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Home injury risks to young children in Karachi, Pakistan: a pilot study

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Abstract

Objective—To pilot an in-home unintentional injury hazard assessment tool and to quantify potential injury risks for young children in a low-income urban setting.

Methods—Two low-income neighbourhoods in Karachi, Pakistan, were mapped, and families with at least one child between the ages of 12 and 59 months were identified. Using existing available home injury risk information, an in-home injury risk assessment tool was drafted and tailored to the local setting. Home injury assessments were done in June–July 2010 after obtaining informed consent.

Results—Approximately 75.4% of mothers were educated through at least grade 12. The main risks identified were stoves within the reach of the child (n=279, 55.5%), presence of open buckets in the bathroom (n=240, 47.7%) within the reach of the child, and pedestal fans accessible to the child (n=242, 48.1%). In terms of safety equipment, a first-aid box with any basic item was present in 70% of households, but only 4.8% of households had a fire extinguisher in the kitchen.

Conclusions—This was the first time that an in-home, all-unintentional injury risk assessment tool was tailored and applied in the context of a low-income community in Pakistan. There was a significant burden of hazards present in the homes in these communities, representing an

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Contributors URK was involved in the basic conception of this study, data analysis and paper writing. AC was involved in the conception of the study and paper writing while NZ was involved in data analysis and paper writing. C-MH was involved in conception of the study and critical revision of the paper. SDR was involved in conception of the study and critical revision of the paper, AF was involved in data analysis. AAH was involved in conception of the study and critical revision of the paper. JAR was involved in conception of the study and critical revision of the paper.

Patient consent Obtained.

Ethics approval Ethical Review Committee of Aga Khan University, Pakistan, and the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health, USA.

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important opportunity for injury prevention. This pilot may have future relevance to other LMICs where child injury prevention is a critical need.

INTRODUCTION

The home is the most common location for non-fatal injuries in children less than 5 years of age¹ in both high-income countries (HIC)^{2,3} and low and middle-income countries (LMIC).⁴⁻⁷ Children in this age group have extended exposures to the home environment⁶ and their level of development does not allow their ability to judge danger thus making them prone to unintentional injuries.⁸

Several studies from HICs have identified various home injury risks for children less than 5 years of age, including: walkers with wheels, lack of gates or barriers for stairs, uncovered electrical outlets and appliances, and accessibility to: kitchen stoves, potential poisoning agents and breakable surfaces.⁸⁻¹³

Some LMICs, such as South Africa,¹⁴ India,¹⁵ Iran¹⁶ and Pakistan,¹⁷ have assessed home injury hazards to children related to falls, poisoning, burns, absence of stair gates, accessible drugs/chemicals and fire within reach of the child. However, to our knowledge, there is a lack of studies with comprehensive in-home injury hazard identification for children under 5 years of age in lower-income settings; such information is important for informing future studies and interventions related to in-home hazard reduction modifications.

The development of an appropriate home hazard assessment tool in the checklist format for Pakistan has been described elsewhere.¹⁸ The primary objective of this study was to pilot this home injury hazard assessment tool, and the secondary objective was to quantify in-home hazards for all unintentional injuries in young children in a lower-income urban setting in Karachi, Pakistan. This study aims to demonstrate potential utility of the risk assessment tool for local injury prevention efforts in Pakistan and in other LMICs for wider application of this tool. This will help to modify and validate the tool for future studies.

METHODS

Study setting

This study was conducted in Karachi, Pakistan, the country's largest city with a population of ~18 million. It comprises urban and semiurban settlements.¹⁹ The communities for this study were chosen due to the lower middle-income status of residents, homes with permanent structures, relatively good literacy level of residents, and ease of access from the research base at the Aga Khan University (AKU) in Karachi.

Eligibility criteria for household enrolment into the study included: having at least one child between the ages of 12 and 59 months, caretakers who were able to read in Urdu (national language of Pakistan), and that the family planned on living in the same house for at least another 3 months. If a household had more than one child between 12–59 months of age, the caretaker selected one child as the index child for this study.

Data collectors were trained by the investigators at AKU. The injury hazard assessment was conducted during June—July 2010. The purpose of the study was explained to each household, and written informed consent was taken from the caretakers who agreed to participate in the study.

Child Home Hazard Assessment Tool

An injury hazard assessment tool, the Child Home Hazard Assessment Tool (CHAAT), was developed specifically for this study; the details of the tool development are given elsewhere.¹⁸ This tool was developed based on a thorough review of existing global literature and tools used in other HIC settings; this was modified for local language and then revised based on a pretest for community understanding prior to this pilot study. Approval for the study was obtained from the Ethical Review Committee of AKU, Pakistan and the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health, USA.

The CHHAT tool had three components. The first was related to the basic demographics of the child and caretaker. This included information including the age and gender of the child, relationship of caretaker with the child and the age of the caretaker, gender and level of education of the caretaker. The occupation of mothers who worked outside homes was noted, as well as the number of individuals living in the household and ownership of the house. The second component of the tool recorded the information on injury events in the previous 3 months. These included all injury events irrespective of whether medical treatment was required or not. The information related to the injury event included type, place, mechanism and outcome of injury. Information on changes made in the house after the incident was also elicited. These first two components were obtained by questioning the caretaker directly.

The third component of the tool was a detailed home injury hazard assessment divided by room or living area. The study team, with the permission of the caretaker, visited each area of the house to view and note each home injury hazard on the checklist. The areas of focus included the kitchen, bathroom, bedroom, courtyard, rooftop and the immediate vicinity of the house. For most questions on the checklist, 'Yes' was marked in case a hazard was found and 'No' in the absence of a hazard.

All data was entered into a Microsoft Access database. Data analysis was carried out using Stata V.10 (Statacorp LP, Texas, USA). The presence of hazards was compared against demographic variables using χ^2 or Fisher's exact test for categorical variables, and a p value < 0.05 was assumed to be significant.

RESULTS

Household structure and composition

A total of 953 household were shortlisted in these two neighbourhoods of Karachi, out of which 503 (88.7%) consented to participate in the study (figure 1).

The mean number of rooms was 2.9 (± 1.5) and the average number of household members was 8.1 (± 3.6) giving a mean household density (person/room) of 3.3 (± 1.8). Each

household had a mean of 5 (± 2.8) adults and 2 (± 1.0) children less than 5 years of age. One hundred and eighty-three (36.4%) households were government owned. About 87.9% (n=442) of the households had a separate kitchen, and 83.1% (n=418) had an enclosed courtyard/patio. Half the households (n=253, 50.3%) had stairs inside the house and 43 (8.5%) households had a balcony in the house. Approximately 70.4% (n=354) households had any type of first-aid supplies, and 95.2% (n=479) of households lacked a fire extinguisher.

Respondent composition

Among the respondents we interviewed, the majority were mothers (n=404, 80%). More than half were between 20–29 years of age (53.2%). Around 50% of the respondents were educated till grade 8 (n=125, 24.8%) or grade 12 (n=130, 25.8%). Mothers (n=451, 89.7%) were the main caregivers of the child at home (table 1). In about 93.6% (n=471) of the households, mothers were housewives; while n=32 (6.4%) were working. The mean number of years that respondents had been living in the community was 13 years (± 12 years). The mean age of the index child in the study was 34.8 (± 12.6) months (table 1).

Past history of injuries

In the 3 months prior to the study, 93 (18.4%) children had suffered from unintentional injuries (figure 2), out of which 53 (57%) of injuries occurred in boys and 40 (43%) in girls. Around 87% (79/91) injuries had occurred when the child was reportedly not being supervised by an adult. The most frequently occurring injuries were falls (n=64, 69%), taking place mainly in and around home (n=73/92, 79.3%). The most common location within home (64 answered) were stairs (n=19, 29.7%), bedrooms (n=13, 20.3%) and balconies (n=11, 17.2%). Cuts/scrapes (n=44, 48.4%) and bruises (n=23, 25.3%) were the most common outcomes of the injuries (91 answered). Medical care was sought for the majority of the injuries (n=45, 48.9%); 23 injuries (25%) did not require any medical care while 24 (26.1%) required hospitalisation (92 answered). The most common body part affected was the head (n=34, 36.6%).

In only 15 (16.1%) cases, modifications were made in the house to prevent future similar injuries from happening. None of these 93 households had previously received information on home injuries preventive strategies.

Injury risks

Figure 3 shows that about 35% of the households had between six and 10 injury risks, 29% had between 11 and 15 injury risks. Only 26% households had five or less risks, while 8% had 15 or more risks.

Table 2 summarises the presence of childhood home injury risk by area of the home. About half the households with stairs (n=253, 50.3%) did not have a stair gate (n=129, 50.5%). The balcony was not protected by a railing in 41.9% (n=18) of the households that had a balcony (n=43, 8.5%). An accessible rooftop (n=192, 38.2%) lacked a protective barrier in 91 households (47.3%). The main risks identified in the kitchen were cupboards without locks (n=282, 56.1%) and stoves within the reach of the child (n=279, 55.5%). Open buckets in

the bathroom within the reach of the child were observed in 47.7% (n=240) households. Pedestal fans (n=242, 48.1%) and trolleys with wheels without wheel locks (n=242, 48.1%) were identified as the main risks in the bedroom area. Water geysers in the courtyards were also within the reach of the child in 70.4% (n=354) of homes. There were no significant differences found in the presence of injury risks by the child's gender.

Supervision

Out of those who were allowed to play outside their houses, about 72.6% (n=189/257) of the caregivers supervised their child during play outside the home. Supervision was done by their mothers (n=106, 55.8%), grandparents (n=20, 10.5%) and fathers (n=12, 6.3%); nearly a quarter (n=40, 21.1%) had older children supervising the younger sibling.

DISCUSSION

The Child Home Hazard Assessment Tool (CHAAT) showed the presence of considerable injury risks for children in a lower-income setting in Karachi, Pakistan. Of note, the high response rate from the community suggests that home visits related to identification of injury risks are feasible in this population, which was also seen in an earlier study in Pakistan.¹⁷ We identified risks for falls, drowning, burns and poisoning; these findings in our study are similar to the ones reported from families with young children in other LMICs¹⁴ as well as HICs.^{15,17,20–22} Our study shows that 34% of the households had chemicals that were kept locked up, which is comparable to a study from the USA, where this percentage is said to be between 26% and 32%.²⁰ However, another study from the USA showed that in 4.3% of the households not all the chemicals were locked up,²³ which is in contrast with our finding. A Singaporean study showed comparable risks for sharp furniture.⁷

Our study showed that more than half the households had a barrier for the stairs which is in contrast with the Canadian study that showed that around one-third of the households had a staircase. A previous study carried out in Pakistan also showed a low percentage of barriers for the stairs.¹⁷ The high percentage reported in our study may be because no standard definition of stair barrier was followed. Any type of barrier used by the family of the child to block the stairs was accounted in our study, thus giving a higher percentage. In our study, the access to a baby walker was twice that compared with a hospital-based study from Canada that showed that in 7.1% households children had access to baby walkers.²⁴ However, a study carried out in Pakistan showed that about half the study population had a baby walker.¹⁷

The association between lower levels of parental education with risk of injury in a child is well established.^{20,25–27} By contrast, despite the relatively high level of education of the caretakers in our study, there were several risks noted in the households enrolled in our study. Previous work shows that parents may perceive fewer risks for their children and may believe that their own child is invulnerable to risks, and follows safety rules better than other children.²⁸ Parents may welcome passive strategies that rely on changing environment to reduce injury, whereas active strategies depend on individual behaviour to promote safety.²⁹

Most HICs have noted a dramatic decrease in the prevalence of home injuries with the implementation of passive prevention strategies, such as smoke alarms³⁰ and child-proof medicine bottle caps.³¹ In lower-income settings, most of the passive safety strategies are either not present or not implemented by the government, for example, construction codes for houses are not a prerequisite, child-resistant packaging for medicines is not mandatory, and older models of baby walkers with wheels are still being used. Furthermore, the practice of home modification does not exist with the addition of a child in the family. Particularly, lower-income families feel that they are not in a position to make risk reduction modifications to their homes because of financial cost.²⁹

The 64th World Health Assembly placed emphasis on member states to involve all relevant stakeholders to implement child injury prevention strategies at the national level. This means the involvement of government along with other stakeholders, like communities, non-governmental organisations and civil society.³² The multilevel collaboration can facilitate the implementation of both active and passive preventive strategies and enables better resource allocation for child injury prevention programmes in the country.³²

The role of supervision by caregivers is important, and lapses in attention have been reported as a risk factor for injuries.³³ The phenomenon, common in many LMICs, of young children being supervised by their elder siblings was also demonstrated in this study. Previous studies showed that injuries often occur when children were either alone or attended by their siblings.^{29,34} However, further research is needed to identify parents' perceptions about supervision and to identify strategies for improving supervision in these lower-income communities.

While the main goal of this study was focused on assessing the feasibility of the tool, several lessons were learnt during the process, and some of these were limitations which would need to be addressed in the main study in the future. First, the level of agreement between the three study teams quantifying injury risks in this study was not assessed; despite rigorous training, there could have been differences in perception of injury risks between observers. We aim to develop a protocol for such inter-rater reliability in the main study. Second, there was no standard measurement given for the definition of 'within reach of the child'; it was up to the data collectors to assess accessibility for children less than 5 years of age. While this is challenging to standardise, we feel that guidelines would need to be developed to help assessments. Finally, we could not explore our pilot results by socioeconomic status within the selected lower-income settings as we specifically chose households with certain socioeconomic characteristics. For example, we selected those in which the parents could read in Urdu. In the future, we hope to apply the tool over several communities and a larger sample to allow for such analysis.

In HICs, the prevention of home injuries has been attempted through counselling and education by home visitation and provision of safety equipment. Systematic reviews and individual studies have shown the effectiveness of these home visitations in terms of safety practices,^{35–37} but there is inconclusive evidence regarding the actual reduction in injuries at homes.^{20,35,38} Unfortunately, the dissemination of injury prevention information is neglected in lower-income countries and, likewise, a subset of our sample reported having received no

injury prevention information despite having had an injury event in a child in their home in the previous 3 months.

CONCLUSION

These findings point out the need for the implementation of safety and injury prevention measures that may involve legal changes and application of passive safety strategies. There is also an opportunity for important strategies that parents may employ on their own, such as storing chemicals/matches out of the reach of the child and covering open vats/buckets of water, thus making homes safer for their children.

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What is already known on this topic

- A substantial proportion of unintentional injuries in young children are home-related.
- These injuries at home are due to the many sources of potential hazards in the environment.
- There is a lack of studies with comprehensive home injury hazard identification for children under 5 years of age in urban lower-income communities.

What this study adds

- Risks for childhood falls, drowning, burns and poisoning are present in lower-income housing communities.
- The Child Home Hazard Assessment Tool is for an assessment of childhood home injury risks tailored to a lower-income country context.

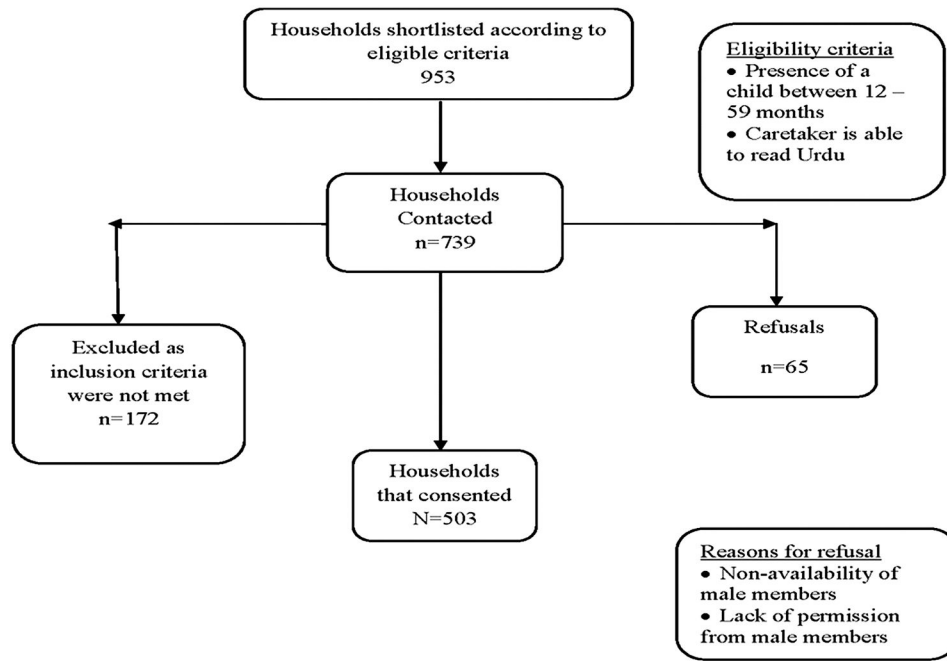


Figure 1.
Flow chart of study household enrolment.

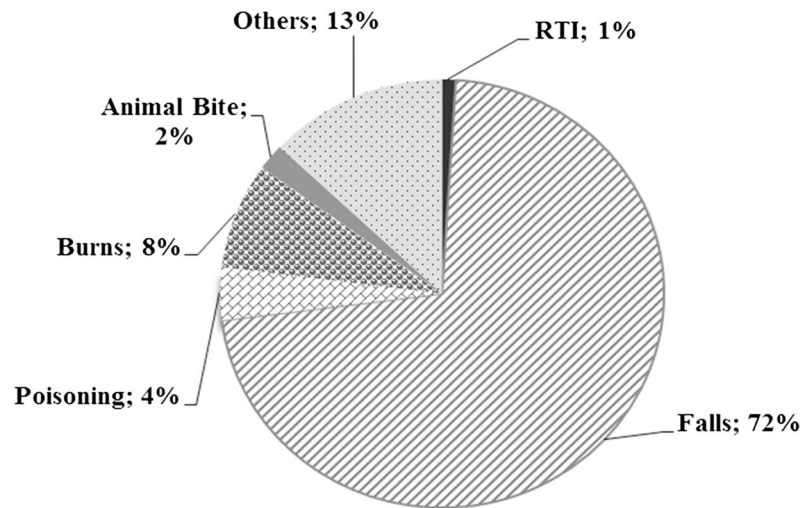


Figure 2. Types of unintentional injuries reported in the index child in the last 3 months (n=93). RTI, road traffic injury.

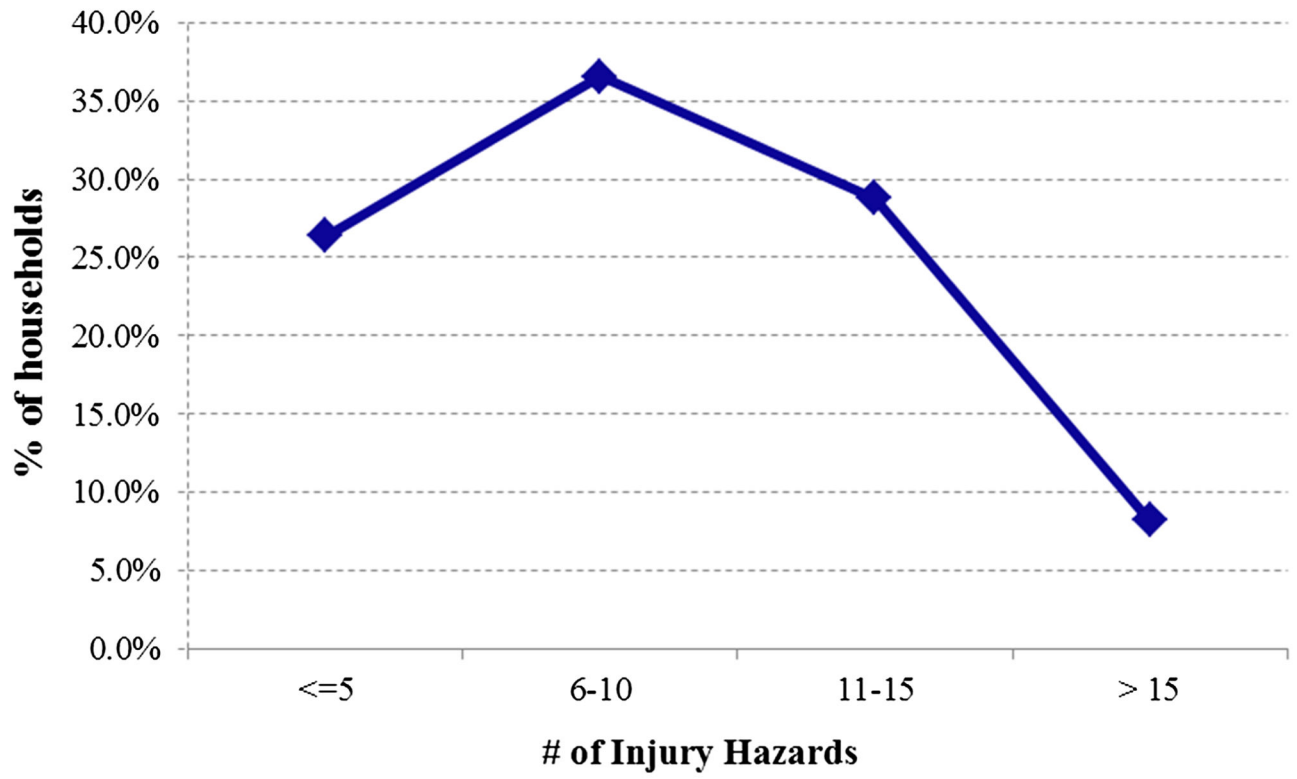


Figure 3.
Distribution of sampled houses by the number of hazards.

Table 1

Demographic characteristics of index children and respondents

Total, n=503, (%)*	
<i>Characteristics of child</i>	
Age (months)	
12–23	97 (19.3)
24–35	133 (26.4)
36–47	127 (25.2)
48–59	146 (29.0)
Gender	
Male	255 (50.7)
Female	248 (49.3)
<i>Characteristics of respondents</i>	
Relationship with Child	
Mother	404 (80.3)
Father	3 (0.6)
Grandparent	31 (6.2)
Uncle/aunt	50 (9.9)
Others	15 (3.0)
Gender	
Male	6 (1.2)
Female	497 (98.8)
Age (years)	
<20	14 (2.8)
20–29	268 (53.3)
30–39	173 (34.4)
40–49	30 (6.0)
>50	18 (3.5)
Years in education	
No formal education but can read	38 (7.6)
Upto 5 years	63 (12.5)
6–8 years	62 (12.3)
9–10 years	125 (24.9)
11–12 years	130 (25.8)
>12 years	85 (16.9)

* Percentages may not sum to 100% due to rounding.

Table 2

Prevalence of home injury hazards for childhood unintentional injuries by room/living area in Karachi, Pakistan

Childhood home injury hazard	Total, n=503, (%) [*]
Kitchen	
Lack of fire extinguisher	479 (95.2)
Lack of cupboards with locks	282 (56.1)
Stove within reach of the child	279 (55.5)
Matches/lighter/cooking fluids within reach of the child	221 (43.9)
Knives or sharp objects within reach of the child	186 (37.0)
Cleaning supplies/chemicals within reach of the child	170 (33.8)
Open fire/fireplace within reach of the child	84 (16.7)
Bathroom	
Open buckets of water within reach of the child	240 (47.7)
Shampoos/soaps/acids within reach of the child	157 (31.2)
Water heater (geyser)/pump/machine within reach of the child	137 (27.2)
Uncovered large vat/pool of water within reach of the child	109 (21.7)
Bedroom/sleeping area	
Pedestal fan or other sharp appliance within reach of the child	242 (48.1)
Trolley with wheels without wheel locks within reach of the child	242 (48.1)
Iron or other hot appliances within reach of the child	227 (45.1)
Any large breakable objects, for example, perfumes on dressing table within reach of the child	153 (30.4)
Bed/furniture or wall with sharp corners within reach of the child	145 (28.8)
Presence of table with glass top	136 (27)
Cosmetics within reach of the child	115 (22.9)
Other small choking hazards within reach of the child	97 (19.3)
Frayed or loose cords within reach of the child	86 (17.1)
Medicines within reach of the child	77 (15.3)
Presence of toys that are pointed/sharp/choking hazard	77 (15.3)
Access to a walker	77 (15.3)
Courtyard/rooftop/outdoors (street/road)	
Water heater (geyser)/pump/machine within reach of the child	354 (70.4)
Structures with sharp/hard protruding components within reach of the child	263 (52.3)
Open buckets of water within reach of the child	91 (18.1)
Stairs without gates (n=253)	129 (50.5)
Balcony without protective railing (n=43)	18 (41.9)
Accessible rooftop without protective railing (n=192)	91 (47.3)

* Percentage refers to dichotomous response (yes or no).