

**Preschool Children Injuries in Rural and Urban Communities at Assiut Governorate: A Comparative Study**

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**Abstract:** Childhood injuries may result in death or significant disability, with significant number of years of productive life lost to society. In Egypt, the overall prevalence is high among children below the age of 5 years. The aim of this study was to compare preschool injuries between urban and rural communities in Assiut Governorate. This cross-sectional comparative research was carried out in Assiut city and surrounding rural areas on 2 groups 200 mothers each, one rural and one urban. An interview questionnaire sheet was designed to collect data regarding preschool child injuries after pilot testing. Data collection lasted from November 2010 to May 2011. The results showed similarity in the personal and family characteristics of the two groups with few exceptions as enrollment in nurseries and parents' education, while the housing conditions were better in urban group. More rural (70.5%) than urban (58.0%) children experienced injuries ( $p=0.009$ ). Household injuries were higher in rural ( $p<0.001$ ), while street injuries were higher in urban children ( $p=0.026$ ). Also, more urban children had fractures or dislocations ( $p=0.008$ ) and smoke inhalation ( $p=0.048$ ). The most common injury site in both groups was the extremities. For first aid, more urban mothers used disinfectants and bandaging ( $p<0.001$ ), whereas more rural mothers used coffee ( $p<0.001$ ) and oven dust ( $p=0.004$ ). The role of the nurse was more prominent in the urban (65.5%) compared with rural (21.3%) samples,  $p<0.001$ . Mother's job status had significant relation with the occurrence of injuries ( $p<0.001$ ). The conclusion is that rural preschool children are more prone to injuries compared to urban ones, and they have less adequate first aid management. The study recommends improving the level of parents' education, especially unemployed mothers regarding household injuries and first aid management. The role of the nurse needs to be fostered.

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**Key Words:** Child, Injuries, Accidents, First-aid

### 1. Introduction

Injuries have replaced infectious diseases as the most serious public health problem of children. They represent the leading cause of death for children aged 0 to 12 years, and thus pose a national health problem. Toddlers and preschoolers are vulnerable to many types of unintentional injuries, such as those caused by unsafe toys, falls, burns or scalding, drowning, and motor vehicle crashes. These injuries may result in death or significant disability. The children's loss of lives resulting from all injuries combined represents a staggering number of years of productive life lost to society (*Kluwer, 2010*).

The Consumer Product Safety Commission in the United States (US) reported more than 800,000 injuries to children in 2000 (*American Academy of Pediatrics, 2003*). Furthermore, a study in US demonstrated that childhood injuries lead to about 16,000 deaths each year, and 70% of these are the result of unintentional injuries. These result in about 300,000 hospital admissions, costing over \$347 billion (*Schnitzer, 2006*). Such injuries cause more deaths among children age 1 to 4 years than in any other childhood age group except for adolescence

(*Hockenbery & Wilson, 2007*). For every childhood death caused by injury, there are approximately 18 hospitalizations, 233 emergency department visits, many more visits to medical facilities, and a much larger number of home-treated injuries (*Grossman, 2000*).

In Egypt, the overall prevalence of indoor injuries in home environment was 72.5% among children below 5 years. In El-Assara village, in Assiut governorate, a study in 1998 revealed that the incidence of home accidents among children - age up to 18 years - was 59% (*Hamza, 2000*).

Most injuries occur under fairly predictable circumstances to high risk children and families (*James & Ashwill, 2007*). Many injuries occur because adults fail to secure a safe environment for children. An example is the failure to ensure a child's safety in a motor vehicle by correctly securing him/her into a car seat (*Nits & McEwen, 2007*). Hence, childcare personnel face a challenging task to provide a safe environment, prevent injury, and comply with regulations (*Waibel et al, 2003*).

Health care professionals have a responsibility to assist families to prevent injuries

from occurring. Community health and pediatric nurses can influence families, legislators, and communities by teaching about the importance of environmental factors that increase preschool injuries. Important activities include advocacy for injury prevention programs, and family education about methods that decrease exposure (*Ramsay et al., 2003*).

### Significance of the problem

Injuries constitute a major pediatric health problem that is best managed with both preventive and treatment strategies. A child with an injury might respond best to a simple home treatment by the parent, caregivers, or supervising adult; intervention by the provider in the primary care setting; referral to a medical specialist or inpatient facility; or a combination of these. In Egypt, the overall prevalence is high among children below the age of 5 years. However, there is a scarcity of data comparing the magnitude and characteristics of the problem between urban and rural communities.

### Aim of the study

The aim of this study was to compare preschool injuries between urban and rural communities in Assiut Governorate.

## 2. Subjects and Methods

**Research design and setting:** A cross-sectional comparative research design was used in carrying out this study, which was conducted at Assiut city and surrounding rural areas.

**Subjects:** The participants of this study were the mothers residing in the study area, with the inclusion criterion of having a pre-school child (3-6 years old), and no exclusion criteria.

**Sample size:** The sample size was calculated to detect the difference between the rate of injuries in rural of about 70% (*Hamza, 2000*) and in urban areas with an Odds ratio of about 2, at 95% level of confidence ( $\alpha$  error = 5%), and a study power of 80% ( $\beta$  error=20%). Using the equation for the difference between two proportions (EpiInfo 6.04), the estimated sample size is 175 subjects per group. After adjustment for a dropout rate of about 10%, the sample size was set to 200 per group.

**Sampling:** Two districts of Assiut city (Elwalidia and Elarbaeen) were randomly selected for the urban sample, and two villages (Bani- morr, and Salam) from the eastern and western regions of Assiut for the rural sample. The sample size was equally divided among these four locations.

Mothers were recruited through convenience sampling according to the eligibility criteria using door-to-door method.

**Tool for data collection:** The researchers designed an interview questionnaire sheet to collect the necessary data regarding preschool child injuries. The

tool consisted of the following parts. The first part was for the demographic data of the child such as age, sex, and birth order, as well as parents' characteristics such as age, education, education, job status, residence, and family stability data. The second part was intended to collect data about the child's home environment such as floor, utilities, and safety measures. The third part was for the characteristics of injuries such as location, cause, type, site, as well as their management. The tool was rigorously revised by experts in nursing and medical pediatrics and community health for face and content validation.

**Pilot study:** A pilot study was carried out on 40 mothers to test the clarity of the questions and accordingly necessary modifications were carried out. The pilot sample was not included in the main study sample since some modifications in the number and phrasing of the questions were done according to its results.

**Fieldwork:** An official letter of approval to carry out the study was obtained from Assiut governorate through a letter from the Dean of the Faculty of Nursing. The sampling methodology was applied and eligible mothers were identified from the home visits records. The researchers contacted these mothers, explained to them the aim and procedures of the study, and obtained their oral consent to participate. Data were collected through home visits, and the mothers who consented to participate were informed about the time of the visit.

Each mother was interviewed individually at her home and the time taken for filling out the sheet ranged between 30 and 45 minutes depending on the response and cooperation of the mother. The average number of interviews was 2-4 per/day. Data collection started in November 2010 and was completed by the end of May 2011.

**Ethical considerations:** The researchers obtained verbal informed consent from each participant after full explanation of the study, and of the rights to refuse or withdraw. They assured voluntary participation and confidentiality of any obtained information. Professional help and health education were provided as needed.

**Statistical analysis:** Data entry and statistical analysis were done using SPSS 16.0 statistical software package. Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Statistical significance was considered at p-value <0.05.

### 3. Results

The personal characteristics of children in the rural and urban samples were similar as shown in Table 1. Both groups had a higher percentage of male children, approaching three-fifth of the samples. The means of age were similar, 4.7 and 4.6 years, respectively. Approximately half of the children in both groups were of second or third birth order, 49.5% and 48.5%, respectively. The only difference of statistical significance between the two groups was in their enrollment in nursery schools, which was higher in urban (83.5%), compared to rural (17.0%) samples,  $p < 0.001$ .

Concerning family characteristics, Table 2 shows that the mothers in the two samples had an almost equal mean age, but their educational level was significantly different, with more illiterate mothers in the urban sample ( $p = 0.032$ ); however, their job status was not different, with almost half of them being housewives. As for fathers, there were more illiterates in the rural sample, and more university graduates in the urban sample, and the difference was statistically significant ( $p = 0.003$ ). No other differences of statistical significance could be shown between in the groups in the other parents or family characteristics.

Table 3 compares the housing characteristics of the two samples. It demonstrates that about two-thirds of children in rural areas were living in the first floor (65.0%), compared to only 18.0% of those in the urban sample, and the difference was statistically significant ( $p < 0.001$ ). The table also shows significantly better conditions of all home utilities in the urban sample, compared with the rural one. As for the safety measures at home, they were generally deficient in both samples, although the urban sample had more cupboard locks ( $p = 0.028$ ) and medication cabinets ( $p = 0.002$ ).

According to Table 4, more children in the rural sample had experienced injuries (70.5%), compared with urban children (58.0%), and the difference was statistically significant ( $p = 0.009$ ). Most injuries occurred at homes or nurseries, and more rural children had household injuries ( $p < 0.001$ ), while more urban children had street injuries ( $p = 0.026$ ). As for the etiology, it was similar in both samples, with falls being the most frequent cause. The majority of the types of injuries in both groups was wounds, and significantly more urban children had fractures or dislocations ( $p = 0.008$ ) and smoke inhalation ( $p = 0.048$ ). The most common injury site in both groups was the extremities, although it was significantly higher among urban children ( $p = 0.013$ ). The first aid management showed many statistically significant differences, with more urban use of

disinfectants and bandaging ( $p < 0.001$ ), and more rural use of coffee ( $p < 0.001$ ) and oven dust ( $p = 0.004$ ). The table also demonstrates significantly more utilization of private clinics in the rural sample ( $p = 0.023$ ), and significantly more utilization of hospitals in the urban sample ( $p < 0.001$ ). Lastly, the role of the nurse was more prominent in the urban (65.5%) compared with the rural (21.3%) samples,  $p < 0.001$ .

Table 5 reveals no association of statistical significance between the occurrence of injuries and child's age or sex. On the other hand, mother's job status had significant relations with it ( $p < 0.001$ ). It is evident that the frequency of injuries was higher among children whose mothers were housewives. Although the highest percentage of injuries were among children with illiterate mothers (73.5%), the difference was not statistically significant ( $p = 0.176$ ). Figure (1) Shows that the relation between source of information and residence. In urban area the source of information from physician followed by the nurse but in rural areas the source of information from nurse flowed by grand mothers.

Figure (2) reveals that the highest percentage of injuries were among Injured children with illiterate mothers (73.5%), the difference was not statistically significant ( $p = 0.176$ ).

Figure (3) reveals no association of statistical significance between the occurrence of injuries and child's age ( $p = 0.865$ ).

### 4. Discussion

The present study aim was to compare preschool injuries at urban and rural communities in Assiut Governorate. The findings indicated higher rates in the rural community. There are also significant differences in the locations, types, and sites of these injuries, as well as the management. The higher rate of injuries in the urban sample could be attributed to the generally unsafe home environment as revealed in the study findings.

The children in the two samples had similar personal characteristics, which validates the comparison between them. Meanwhile, it is noticed that the samples included more boys than girls in rural and urban areas. This might be explained by the assumption that boys may be more active than girls, which is in agreement with *Brown et al (2012)* who found that the boys were more active than girls in their sample. However, the present study could not demonstrate any association between child's gender and the risk of injury. This could be explained by the similarity of activities between both genders in this age group.

**Table 1: Personal characteristics of children in the rural and urban samples**

	Rural (n=200)		Urban (n=200)		X <sup>2</sup> Test	p-value
	No.	%	No.	%		
Sex:						
Male	116	58.0	119	59.5	0.090	0.761
Female	84	42.0	81	40.5		
Age: (years)						
3 - < 4	33	16.5	35	17.5	0.510	0.777
4 - < 5	81	40.5	86	43.0		
5-6	86	43.0	79	39.5		
Mean ± SD (Range)	4.7±0.8 (4-6)		4.6±0.8 (3-6)			
Birth order:						
1	54	27.0	54	27.0	0.060	0.967
2-3	99	49.5	97	48.5		
4+	47	23.5	49	24.5		
Enrolled with nursery school	34	17.0	167	83.5	176.890	<0.001*

(\*) Statistically significant at p&lt;0.05

**Table 2: Parents' characteristics of children in the rural and urban samples**

	Rural (n=200)		Urban (n=200)		X <sup>2</sup> Test	p-value
	No.	%	No.	%		
Mother age: (years)						
< 30	25	12.5	28	14.0	0.700	0.705
30 - < 35	133	66.5	125	62.5		
≥ 40	42	21.0	47	23.5		
Mean ± SD (Range)	35.1±5.0 (22-46)		35.2±5.3 (22-48)			
Mother education:						
Illiterate	23	11.5	45	22.5	8.770	0.032*
Basic education	50	25.0	41	20.5		
Secondary	80	40.0	70	35.0		
University	47	23.5	44	22.0		
Mother job status:						
Working	96	48.0	106	53.0	1.000	0.317
Housewife	104	52.0	94	47.0		
Father education:						
Illiterate	44	22.0	22	11.0	14.150	0.003*
Basic education	36	18.0	45	22.5		
Secondary	90	45.0	82	41.0		
University	30	15.0	51	25.5		
Father job status:						
Working	183	91.5	185	92.5	0.140	0.712
Unemployed/retired	17	8.5	15	7.5		
Marital status of mother:						
Married	190	95.0	191	95.5	0.060	0.841
Divorced/widow	10	5.0	9	4.5		
Number of family members:						
<6	124	62.0	132	66.0	0.690	0.410
6+	76	38.0	68	34.0		
Mean ± SD (Range)	5.2±1.3 (3-9)		5.1±1.2 (3-9)			
Parents living together	169	84.5	172	86.0	0.180	0.672
The child live with parents	173	86.5	173	86.5	0.000	1.000

(\*) Statistically significant at p&lt;0.05

**Table 3: Home characteristics of children in the rural and urban samples**

	Rural (n=200)		Urban (n=200)		X <sup>2</sup> Test	p-value
	No.	%	No.	%		
Number of floors:						
1	130	65.0	36	18.0		
2+	70	35.0	164	82.0	90.990	<0.001*
Home utilities: <sup>@</sup>						
Sanitary sewage disposal	106	53.0	183	91.5	73.930	<0.001*
Electricity	166	83.0	200	100.0	37.160	<0.001*
Source of drinking water	193	96.5	200	100.0	Fisher	0.015*
Living room	82	41.0	145	72.5	40.430	<0.001*
Safety measures at home: <sup>@</sup>						
First aid	22	11.0	30	15.0	1.410	0.234
Windows locks	6	3.0	12	6.0	2.090	0.148
Cupboard locks	13	6.5	26	13.0	4.800	0.028*
Medication cabinet	16	8.0	37	18.5	9.590	0.002*
Safety glass	11	5.5	18	9.0	1.820	0.177
Stove guard	3	1.5	9	4.5	3.090	0.079

(\*) Statistically significant at p&lt;0.05

(@) Not mutually exclusive

**Table 4: Frequency and classification of injuries among children in the rural and urban samples**

	Rural		Urban		X <sup>2</sup> Test	p-value
	No.	%	No.	%		
Child injured:	141	70.5	116	58.0	6.800	0.009*
Location of accident: <sup>@</sup>						
Household	106	75.2	60	51.7	15.310	<0.001*
Nursery	75	53.2	63	54.3	0.030	0.858
Street	43	30.5	51	44.0	4.980	0.026*
RTA	6	4.3	8	6.9	0.860	0.353
Others (sports, unknown)	26	18.4	7	6.0	8.750	0.003*
Etiology: <sup>@</sup>						
Falls	91	64.5	86	74.1	2.740	0.098
Sharps	46	32.6	42	36.2	0.360	0.547
Fire/heat	24	17.0	22	19.0	0.160	0.686
Cycling	13	9.2	15	12.9	0.900	0.342
RTA (not cycling)	13	9.2	13	11.2	0.280	0.599
Electrocution	5	3.5	8	6.9	0.149	0.223
Type of injury: <sup>@</sup>						
Wounds	113	80.1	100	86.2	1.650	0.199
Fractures/ Dislocation	20	14.2	32	27.6	7.080	0.008*
Head injury (exclude skull)	9	6.4	9	7.8	0.180	0.667
Burn	9	6.4	7	6.0	0.010	0.908
Foreign body swallowed	6	4.3	11	9.5	2.820	0.093
Inhalation of smoke	1	0.7	6	5.2	Fisher	0.048*
Site of injury: <sup>@</sup>						
Extremities	92	65.2	92	79.3	6.190	0.013*
Trunk	57	40.4	49	42.2	0.090	0.769
Head and neck	36	25.5	39	33.6	2.010	0.156
First aid management: <sup>@</sup>						
Disinfectant	57	40.4	83	71.6	24.860	<0.001*
Bandaging	46	32.6	67	57.8	16.320	<0.001*
Ointment	43	30.5	36	31.0	0.010	0.926
Coffee	29	20.6	3	2.6	18.880	<0.001*
Oven dust	15	10.6	2	1.7	8.190	0.004*
Health service used: <sup>@</sup>						
Private clinic	90	63.8	58	50.0	4.980	0.023*
Ambulance	55	39.0	38	32.8	1.080	0.299
Pharmacy	37	26.2	35	30.2	0.490	0.485
Hospital	31	22.0	76	65.5	49.630	<0.001*
Attended by: <sup>@</sup>						
Neighbors	65	46.1	39	33.6	4.110	0.043
Physician	63	44.7	49	42.2	0.150	0.695
Pharmacist	54	38.3	46	39.7	0.050	0.824
Nurse	30	21.3	76	65.5	51.400	<0.001*

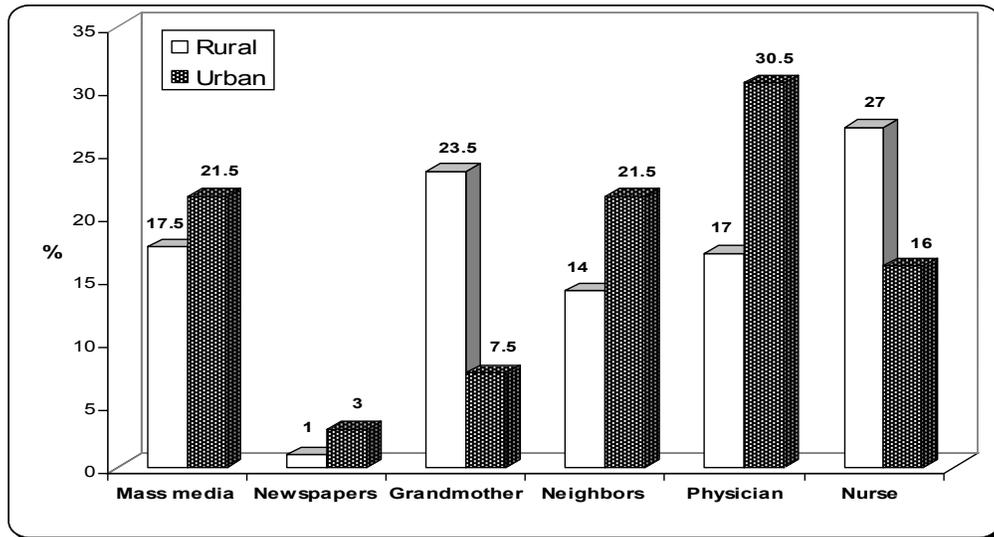
(\*) Statistically significant at p&lt;0.05

(@) Not mutually exclusive

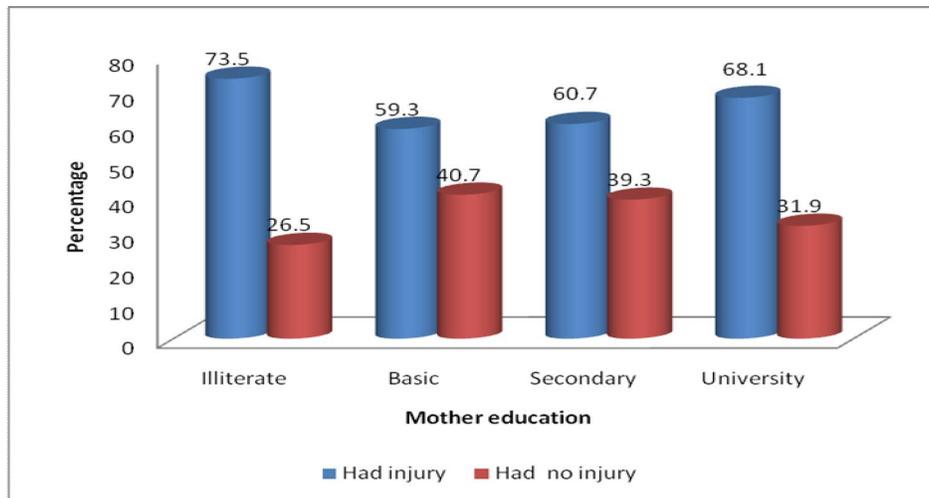
**Table 5: Relation between Parents' characteristics of children in the rural and urban samples**

	Had injury (n=257)		Had no injury (n=143)		X <sup>2</sup> Test	p-value
	No.	%	No.	%		
Age: (years)					0.29	0.865
3 - < 4	42	61.8	26	38.2		
4 - < 5	107	64.1	60	35.9		
5-6	108	65.5	57	34.5		
Sex:					0.00	0.997
Male	151	64.3	84	35.7		
Female	106	64.2	59	35.8		
Mother education:					4.94	0.176
Illiterate	50	73.5	18	26.5		
Basic	54	59.3	37	40.7		
Secondary	91	60.7	59	39.3		
University	62	68.1	29	31.9		
Mother job status:					15.36	<0.001*
Working	111	55.0	91	45.0		
Housewife	146	73.7	52	26.3		

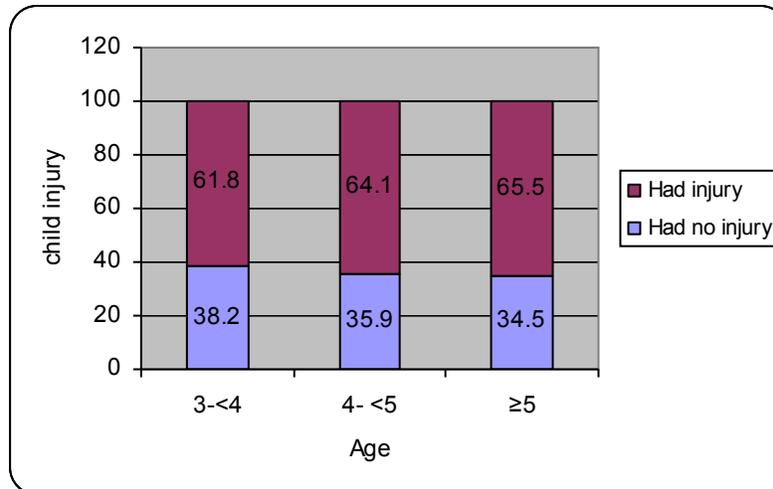
(\*) Statistically significant at p<0.05



**Fig. (1): Relation between residence and source of information**



**Fig. (2): Relation between child injury and mothers education.**



**Fig. (3): Relation between child injury and child age.**

The only significant difference between children's characteristics in the two present study sample was regarding the enrollment in nursery schools, which was considerably higher in the urban sample. This cannot be due to the claim that most of the mothers in rural areas are unemployed as stated by *Jackson et al. (2004)* since our results did not show any significant difference in maternal employment between the two samples. Therefore, the difference could be due to the higher availability of nurseries in urban areas.

Concerning family characteristics, the only differences between the two present study samples was in parents' education. It was noticed that the illiteracy was higher among mothers in urban areas, whereas, on the contrary, it was lower among fathers. This might be attributed to the fact that the girls in rural areas are increasingly interested in pursuing their education as a means to reduce the inequalities they suffer from as mentioned by *Haddad et al (2011)*, whereas those in urban areas might seek early employment.

Meanwhile, the current study identified a significant association between maternal unemployment and the risk of child's injury. This might be due to the confounding factor of illiteracy, where the probability of being illiterate is higher among the unemployed. Thus, the combined effect of illiteracy and the housewife' status may lead to lack of knowledge and information about childhood injuries and their prevention and management. Nonetheless, the lack of significant association between mothers' level of education and their children's exposure to accidents in the current study is incongruent with previous studies (*Gupta et al, 2005; Abd elkreem et al, 2008*) which demonstrated

that the majority of childhood injuries were significantly associated with parents' lower educational levels. Nevertheless, still the illiterate mothers of our sample had the highest prevalence of injuries among their children although the difference could not reach statistical significance. However, in agreement with our finding, *Bombaci et al. (2008)* reported no association between mother's education and child' exposure to injuries.

According to the present study, the rural household environments were less safe, and showed more lack of safety measures. This might explain the higher rates of injuries among rural children, which is in congruence with the finding of *Santo et al (2004)* who reported lack of medical facilities at home and nursery schools.

The importance of the home environment in the causation of injuries was put in evidence by the study finding that the majority of urban injuries occurred at home, at a rate significantly higher than in the urban sample. A similar finding was reported in a nationwide study in Singapore (*Bun et al, 2005*). Moreover, *Lovett et al (2004)* clarified that most unintentional injuries to children less than five years of age occur at home. Thus, *Wong (2005)* emphasized the importance of environmental safety precautions and sanitary conditions to prevent the risk of child injury.

On the contrary, the present finding demonstrated higher rates of street injuries in the urban sample. This might be attributed to the differences in the width of streets and in the heaviness of traffic, which may lead to higher risks in the urban environment. Moreover, more children in the urban sample were enrolled in nursery schools and thus might be more exposed to transportation

risks. This is the responsibility of the nurseries to ensure safe environment in their premises as well as in the transportation as recommended by the Centers for Disease Prevention (*Centers for Disease Prevention [CDC], 2004*).

Regarding the etiology of injuries, the current study identified falls as the most frequent cause in rural and urban areas, which is in agreement with the findings of *Ben Hamida-Nouaili et al (2011)* in Tunisia. This is expected at this age when the coordination of movement is not yet fully developed. In congruence with this, *Garzon (2002)* and *Morrogiello and Kirikou (2004)* mentioned that preschool children are more prone than adults to accidents and their consequences due to physical differences and developmental issues that increase their risk of falls and injuries. The injuries from falls are not a cause of death in this age group injury, but they are quite prevalent and cause many nonfatal and disabling injuries for young children (*National Safety Council, (2001)*).

As for the site of injury, the present study revealed that the extremities were the most commonly affected in both urban and rural samples. Additionally, the most frequent types of injuries were wounds and fractures or dislocations. These findings are in congruence with the results that showed falls to be the most common cause since falls often lead to these types of injuries as indicated by *Brown et al (2012)*.

The first aid management is crucial in mitigating any untoward consequences of injuries. The current study demonstrated significant differences between rural and urban areas in dealing with childhood injuries. The first aid management in urban areas were more adequate, using disinfectants and bandaging, compared to more use of traditional remedies and household objects in rural areas. This reflects lack of knowledge, in addition to unavailability of first aid measures at home, which was more prominent in the rural sample, which is in line with the findings of *Eldosoky (2012)* in a study in Qalubeya.

The urban and rural samples have also differed regarding the health services utilization. Rural areas depended more on private clinics, whereas hospitals were more utilized in urban areas. This might be explained by the lack of supplies and facilities in rural hospitals, compared to urban ones, which forces people to get the service from private settings. In agreement with this, a study in rural Vietnam (*Hang & Byass, 2012*) reported low usage of public health services among injury patients. People often used less qualified or untrained private providers.

Another important finding of the present study is the role of the nurse in dealing with childhood injuries, which was obviously more deficient in rural areas, compared to the urban. This might be related to the settings used. In fact, the private clinics are more utilized in the rural areas, and in these clinics the role of the nurse is minimal compared to their roles in hospitals. Moreover, people in rural areas might still have less trust in the nurse as a care provider in emergency situations, an attitude that should be rectified. In this regard, *Webb (2011)* identified the development of trust among the rural population as one of the challenges that rural nurses face.

### 5. Conclusion and Recommendations

The study concludes that rural preschool children are more prone to injuries compared to urban ones, and they have less adequate first aid management. This might be related to differences in parental factors as mothers' employment status, in addition to environmental factors at home. However, the results of this study suffer the limitation of depending on self-reporting, which could be sometimes inaccurate. This should be avoided in future research through supporting data from records. The study recommends improving the level of parents' education, especially unemployed mothers regarding household injuries and first aid management. The role of the nurse in such educational efforts as well as in proper first aid management needs to be fostered. The effectiveness of such educational endeavors needs to be tested in future research.

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