilisant une technique d'échantillonnage en en trois groupes d'étapes pour sélectionner 4433 individus de 1015 ménages provenant d'établissements sélectionnés dans une zone de mairie rurale et urbaine. Un questionnaire structuré a été utilisé pour obtenir des informations sur les caractéristiques des membres du ménage, l'expérience individuelle des blessures et la nature des blessures subies. Le test du Chi carré et la régression logistique ont été utilisés pour déterminer les facteurs associés aux blessures des chutes non intentionnelles à la maison.

Résultats: Dans l'ensemble, l'incidence des traumatismes de chute non intentionnels à la maison était de 171/1,000 par an, avec une incidence nettement plus élevée dans les zones urbaines (195/1,000 par an) que dans les zones rurales (150/1,000 par an). Les probabilités de subir des blessures de chute involontaires à la maison étaient 1,47 fois plus élevées chez les membres des ménages vivant en zone urbaine que chez leurs homologues ruraux (OR = 1,47, IC à 95%: 1,13-1,92).

Conclusion: Le fardeau des blessures non intentionnelles à la maison est important, avec une prépondérance urbaine significativement plus élevée. L'application des codes du bâtiment pour assurer la sécurité de l'environnement domestique, en particulier dans les zones urbaines, est également recommandée pour les pays à ressources pauvres comme le Nigeria.

Mots-clés: *Blessures non intentionnelles, milieu rural-urbain, blessures à la maison, chutes*

Introduction

According to the World Health Organization, falls have been described as a situation in which an individual unintentionally rests on the floor or a level below the floor [1]. This excludes intentional change

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to a lower position by individuals to rest and intentional self-harm or assault [1, 2]. However most fall injuries are non-fatal. Globally, falls have become a major public health problem. With an estimated 424,000 fatal falls occurring yearly, it is the second leading cause of unintentional injury deaths, after road traffic injuries worldwide [3]. Over 80% of fall-related fatalities occur in low- and middle-income countries, with regions of the Western Pacific and South East Asia accounting for more than two thirds of these deaths [3] . Injuries resulting from falls may vary in severity from non-fatal to fatal injuries [2]. Globally, over 37 million falls are severe and require medical attention [3] with most of the fall-related deaths affecting adults over the age of 60 years [2].

Generally, people of all ages spend a considerable amount of their time at home and is also the place where many falls and attendant injuries occur. According to the ICD-10 classification, a home injury is defined as "an injury occurring within or around an individual's own home or another person's private dwelling [4]. Fall injuries are the second leading cause of unintentional injury deaths [5] occurring among people of all ages with the highest incidence occurring in children and elderly persons [3, 6–8]. Unintentional home fall injuries have social, physical, economic and psychological consequences on individuals and family members within a community [9]. Some of these include: the cost of hospitalization or treatment for injuries which depends on severity, days lost at work with subsequent loss or reduction in income, school days lost by injured children, disabilities with reduction in quality of life and death, in fatal cases [10].

The patterns and magnitude of unintentional home fall injuries vary from country to country and have been widely reported in high income countries (HIC). These studies have been used to develop and evaluate home injury interventions [11, 12]. In Africa, injury prevention policies or control programs are still either non-existent in most countries in the region or are very limited despite the burden of unintentional falls in homes [13]. The problems of data availability on road traffic and other injury exists with unintentional home injuries in the region and they are either incomplete or absent [14–16].

Unintentional home fall injuries despite being a problem with significant public health burden remains poorly documented and researched among households in rural and urban communities. In Nigeria and other countries in the Sub-Saharan region, studies have been conducted on road traffic injuries, and community-based injuries including occupational injuries within the communities [17-19]. However the paradigm shift of injury epidemiology from "domestic accidents" to "home injuries" - a better epidemiological indicator, allows for: comparable magnitude to be obtained, interventions for controlling home injuries to be developed and evaluation of control programmes [20-26, 19].

In view of the burden of unintentional home injuries on household financially, socially and emotionally, estimates of the burden and risk factors are required. These estimates can then be deployed for policy development and implementation, and to develop interventions targeted at household members with a view to reducing the burden of home injury falls in Nigeria. This study was conducted to examine the prevalence of home injuries and factors associated with its occurrence in rural and urban communities in South-western Nigeria.

Methods

The study was carried out in the Ibadan and Ibarapa Zone, which are well delineated health zones under the Oyo State Ministry of Health. Oyo State is one of the 36 states of Nigeria located in the South-Western region with an estimated population of about 5,580,894. The state is made up of three senatorial zones namely Oyo South, Oyo North and Oyo Central with 33 Local Government Areas (LGAs). The six health zones in Oyo State are: Ibadan, Ogbomoso, Oyo, Oke-Ogun 1, Oke-Ogun 2 and Ibarapa Health zones [27]. The Ibadan Health Zone has 10 LGAs, five urban (Ibadan North, Ibadan North West, Ibadan North East, Ibadan South East, Ibadan South West) and five semi-urban LGAs (Egbeda, Oluyole, OnaAra, Lagelu and Ido). Ibarapa Health zone is made up of one semi-urban (Ibarapa East) and two rural (Ibarapa Central and Ibarapa North) LGAs.

The study was a community-based cross-sectional study conducted among household members who had lived in the selected rural and urban settlements for at least 5 years.

A multi-stage cluster sampling technique was used to select the households. One rural (Ibarapa North) and one urban (Ibadan South West) area were selected from the Ibadan and Ibarapa Health Zones respectively by balloting. From the list of wards in both LGAs, five wards were selected out of 10 from the rural LGA and five wards out of 12 from the urban LGA by balloting. Using the list of settlements in the wards, balloting was used to select 15 settlements from the rural areas and 11 settlement/streets from the urban areas. All eligible and consenting households were recruited for the study.

In each eligible household, the head of the family or any adult (≥ 18 years) was interviewed to provide information on household demographics and unintentional home fall injury among children and other members of the household who were not present at the time of the interview. Where the injured person was available, information on the injury was also provided by them.

A semi-structured interviewer-administered questionnaire developed based on standard items in the World Health Organization's "Guidelines for conducting community surveys on injuries and violence" [28] and "Injury surveillance guidelines" [29] was developed and used for this study. The questionnaire was in two parts. The first part was used to obtain household and household members demographic information and to determine the household members who had experienced unintentional home falls injury. The second part of the questionnaire was then used to obtain information on type and nature of unintentional home fall injury for all the members of the household who were identified to have experienced injury. Where a member of the household had experienced more than one falls injury, information on the most recent injury episode was then obtained.

Data analysis

Data obtained were entered, cleaned and analysed with SPSS version 20. We used frequencies, proportions and means to summarise descriptive data by location (rural and urban areas).

Outcome: Unintentional home falls injury incidence for recoverable injury was calculated for injury which occurred up to four months prior to the study, while incidence of disability was calculated for unintentional home falls disability which occurred 5 years prior to the study. This was done to reduce effects of recall bias [30]

Independent variables: Age and gender [5].

We used Chi-square tests to compare occurrence of unintentional fall injuries in rural and urban areas and to determine the association between injury occurrences by demographic characteristics.

Measures

Unintentional home injury: We used the ICD-10 definition of an unintentional home injury which is "an injury occurring within or around an individual's own home or another person's private dwelling" [31]. This definition covers the living space within the house and the yard/compound but excludes the sidewalks and street.

Unintentional home falls injury:

A household member was said to have experienced unintentional home fall injury if the individual either had a recoverable injury, disability or death resulting from an unintentional home fall. In the event that a household member had experienced more than one unintentional home fall injury, information of the most recent injury was then obtained. This was done because the denominator was the individual and not the falls injury itself.

Recoverable unintentional home fall injury

A recoverable unintentional home falls injury is one which must have occurred in the four months preceding the study, be apparent (bruise, cut/laceration, dislocation or fracture) or cause pain (sprain or strain) of up to three days duration if it is not apparent. The injured member of the household should be recovering or has recovered from the injury without a disability.

Unintentional fall injury disability

Is a fall-related injury which occurred at home five years preceding the study. The injury would have resulted in anatomical deformity or total/partial limitation of functions of body parts. [32].

Results

Socio-demographic characteristics of household members in study areas

A total of 2340 and 2093 respondents were interviewed in the rural and urban locations respectively. Slightly over half (51.7% in rural and 51.3% in urban) of the respondents were males.

Prevalence, nature and outcome of unintentional home fall injuries

A total of 253 (5.7%) individuals experienced fall injuries, giving an overall fall injury incidence of 17,122 falls/100,000 individuals/year with a significantly higher incidence of fall injuries among urban dwelling household members (19,350/100,000 persons/year) compared to rural dwelling household members (15,128/100,000 persons/year) ($p = 0.044$). Overall, fall-related disability was reported among three household members giving an incidence of 13.5/100,000 persons/year. Household members in the urban areas had a higher fall disability (9.0/100,000 persons/year) compared to those in the rural areas (4.5/100,000 persons/year).

The commonest body parts injured were the extremities with a significantly high proportion of household members from urban (73.3%) compared to those in the rural areas (53.4%). Concerning the

Table 1: Demographic Characteristics (Age and Gender) of Household Members in Rural and Urban Areas

Variable	Rural (2340)		Urban(2093)	
	Male (1209) n (%)	Female (1131) n (%)	Male (1073) n (%)	Female (1020) n (%)
Age of household members in Years				
Under-5	156 (12.9)	159 (14.1)	78 (7.3)	92 (9.0)
5 – 9	173 (14.3)	166 (14.7)	115 (10.7)	96 (9.4)
10 – 14	154 (12.7)	123 (10.9)	110 (10.3)	105 (10.3)
15 – 24	227 (18.8)	207 (18.3)	251 (23.4)	240 (23.5)
25 – 39	221 (18.3)	308 (27.2)	202 (18.8)	236 (23.1)
40 – 64	240 (19.9)	148 (13.1)	274 (25.5)	225 (22.1)
≥ 65	38 (3.1)	20 (1.8)	43 (4.0)	26 (2.5)

nature of fall injuries, rural dwelling household members (58.5%) sustained bruises, cuts and deep injuries. However, household members living in urban areas (51.9%) significantly sustained sprains, fractures or dislocations compared to those in the rural areas (27.1%).

Factors associated with falls injury

In the rural area, a significantly higher proportion (16.2%) of children under five years of age experienced unintentional home falls injury while in the urban area, a significantly higher proportion (8.5%) of those aged 5 – 9 years of age experienced fall injury. There were no significant associations in the occurrence of unintentional home fall injury by gender in both rural and urban areas (Table 3). Urban dwellers had a significantly higher risk of fall injury when compared with rural dwellers (OR 1.5; 95%CI 1.1-1.9).

Discussion

This community based comparative study assessed the incidence and nature of unintentional home fall injury. We also determined the factors associated with unintentional home fall injuries in rural and urban communities in the Ibadan and Ibarapa Health Zone.

Table 2: Association between nature, severity and outcome of unintentional home Fall Injury experienced among household members in by location

Variable	Location		Total	Test Statistics	p-value
	Ruraln N =118 n (%)	Urban N =135 n (%)	N =253 N(%)	(χ^2)	
Part of the body injured during fall					
Head / neck and trunk region	55 (46.6)	36 (26.7)	91 (36.0)		
Extremity	63 (53.4)	99 (73.3)	162 (64.0)	10.87	0.001
Injury sustained during fall					
No apparent injuries (Pain)	17 (14.4)	23 (17.0)	40 (15.8)		
Bruise / cut injuries	69 (58.5)	42 (31.1)	111 (43.9)		
Sprain / Strain / Fracture/ Dislocation	32 (27.1)	70 (51.9)	102 (40.3)	20.56	<0.001
Reported severity of the fall injury					
No apparent/mild/superficial	103 (87.3)	110 (81.5)	213 (84.2)		
Moderate severe injury	15 (12.7)	25 (18.5)	40 (15.8)	1.59	0.230
Outcome of fall injury					
Disability-related injury	1 (0.8%)	2 (1.5)	3 (1.2)	0.22*	0.642
Recoverable Injury	117 (99.2)	133 (98.5)	250 (98.8)		

*-fischer's exact

The overall incidence of fall injury for this study (171/1000/year) was higher than reported incidences from an earlier study [33].This incidence was higher in urban areas compared to rural areas. A study by Kobusingye in Uganda also reported a higher fall injury incidence among household

Table 3: Factors associated with fall injury among household members by rural and urban location

Variable	Rural (2340) Fall Injury Yes	95% CI	Urban (2093) Fall Injury Yes	95% CI
Age of household members in Years				
Under-5	51 (16.2)	12.4 - 20.6	13 (7.6)	4.3 - 12.4
5 – 9	30 (8.8)	6.2 - 12.2	18 (8.5)	5.3 - 12.9
10 – 14	8 (2.9)	1.4 - 5.4	10 (4.7)	2.4 - 8.1
15 – 24	13 (3.0)	1.7 - 4.9	25 (5.1)	3.4 - 7.3
25 – 39	9 (1.7)	0.8 - 3.1	26 (5.9)	4.0 - 8.5
40 – 64	6 (1.5)	0.6 - 3.2	40 (8.0)	5.9 - 10.7
≥ 65	1 (1.7)	0.1 - 8.2	3 (4.3)	1.1 - 11.4
	$\chi^2 = 122.06$	p<0.001	$\chi^2 = 7.29$	p = 0.294
Sex of household members				
Male	56(4.6)	3.6 - 5.9	78(7.3)	5.8 - 8.9
Female	62(5.5)	4.3 - 6.9	57(5.6)	4.3 - 7.1
	$\chi^2 = 0.88$	p = 0.348	$\chi^2 = 2.45$	p = 0.118

members in an urban area compared to those in a rural area [34]. However, another study by Moshiro in Tanzania reported higher incidence of fall injury in rural areas compared to urban areas [35]. The significantly higher incidence of falls injury among household members in urban areas can be attributed to the poorly constructed houses with poor lightening and limited space [36–38]. Furthermore, migration to the urban areas by household members from the rural areas has contributed to the overcrowding of houses that predisposes to falls injuries [39–41].

Overall, children experienced fall injuries than adults in both areas. Fall injury among children was however higher in the rural area compared to the urban area which was similar to a study among children in rural North-Western Uganda [42]. This high fall injury incidence among children in rural areas may be due to peculiar characteristics of rural areas where children's activities are more rigorous and less supervised. Fall injury among adults was however higher in the urban area compared to the rural areas. The communal sharing, helping and togetherness with higher social capital, sedentary attitude, high inactivity rates [43, 44] prevalent in the rural areas might explain the reason for the discrepancy. .

Gender differences were observed in both areas. Females reported higher incidence of fall injury in the rural area while males reported higher incidence in the urban area. Varied reports have been observed from other studies. In Australia, higher incidence of falls was reported among older females [5], but in India, similar fall injury rates was reported in both sexes in India [45] while a higher fall injury rates was reported among males (old and young) in rural part of Iran [46]. The incidence in this study was however not disaggregated by age, therefore, comparability with other age-specific studies might be difficult. In both areas, most of the injuries were recoverable injuries and was similar to a rural and urban study in Iran reported that majority (80.5%) of the injuries were recoverable while 0.05% and 1.5% resulted in disability and death respectively [46].

Unintentional home injury constitutes a major problem of public health significance among household in rural and urban settlements [34, 47, 48]. Interventions involving individuals, communities and regulating government institutions are therefore required to reduce the occurrence [49–51]. These interventions ensure strict compliance to housing codes and the incorporation of public health standards into building houses [52–55].

Further research on: economic impact analysis of home injuries, home environment hazard analysis, home safety knowledge and behaviour, development of home safety ratings and cause-specific prevention can be performed with the aim of developing locally appropriate interventions.

Limitations of the study

A potential limitation of this study was recall bias. This might have been present as is usual in self-reported prevalence surveys especially in injuries that are inapparent, superficial or mild, as seen in unintentional home injuries. However this was limited by restricting enquiries to injuries in the last four months. The incidence of injury obtained might have been slightly overestimated as some respondents may have report injuries sustained

outside the home as having occurred in the home. Efforts were made to ensure that information given about home injuries was accurate by obtaining information on circumstance surrounding the injury and using operational definitions.

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References

1. World Health Organization (WHO). WHO Global Report on Falls Prevention in Older Age. Epub ahead of print 2007. DOI: 978 92 4 156353 6.
2. WISQARS™ (Web-based Injury Statistics Query and Reporting System): Unintentional All Injury Causes Nonfatal Injuries. Centers for Disease Control and Prevention, December 2016.
3. World Health Organization (WHO). Falls Fact sheethttp://www.who.int/mediacentre/factsheets/ fs344/en/. (23 December 2012).
4. Scott VJ, Kendall P and Peck S. Prevention of falls and injuries among the elderly: a special report from the office of the provincial health officer. 2004.
5. Oxley J and Hern SO. Fall-Related Injuries While Walking in Victoria. Accessed on line from http://www.victoriawalks.org.au/Assets/Files/Fall-related-injuries-While-Walking. Report.pdf on 16/02/2016.
6.. Williams JS, Nawi NG, Peltzer K, *et al.* Risk factors and disability associated with low back pain in older adults in low- and middle-income countries. Results from the WHO study on global AGEing and adult health (SAGE). PLoS One 2015; 10: 1–12.
7. Verma SK, Willetts JL, Corns HL, *et al.* Falls and fall-related injuries among community-dwelling adults in the United States. PLoS One 2016; 11: 1–14.
8. Pant PR, Towner E, Ellis M, *et al.* Epidemiology of unintentional child injuries in the makwanpur district of Nepal: A household survey. Int J Environ Res Public Health 2015; 12: 15118–15128.
9. Golden J, Conroy RM, Bruce I, *et al.* Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. Int J Geriatr Psychiatry 2009; 24: 694–700.
10. Corso P, Finkelstein E, Miller T, *et al.* Incidence and lifetime costs of injuries in the United States. Inj Prev 2006; 12: 212–218.
11. Runyan C and Casteel C. The state of the home safety in American. Facts about intentional injury in the home. 2004.
12. Sethi D VP, Racioppi O F and Baumgarten I. Injuries and violence in Europe; why they matter and what can be done. Copenhagen, Denmark WHO Reg Off Eur 2006.
13. Chandran A, Hyder AA, and Peek-Asa C. The global burden of unintentional injuries and an agenda for progress. Epidemiol Rev 2010; 32: 110–120.
14. Kipsaina C, Eze UO and Ozanne-Smith J. A standardised mortuary-based injury surveillance system: lessons learned from the Ibadan Nigerian trial. Int J Inj Contr Saf Promot 2015; 22: 193–202.
15. Krug EG, Mercy JA, Dahlberg LL, *et al.* The world report on violence and health. Lancet 2002; 360: 1083–1088.
16. Eze UO, Kipsaina CC and Ozanne-Smith J. Fatal road traffic injuries in Ibadan, using the mortuary as a data source. Inj Prev 2013; 19: 387–392.
17. Olawale OA and Owoaje ET. Incidence and pattern of injuries among residents of a rural area in South-Western Nigeria: a community-based study. BMC Public Health 2007; 7: 246.
18. Sangowawa AO and Owoaje ET. Building capacity of drivers in Nigeria to provide first aid for road crash victims. Inj Prev 2012; 18: 62.
19. World Health Organization. Accidents in childhood- Facts as a basis for prevention: Report of an advisory group. World Health Organization Technical Reports Series No. 118, Geneva, June 1956.
.20. The Department of Health Services: Graduate Degree (PhD, MPH, MS, MHA) and Certificate Programs at the University of Washington - Department of Health Services. Graduate Degree (PhD, MPH, MS, MHA) and Certificate Programs at the University of Washington.
21. Ruiz-Caesares M. Unintentional childhood injuries in Sub-Saharan Africa: An overview of Risk and Protective Factors. J Health Care Poor Underserved 2009; 20: Supplement, pp. 51–67.
22. Can Child Accidents Be Prevented in Your Community? Am J Public Health 2004; 94: 940–942.
23. Uniform definitions of home accidents. Washington, D.C./ : U.S. Public Health Service, Bureau of State Services, 1958.
24. Domestic accidents. Public Heal Pap WHO Geneva 1965; 26: 137.

25. Advances in the epidemiology of injuries as a basis for public policy. Public Heal Rep 1980; 95: 411–421.
26. National Center for Injury Prevention and Control. CDC Injury fact book. Atlanta (GA): Centers for Disease Control and Prevention, 2006.
.27. Oyo State Ministry of Health Report. Oyo State Government, January 2011.
28. Sethi D, SHabibula, McGee K, *et al.* Guidelines for conducting community surveys of injury and violence. 2004.
29. Holder Y, Peden M, Krug E, *et al.* Injury Surveillance Guidelines. Who 2001; 1–91.
30. Mock C. The effect of recall on estimation of incidence rates for injury in Ghana. Int J Epidemiol 1999; 28: 750–755.
31. International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. Geneva, World Heal Organ; Volume 1:
32. Oyedeji GA. Socioeconomic and cultural background of hospitalized children in Ilesha. Niger J Paediatr 1985; 12: 111–117.
33. Kraus A. A journey to and through injury epidemiology. Inj Epidemiol 2014; 1: 3.
34. Kobusingye O LR, Guwatudde D. Injury Patterns in rural and urban Uganda. Injury Prevention. 2001; 7: 46–50.
35. Moshiro C, Heuch I, Astrøm AN, *et al.* Injury morbidity in an urban and a rural area in Tanzania: an epidemiological survey. BMC Public Health 2005; 5: 11.
36. Bonnefoy X. Inadequate Housing and Health: An Overview. Int J Environ Pollut 2007; 30: 411–429.
37. Braubach JF, Matthias. Social Inequities in Environmental Risks Associated with Housing and Residential Location – A Review of the Evidence. Eur J Public Health 2010; 20: 36–42.
38. DiGuiseppi DO, Carolyn, David E. *et al.* Housing Interventions and Control of Injury-Related Structural Deficiencies: A Review of the Evidence. J Public Heal Manag Pract 2010; 16: S34–S43.
39. Lee S, Lee C and Rodiek S. Neighborhood factors and fall-related injuries among older adults seen by emergency medical service providers. Int J Environ Res Public Health; 14. Epub ahead of print 2017. DOI: 10.3390/ijerph14020163.
40. Hove M MC and Ngwerume E. The urban crisis in Sub-Saharan Africa: A threat to human security and sustainable development. Stability. Int J Secur Dev; 2.
41. Tao LW. The drawbacks of housing overcrowding characteristic to rural migrants' life in Beijing.
42. Mutto M, Lawoko S, Ovuga E, *et al.* Childhood and adolescent injuries in elementary schools in north-western Uganda: extent, risk and associated factors. Int J Inj Contr Saf Promot 2012; 19: 357–367.
43. Baernholdt M, Yan G, Rose K, *et al.* NIH Public Access. J Rural Heal 2012; 28: 339–347.
44. Wilcox S, Castro C, King AC, et al. Determinants of leisure time physical activity in rural compared with urban older and ethnically diverse women in the United States. J Epidemiol Community Health 2000; 54: 667–672.
45. Jagnoor J, Suraweera W, Keay L, *et al.* Childhood and adult mortality from unintentional falls in India. Bull World Health Organ 2011; 89: 733–740.
46. Neghab M, Fard AR, Habibi M, *et al.* Home accidents in rural and urban areas of Shiraz, 2000-02. East Mediterr Heal J 2006; 12: 824–833.
47. Moshiro C KG. Injury morbidity in an urban and rural area in Tanzania: an epidemiological survey,. BMC Public Health. Epub ahead of print 2005. DOI: 10.1186/1471-2458-5-11.
48. Nordberg E D V. Household survey of injuries in a Kenyan district. 2000; 77: 240–244.
49. Keall M, Baker MG, Howden-Chapman P, *et al.* Assessing housing quality and its impact on health, safety and sustainability. J Epidemiol Community Health 2010; 64: 765.
50. Keall MD, Crane J, Baker MG, *et al.* A measure for quantifying the impact of housing quality on respiratory health: a cross-sectional study. Environ Heal 2012; 11: 33–33.
51. Pearson AL, Barnard LT, Pearce J, *et al.* Housing quality and resilience in New Zealand. Build Res Inf 2014; 42: 182–190.
52. Thomson H, Thomas S, Sellstrom E, *et al.* The health impacts of housing improvement: a systematic review of intervention studies from 1887 to 2007. Am J Public Health 2009; 99: S681–S692.
53. Crawford K, Johnson C, Davies F, *et al.* Demolition or Refurbishment of Social Housing? A review of the evidence.
54. Howden-Chapman P and Chapman R. Health co-benefits from housing-related policies. Curr Opin Environ Sustain 2012; 4: 414–419.
55. Kearns A, Whitley E, Mason P, *et al.* 'Living the High Life'? Residential, social and psychosocial outcomes for high-rise occupants in a deprived context. Hous Stud 2012; 27: 97–126.