

# The impact of parental migration on injuries among left behind young people aged 10 years to 24 years in Botswana

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## Summary

There has been little evidence of the relationship between children and absence of parents in Botswana literature; and it is still the case that absence of parents increases the risk of injuries to their children. The aim of this study is to investigate the impact of parental migration among left behind young people aged 10 years to 24 years in Botswana and examine patterns of injuries from immigrant families. This is a population-based cross-section from which a dataset was created by compiling data from two different sources for the period of 2010 to 2015. All the variables were transformed into natural logarithms so as to avoid outliers and normalize the variables. All statistical modeling was carried out using Statistical Analysis System version 6.1. Left behind young people were associated with higher risk of injuries especially in motor vehicle accidents 391(40%), fire 264 (27%), and burns 162 (16%) except for drowning, machinery and poisoning. Parental migration is the most important issue in the total number of injuries. Correlation coefficient shows that non-left behind, the greater the chance to be classified under the poisoning cases ( $r = 0.888$ ) and is lower compared to the left behind ( $r = 0.471$ ). This study shows clearly that injuries take an insufficiently high toll on children's health and on society. Additionally, if parental migration trends continue, Botswana's burden of injuries are expected to rise in the next 10 years.

**Keywords:** Parental migration, young people, injuries, Botswana

## 1. Introduction

Migration is a complex phenomenon, often viewed in the context of benefits or risks. Despite the growing public discourse on the subject of migration, little is known about the migration process itself, notably, what the feelings of their family members left behind are and the effects of their migration. In African countries, parents are primarily responsible for the care of their children. However, out-migration of parents is common in these countries. Migration can have an impact on mental, emotional health, physical, and wellbeing of those left behind especially young people in the place of origin. The connection between migration and health status

is duplex, in which the act of migration may influence health outcomes of those left behind (1). Parental Migration might also unfavorably affect the young people's levels of satisfaction leading to loneliness that might aggravate emotional wellbeing (2).

The generation between 10 and 24 years holds a lot of potential yet faces a lot challenges, especially when their parents migrated in search of better opportunities. There is little consistency in the young people definitions across countries and organizations when it comes to using an age-based definition. For analytical purposes, the World Health Organization (WHO) defines young people as individuals between ages 10 and 24 (3). Migration is emerging as one of the key issues affecting left behind young people. Since their parents are increasingly migrating in search of survival, security, improved standards of living and education. The United Nation's report on migrants between 24 and 49 years of age, concerns who in 2013 represented about one-eighth (28.2 million) of the 232 million international migrants worldwide (4).

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Injuries are defined as damage to a person caused by an acute transfer of mechanical, electrical, chemical or radiation energy (5). Worldwide, injuries are the second leading cause of death among young people accounting for 13% of the total years lost because of disabilities in this cohort (6). Nearly every day 2,300 adolescents die from injuries sustained from motor vehicle injuries, drowning, poisoning, falls, burns, and violence, while motor vehicle injuries alone are responsible for 10.2 deaths per 100,000 adolescents. More than 3,400 individuals die on the world's roads every day. In addition, tens of millions of people are injured or disabled every year. Children, pedestrians and older people are among the most vulnerable of road users. Drowning is a leading killer, almost 360,000 people lost their lives to drowning in 2015, and drowning is the third leading cause of death worldwide for children aged 5-14 years. Over 90% of drowning deaths occur in low- and middle-income countries. Burns and falls are significant causes of morbidity and mortality all over the world. They are among the leading causes of death among children under the age of 15 years (7). Parental migration has a negative effect on children's emotions, which may contribute to the cause of injuries among these children.

Botswana has been undergoing rapid urbanization in the last few decades. By 2011, over 100 thousand people in Botswana were migrants (8). The majority of internal migrants are adults aged 24-49 years old, moving from rural to urban areas to seek greener pastures (9). Children often do not move with their parents due to financial constraints and nature of work in urban areas. The term left behind young people referred to people (aged between 10 years to 24 years) in their rural hometowns and villages whose parents migrated to urban areas or internationally. By 2011, the number of young people living in rural areas across Botswana was estimated to be more than fifty thousand (10). Injuries are one of the leading causes of death and hospitalization for children and youth in Botswana (11). Those left behind children, youth in Canada have a higher risk of injuries than the children and youth whose parents did not migrate (12). The previous study in China indicated that left behind adolescents encounter educational problems, such as higher rates of drop outs (13). In this study, we investigated the impact of parental migration among left behind young people in Botswana and examined patterns of injuries in young people from immigrant families. We were able to describe the impact of those left behind, through comparison with their counterparts in the same rural area whose parents had not migrated.

## 2. Materials and Methods

### 2.1. Materials

This is population-based cross-section from which a dataset was created by compiling data from two

different sources for the period of 2010 to 2015. Ministry of Health in Botswana provides standard data collection to capture hospitalization and emergency department visits and includes the main diagnoses for the period of 2010 to 2015. These were used to obtain injury-related information where emergency department visits and hospitalization occurred. The department of civil and national registration provided the death dataset, which was used to identify in and out of hospital injury-related deaths in Botswana. Botswana has a population of 2,319,295. The Gross Domestic Product (GDP) in Botswana was worth 15.27 billion US dollars in 2016. The GDP value of Botswana represents 0.02 percent of the world economy. GDP in Botswana averaged 4.46 USD Billion from 1960 until 2016, reaching an all time high of 16.26 USD Billion in 2014 and a record low of 0.03 USD Billion in 1961 (14). Botswana's extraordinarily high inequality is holding the country back, making it difficult for sustained growth to lead to rapid poverty reduction. Poverty remains high in rural areas, female-headed households, and those with low levels of education. Alarming, poverty is concentrated among children and youth, with significant implications for social inclusion and inter-generational effects (15).

### 2.2. Study population

In order to be consistent with the national definition, this study adopted WHO definition of young people "Children between 10 years to 24 years who are left behind at their original residence, while one or both parents migrate into other places and have not been living with them for at least six months. This study uses two categories when it comes to age. Young people refers to 10-14 years and "old people" which refers to 15-24 years. Separation due to divorce or deceased parents did not constitute left behind young people. Information about young people's gender, age, education, occupation of parents, who are they living with; injury-related visits to emergency department and hospitalization was collected. Sample size is 2991.

### 2.3. Statistical analysis

Descriptive statistics were performed for the main independent variables. The panel data has been used for bivariate and multivariate linear regression analysis. Two dependent variables have been used for multivariate linear regression analysis (for example *i*) "left behind young people"; *ii*) "non-left behind young people"). These responses were considered as polytomous variables, with these two categories as possible answers. Explanatory variables were selected based on theoretical considerations. To compare outcomes of immigrants by migration status, multiple variables Poisson regression models adjusting for over

dispersion were used to compute rate ratios with 95% confidence intervals. For each model, variables were selected a priori and included in the regression analysis. The following function was developed to estimate the effect of migration on injuries.

$$\text{Injuries} = \beta_0 + \beta_1 \text{FB}_t + \beta_2 \text{NFB}_t + \mu_t$$

Where, injuries refers to poisoning, falls, drowning, cuts/piercing, motor road traffic, burns, suffocation, machinery and fires. FB refers to those that were left behind while NFB is non-left behind young people aged 10 years to 24 years and the stochastic error term that is assumed to be distributed with a zero mean. All variables were transformed into natural logarithms to avoid outliers and normalize the variables. All statistical modelling was carried out using Statistical Analysis System Enterprise Guide, version 6.1.

### 3. Results

#### 3.1. Descriptive analysis

Table 1 indicates 62% (611) of the left behind were female and their ages ranged from 10-14 years (mean age 13.2 years, median 13 years). When compared to non-left behind still majority were female and their mean age was 14.2 years. The fathers for those that were left behind were 97% (953) less likely to be non-farmers. In addition, the majority of left behind young people do not go to school ( $p < 0.001$ ) compared to non-left behind. Left behind young people were more likely staying with grandparents ( $p < 0.001$ ), followed by staying with a guardian 26% (252).

Table 2 shows the cause specific risk of injury for non-left behind and left behind young people. Left behind young people were associated with higher risk

**Table 1. Comparison of demographic characteristics between LBAY and non-LBAY**

Items	Total, n = 2,991 (%)	Non-Left behind, n = 2,005 (%)	Left Behind, n = 986 (%)	p-values, ( $\chi^2$ test)
Gender				
Male	1,318 (44)	943 (47)	375 (38)	0.085
Female	1,673 (56)	1,062 (53)	611 (62)	
Age, Mean		14.2	13.2	0.066
10 -14 years	1,865 (62)	1,303 (65)	562 (57)	
15-24 years	1,126 (38)	702 (35)	424 (43)	
School Attendance				< 0.001
Yes	2,258 (75)	1,804 (90)	454 (46)	
No	733 (25)	201 (10)	532 (54)	
Parental migration				0.030
Internal	906 (92)	-	906 (92)	
International	80 (8)	-	80 (8)	
Father's occupation				0.782
Farmer	72 (3)	39 (2)	33 (3)	
Non Farmer	2,919 (97)	1,966 (98)	953 (97)	
Mother's occupation				0.089
Farmer	39 (1)	21 (1)	18 (2)	
Non farmer	2,952 (99)	1,984 (99)	968 (98)	
Who are staying with				< 0.001
Aunty/Uncle	101 (3)	-	101 (10)	
Grand parents	406 (14)	-	406 (41)	
Parent/s	2,005 (67)	2,005 (100)	-	
Guardian	252 (8)	-	252 (26)	
Alone	227 (8)	-	227 (23)	

\*\*Significant at  $p < 0.001$  level. LBAY: Left behind adolescent and youth, non-LBAY: non-left behind adolescent and youth.

**Table 2. Injury related emergency department (ED) visits, Hospitalization, and deaths**

Items	Non- Left behind n = 2,005 (%)	Left behind n = 986 (%)	Non-Left behind n = 907 (%)	Left behind n = 380 (%)	Non-Left behind	Left behind n = 365 (%)
Poisoning	246 (12.3)	23 (2.3)	80 (8.8)	15 (3.9)	-	6 (1.6)
Fall	1,283 (64.0)	43 (4.4)	659 (72.7)	12 (3.3)	-	-
Drowning	12 (0.6)	8 (0.8)	-	-	-	-
Cut/pierce	163 (8.1)	54 (5.5)	96 (10.6)	19 (5.0)	-	-
Road Traffic	86 (4.3)	391 (39.7)	23 (2.5)	130 (34.2)	-	174 (47.7)
Burns	91 (4.5)	162 (16.4)	38 (4.2)	77 (20.3)	-	2 (0.5)
Suffocation	12 (0.6)	28 (2.8)	-	-	-	-
Machinery	44 (2.2)	13 (1.3)	2 (0.2)	1 (0.3)	-	-
Fire	68 (3.4)	264 (26.8)	9 (1.0)	126 (31.6)	-	183 (50.1)

of injuries especially in road traffic 391(40%), fires 264 (27%), and burns 162 (16%) except for drowning, machinery and poisoning. Moreover, deaths due to injury was highest among left behind (deaths caused by fire was recorded highest with 50.1%, followed by motor vehicle accidents 47.7%) and those left behind recorded the highest in terms of hospitalization cases.

### 3.2. Bivariate analysis

Table 3 indicates Correlation coefficients ( $r$ ) to examine strength and significance of linear relationships between the variables in this study.

A significant relationship was found between young people for both cases (left behind and non-left behind). The correlation was considerably lower for the left behind older ( $r = 0.780$ ) than the younger ( $r = 0.928$ ). Parental migration is the most important issue in the total number of injuries. Correlation coefficients show that for non-left behind, there was a greater chance to be classified under poisoning cases ( $r = 0.888$ ) and is

lower compared to the left behind ( $r = 0.471$ ). Again in the cases of falls, the correlation was slightly lower for left behind ( $r = 0.332$ ) than the non-left behind ( $r = 0.779$ ). As expected, road traffic is likely associated with both left behind and non-left behind young people. For the left behind the correlation coefficient shows that it is higher for left behind ( $r = 0.934$ ) and lower among non-left behind ( $r = 0.804$ ). Again in the cases of burns, the correlation was higher for left behind ( $r = 0.801$ ) and lower among non-left behind (0.316). In addition correlation coefficients show that for the left-behind, there is a greater chance for injury caused by fire ( $r = 0.925$ ).

### 3.3. Multivariate analysis

Table 4 indicates that age (young and old) and gender significantly influence injuries as an outcome. Females have a higher chance of an injury than male, especially those that were left behind, with the odds for gender remaining stable in all three models (OR = 0.25; 95% CI:

**Table 3. Correlation between the variables that were examined**

Items	LB	NLB	AGE	PSN	FL	DWG	CT	RT	BS	SCN	MCY	FR
LB	1.00											
NLB	0.698	1.00										
AGE	0.928**	0.794*	1.00									
PSN	0.471*	0.888**	0.502	1.00								
FL	0.332*	0.779*	0.230	0.685	1.00							
DWG	0.342	0.638	0.423	0.340	0.591	1.00						
CT	0.425	0.796	0.678	0.272	0.382	0.189	1.00					
RT	0.934**	0.804*	0.512	0.503	0.301	0.221	0.377	1.00				
BS	0.801*	0.316*	0.699	0.239	0.467	0.403	0.509	0.466	1.00			
SCN	0.569	0.211	0.306	0.419	0.288	0.142	0.124	0.521	0.555	1.00		
MCY	0.289	0.380	0.462	0.391	0.640	0.546	0.691	0.399	0.255	0.662	1.00	
FR	0.925**	0.244	0.601	0.360	0.598	0.393	0.193	0.294	0.149	0.501	0.333	1.00

\*\*Significant at  $p < 0.01$  level, \*Significant at  $p < 0.05$  level. Note: LB; Left behind. NLB; Non-left behind. PSN; Poisoning. FL; fall. DWG; Drowning. CT; Cut/pierce. RT; Road traffic. BS; Burns. SCN; Suffocation. MCY; Machinery. FR; Fire.

**Table 4. Multivariate linear regression models explaining the injuries**

Items	Non-left behind, OR (95% CI)			Left Behind, OR (95% CI)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
F	0.44 (0.29-0.66)	0.45 (0.29-0.67)	0.43 (0.27-0.65)	0.25 (0.11-0.53)	0.22 (0.10-0.48)	0.21 (0.08-0.46)
YNG	1.81 (1.10-2.98)	1.76 (1.06-2.98)	1.42 (0.88-2.40)	4.61 (1.66-13.10)	3.88 (1.30-11.44)	3.16 (1.06-9.48)
OLD	11.90 (3.30-19.40)	5.20 (3.10-8.60)	6.75(3.60-12.50)	15.60 (14.90-48.80)	10.29 (3.16-33.32)	7.04 (2.11-23.60)
PSN	-	2.38 (1.60-4.12)	2.40 (1.66-4.10)	-	2.72 (1.38-4.18)	2.80 (2.30-4.29)
FL	-	0.82 (0.69-0.99)	0.83 (0.68-1.02)	-	0.74 (0.58-1.00)	0.77 (0.56-1.09)
DWG	-	0.80 (0.68-0.99)	0.88 (0.71-1.10)	-	0.70 (0.54-0.95)	0.78 (0.57-1.06)
CT	-	0.86 (0.72-1.08)	0.84 (0.68-1.12)	-	0.86 (0.68-1.18)	0.82 (0.64-1.12)
RT	-	1.03 (0.88-1.24)	1.05 (0.88-1.25)	-	1.30 (1.08-1.65)	1.30 (1.05-1.62)
BS	-	1.25 (0.83-1.98)	1.27 (0.85-1.90)	-	3.05 (1.68-5.92)	3.20 (1.75-5.88)
SCN	-	1.06 (0.88-1.28)	1.03 (0.88-1.26)	-	1.10 (0.88-1.44)	1.09 (0.84-1.46)
MCY	-	-	1.11 (0.94-1.34)	-	-	1.07 (0.83-1.42)
FR	-	-	5.18 (3.97-8.44)	-	-	6.68 (4.01-11.80)

Note: LB; Left behind. NLB; Non-left behind. YNG; age 10-14. OLD; age 15-24. PSN; Poisoning. FL; fall. DWG; Drowning. CT; Cut/pierce. RT; Road traffic. BS; Burns. SCN; Suffocation. MCY; Machinery. FR; Fire.

0.11-0.53). Moreover, age is significantly associated with increased "injury" status in all models (*i.e.* old has less injuries compared to the young).

When adding types of injuries to model 2 lower levels associations were found for reports of poisoning and falls as an additional risk factor, while falls were only associated with those who are left-behind. Moreover, reports of higher "road traffic" and "burns", turned out to be an important risk factor, for both non- left behind and left behind, except for "cuts/piercing", which revealed no elevated risk for non- left behind.

The final model 3 indicated that fire plays a crucial risk factor in the likelihood of young people, independently of other factors. Left behind young people are highly associated with reports of the fire. Reports on fire had nearly a 7 times higher chance for those left behind, while the odds for non-left behind is only a bit lower (OR = 5.2). In this last model, reports on machinery were significant among non-left behind but not for left behind.

#### 4. Discussion

The migration of parents for jobs or better income to cities has resulted in the separation of many families, leaving their families behind. Most of those left behind are children who cannot move to the city with their parents due to financial constraints (16). China is facing the same situation where over 60 million children in rural areas are left without one or both of their parents (17). The key findings from this study gathered from 2991 young people on the impact of parental migration on injuries in Botswana, supports the hypothesis that parental migration plays a crucial role in injuries of the left behind. Previous studies indicated that the largest cause of death among adolescents and more than seventy percent of these injuries are consequences of motor vehicle collisions (18). This study verifies that absence of parents contributes to road traffic injuries that occur among young people. World Health Organization and the United Nations Children's Fund published the report focused on the five leading causes of child injury deaths being road traffic injuries, drowning, poisoning, burns and falls (19). Recent studies showed that adolescents separated from parents were disadvantaged in social emotional health; for example, and a majority of them have a higher prevalence of depression, suicide, anxiety, and substance abuse than those who are staying with parents. Gender is a significant risk factor for injuries among females in this paper. The previous study reported that being a female has consistently been identified as a significant risk factor for injuries. Therefore, most researchers have suggested that the behavior associated with the female sex role contributes to risk factors for injuries. Parental migration was associated with school dropout among left-behind young people in this study. In the absence of parents, living with grandparents was

associated as a risk factor for injuries. The previous study reported that young people, when both parents migrated, were more likely to be associated with risk factors for injuries. The parents' situation of working in urban areas causes a number of direct, significant effects on the family functionality, especially on the children who remain in rural areas. Due to the problems related to the lack of effective supervision and the absence of a real family environment, children left behind are vulnerable to abuse, labor exploitation and injuries. This category of children has been increasingly affected by lower school performance, with an increasing dropout climax even from early ages (20). Poisoning has been identified as one of the major causes of young people hospital emergencies and admissions in the paper for those that are non-left behind. In African countries, poisoning has also been recognized as a major health problem among adolescents (21). This study reported home burns are among the main causes of morbimortality in Botswana, mainly affecting young people whose parents migrated, and being one of the main accidental reasons for trips to the emergency department. However, WHO highlights a higher frequency of burn injuries in African countries when compared to continents (21). Similar results were obtained in other studies (22), this study observed a greater prevalence of female victims. One possible explanation for this finding may be related to the copied behavior of girls in relation to their mothers since they need to fit in the shoes of the migrated parents. Residential fires are a leading cause of unintentional injury deaths to children in Botswana. In this study, fire injuries accounted for most of the injuries and also registered some deaths in past years. Our data could not distinguish whether the injured adolescent was the same person who started the fire, but other studies have found that as many as one-third of the victims of the fire were the ones who started it (23). Nevertheless, previous studies have shown that injuries are among the top public health problems facing young people today. In the United States in ages 10-19 death from injuries is higher than from all other causes of death (24).

#### 5. Conclusion

This study shows clearly that injuries take a significantly high toll on children's health and left behind young people. Additionally, if parental migration trends continue, Botswana's burden of injuries are expected to rise in the next 10 years. If measures to prevent injuries among the left behind are not taken now, this situation is likely to exacerbate the problem, and not only in Botswana. The Government must take development to rural areas in order to reduce rural- urban migration, and by doing this the numbers of injuries among left behind children may be reduced since children will be under the care of their parents and not grandparents. Young people are among the most vulnerable when it comes to injuries.



The International organizations like United Nations International Children's Emergency Fund must work with partners (governmental and non-governmental) to raise the profile of the preventability of road traffic injuries, falls, fire, burns and promote good practice related to addressing key behavioural risk factors, especially in rural areas because that is an area with a high population of young people who are left behind. Burns and fire are a serious public health problem among the left behind young people in Botswana. The suffering caused by burns is even more tragic as burns are so eminently preventable. High-income countries have made considerable progress in lowering rates of burn deaths, through a combination of proven prevention strategies and through improvements in the care of burn victims. These can be a learning tool for Botswana and this would likely lead to significant reductions in rates of burn-related death and disability among left behind young people.

### Acknowledgements

United Nation Economic Commission for Africa (Social Development Policy Division) supported this work without a grant. We thank Ministry of Health for providing data on hospitalization and emergency department visits, and the department of civil and national registration on death causes by injuries among people aged 10 years to 24 years. In addition, I would like to thank William Muhwava for support and guidance.

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(Received April 2, 2018; Revised April 24, 2018; Accepted April 26, 2018)