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Intentional injuries: The Experience from Dodoma Regional Hospital, Central Tanzania.

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Background: ***Worldwide intentional injuries cause about 9 deaths for every 100,000 persons; in Africa the contribution is estimated to be twice as much (25 out of 100000 persons).The true incidence of intentional injuries in Tanzania is unknown. There are very few hospital based studies which have characterized patients with intentional injuries. This study shares the experience obtained in management of patients with intentional injuries at Dodoma Regional Hospital for a period of about 9 months.***
Methods: ***A hospital based prospective descriptive study was carried out, in which all patients admitted with history of intentional injury were conveniently recruited into the study. Demographic data, injury causes and pattern were recorded; treatment was given according to hospital standard protocol. Consent was obtained from all patients.***
Results: ***Two hundred and fifty two patients were studied, the age ranged from 10 to 60 years with a mean age of 30.54 (standard deviation = 9.6). Males outnumbered females by 1.6. The commonest assailants were persons not related to victims (80%). The majority of injuries occurred outside home environment (70%), with marital status having a significant contribution. Most injuries took place at night. Sexual violence was a leading overall cause (27%), in men robbery or theft was the commonest cause (82%). Knives/machetes in 42% were among the commonest weapons used, followed by wooden sticks 26%. Head and neck were the most common body parts injured (79%), followed by chest and abdomen (19%), with significant difference between men and women (p value = 0.0001). Non-penetrating stabs or cuts wounds were the commonest injuries (70%), followed by penetrating chest and abdominal injuries (12%). Surgical debridement and primary suture was performed in 77% of cases, followed by thoracotomy and or laporatomy. Men needed more radical forms of surgical intervention than women (p value < 0.0001). The wound complication rate was 37%. The mean hospital stay was 4.7 days, with standard deviation of 7.7 and a range of 1 to 64 days.***
Conclusion: ***Intentional injuries in Dodoma are probably very high, and there is possibility that domestic violence may be higher in this area, if findings from this study are to be extrapolated into the community. There is no doubt that this may significantly contribute to family poverty through morbidity, hospital expenses and lost hours of productivity. Further community based studies and community advocacy through health education are recommended.***

Key words: Intentional injuries, Pattern, Causes, Treatment, Complication and Hospital stay

Introduction

Injuries in general have become a global public health concern in terms of mortality and morbidity[1]. It is also estimated that injuries in general cause 10-30% of all hospital admissions across the globe and contribute about 9% of all deaths and 16% of all disabilities with heaviest impact in developing countries.[2]

Intentional injuries which has been defined by Krug et al, 2004 as a spectrum of injuries resulting from interpersonal violence, self inflicted injuries, and group act of violence [3] are also

very common and contribute significantly to mortality and morbidity. Globally, intentional injuries cause about 9 deaths for every 100,000 persons, most of whom are individuals of good economic productivity in the society at the age of 15-45 years, in Africa, and probably other developing countries, the contribution of intentional injuries is even higher, it was estimated in 2004 that about 25 out of 100000 persons (twice as much as global incidence) died due this type of injuries[2]. The true incidence of intentional injuries in Tanzania is unknown, although Moshiro et, al 2001 found the overall mortality related to injuries in general to be 5-8% in some districts [4].

Most studies which have reported intentional injuries are community based [5-10], there are very few hospital based studies which have characterized patients with intentional injuries as seen in hospitals[11-13], none has been done in central part of Tanzania. This study shares the experience obtained in management of patients with intentional injuries at Dodoma Regional Hospital for a period of about 9 months, it is envisaged that the study will also increase awareness of the problem to different stakeholders, including residents of this area.

Patients and Methods

This was a nine months hospital based prospective descriptive study, conducted in Dodoma regional referral hospital in Tanzania from February to October, 2011. Ethical clearance to conduct this study was obtained from the University of Dodoma Ethical Review Committee. All 252 patients who were admitted with history of intentional injury were conveniently recruited into the study after providing a written informed consent. Data collected from patients included: demographic characteristics, setting of injury, type of injury, assailant/perpetrator of injury and their social history, type of weapon used, history of past violence, treatment modality and outcomes.

Patients were treated according to standard procedure set by the Hospital; such treatments included; resuscitation, debridement, wound irrigation and suturing. In some patients specific treatments included insertion of chest tube, thoracotomy and or laparotomy. All patients were monitored for local wound complications such as discharge, gaping, delayed healing and non-healing and systemic complications which included observation for presence of septicemia and distant infection. All parameters were recorded on the pre-formed pretested questionnaire and coded accordingly.

Collected data was cleaned, coded and entered into an SPSS version 12.0 for analysis where cross tabulations and association between dependent and independent variables were calculated before analysis. Where necessary, chi-square and p-value was determined where a value of 0.05 with a confidence interval of 95% was considered to have significant difference.

Results

A total of 252 patients with various intentional injuries were recruited into the study. The age ranged from 10 to 60 years with a mean age of 30.5 years with standard deviation of 9.6. The most common age group was 18 to 36 years (72%), followed by 36-54 age groups (21%), the two age groups making 93% of all patients admitted, males outnumbered females by 1.6. Majority (70%) of respondents had formal education status. The commonest assailants were persons not related to victims (80%), while spouses (which included partners and close relatives) contributed 20% of all injuries in this study.

The majority of injuries occurred outside home environment (71%), but there was no significant difference of setting of violence across the age groups (p value = 0.17), but when

comparison between males and females was done, males tended to be injured outside home environment more often (81%) as compared to females (56%) (p value <0.0001) (Figure 1).

Marital status was significantly associated with setting of violence (p value = 0.001), married/cohabiting patients were likely (72%) to be injured outside while 50% of those who are single or widowed were injured at home (Table 1).

Timing of violence

Majority (69%) of injuries which took place at night was among those married or cohabiting and 59% of day injuries also came from the same group. Single or widowed individuals tend to injured during the day than night.

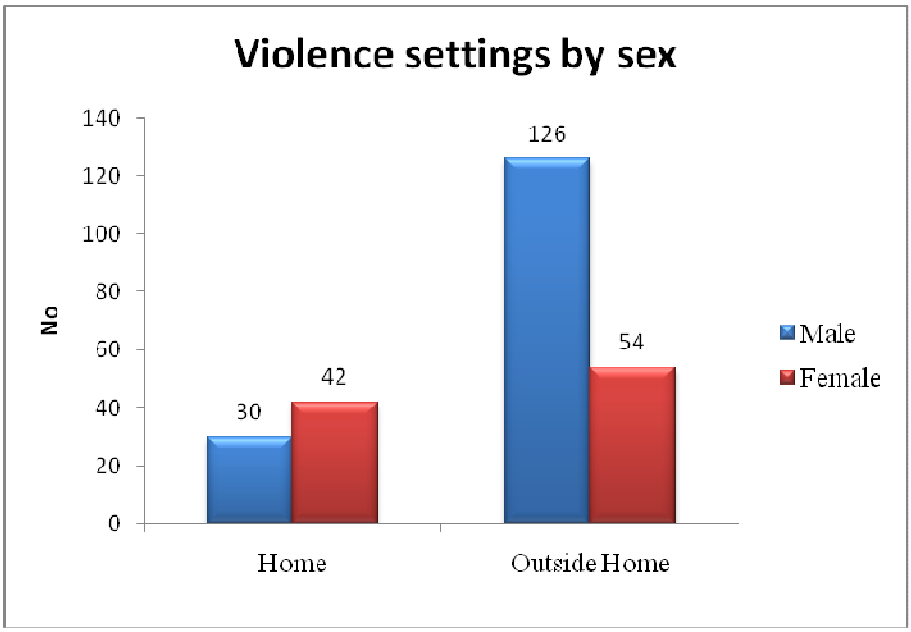


Figure 1. Violence Settings by Sex

Table 1. Percentage distribution of setting of violence by marital status

Setting of Violence	Number	Marital status		
		Single/widowed	Marriage/cohabiting	Divorced/separated
Home	72 (29%)	50%	46%	4%
Outside home	180 (71%)	27%	72%	2%
Total	252	33%	64%	3%
p value = 0.001				

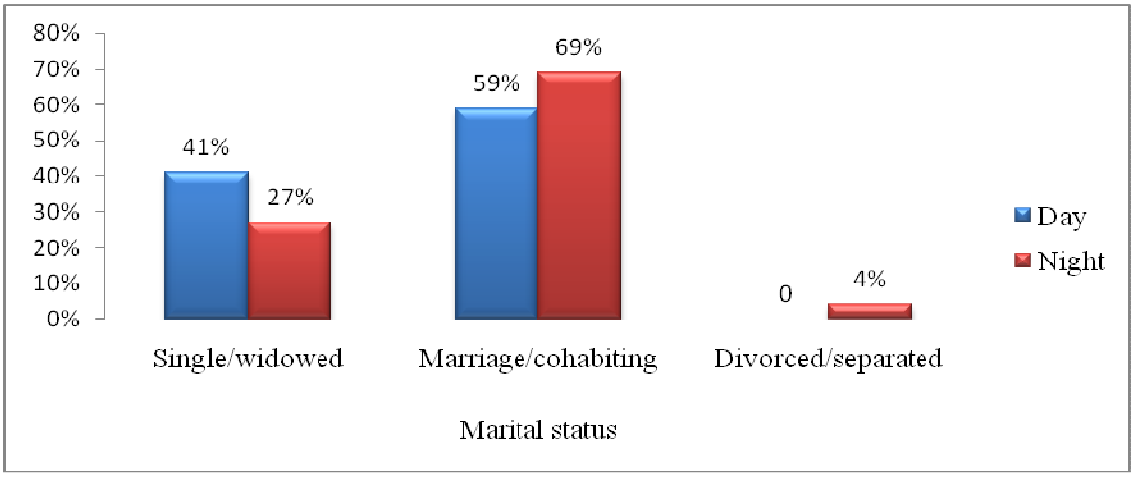


Figure 2. Marital status and timing of violence

Table 2: Percentage Distribution of Reasons for violence or Injury as Related to Sex

Reasons	**Number (%)**	**Sex**	
		Male	**Female**
Alcohol related	60 (24%)	65%	35%
Robbery or Theft	61 (24%)	82%	18%
Sexual related (Jealous, adultery)	69 (27%)	36%	64%
Others**	62 (25%)	68%	32%
Total	**252**	**62%**	**38%**
** Includes a range of other reasons such us farm conflicts, assault by unknown or mentally ill people, peer conflicts, etc.			

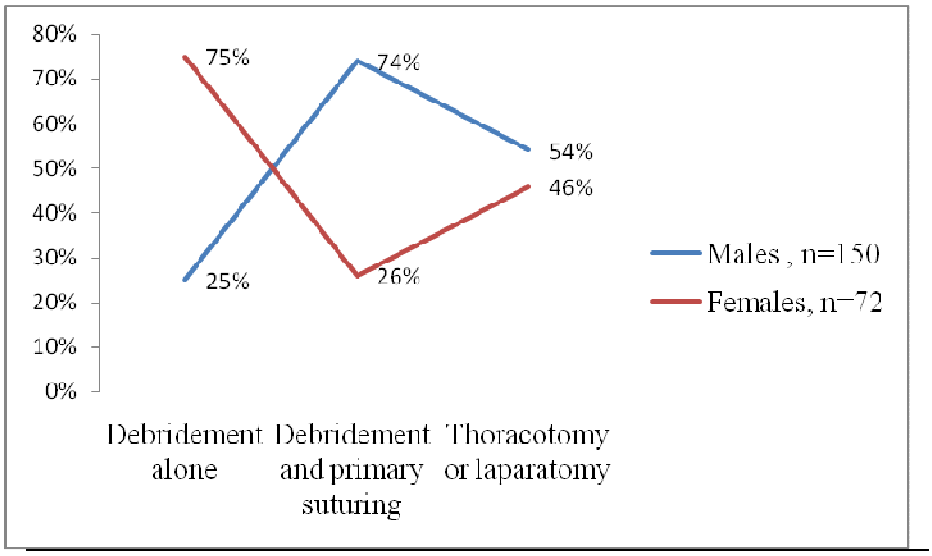
Table 3. Percentage Distribution of Weapons Used for Violence or Injury as Related to Gender

Type of weapon used	**Number**	**Sex**	
		Male	**Female**
Broken glasses/ bottles	31 (12%)	58%	42%
Knives/ Machetes	105 (42%)	64%	36%
Iron Bars	21 (8%)	86%	14%
Wooden sticks	66 (26%)	68%	32%
Multiple weapons	9 (4%)	56%	44%
Bodily (no weapons used)	20 (8%)	15%	85%
Total	**252**	**62%**	**38%**
p value < 0.0001, note cells with values <5			

Table 4. Distribution of Body Parts Injured and Type of Injury Inflicted by Sex

Part of body injured	Number	Gender	
		Males	Females
Head and Neck	198 (79%)	58%	42%
Chest and or Abdomen	48 (19%)	64%	36%
other parts**	6 (2%)	0%	100%
Total	252	62%	38%
p value = <0.0001, note a cell with value less than 5			
Type of injury inflicted	Number	Gender	
		Males	Females
Non penetrating stabs/cuts	177 (70%)	71%	29%
Blunt trauma	27 (11%)	22%	78%
Penetrating chest/abdominal injury	31 (12%)	52%	48%
Others	17 (7%)	47%	53%
Total	252	62%	38%
p value = <0.0001			

** Other parts included upper and lower limbs or pelvis.



p value <0.0001

Figure 3. Surgical intervention by Sex

Reasons for violence

The commonest reason for injury was sexual violence (27%), with women being the commonest group in 64% of cases as compared to men (36%). On the other hand men were mostly injured in or during robbery or theft (82%). The table 2 above summarizes the various reasons cited by patients by gender.

Weapons used in injuries
The commonest category of weapons used in violence was knives/machetes in 42% cases, followed by wooden sticks in 26% of cases. Significantly, more men tended to be injured by weapons than women (.p value <0.0001). Most of those injured bodily (85%) were women.

Injury distribution
Most injuries occurred around the head and neck region in 79% (n = 198), followed by chest and or abdomen in 19% (n = 48%). There was significant difference (p value = 0.0001), when body parts injured was compared by sex. The commonest injuries were none penetrating stabs or cuts wounds, penetrating chest and abdominal injuries were noted in 12% of patients

Treatment and interventions
Surgical debridement and primary suture was the commonest procedure done (77%, N 171), followed by thoracotomy and or laporatomy. Significantly, more men tended to be treated with radical forms of surgical intervention (p value < 0.0001). **[Graph 3]**

Treatment complications
A total of 70 patients (30%), had superficial wound infection, deep wound infection occurred in 7%. (**Table 5**).

Table 5: Distribution of Wound Complication by Gender

Type surgical intervention	Number	Gender	
		Males	Females
Superficial wound infection	70 (30%)	60%	40%
Deep wound infection	16 (7%)	74%	26%
Total	234	65%	35%
p value = <0.003, 18 cases were lost to follow			

Discussion

Similar to other studies [5, 11, 14], the commonest age group involved in intentional injuries was found to be 18-54 years, contributing to about 93% of all patients, with men being 1.6 times more likely to be admitted in the hospital due intentional injuries than their female counter parts. Although this is not a community based study, seeing a total of 252 patients being admitted in just eight months in one hospital may indicate that the incidence at community level is probably very high, it may even be higher than the estimated incidence in Africa as reported by WHO [2]. It is important to also note that almost all the patients in our series needed a surgical intervention, thus making an assumption that it is only those with serious injuries who managed to come to the hospital and those with minor injuries remained at home or are treated at a lower health facility and discharged home. Men dominance may also keep women faced with Gender Based Violence from reporting to health facility for attention in fear of retaliation and breakage of marriages. It is known that, central parts of Tanzania, Dodoma inclusive are dry areas, with poor rainfall and poor annual harvests; all these factors are related to poverty, one can therefore be tempted to associate the later with risk behaviors which may lead to intentional injuries, as cited by Challya and Gillyoma 2012, that poverty, lack of education,

unemployment and lower socioeconomic class as the major sources of injuries [13]. It should be noted however that, most of our patients had some form of formal education contrary the Challya and Gillyoma, 2012, findings.

This study has also established that the commonest assailants (persons who committed an act of violent injury) were persons not directly related to victims (80%), this finding is similar to other studies [6, 10]. The high prevalence of non relative assailant, probably reflects the facts that confrontations are more likely to involve non related members of society than the other way round; although some studies have shown that relatives or close friends are commoner assailants in intentional injuries [13, 15]. The differences possibly reflect study setting and the socio-cultural characteristics of the populations, the topic which was beyond the scope of our study.

The commonest setting of violence in this study was found to be outside home environment accounting for about 71% of all cases, with men being significantly more likely to be injured outside home environment with a prevalence of 80%, versus 56% of women (p value <0.0001). This observation contradicts with other workers such as Aggarwa;l et at, 2010 [5], Challya & Gillyoma, 2012 [13] and Faduazar et al, 2011, [15]: The study by Aggarwal was a community based study, which is definitely different from the index study, and that of Faduazar et al, 2011 mainly involved women of reproductive age a population not similar to ours, the only study similar to this study is that of Challya and Gillyoma 2012. The differences may be explained by; study setting, and population differences in terms of practices, and social-cultural-economic dynamics. Furthermore, and surprisingly, it has been found that marital status was significantly associated (p value = 0.001) with setting of violence, with married or cohabiting being more likely to injured outside home environment (72%), than those who are either single or widowed (50%). The difference observed may be due to the fact that men and women who are married are more likely to involved in sexual affairs than those who are not married, more importantly, most of those who are single or widowed may have been children, who are unlikely to be involved in the major reasons for violence as found in this study. A large proportion of injuries occurred during the night (56%), but there was no significant difference when males were compared to females, similar to Challya and Gillyoma 2012 findings[13], however this study has demonstrated a significant relationship between the marriage status and timing of violence, a pattern which was not reported in the former study, in which once again married and or cohabiting individuals were taking a lead.

With regard to reasons for injuries, a sexual related assault was the commonest in 27% of cases, majority being females (64%). This category included all injuries related to sexual affairs in form of jealousy, adultery and other forms of promiscuities which lead to fights, involving either men to men or men to women. The observation is contrary to Challya and Gillyoma 2012, who found criminal assault to be the leading overall cause of intentional injuries, however, the observation that sexual violence was among the commonest causes of injuries in women, is similar to this study. Robbery or theft ranked the second most common reason (the commonest in men) for injuries in this study at (24%), in which majority were men 82% (p value = 0.0001), similar to another study [13]. There are may be three main reasons to explain the difference: one, men are usually the bread winners in most homes and therefore responsible for daily economy of their formal or informal families, two men are more commonly involved in drinking and other forms of luxuries which entail them to look for extra income and therefore robbery and theft, three some scholars have suggested that men are more likely to engage in more risky behaviors than females and therefore high preponderance of men in robbery and theft. On the other hand, one possible explanation for high involvement of women in sexual violence is that women are

usually at the epicenter of sexual affairs in all its forms, and therefore high likelihood of being injured.

This study has also evaluated the prevalence of weaponization of injuries; it has been revealed that, 92% of confrontation resulted in injuries. The commonest weapons used were knives/machetes (42%) and wooden sticks (26%), broken glasses or bottles were used in 12% of patients. There was a significant difference (p value < 0.0001) when type of weapons used to injure were compared by sex, note that men tended to be injured by weapons than women, and most (85%) of those injured by bodily physical assault were women. This pattern of weapons differs from other studies, for example, Farduazar, et al, 2011 in Iran found hot liquids to be the commonest weapon injury inflictor [15], while in South Africa, guns were the most common[9]. Challya and Gillyoma 2012, found almost similar pattern of weapons[13]. Of importance in this study is the common use of wooden sticks which results in significant trauma, to explain this one has to understand the culture and traditions of Gogo ethnic group which reside in this region (Dodoma, central Tanzania), this ethnic group is semi pastoralist, men have tendency to carry hard wooden sticks, with a club like projection at the end. It is the strength and the club like projection which inflict very severe injury. Authors have witnessed some patients with severe head injury as a result of this weapon. Moreover, the high prevalence of use of bottles and broken glass reflect the possible alcohol related violence, typical in urban settings. An important note is the total absence of guns contrary to other studies [9, 13], in Tanzania guns are rarely used in violence, ownership of weapons is tightly regulated in this country and therefore use of these weapons are normally heard of in regions bordering unstable countries in Western and North-western parts of the country.

Similar to Challya and Gillyoma, 2012, the commonest part of the body injured in this study was found to be head and neck in 79% of all patients, the second commonest region was chest and abdomen which contributed to about 19% of all cases. It has been established in this study that body parts injury distribution was statistically significant by sex (p value = 0.0001), but not by age groups (p value = 0.105), The common occurrence of injuries in areas around head and neck probably reflects that this area is easily accessible during fight involving non ballistic hand held short weapons typical in this study. Some investigators have suggested, the preponderance of injuries of this areas to be due to the underlying intention to kill[13], although this explanation may be true for ballistic weapon. This observation, however, is dissimilar to that documented by Majori et al, 2011 and Farduazar et al, 2012 who found that the most common sites involved were upper and lower limbs[11, 15]. The possible explanation for the dissimilarities observed essentially may be due to the difference in study setting and the difference in study populations, in the later study participants were predominantly women of reproductive age, as it is understood in most Islamic states, women are obliged to be home care takers and therefore high likelihood of injuries in respective parts of the body.

The difference in types of wound inflicted may be explained by the difference in classification systems used, in this study 70% of injuries were classified as non penetrating type, which included all kinds of stabs or cuts involving both sharp and blunt objects as classified by Challya and Gillyoma 2012, penetrating abdominal or chest injuries were the second commonest representing about 12% of all injuries, in this category large proportion of patients were males 58% , the significance of this classification is that most of these patients needed opening of the chest and abdomen for further exploration. The current observation differs from that of Majori et al, 2009 in which penetrating chest or abdominal injuries were not reported at all [11]. As it can be obviously noted, this study has not reported any fracture as opposed to Majori et al, 2009,

Challya and Gillyoma, 2012 possibly due to the nature of weapons commonly used; most of them are unlikely to cause major fractures.

With regard to management of patients involved in intentional injuries, most of the patients (88%) were treated with some form of surgical intervention. The commonest surgical procedure performed was surgical debridement with primary suturing of wound, accounting for about 77% of cases. About 18% of them needed exploratory thoractotomy or laparotomy, these were the patients who presented with penetrating stab or cut wounds. It should not go without saying that, exploration was needed to exclude thoracic or abdominal visceral injuries and to avert a more likely morbidity such as infection in case of intestinal perforation or exsanguination in case of vascular or solid organ injury. In this regard, men are significantly more likely to require radical surgical intervention than women, (p value < 0.0001). As explained above, men were more likely to engage in more risk behavior than women, just like women are possibly faced with more humane eyes of offenders than men. The intraoperative findings during thoracotomy or laparotomy, has shown high prevalence of intestinal perforation in 19 of cases, followed by diaphragmatic tears and pneumothorax 6 cases each, only stresses the need to do exploratory opening of the respective cavities when a penetrating injury is seen. It should be noted however, that, authors have not been able to find any similar study, from which these findings can be compared. But it is our belief that all cases of penetrating injury should proceed to theatre after thorough pre operative evaluation especially in resource poor countries.

Lastly, this study has demonstrated that 37% of patients did indeed get some form of wound infection as a complication, majority of them (82%) getting superficial wound infection with no significant differences in terms of complications across the age groups, however when compared by sex, a significant difference was noted, with men being more likely to get wound complications (p value = 0.003). The high rate of wound infection in this study can be explained by the fact that, wounds which follow trauma are generally at higher risk of infection as compared to wounds which follow elective surgery, partially due to wound inflicting instruments being dirty as it has been witnessed by the variety weapons used in this study, but more importantly delayed hospital reporting may allow bacterial overgrowth on the wounds. This complication is commonly translated to long hospital stay as it has been found in this study, in which the longest duration of stay at the hospital was 64 days, and this was a case of deep wound infection with subsequent abdominal dehiscence. There was no single death witnessed in this report, and nothing can be reported on the 18 patients lost to follow.

Conclusion and Recommendation

This study has demonstrated that, intentional injuries in Dodoma is probably very high, and there is possibility that domestic violence particularly gender based violence may be a bigger problem in this area if findings from this study are to be extrapolated in the community. It has been found that the most common reason for intentional injuries in Dodoma is sexual related assault, although robbery/theft and alcohol consumption also contribute significantly. Furthermore, it has been determined that weaponization of injuries is very common, with use of unusual weapons such as bottles/broken glasses and wooden sticks, all of which results in significant trauma to victims with subsequent hospitalization, and intervention. There is no doubt that this may significantly contribute to family poverty through morbidity, hospital expenses and lost hours of economic productivity. It is therefore recommended that, more thorough community studies be done to establish the extent of the problem in this region, but

more importantly community advocacy through health education should be carried out to reduce this problem.

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