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Sociodemographic distribution and correlates of nonfatal unintentional non-traffic-related injuries in Kenya: Results from the 2014 demographic and health survey

Anne Abio[1,2] | Peter Ngum[3] | Michael Lowery Wilson[2] | Till Bärnighausen[2] | Herman Lule[1]

[1]Department of Clinical Neurosciences, Injury Epidemiology and Prevention (IEP) Research Group, Turku Brain Injury Centre, Turku University Hospital, University of Turku, Turku, Finland

[2]Heidelberg Institute of Global Health (HIGH), University Hospital and University of Heidelberg, Heidelberg, Germany

[3]Department of Neurology, Turku Brain Injury Center, Turku University Hospital, University of Turku, Turku, Finland

Correspondence

Anne Abio, Department of Clinical Neurosciences, Injury Epidemiology and Prevention (IEP) Research Group, Turku Brain Injury Centre, Turku University Hospital, University of Turku, Turku, Finland.
Email: anne.p.abio@utu.fi

Abstract

Background and Aim: Injuries are among the leading causes of mortality worldwide. There exists a paucity of nationally representative injury data from the sub-Saharan African region on the nature of injuries outside of road traffic contexts. The aim of this study was to estimate the prevalence of nonfatal unintentional injuries that occurred outside of the traffic environment among persons aged 15–54 years in Kenya.

Methods: We used the 2014 Kenyan Demographic Health Survey data to estimate the prevalence of nonfatal unintentional injuries and their injury mechanisms. Binary logistic regression was used to estimate the odds of unintentional injuries and associated factors.

Results: Injury prevalence was three times higher among males (27.56%) compared to females (8.25%). The highest prevalence for females and males respectively was among those aged 15–19 years (9.80%) and (31.18%), rural residents (8.45%) and (30.05%) and those who consumed alcohol (18.13%), and (31.39%). For both females and males, the most frequent injuries were cuts (4.95%; 18.15%) and as result of falls (3.29%; 8.92%) respectively. Burns were more prevalent among females (1.65%) compared to males (0.76%). Among males, the demographic and contextual factors associated with nontraffic unintentional injuries were residing in a rural area (OR 1.33, 95% CI 1.14, 1.56), primary education (OR 2.02, 95% CI 1.48, 2.76), a higher wealth index (second quintile OR 1.41, 95% CI 1.19, 1.67) and consuming alcohol (OR 1.49, 95% CI 1.32, 1.69). Females who had completed primary, secondary (OR 2.43, 95% CI 1.92, 3.08) or higher education had higher odds of unintentional injuries.

Conclusion: The findings mirror prior literature highlighting the clustering of demographic and behavioral factors which underlie predisposition to injuries outside of the traffic environment. Future nationally representative studies would benefit from deeper inquiry into and measurement of injury severity and health care utilization to inform strategic policy-relevant research.

KEYWORDS
Africa, epidemiology, global health, injuries, Kenya, public health

1 | INTRODUCTION

Injuries are among the leading causes of death and disability globally.[1,2] Unintentional injuries (UIIs) account for over three million lives lost annually with approximately 90% of these injury-related deaths occurring in low- and middle-income countries (LMICs).[1,2] Road traffic crashes (RTCs) are a leading contributor to injury-related mortality and disability, with among the highest global death rates being concentrated in the African region (26.6/100 000 inhabitants). It is envisioned that the prevalence of road traffic crashes will continue to rise over time in LMICs owing to increased motorization as a result of increasing affluence.[3] However, research on RTCs has tended to overshadow a range of other unintentional injuries which occur outside of the traffic environment. Major causes of UIIs in LMICs include falls, drowning, burns, and accidental poisoning.[4]

Falls are the second leading cause of UIIs globally, after road traffic crashes.[2,5] They account for 684,000 deaths and approximately 37.7 million falls require significant medical attention on an annual basis.[2,6] While more commonly associated with the aged populations of high-income countries, fall-related deaths occur frequently in the African region.[5]

Drowning, contributes to 7% of UII deaths worldwide, making it the third leading cause of UII-related mortality worldwide.[2,6] However, in terms of it's overall case-fatality-ratio, drowning is a frequent cause of injury mortality globally, accounting for its relatively uncommon reported morbidity.[2,6] Moreover, populations living near water bodies have an increased risk of drowning with the highest rates reported among children less than 15 years of age.[2,7]

Fire-related burns on the other hand are more common among women, especially in sub-Saharan Africa (SSA), which has been attributed to cooking in domestic settings.[1] Other household residents may also be particularly exposed to flame burns and scalds, due to the nature of cooking facilities in homes where there may be no separation from other household areas.[1] Children under the age of 5 years are particularly at risk for burns from flames and hot liquids.[8]

Beyond fatalities, far more numerous are injuries which do not result in death, but require significant medical intervention.[9] Physical disability, psychological trauma, health care expenditure as well as productivity and economic losses, are among the myriad consequences of UIIs for individuals, their families and society at large.[10]

Generally, LMICs have the least amount of available evidence on UIIs to guide intervention and prevention strategies. In SSA, one of the few nationally representative comparative studies on UIIs showed an overall UII prevalence of between 38.6% and 71.5% among school-attending adolescents in the six countries that were studied.[11]

A more recent study indicated that 45% of in-school adolescents experienced serious injuries during the 12-month before being surveyed, with prevalence rates ranging from 32.3% in Mauritius to 68.2% in Liberia.[12] This compares globally to data from China, where data show a prevalence of 38%[13] and in Europe an overall prevalence of 21%.[14] It must also be born in mind that in SSA, school attendance in many countries is far from universal. Adolescents who do not attend schools may be at increased risk for injuries due to their socioeconomic vulnerability.[15]

A number of risk factors for UIIs have been documented in the existing literature. First, a majority of these injuries disproportionately affect men and young adults.[2,16,17] Men are more likely to engage in high risk activities or engage in dangerous forms of employment.[2] They also tend to be the sole source of income for their respective families, which underscores the economic threat to families which may depend on one income. For similar reasons, economically productive young adults also tend to have a higher prevalence of UIIs compared to other age groups.[2]

Second, lower socioeconomic status has been found to be associated with an increased risk for UIIs.[2,17–19] In addition, families with lower incomes are less likely to afford suitable out of pocket medical care which can not only worsen their injury outcomes but potentially even drive them deeper into poverty as a result of needing to borrow money for health-related expenditures.[15]

Furthermore, research has associated UIIs with one's place of residence. In a study utilizing data from Ethiopia and Kenya, those living in rural areas had a higher prevalence of UIIs compared to those in urban settings,[16,20] although the observed differences could be a result of contextual environmental factors and differential access to essential services. For instance, one's geographical location can determine the quality of information, educational material and health care they access. On the other hand, some scientists have associated non-traffic-related UIIs with the level of education [16] and wealth index. In an Ethiopian study, the population with the lowest quintile was associated with higher odds for unintentional injuries.[20] Other factors documented to be associated with UIIs include alcohol use.[16,17,21] Alcohol tends to result in poor judgment and delayed reaction time even when consumed in moderate amounts.[21]

Pursuing effective public health interventions to reduce the burden of UIIs therefore requires a detailed understanding of the distinct sociodemographic patterns associated with the different injury types. It is thus imperative to understand the scope, patterns, and contexts in which injuries tend to occur most frequently to reduce these impacts. However, comprehensive data on nonfatal unintentional nontraffic injuries remains limited. In SSA, much of the data are limited to specific geographical areas, or are hospital based and not usually nationally representative.

The aim of the present study was to estimate the prevalence of nonfatal unintentional non-road-traffic injuries and the associated sociodemographic factors in Kenya, using a nationally representative sample. Our focus on nonroad traffic injuries was because other than the injury mechanism, the Kenyan Demographic and Health

Survey-2014 (KDHS-2014) did not detail the nature of an injury or its severity. Additionally, a different study that focused on road traffic crashes in Kenya using the same survey is available.[22] Therefore, this study seeks to expand on the previous study.

2 | METHODS

2.1 | Study design

The study used data from the 2014 Kenyan Demographic and Health Survey. The Demographic Health Surveys have been conducted in about 90 low and middle income countries. The surveys normally collect information that provides indicator information on population, health and nutrition in each respective country. Additionally, the surveys are nationally representative and collected at the household level. On average, the surveys are conducted every 5 years. In Kenya, the first standard survey was conducted in 1989, and while the 2014 survey that used in this study was the 6th survey.[23]

2.2 | Sample population

The sample was obtained from the Fifth National Sample Survey and Evaluation Programme (NASSEP V), which is a master frame from which the Kenya National Bureau of Statistics uses to conduct household surveys in Kenya. The survey used a two stage cluster sample design. The clusters were determined by a stratified probability proportional to size sampling methodology from 96,251 enumeration areas (EAs) from the 2009 Kenya Population and Housing Census. Kenya is comprised of 47 counties, which were stratified into urban and rural strata, yielding a total of 92 strata (including Nairobi and Mombasa that were considered urban). The sample was meant to include 40,300 households from 1612 clusters, with 995 in rural and 617 in urban areas, which constituted the first sampling stage. The second sampling stage involved selecting 25 households that were randomly selected from each cluster. Ultimately, 36,430 households were interviewed, consequently leading to a household response rate of 99%. Additional information is available elsewhere.[24]

2.3 | Data collection

The survey was implemented by the Kenya National Bureau of Statistics in collaboration with other partner agencies. Data collection from the households was conducted from May to October 2014. The questionnaires used were based on the model questionnaires used in the DHS program and previous questionnaires used in the earlier Kenyan surveys. Five questionnaires were used in the survey, which comprised of a full household questionnaire, a short household questionnaire, a full woman's questionnaire, a short woman's questionnaire and a man's questionnaire. The sample was divided into two, and one half was given the full household questionnaire, the full woman's questionnaire and the man's questionnaire.

While the second half was given the short household questionnaire and the short woman's questionnaire. The questions on the experience of unintentional injuries were included in the long woman's questionnaire and the man's questionnaire. Thus, females aged 15–49 years and males aged 15–54 years from every second household were eligible to respond the unintentional questions. The data used in the survey is also publicly available from the DHS program website.[23]

2.4 | Study variables

The outcome variable was the experience of nontraffic related unintentional injuries. This was determined from the question "In the past 12 months, were you injured accidentally, not related to a traffic accident?" This was followed up with another question to identify the mechanism of injury asked as "How did the injury happen?", if they had experienced a nontraffic unintentional injury. The eight types of non traffic unintentional injury mechanisms included falls, burns, poisoning, cuts, near-drowning, animal bites, shooting, and "other" to be specified. However, no additional information was provided on what was filled out for the "other" category in the data. The data was coded as 1 if they had experienced any of the mentioned unintentional injuries and 0 if they had not.

The explanatory variables used to determine associations with the experience of nontraffic related unintentional injuries included age, place of residence (urban/rural), household wealth index, educational attainment, and the use of alcohol.

2.4.1 | Age

This was used as categorical divided into 5-year intervals from 15 to 19, 20 to 24, 25 to 29, 30 to 34, 35 to 39, 40 to 44, 45 to 49, and 50 to 54 years. The lowest age group of 15–19 years was used as the reference group.

2.4.2 | Residence

The place of residence was analyzed as urban versus rural, with the former used as the reference group.

2.4.3 | Wealth index

The wealth index is a composite measure of a household's cumulative living standard. It was calculated based on a household's ownership of selected assets and the wealth index places individual households on a continuous scale of relative wealth. The data included the wealth index variable categorized into five quintiles, labeled as lowest,

second, middle, fourth, and highest. The lowest quintile was used as the reference group.

2.4.4 | Educational attainment

The level of education was divided into four categories, which included no education, primary education, secondary education, and higher. The no education category was used as the reference group in the analysis.

2.4.5 | Alcohol use

The use of alcohol was determined using the question "Do you drink alcohol?", with options to respond either yes or no. The reference group used in the analysis was the category that did not report using alcohol.

2.5 | Data analysis

The survey design of the data was taken into consideration when conducting the analysis. The prevalence of the nontraffic related unintentional injuries with their corresponding 95% confidence intervals were estimated separately for females and males. Logistic regression analysis was used to determine the association between the unintentional injuries and the explanatory variables. Variables were retained in the final multivariable model based on the p value 0.2. The results are presented as odds ratios and their corresponding 95% confidence intervals. The data analysis was conducted using Stata 17 (StataCorp).

2.6 | Ethics approval and consent to participate

The participants signed consent forms before responding to the survey questionnaires. Furthermore, ethical approval to conduct the survey in Kenya was granted by the Kenya Medical Research Institute. Since this study used publicly available data, no additional approval was required, however, permission was sought and granted by the DHS Program.

3 | RESULTS

We found that injury prevalence was higher among males, the 15–19 age group, rural residents, and those who consumed alcohol. The most frequent injuries for both genders were cuts and falls, with burns being more prevalent among females.

Approximately 8.25% (95% CI 7.84, 8.67) of females and 27.56% (95% CI 26.14, 29.03) of males reported sustaining a nontraffic related unintentional injury in the 12 months preceding the survey. By age, the highest prevalence was recorded among those aged 15–19 years at 9.80% and 31.18% among females and males, respectively. Respondents residing in rural areas had a higher prevalence of unintentional injuries at 8.45% and 30.05% among females and males, respectively. Regarding the levels of education, the highest prevalence was recorded among respondents with secondary education at 9.41% among females; and those with primary education at 29.72% among the males. Additionally, respondents belonging to the second wealth quintile had the highest prevalence of the nontraffic unintentional injuries at 8.69% and 32.25% among females and males, respectively. Respondents who drank alcohol also reported a higher prevalence of unintentional injuries among females (18.13%) and males (31.39%). Details are presented in Table 1.

By the category of injuries, cuts were the most frequent nontraffic unintentional injuries reported at 4.95% and 18.15% among females and males, respectively. Falls were the second highest contributor to unintentional injury occurrence at 3.29% and 8.92% among females and males, respectively. In constrast to an over-representation of males, a higher prevalence from burn injuries was reported among females with a prevalence of 1.65% compared to 0.76% among males. Details on the prevalence by the nontraffic unintentional injury categories are presented in Table 2.

In the multivariable model for the nontraffic unintentional injuries shown in Table 3, female respondents were twice as likely to report injuries compared to those without any education if they had primary (OR 2.03, 95% CI 1.65, 2.50; $p < 0.001$), secondary (OR 2.43, 95% CI 1.92, 3.08; $p < 0.001$) or higher (OR 2.16, 95% CI 1.61, 2.90; $p < 0.001$) education levels in the year preceding the survey. Females aged 25–39 years were less likely to report unintentional injuries compared to those aged 15–19 years. Female respondents in the highest wealth quintile were less likely to report unintentional injuries (OR 0.82, 95% CI 0.67, 1.00; $p = 0.046$). Among the males, respondents with primary (OR 2.02, 95% CI 1.48, 2.76; $p < 0.001$) and secondary (OR 1.92, 95% CI 1.38, 2.66; $p < 0.001$) education levels were roughly twice as likely to report unintentional injuries compared to those with no education. Males who reported using alcohol and those who resided in rural areas were also 49% and 33% more likely to report unintentional injuries respectively. Furthermore, the males in the higher wealth quintiles were more likely to report unintentional injuries compared to those in the lowest quintile. In contrast, males aged 25 and older were less likely to report unintentional injuries compared to those aged 15–19 years.

Regarding the fall injuries, females with primary (OR 2.21, 95% CI 1.61, 3.02; $p < 0.001$), secondary (OR 2.75, 95% CI 1.95, 3.88; $p < 0.001$), and higher (OR 1.69, 95% CI 1.07, 2.66; $p = 0.025$) levels of education were more likely to report falls compared to those with no education. However, female respondents in the middle to the highest wealth quintile were less likely to report fall injuries in the year preceding the survey. Congruently, males with primary (OR 1.60, 95% CI 1.03, 2.48; $p = 0.035$) and secondary (OR 1.58, 95% CI 0.99, 2.50; $p = 0.053$) education levels had higher odds of fall injuries. Males who drank alcohol were also 49% more likely to report fall

TABLE 1 Prevalence, 95% confidence intervals, and unweighted counts of nontraffic unintentional injuries disaggregated by sex and explanatory variables.

Variable		Females (31, 071)			Males (12, 817)		
		Prevalence %	95% CI	Injuries (*N*)[a]	Prevalence* %	95% CI	Injuries (*N*)[a]
Age	15–19	9.80	8.82, 10.87	550	31.18	28.81, 33.66	855
	20–24	8.45	7.49, 9.53	452	28.97	26.09, 32.02	578
	25–29	7.73	6.88, 8.67	442	26.67	23.77, 29.78	520
	30–34	7.81	6.92, 8.80	348	25.08	22.21, 28.18	473
	35–39	7.20	6.16, 8.39	281	26.79	23.65, 30.19	413
	40–44	7.95	6.81, 9.26	249	26.46	23.00, 30.24	338
	45–49	8.22	7.00, 9.63	200	26.19	21.99, 30.87	231
	50–54	NA			24.53	20.84, 28.64	203
Residence							
	Urban	7.96	7.27, 8.71	918	24.32	21.70, 27.15	1241
	Rural	8.45	7.96, 8.97	1604	30.05	28.60, 31.54	2370
Education							
	No education	4.35	3.60, 5.24	175	14.91	11.53, 19.07	120
	Primary	8.16	7.66, 8.69	1332	29.72	28.00, 31.49	1971
	Secondary	9.41	8.59, 10.29	798	28.51	26.29, 30.85	1181
	Higher	7.85	6.45, 9.52	217	20.46	17.34, 23.97	339
Wealth quintile							
	Lowest	7.81	6.98, 8.73	509	24.36	22.08, 26.79	687
	Second	8.69	7.81, 9.65	531	32.25	29.95, 34.64	838
	Middle	8.44	7.57, 9.39	523	29.93	27.65, 32.32	785
	Fourth	8.39	7.49, 9.38	521	27.71	24.97, 30.63	771
	Highest	7.98	7.02, 9.05	438	23.87	20.62, 27.45	530
Alcohol use							
	No	17.51	16.65, 18.40	2416	25.91	24.50, 27.38	2493
	Yes	18.13	14.04, 23.08	106	31.39	28.93, 33.97	1116
Total		8.25	7.84, 8.68	2522	27.56	26.14, 29.03	3611

Note: The unintentional injuries include falls, burns, poisoning, cuts, near-drowning, animal bites, shooting and other.

Abbreviation: 95% CI, confidence interval.

[a]Indicated above are nontraffic unintentional injury unweighted numbers.

injuries (OR 1.49, 95% CI 1.22, 1.83; $p < 0.001$). All the age groups from 20 to 24 years and older had lower odds of fall injuries compared to the youngest age group 15–19 years. The associations for the fall injuries are presented in Table 4.

The cut injuries are shown in Table 5. Compared to females with no education, those with a primary (OR 1.87, 95% CI 1.42, 2.46; $p < 0.001$), secondary (OR 2.43, 95% CI 1.79, 3.28; $p < 0.001$) and a higher (OR 2.68, 95% CI 1.86, 3.86; $p < 0.001$) level of education were more likely to report cuts. Females in the rich (OR 0.77, 95% CI 0.61, 0.99; $p = 0.038$) and richest (OR 0.72, 95% CI 0.55, 0.94; $p = 0.018$) wealth quintiles had lower odds of cut injuries. Among the males, the place of residence, level of education, the wealth index and the use of alcohol were associated with cut injuries. Males with primary (OR 2.50, 95% CI 1.62, 3.85; $p < 0.001$) and secondary (OR 2.25, 95% CI 1.43, 3.53; $p = 0.001$) education were two times more likely to report cut injuries. Additionally, males who resided in rural areas, drank alcohol and those from the second to the highest wealth quintiles had higher odds of reporting cuts.

Table 6 shows the odds of burn injuries. Females with primary and secondary education were 57% and 70% more likely to report burn injuries (OR 1.57, 95% CI 1.04, 2.39; $p = 0.033$) and (OR 1.70, 95% CI 1.09, 2.65; $p = 0.020$) respectively compared to those with no

TABLE 2 Prevalence, 95% confidence intervals, and unweighted counts by type of unintentional injuries disaggregated by explanatory variables.

Variables	Falls Prevalence (95% CI) [N]	Burns Prevalence (95% CI) [N]	Poisoning Prevalence (95% CI) [N]	Cuts Prevalence (95% CI) [N]	Near drowning Prevalence (95% CI) [N]	Animal bites Prevalence (95% CI) [N]	Gun shot Prevalence (95% CI) [N]	Other[a] Prevalence (95% CI) [N]
Age								
Females								
15–19	4.00 (3.37, 4.74) [237]	1.77 (1.40, 2.24) [116]	0.03 (0.01, 0.15) [2]	5.89 (5.14, 6.74) [326]	[0]	0.28 (0.16, 0.51) [17]	[0]	0.41 (0.18, 0.92) [15]
20–24	3.27 (2.71, 3.93) [192]	2.24 (1.80, 2.78) [128]	0.03 (0.01, 0.09) [5]	4.96 (4.18, 5.87) [256]	0.01 (0.01, 0.17) [3]	0.24 (0.13, 0.45) [12]	[0]	0.20 (0.11, 0.36) [14]
25–29	2.89 (2.37, 3.52) [169]	1.75 (1.37, 2.23) [110]	0.18 (0.07, 0.44) [8]	4.61 (3.99, 5.33) [274]	0.02 (<0.01, 0.12) [1]	0.20 (0.11, 0.35) [15]	[0]	0.09 (0.03, 0.25) [5]
30–34	2.75 (2.23, 3.38) [136]	1.36 (1.02, 1.81) [76]	0.15 (0.04, 0.56) [4]	4.79 (4.09, 5.62) [215]	[0]	0.13 (0.06, 0.31) [8]	[0]	0.25 (0.11, 0.55) [14]
35–39	2.70 (2.16, 3.38) [116]	1.28 (0.92, 1.77) [60]	0.07 (0.01, 0.40) [2]	4.60 (3.73, 5.66) [174]	0.01 (<0.01, 0.07) [1]	0.13 (0.06, 0.28) [8]	[0]	0.37 (0.18, 0.76) [14]
40–44	3.76 (2.99, 4.73) [122]	1.35 (0.94, 1.93) [48]	0.03 (<0.01, 0.23) [1]	4.46 (3.64, 5.44) [144]	0.03 (0.01, 0.13) [2]	0.18 (0.09, 0.34) [11]	[0]	0.52 (0.19, 1.38) [13]
45–49	4.01 (3.22, 5.00) [100]	1.23 (0.82, 1.84) [31]	0.07 (0.02, 0.34) [2]	4.94 (3.99, 6.10) [115]	[0]	0.14 (0.03, 0.54) [4]	0.02 (<0.01, 0.16) [1]	0.25 (0.09, 0.72) [5]
Male								
15–19	13.02 (11.38, 14.87) [361]	0.60 (0.36, 0.99) [24]	0.20 (0.06, 0.67) [3]	18.24 (16.38, 20.25) [526]	0.03 (<0.01, 0.18) [1]	0.60 (0.31, 1.15) [13]	[0]	2.66 (1.92, 3.67) [69]
20–24	10.39 (8.53, 12.60) [198]	1.23 (0.67, 2.27) [20]	0.34 (0.11, 1.12) [4]	16.34 (13.96, 19.05) [349]	0.05 (0.02, 0.13) [4]	0.32 (0.11, 0.91) [7]	0.01 (<0.01, 0.09) [1]	3.64 (2.64, 5.00) [69]
25–29	7.36 (6.00, 9.00) [153]	0.70 (0.34, 1.43) [16]	0.19 (0.06, 0.61) [5]	19.19 (16.42, 22.30) [353]	0.12 (0.03, 0.47) [2]	0.08 (0.03, 0.24) [4]	0.06 (0.01, 0.46) [1]	2.71 (1.94, 3.77) [65]
30–34	8.65 (7.08, 10.52) [150]	0.69 (0.43, 1.12) [21]	0.23 (0.08, 0.67) [4]	17.34 (14.90, 20.09) [327]	[0]	0.31 (0.14, 0.67) [8]	0.05 (0.01, 0.32) [1]	1.31 (0.85, 2.02) [37]
35–39	6.07 (4.77, 7.71) [109]	0.66 (0.21, 2.00) [8]	0.03 (<0.01, 0.20) [1]	20.58 (17.62, 23.89) [294]	0.08 (0.01, 0.55) [1]	0.17 (0.05, 0.54) [3]	[0]	1.98 (1.42, 2.75) [45]
40–44	6.97 (5.42, 8.90) [103]	0.64 (0.30, 1.34) [12]	0.12 (0.03, 0.47) [2]	18.11 (15.07, 21.61) [233]	0.10 (0.02, 0.62) [2]	0.17 (0.05, 0.54) [4]	[0]	3.13 (2.04, 4.78) [37]
45–49	7.68 (4.85, 11.95) [65]	0.74 (0.32, 1.68) [9]	0.15 (0.02, 1.03) [1]	18.08 (14.95, 21.70) [163]	[0]	0.35 (0.11, 1.12) [3]	[0]	2.93 (0.97, 8.53) [21]
50–54	6.08 (4.28, 8.59) [55]	0.79 (0.38, 1.64) [8]	[0]	17.32 (14.12, 21.08) [142]	[0]	0.44 (0.19, 1.04) [6]	[0]	2.52 (1.39, 4.53) [21]

TABLE 2 (Continued)

Variables	Falls Prevalence (95% CI) [N]	Burns Prevalence (95% CI) [N]	Poisoning Prevalence (95% CI) [N]	Cuts Prevalence (95% CI) [N]	Near drowning Prevalence (95% CI) [N]	Animal bites Prevalence (95% CI) [N]	Gun shot Prevalence (95% CI) [N]	Other[a] Prevalence (95% CI) [N]
Residence								
Females								
Urban	3.08 (2.61, 3.63) [392]	1.70 (1.40, 2.07) [222]	0.12 (0.06, 0.28) [11]	4.57 (3.98, 5.24) [533]	0.01 (<0.01, 0.04) [3]	0.06 (0.03, 0.15) [14]	[0]	0.26 (0.14, 0.49) [28]
Rural	3.43 (3.13, 3.75) [680]	1.62 (1.41, 1.86) [347]	0.06 (0.03, 0.11) [13]	5.21 (4.81, 5.64) [971]	0.02 (0.01, 0.06) [4]	0.29 (0.21, 0.39) [61]	<0.01 (<0.01, 0.02) [1]	0.29 (0.20, 0.42) [52]
Males								
Urban	8.51 (7.34, 9.84) [409]	0.83 (0.53, 1.31) [46]	0.05 (0.02, 0.15) [5]	15.25 (12.95, 17.87) [775]	0.02 (0.01, 0.07) [4]	0.21 (0.10, 0.40) [14]	0.02 (<0.01, 0.17) [1]	2.53 (1.89, 3.38) [146]
Rural	9.23 (8.38, 10.16) [785]	0.71 (0.52, 0.97) [72]	0.29 (0.16, 0.51) [15]	20.38 (19.19, 21.62) [1612]	0.07 (0.03, 0.18) [6]	0.39 (0.26, 0.59) [34]	0.01 (<0.01, 0.07) [2]	2.68 (2.25, 3.20) [218]
Education								
Females								
No education	1.83 (1.38, 2.41) [79]	1.10 (0.72, 1.67) [47]	0.01 (<0.01, 0.05) [2]	2.69 (2.08, 3.47) [102]	[0]	0.23 (0.11, 0.49) [13]	0.02 (<0.01, 0.16) [1]	0.11 (0.03, 0.42) [5]
Primary	3.39 (3.06, 3.77) [574]	1.62 (1.40, 1.87) [286]	0.07 (0.03, 0.13) [12]	4.73 (4.35, 5.13) [771]	0.02 (0.01, 0.06) [3]	0.22 (0.15, 0.31) [42]	[0]	0.39 (0.27, 0.57) [52]
Secondary	3.85 (3.30, 4.49) [344]	1.86 (1.53, 2.24) [184]	0.10 (0.03, 0.27) [6]	5.62 (4.98, 6.34) [491]	0.02 (0.01, 0.06) [4]	0.21 (0.12, 0.37) [19]	[0]	0.21 (0.11, 0.40) [19]
Higher	2.13 (1.56, 2.90) [75]	1.60 (1.10, 2.30) [52]	0.18 (0.05, 0.71) [4]	5.47 (4.25, 7.03) [140]	[0]	0.03 (<0.01, 0.21) [1]	[0]	0.07 (0.02, 0.26) [4]
Males								
No education	4.88 (3.30, 7.17) [50]	0.53 (0.21, 1.36) [5]	0.34 (0.06, 1.88) [2]	8.24 (5.58, 12.02) [70]	[0]	0.85 (0.22, 3.25) [6]	[0]	2.25 (1.06, 4.72) [15]
Primary	9.21 (8.34, 10.16) [635]	0.66 (0.48, 0.89) [62]	0.17 (0.08, 0.35) [9]	20.38 (18.84, 22.01) [1327]	0.07 (0.03, 0.17) [7]	0.36 (0.23, 0.54) [27]	0.03 (<0.01, 0.14) [2]	2.66 (2.17, 3.25) [189]
Secondary	9.46 (8.22, 10.86) [390]	0.69 (0.42, 1.12) [34]	0.26 (0.11, 0.61) [9]	18.14 (16.23, 20.23) [782]	0.04 (0.01, 0.19) [2]	0.23 (0.11, 0.48) [12]	0.02 (<0.01, 0.13) [1]	2.71 (2.08, 3.53) [114]
Higher	7.43 (5.79, 9.49) [119]	1.37 (0.68, 2.75) [17]	[0]	12.62 (10.19, 15.53) [208]	0.02 (<0.01, 0.13) [1]	0.23 (0.06, 0.88) [3]	[0]	2.34 (1.49, 3.64) [46]

(Continues)

TABLE 2 (Continued)

Variables	Falls Prevalence (95% CI) [N]	Burns Prevalence (95% CI) [N]	Poisoning Prevalence (95% CI) [N]	Cuts Prevalence (95% CI) [N]	Near drowning Prevalence (95% CI) [N]	Animal bites Prevalence (95% CI) [N]	Gun shot Prevalence (95% CI) [N]	Other[a] Prevalence (95% CI) [N]
Wealth quintile								
Females								
Lowest	3.72 (3.15, 4.39) [238]	1.70 (1.31, 2.20) [121]	0.05 (0.02, 0.14) [6]	4.67 (4.00, 5.45) [297]	[0]	0.38 (0.24, 0.60) [31]	0.01 (<0.01, 0.07) [1]	0.22 (0.12, 0.42) [16]
Second	3.85 (3.31, 4.47) [243]	1.33 (1.03, 1.71) [107]	0.02 (0.01, 0.09) [2]	5.74 (5.02, 6.55) [334]	0.03 (0.01, 0.11) [3]	0.23 (0.13, 0.41) [14]	[0]	0.34 (0.21, 0.55) [23]
Middle	3.24 (2.73, 3.85) [210]	1.64 (1.31, 2.05) [111]	0.11 (0.04, 0.29) [6]	5.19 (4.52, 5.95) [318]	0.03 (<0.01, 0.17) [2]	0.11 (0.05, 0.27) [7]	[0]	0.24 (0.12, 0.49) [12]
Fourth	3.14 (2.64, 3.74) [216]	1.95 (1.57, 2.43) [124]	0.07 (0.02, 0.22) [4]	4.66 (4.01, 5.42) [299]	0.01 (<0.01, 0.05) [1]	0.29 (0.17, 0.51) [20]	[0]	0.39 (0.20, 0.77) [19]
Highest	2.81 (2.25, 3.50) [165]	1.62 (1.25, 2.10) [106]	0.14 (0.05, 0.39) [6]	4.64 (3.83, 5.61) [256]	0.01 (<0.01, 0.09) [1]	0.05 (0.01, 0.24) [3]	[0]	0.21 (0.07, 0.61) [10]
Males								
Lowest	8.47 (7.12, 10.04) [263]	0.45 (0.26, 0.77) [20]	0.17 (0.05, 0.57) [4]	15.30 (13.48, 17.31) [438]	0.08 (0.01, 0.41) [2]	0.27 (0.12, 0.59) [13]	0.06 (0.01, 0.28) [2]	2.92 (2.10, 4.05) [76]
Second	10.26 (8.87, 11.83) [269]	0.83 (0.45, 1.52) [23]	0.54 (0.23, 1.24) [8]	21.48 (19.50, 23.61) [574]	0.12 (0.03, 0.42) [3]	0.44 (0.22, 0.86) [11]	[0]	2.77 (2.11, 3.63) [76]
Middle	9.28 (8.01, 10.73) [247]	0.71 (0.41, 1.22) [23]	0.13 (0.03, 0.52) [2]	19.62 (17.78, 21.60) [524]	<0.01 (<0.01, 0.03) [1]	0.39 (0.21, 0.73) [12]	0.05 (0.01, 0.38) [1]	2.82 (2.06, 3.86) [70]
Fourth	8.14 (6.88, 9.60) [233]	0.78 (0.49, 1.25) [31]	0.03 (0.01, 0.14) [2]	19.54 (17.18, 22.13) [536]	0.06 (0.01, 0.24) [2]	0.31 (0.14, 0.69) [8]	[0]	2.24 (1.66, 3.01) [78]
Highest	8.70 (6.92, 10.90) [182]	0.93 (0.49, 1.75) [21]	0.12 (0.04, 0.41) [4]	14.72 (12.12, 17.76) [315]	0.01 (<0.01, 0.07) [2]	0.18 (0.06, 0.57) [4]	[0]	2.54 (1.62, 3.97) [64]
Alcohol use								
Females								
No	7.01 (6.43, 7.64) [1024]	3.51 (3.13, 3.94) [545]	0.15 (0.08, 0.27) [21]	10.59 (9.88, 11.36) [1454]	0.04 (0.01, 0.08) [7]	0.41 (0.30, 0.55) [68]	<0.01 (<0.01, 0.03) [1]	0.52 (0.37, 0.73) [71]
Yes	6.51 (4.50, 9.34) [48]	3.57 (2.10, 5.99) [24]	0.84 (0.20, 3.46) [3]	9.00 (6.27, 12.76) [50]	[0]	0.62 (0.26, 1.46) [7]	[0]	2.04 (0.68, 5.95) [9]
Males								

TABLE 2 (Continued)

Variables	Falls Prevalence (95% CI) [N]	Burns Prevalence (95% CI) [N]	Poisoning Prevalence (95% CI) [N]	Cuts Prevalence (95% CI) [N]	Near drowning Prevalence (95% CI) [N]	Animal bites Prevalence (95% CI) [N]	Gun shot Prevalence (95% CI) [N]	Other[a] Prevalence (95% CI) [N]
No	8.51 (7.72, 9.37) [838]	0.71 (0.50, 1.00) [82]	0.15 (0.08, 0.29) [12]	17.08 (15.89, 18.34) [1649]	0.06 (0.03, 0.13) [9]	0.30 (0.19, 0.47) [32]	0.02 (<0.01, 0.10) [2]	2.56 (2.10, 3.11) [248]
Yes	9.88 (8.56, 11.37) [356]	0.88 (0.56, 1.39) [35]	0.26 (0.11, 0.64) [8]	20.62 (18.56, 22.86) [736]	0.03 (<0.01, 0.24) [1]	0.33 (0.19, 0.58) [16]	0.02 (<0.02, 0.15) [1]	2.76 (2.16, 3.54) [116]
Total								
Females	3.29 (3.02, 3.58) [1072]	1.65 (1.47, 1.86) [569]	0.08 (0.05, 0.15) [24]	4.95 (4.61, 5.31) [1504]	0.02 (0.01, 0.04) [7]	0.20 (0.15, 0.26) [75]	<0.01 (<0.01, 0.01) [1]	0.28 (0.20, 0.39) [80]
Males	8.92 (8.21, 9.69) [1194]	0.76 (0.58, 1.00) [118]	0.18 (0.11, 0.31) [20]	18.15 (16.92, 19.44) [2387]	0.05 (0.02, 0.11) [10]	0.31 (0.22, 0.44) [48]	0.02 (0.01, 0.07) [3]	2.62 (2.23, 3.07) [364]

[a]No additional information was provided.

education. Additionally, females in the second wealth quintile were 31% less likely to report burn injuries compared to those in the lowest quintile. Among the males, none of the variables were associated with burn injuries.

4 | DISCUSSION

This study aimed at determining the prevalence and sociodemographic distribution, of UIIs in Kenya. We found that falls, burns and cuts predominated among nonfatal unintentional nontraffic injuries. This finding was consistent with a comparable stepwise surveillance (STEPS) study in Kenya where a 10.9% overall prevalence of UII was reported, with cuts, falls and burns contributing to (47.7%), (33.8%) and (3.9%), respectively.[16] This study found that among the considered UIIs, the prevalence was higher among males at 27.56% compared to females at 8.25% with the exception of burns. This pattern was similar to findings reported elsewhere in Kenya,[16] Sudan,[18] and in South Africa.[25] Male over representation has been partly attributed to increased alcohol use and other substance abuse and generally being more prone to occupational hazards and risk taking compared to their female counterparts.[16,25,26] The deviation in the injury occurrence for burns in the SSA context might be due to prevailing social roles where women spend more time in kitchen settings where they are often exposed to open flames and scalding liquids.[27]

With respect to age, the highest prevalence of UIIs were found among those aged 15–19 years for both females (9.80%) and males (31.18%), respectively, compared to other age groups. In addition, the odds of having UIIs decreased for the age group 25–54 years among males and 25–39 years among females ($p < 0.05$). A similar pattern was observed for fall related injuries among males. The peak prevalence in age group 15–19 years could be a manifestation of adolescent risk behavior amidst weak safety legislation in the environment where they work, live and play.[28]

Furthermore, UIIs in this age group imply a financial strain for families since individuals 15–19 years of age are still largely dependent on their parents or legal representatives. In addition, in the event of permanent disability, caretakers may then be forced to provide for the care needs of the disabled relative throughout their lifetime. The long term care required by an injured family member has been found to be linked with not only psychosocial stress, but financial and other material losses related to health care costs.[10]

Regarding place of residency, rural dwellers reported higher UII prevalence for both females (8.45%) and males (30.05%) compared to their urban counterparts. This was also similar to the UIIs from falls and cuts, but the reverse was the case for burn injuries. This injury pattern has been previously reported in Kenya [16] but not in Sierra Leone where no difference was observed.[1] The Kenyan study attributed the increased risk of injuries such as cuts to farming activities which is the main economic activity in rural areas where majority of the country's population reside.[16] However, a household based survey in Sierra Leone did not find any relationship between

TABLE 3 Crude and adjusted odds ratios for the association between nontraffic unintentional injuries with explanatory variables in Kenya (DHS-2014).

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Females							
Age	15–19	Ref			Ref		
	20–24	0.85	0.71, 1.02	0.074	0.88	0.74, 1.05	0.161
	25–29	0.77	0.65, 0.92	0.003	0.83	0.69, 0.99	0.041
	30–34	0.78	0.66, 0.93	0.005	0.84	0.71, 1.00	0.054
	35–39	0.71	0.59, 0.87	0.001	0.77	0.63, 0.94	0.011
	40–44	0.80	0.65, 0.98	0.029	0.87	0.70, 1.07	0.176
	45–49	0.83	0.68, 1.00	0.053	0.91	0.75, 1.11	0.354
Residence	Urban	Ref			NA		
	Rural	1.07	0.95, 1.20	0.275			
Education	No education	Ref			Ref		
	Primary	1.95	1.60, 2.39	<0.001	2.03	1.65, 2.50	<0.001
	Secondary	2.29	1.83, 2.85	<0.001	2.43	1.92, 3.08	<0.001
	Higher	1.87	1.41, 2.50	<0.001	2.16	1.61, 2.90	<0.001
Wealth quintile	Lowest	Ref			Ref		
	Second	1.12	0.96, 1.32	0.160	0.94	0.80, 1.11	0.472
	Middle	1.09	0.91, 1.29	0.346	0.89	0.75, 1.06	0.196
	Fourth	1.08	0.91, 1.29	0.390	0.87	0.72, 1.05	0.156
	Highest	1.02	0.85, 1.23	0.812	0.82	0.67, 1.00	0.046
Alcohol use	No	Ref			NA		
	Yes	1.04	0.76, 1.42	0.791			
Males							
Age	15–19	Ref			Ref		
	20–24	0.90	0.76, 1.06	0.214	0.93	0.79, 1.10	0.402
	25–29	0.80	0.67, 0.97	0.020	0.82	0.68, 0.99	0.034
	30–34	0.74	0.61, 0.90	0.002	0.71	0.58, 0.87	0.001
	35–39	0.81	0.66, 0.99	0.037	0.78	0.63, 0.96	0.017
	40–44	0.79	0.64, 0.98	0.031	0.76	0.62, 0.96	0.012
	45–49	0.78	0.61, 1.00	0.050	0.73	0.56, 0.96	0.023
	50–54	0.72	0.57, 0.90	0.004	0.67	0.53, 0.84	0.001
Residence	Urban	Ref			Ref		
	Rural	1.34	1.13, 1.57	0.001	1.33	1.14, 1.56	<0.001
Education	No education	Ref			Ref		
	Primary	2.41	1.77, 3.28	<0.001	2.02	1.48, 2.76	<0.001
	Secondary	2.28	1.65, 3.13	<0.001	1.92	1.38, 2.66	<0.001
	Higher	1.47	1.02, 2.11	0.037	1.32	0.91, 1.92	0.140
Wealth quintile	Lowest	Ref			Ref		
	Second	1.48	1.26, 1.73	<0.001	1.41	1.19, 1.67	<0.001
	Middle	1.33	1.12, 1.56	0.001	1.30	1.10, 1.52	0.002

TABLE 3 (Continued)

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
	Fourth	1.19	0.98, 1.44	0.072	1.32	1.09, 1.60	0.005
	Highest	0.97	0.78, 1.22	0.818	1.27	1.00, 1.62	0.048
Alcohol use	No	Ref			Ref		
	Yes	1.31	1.16, 1.47	<0.001	1.49	1.32, 1.69	<0.001

Abbreviations: Adj OR, adjusted odds ratio; NA, not applicable; Ref., reference.

TABLE 4 Crude and adjusted odds ratios for the association between unintentional fall injuries with explanatory variables in Kenya (DHS-2014).

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Females							
Age	15–19	Ref			Ref		
	20–24	0.81	0.64, 1.03	0.089	0.88	0.69, 1.14	0.331
	25–29	0.71	0.55, 0.93	0.013	0.83	0.63, 1.09	0.171
	30–34	0.68	0.51, 0.90	0.007	0.78	0.58, 1.04	0.094
	35–39	0.67	0.51, 0.87	0.003	0.75	0.57, 0.99	0.045
	40–44	0.94	0.70, 1.26	0.677	1.06	0.78, 1.44	0.706
	45–49	1.00	0.75, 1.34	0.979	1.16	0.86, 1.55	0.333
Residence	Urban	Ref			NA		
	Rural	1.12	0.92, 1.36	0.271			
Education	No education	Ref			Ref		
	Primary	1.89	1.39, 2.56	<0.001	2.21	1.61, 3.02	<0.001
	Secondary	2.15	1.55, 2.99	<0.001	2.75	1.95, 3.88	<0.001
	Higher	1.17	0.76, 1.79	0.469	1.69	1.07, 2.66	0.025
Wealth quintile	Lowest	Ref			Ref		
	Second	1.04	0.82, 1.31	0.765	0.86	0.67, 1.09	0.203
	Middle	0.87	0.68, 1.12	0.267	0.70	0.54, 0.91	0.007
	Fourth	0.84	0.66, 1.08	0.170	0.68	0.52, 0.89	0.005
	Highest	0.75	0.56, 1.00	0.049	0.64	0.47, 0.87	0.005
Alcohol use	No	Ref			NA		
	Yes	0.92	0.61, 1.39	0.704			
Males							
Age	15–19	Ref			Ref		
	20–24	0.77	0.60, 1.00	0.054	0.74	0.56, 0.96	0.027
	25–29	0.53	0.41, 0.69	<0.001	0.48	0.37, 0.34	<0.001
	30–34	0.63	0.49, 0.82	0.001	0.56	0.42, 0.74	<0.001
	35–39	0.43	0.32, 0.58	<0.001	0.38	0.28, 0.52	<0.001
	40–44	0.50	0.37, 0.68	<0.001	0.44	0.32, 0.61	<0.001
	45–49	0.56	0.33, 0.93	0.024	0.50	0.29, 0.85	0.011
	50–54	0.43	0.29, 0.64	<0.001	0.38	0.26, 0.57	<0.001

(Continues)

TABLE 4 (Continued)

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Residence	Urban	Ref			NA		
	Rural	1.09	0.90, 1.33	0.361			
Education	No education	Ref			Ref		
	Primary	1.98	1.30, 3.01	0.001	1.60	1.03, 2.48	0.035
	Secondary	2.04	1.32, 3.15	0.001	1.58	0.99, 2.50	0.053
	Higher	1.56	0.96, 2.56	0.074	1.35	0.80, 2.27	0.260
Wealth quintile	Lowest	Ref			Ref		
	Second	1.24	0.97, 1.57	0.086	1.19	0.93, 1.53	0.172
	Middle	1.11	0.87, 1.41	0.418	1.07	0.83, 1.37	0.611
	Fourth	0.96	0.74, 1.24	0.745	0.96	0.73, 1.26	0.763
	Highest	1.03	0.75, 1.41	0.851	1.10	0.78, 1.55	0.591
Alcohol use	No	Ref					
	Yes	1.18	0.98, 1.42	0.081	1.49	1.22, 1.83	<0.001

Abbreviations: Adj OR, adjusted odds ratio; NA, not applicable; Ref., reference.

TABLE 5 Crude and adjusted odds ratios for the association between unintentional cut injuries with explanatory variables in Kenya (DHS-2014).

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Females							
Age	15–19	Ref			Ref		
	20–24	0.83	0.66, 1.05	0.124	0.85	0.68, 1.07	0.178
	25–29	0.77	0.62, 0.96	0.018	0.83	0.66, 1.04	0.098
	30–34	0.81	0.65, 1.00	0.045	0.87	0.71, 1.08	0.211
	35–39	0.77	0.60, 1.00	0.046	0.84	0.64, 1.08	0.177
	40–44	0.75	0.58, 0.96	0.022	0.82	0.63, 1.06	0.127
	45–49	0.83	0.66, 1.05	0.126	0.92	0.72, 1.17	0.494
Residence	Urban	Ref			NA		
	Rural	1.15	0.97, 1.35	0.105			
Education	No education	Ref			Ref		
	Primary	1.80	1.37, 2.36	<0.001	1.87	1.42, 2.46	<0.001
	Secondary	2.16	1.61, 2.89	<0.001	2.43	1.79, 3.28	<0.001
	Higher	2.10	1.45, 3.04	<0.001	2.68	1.86, 3.86	<0.001
Wealth quintile	Lowest	Ref			Ref		
	Second	1.24	1.01, 1.53	0.040	1.05	0.85, 1.29	0.682
	Middle	1.12	0.90, 1.40	0.326	0.90	0.72, 1.13	0.366
	Fourth	1.00	0.79, 1.26	0.992	0.77	0.61, 0.99	0.038
	Highest	0.99	0.77, 1.29	0.959	0.72	0.55, 0.94	0.018
Alcohol use	No	Ref			NA		
	Yes	0.83	0.56, 1.23	0.363			

TABLE 5 (Continued)

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Males							
Age	15–19	Ref			Ref		
	20–24	0.88	0.70, 1.09	0.239	0.95	0.77, 1.17	0.621
	25–29	1.06	0.85, 1.34	0.592	1.15	0.93, 1.43	0.206
	30–34	0.94	0.75, 1.18	0.593	0.97	0.77, 1.22	0.770
	35–39	1.16	0.92, 1.47	0.211	1.19	0.94, 1.51	0.149
	40–44	0.99	0.77, 1.28	0.949	1.01	0.78, 1.31	0.931
	45–49	0.99	0.77, 1.27	0.933	0.97	0.76, 1.26	0.840
	50–54	0.94	0.72, 1.23	0.653	0.92	0.70, 1.22	0.651
Residence	Urban	Ref			Ref		
	Rural	1.42	1.16, 1.75	0.001	1.48	1.23, 1.78	<0.001
Education	No education	Ref			Ref		
	Primary	2.85	1.85, 4.38	<0.001	2.5	1.62, 3.85	<0.001
	Secondary	2.47	1.58, 3.85	<0.001	2.25	1.43, 3.53	0.001
	Higher	1.61	0.99, 2.61	0.055	1.51	0.91, 2.49	0.109
Wealth quintile	Lowest	Ref			Ref		
	Second	1.52	1.26, 1.82	<0.001	1.44	1.19, 1.74	<0.001
	Middle	1.35	1.12, 1.63	0.001	1.34	1.11, 1.62	0.003
	Fourth	1.34	1.09, 1.66	0.007	1.54	1.25, 1.90	<0.001
	Highest	0.96	0.73, 1.25	0.742	1.34	1.03, 1.75	0.031
Alcohol use	No	Ref			Ref		
	Yes	1.26	1.11, 1.43	<0.001	1.31	1.16, 1.49	<0.001

Abbreviations: Adj OR, adjusted odds ratio; NA, not applicable; Ref., reference.

UIIs and place of residence.[1] The difference could have resulted from our study excluding road traffic crashes and children who have been substantially reported to sustain UIIs in urban settings except for drowning and animal bites.[29] Furthermore, the risk factors usually vary by geographical location and context.

With regard to educational attainment, the UII prevalence was lowest in the group with no educational attainment for both females (4.35%) and males (14.91%) respectively, compared to those who had attained some form of education. A higher risk was observed among study participants with primary and secondary education for UIIs and falls. This finding is similar to studies from Sierra Leone and Sudan.[1,18] In a different Kenyan study, students had higher odds of sustaining unintentional injuries, especially those resulting from falls.[16] According to Othieno et al.[30] posttraumatic stress symptoms, depression and health risk behaviors were key risk factors for UIIs amongst university students in Kenya. Some researchers have attributed this association to a low socioeconomic status,[19] however a combination of stressful factors including parental expectations and school dropout could potentially be contributing factors.[31] There is evidence to suggest a bidirectional relationship between mental health, for instance stress and UIIs.[32] Researchers have thus called for resources to be dedicated towards mental health screening and motivational interventions within the framework of psychosocial support for young people.[33]

For the household wealth index, our findings showed no significant differences among females but for males, all quintiles from the second to the highest were associated with increased odds for UIIs compared to the lowest quintile. A similar pattern was observed for cuts-related UIIs for males. However, females in the fourth and highest wealth quintile also had lower odds of cut injuries. Our findings are consistent with an Ethiopian household survey in which belonging to the lowest wealth index was protective against UIIs.[20] However, this is in contrast with previous studies from Kenya and Sudan where higher socioeconomic status was shown to be protective against UIIs.[16,18] Whereas socioeconomic disparities, marginalization, unsafe living and travel environments might increase risk for UIIs among the poor,[18] alcohol related poisoning, aflatoxins, poisoning from personal care products, drowning during recreational boating and sports appear to impact those with greater access to financial resources,[34] thus requiring attention in future analyses since

TABLE 6 Crude and adjusted odds ratios for the association between unintentional burn injuries with explanatory variables in Kenya (DHS-2014).

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
Females							
Age	15–19	Ref			Ref		
	20–24	1.27	0.93, 1.73	0.132	1.29	0.94, 1.77	0.116
	25–29	0.99	0.70, 1.40	0.947	1.02	0.71, 1.48	0.896
	30–34	0.76	0.53, 1.10	0.148	0.79	0.55, 1.15	0.225
	35–39	0.72	0.47, 1.09	0.117	0.75	0.49, 1.13	0.166
	40–44	0.76	0.49, 1.17	0.211	0.80	0.51, 1.24	0.309
	45–49	0.69	0.44, 1.09	0.110	0.73	0.47, 1.15	0.173
Residence	Urban	Ref			NA		
	Rural	0.95	0.75, 1.21	0.689			
Education	No education	Ref			Ref		
	Primary	1.48	0.95, 2.31	0.081	1.57	1.04, 2.39	0.033
	Secondary	1.71	1.06, 2.75	0.028	1.70	1.09, 2.65	0.020
	Higher	1.46	0.83, 2.59	0.190	1.50	0.87, 2.59	0.148
Wealth quintile	Lowest	Ref			Ref		
	Second	0.78	0.54, 1.12	0.171	0.69	0.48, 0.99	0.041
	Middle	0.96	0.68, 1.36	0.825	0.85	0.61, 1.20	0.369
	Fourth	1.15	0.81, 1.63	0.433	1.00	0.71, 1.42	0.998
	Highest	0.95	0.65, 1.38	0.783	0.83	0.56, 1.23	0.350
Alcohol use	No	Ref			NA		
	Yes	1.02	0.59, 1.75	0.954			
Males							
Age	15–19	Ref			Ref		
	20–24	2.07	0.92, 4.62	0.077	1.95	0.92, 4.16	0.083
	25–29	1.17	0.54, 2.51	0.695	1.1	0.52, 2.35	0.799
	30–34	1.16	0.57, 2.35	0.688	1.1	0.54, 2.22	0.799
	35–39	1.09	0.32, 3.78	0.887	1.04	0.31, 3.42	0.952
	40–44	1.06	0.44, 2.59	0.896	1.02	0.41, 2.50	0.974
	45–49	1.23	0.46, 3.28	0.677	1.18	0.44, 3.19	0.742
	50–54	1.32	0.54, 3.22	0.545	1.28	0.53, 3.10	0.582
Residence	Urban	Ref			NA		
	Rural	0.85	0.49, 1.48	0.560			
Education	No education	Ref			NA		
	Primary	1.23	0.47, 3.24	0.674			
	Secondary	1.30	0.44, 3.81	0.635			
	Higher	2.60	0.80, 8.44	0.112			
Wealth quintile	Lowest	Ref			Ref		
	Second	1.88	0.80, 4.37	0.145	1.85	0.79, 4.33	0.158
	Middle	1.60	0.73, 3.49	0.236	1.56	0.71, 3.42	0.268

TABLE 6 (Continued)

Variable		Crude OR	95% CI	*p* Value	Adj OR	95% CI	*p* Value
	Fourth	1.76	0.85, 3.64	0.129	1.68	0.81, 3.48	0.160
	Highest	2.09	0.89, 4.91	0.090	1.99	0.85, 4.65	0.110
Alcohol use	No	Ref			NA		
	Yes	1.25	0.70, 2.23	0.457			

Abbreviations: Adj OR, adjusted odds ratio; NA, not applicable; Ref., reference.

clustering by wealth index does influence injury risks.[35] However, existing studies show mixed findings. In a systematic review of the association between socioeconomic status and childhood UIIs, Mahboob et al.[19] reported that 32 studies found an inverse association, 3 found a positive association while 20 studies were not significant. The generation of key data through evidence-based approaches and engagement with stakeholders will be crucial in establishing this relationship.[36]

Irrespective of sex, we found that the prevalence of UIIs was higher among alcohol users, except for falls among females. Males who used alcohol were 49% more likely to sustain UIIs compared to nonalcohol users. The association between alcohol use and UIIs was documented in a similar study in South Africa's Cape town[25] although other studies have associated it more with violent injuries,[37] and mixed findings.[21] Unfortunately sustaining such injuries under the influence of alcohol not only compounds the injury severity but also injury assessment and their management outcome. Of importance is that individuals who use alcohol may be at risk for worse drinking habits due to additional psycho-social stress and mental health consequences posed by UIIs.[10] In addition, consuming alcohol in Kenyan settings poses additional risk of methanol poisoning especially in the urban slums.[17] Methanol poisoning from alcohol consumption has been associated with spiking alcoholic beverages to increase profit.[38] However, our study could not directly link the consumption of alcohol to the UIIs reported.

4.1 | Study strengths and limitations

The survey was nationally representative, thus the estimates reflect the nonfatal unintentional nontraffic injury prevalence at the national level in Kenya. Furthermore, since the data collection was conducted outside hospital settings, it is likely to capture both mild and severe cases of UIIs owing to the larger sample sizes, increasing national representatives thus making it feasible to determine the community population most at risk using concurrent multiple analyses.

Our study is not without limitations. First, data from the survey does not provide information on injury severity which is a crucial piece of information for interpreting injury data and in determining where prevention measures should be prioritized. Second, studies from health demographic surveys such as this one may be biased due to the self-reported nature of the responses in the form of social desirability and recall bias. As such, there is considerable risk of under-reporting given the longer 12-month recall duration and it is hard to validate self-reports.[39] The data used was from survey conducted in 2014, and there may have been changes in injury prevalence or risk factors since then. Furthermore, with these cross-sectional survey data, it was not possible to determine causality regarding the UIIs. In addition, the present study does not detail injury outcomes including personal and society consequences which are components of the injury burden. When trying ascertain alcohol use using questionnaires, prior research shows this method to be imprecise.[40] Thus, statistical associations which emerge when measuring behavior as it relates to alcohol intake tends to skew toward the null. Additionally, we were not able to determine mortality from the UIIs. It would be advantageous to collect this information through additional strategies such as verbal autopsy to estimate the mortality rates. Lastly, host factors such as an individual's mental health, level of physical activity; contextual environmental factors such as occupational hazards and safety profiles and community level risk factors for each injury mechanism could not be examined in the present study due to constraints of the scope of the data sets. Such factors have been previously shown to influence UIIs from a broader agent-host-environment epidemiological view point.[41]

4.2 | Policy implications

Overall, within the context of the limitations of the present study, it is important to note that the high prevalence of nonfatal unintentional non-traffic injuries—established at 8% and 27% in women and men respectively—may have considerable impact on the Kenyan health care budget. This can have serious economic consequences since the country's health care system is already constrained by the high infectious disease burden, emerging chronic disease burden, obstetric emergencies, intentional injuries and scarce human and infrastructural resources.[42] Moreover, there exists compelling evidence to suggest that only 7% of Kenyans who sustain such injuries receive any prehospital care,[42] underpinning the need for safety promotion efforts in communities. In addition, the diverse socioeconomic and behavioral factors associated with UIIs warrant multidimensional

preventive approaches. Most importantly, only 20% of Kenyans work in the formal sector and as such, health insurance coverage is less than 15%, with most of the health bills being paid out of pocket yet nearly half of the country's population live below the national poverty line.[43] UIIs mainly affecting younger males imply more economic losses in a country with a young population as the most economically active portion of the population fail to live to their full potential. These policy implications necessitate the further need for frequent comprehensive demographic health surveillance with increased nuance for injury mechanisms and risk factors. Increased access to data is of paramount importance in guiding prevention strategies.

5 | CONCLUSION

Taken as a whole, these findings from a nationally representative survey of Kenyans, which investigated unintentional non-traffic injuries, lend essential insights to help guide priorities for further research, intervention, and prevention. Our findings show that a combination of sociodemographic and behavioral factors influence nonfatal unintentional nontraffic injuries. Being male, belonging to the age group 15–19 years, formal educational attainment, rural residence and history of alcohol use were the most important determinants of UIIs in Kenya. Holistic approaches are required in targeting the most at risk population groups. Future demographic health surveys could report on all eligible household occupants, injury severity and mortality including resulting personal and societal consequences to enhance the actionable utility of such data.

AUTHOR CONTRIBUTIONS

Anne Abio: Conceptualization; formal analysis; methodology; validation; writing—original draft; writing—review & editing. **Peter Ngum**: Validation; writing—original draft; writing—review & editing. **Michael Lowery Wilson**: Supervision; validation; writing—original draft; writing—review & editing. **Till Bärnighausen**: Validation; writing—original draft; writing—review & editing. **Herman Lule**: Validation; writing—original draft; writing—review & editing. All authors have read and approved the final version of the manuscript

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data used in the survey is also publicly available from the DHS program website. Anne Abio had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

The lead author Anne Abio affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

ORCID

Anne Abio http://orcid.org/0000-0002-4568-3509
Michael Lowery Wilson https://orcid.org/0000-0002-4007-3496

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