

Title: Broken glass as an injury hazard in an Indigenous community

Richard Henshaw, Darling Downs Public Health Unit, Southern Regional Services
Division of the Chief Health Officer, Queensland Health

Dr Robert Eley, Centre for Rural and Remote Area Health, University of Southern
Queensland

Professor Don Gorman, Centre for Rural and Remote Area Health, University of
Southern Queensland

Abstract

Reduction in glass-sourced injury is one target of an injury prevention and safety promotion project in an Indigenous community in Queensland. The research into broken glass litter had three principal objectives of determining the extent of the problem, devising workable strategies within the local context and assessing the outcome and impact following implementation of those strategies. Surveys, individual interviews, Photovoice®, observations and injury data collection forms were utilised to determine the extent of the problem and gather perceptions from the community. Data collected supported the community's view that broken glass was an abundant source of litter, with the majority of respondents also stating they had been injured by broken glass. Strategies to improve the amounts of broken glass litter were centred upon what caused people to litter in the first place. Working collaboratively with the Aboriginal Shire Council and Community Injury Prevention and Safety Promotion Project group a waste management plan was developed which increased the number of waste facilities, aired a public awareness campaign including antilitter posters, and developed plans for a recycling plant.

Context

Injury within the public health context is defined as physical harm to a person's body commonly seen as broken bones, cuts, brain damage, poisoning and burns¹. Injuries occur in a multitude of ways and can have the potential to cause a range of physical, cognitive and psychological disabilities and death². In fact injury is the primary cause of death in people under the age of 45².

In Australia, Indigenous communities experience approximately three times the rate of fatal injuries as do the general community^{3,4}. Demand for improved

health conditions and reduction in inequities between Indigenous and non Indigenous Australians has coincided with a focus on public health strategies for primary and secondary prevention which often encompasses a whole of community population level intervention⁴. Commonwealth and State Governments have declared injury prevention as a National Health Priority Area³.

Litter is an important environmental and public health issue that negatively affects the image of communities, and items such as broken glass are often a health hazard and source of injury⁵. Research in the United Kingdom and the United States has indicated that the leading cause (15 to 27% of all lacerations reported to an urban emergency department) of lacerations is glass from broken bottles⁶. Lacerations from glass can result in many health problems such as delayed wound healing, infection, debilitation and neuropraxia⁶. These health problems can be potentially exacerbated by low immunisation rates and diseases such as diabetes.

Injuries can seriously affect a person's quality of life and the life of those around them². However through precise, specific implementation of strategies, injuries are viewed as being preventable. This paper describes the process undertaken to evaluate the extent to which broken glass was a health hazard in one community and the strategies identified and implemented to reduce glass injury.

Background

Injury prevention is a strategic direction for Queensland Health, and in 2008 the department, through Health Promotion Queensland (HPQ), started supporting an Aboriginal Shire Council to implement a five-year Community Injury Prevention and Safety Promotion Project (CIPSSP). Principal partners to the Council were the Public Health Unit and the Centre for Rural and Remote Area Health at the University of Southern Queensland.

On the 20th of April 2009, the Council hosted the inaugural CIPSSP reference group meeting. In attendance were the partner organisations plus representatives from the community health department, hospital, community run medical centre, radio station and school.

Workshops with the community run by Council had previously prioritised five key areas for action: Environment, Housing, Children, Road Safety and Alcohol, Tobacco & Other Drug's/Mental Health.

At the first reference group meeting members discussed these community safety concerns in order to identify activities that could be undertaken under the banner of the CIPSP.

Subsequent reference group meetings invited participation from government departments and services (e.g. Communities and Police) and local non-governmental organisations representing employment, health and education. At these quarterly meeting additional activities were proposed and discussed.

With children identified as the number one priority for the IPSP, and environment also recognised as a key area, the project recognised the health concern of broken glass in the community. Research into broken glass as reported here became an actioned strategy of CIPSP.

Objectives

The research project had three objectives. Firstly to determine the extent to which broken glass was a hazard; secondly to explore with the community what strategies could be used to address the hazard, and finally to implement identified strategies.

Methods

The extent of broken glass as a hazard was captured by a mixed method approach involving six activities. Firstly individual interviews lasting 5-10 minutes were held with twenty people over the age of 18 years who were local residents or worked in the community. During the interview the participants were asked a range of open-ended and closed questions generating data of sex, age, their relationship to the community, their perception of litter and broken glass in the community, types of litter in the community and its source, changes in the amount of litter and why, injury from broken glass and solutions.

Secondly a survey was used to gain views from the broader community. A total of 330 surveys were distributed to homes and services. The survey contained 19 questions and was constructed to record a mixture of quantitative and qualitative data similar to the individual interview questions, which included demographic information along with the individual's perception of the broken glass

issue within the community, their exposure to the problem, any injuries sustained and solutions or strategies to improve the hazard.

Children from a class within the local primary school were also surveyed for their experiences with broken glass and thoughts on the topic. With approval from the State Primary School Principal a modified and shortened version of the community survey was completed by the single class year 6/7 students in the presence of their teacher who explained the topic to the children.

Additionally Photovoice was employed⁷ where students were provided with disposable cameras for the purpose of recording items or locations within the community which they considered to be potential hazards. Groups of students, escorted by teaching staff, took photographs which were then compiled into a slide show and presented to the CIPSPP reference group.

A fifth method of data collection was observations of the community by the researcher. The researcher travelled to the community no less than once a month for 12 months, and during busy stages of the project visited weekly. On these visits written comments were recorded in a note book. Recordings included observations of the community, general knowledge gained from community members, and follow up actions.

Finally data identifying causes and rates of injury were collected from the hospital and the primary school during the period of April through to December 2010 using patient injury forms designed in partnership with the Queensland Injury Surveillance Unit.

The research was undertaken by a health promotion officer and all activities were carried out with the assistance of the CIPSPP Coordinator.

Ethical approval for the research project was received from both the University of Southern Queensland and Queensland Health. All data was collected in accordance with the guidelines for ethical conduct in Aboriginal and Torres Strait Islander Health Research⁸.

Results

Individual Interviews

Twenty people were interviewed, 15 were male and half were over 40 years of age. Results are summarised in Table 1. All but one of the people interviewed claimed the community had a litter problem, with all stating broken glass was a concern.

Sixty five percent of people interviewed claimed they or a family member had been affected by broken glass. The most frequent location where an injury occurred was on the street, with most injuries resulting in a laceration to the foot. Of the 13 who said they or a family member were injured, eight required medical treatment and only one person was wearing shoes at the time of injury. The most frequent responses for solutions to broken glass were to recycle, increase the number of litter bins, and deploy a clean-up gang.

Table 1: Responses to individual interview questions

Interview question	Response	Number
Is broken glass a concern in the community?	Yes	19
	No	1
Where is the glass found?	Footpath	13
	Streets	13
	Parks-ovals	4
What types of glass is it?	Beer bottles	20
	Spirit bottles	6
	Soft drink bottles	2
Where do you think the broken glass comes from?	Kids smash the glass bottles	10
	Incorrect disposal of bottles by adults	9
Was the person wearing shoes at the time of injury?	Yes	1
	No	12
Solutions for broken glass?	Recycle	4
	Increase number of bins	5
	Clean up gang	4
	Ban glass	1
	Street sweeper	2
	Improve peoples' behaviour	3

Community Survey

Fifty three people responded to the survey. Fifty-four percent of respondents (n=29) were 40 years of age or older, 64 percent (n=34) were female, 33 (64.2%) lived in the community, and 85 percent (n=45) worked in the community. Results indicated that broken glass was a hazard (Table 2).

Table 2. Responses to community survey

Question	Yes	%*	No	%*
Does the community have a litter problem	48	92.3	4	7.7
Is broken glass in the community a hazard?	49	100.0	0	0
Have you been cut by broken glass?	31	59.6	19	40.4
• Did you seek medical treatment?	19	61.3	12	38.7
• Were you wearing shoes when injured?	19	61.3	12	38.7
What is the source of litter?				
• broken glass-beer bottles	49	92.5		
• soft drink bottles	16	30.2		
What contributes to litter?				
• Not enough bins	48	94.1	3	5.9
In the past year has the problem improved? **	26	56.5	20	43.5

* Percentages of those answering the question.

**Clean-up gangs and the introduction of an alcohol management plan by the government were predominantly the reasons for the broken glass litter levels improving.

Table 2. Reasons for litter

Cause	Number
Poor behaviour	15
Boredom	3
Bad attitude/apathy	8
Lack of waste facilities	10
Alcohol	2
Violence	1
Lack of signage	1
Lack of education	2

Those who disagreed that the problem was lessened over the previously year frequently stated it was due to a lack of waste facilities, poor behaviour and attitude (Table 3). Although many causes were documented, poor behaviour and a lack of waste facilities were the most frequent responses.

Cross tabulations of the survey data found several significant findings. Although non residents were affected by broken glass, there was a higher rate of cuts amongst residents. Results indicate that lacerations can occur regardless of footwear, it was found that all of the people surveyed who were not injured were wearing shoes. However 38.7 percent of respondents who were injured were wearing footwear at the time of injury. A significant difference was found with age versus perception of litter, with 100 percent of respondents aged over 40 indicating that the community has a litter problem, almost double any of those under 40.

Children survey

All 12 of the children who were surveyed identified the community as having a litter problem and stated glass was a hazard where they played. All had been cut by broken glass while in the community and only three were wearing shoes at the time of injury. The street was the most frequently indicated location for injury.

Table 4. Children’s responses to survey

Question	Yes	%*	No	%*
Does the community have a litter problem	11	100		
Is there a lot of broken glass in the community where you walk, skate, cycle or play?	12	100		
Have you ever been cut by broken glass in the community?	12	100		
• Were you wearing shoes at the time?	3	25	9	75
Where were you when you were cut by glass?				
• School oval	3			
• Park	6			
• Hall	5			
• Street	10			
• Skate park	7			
• Creek	1			

Photovoice

Over 100 photographs were taken by the school children to illustrate that the community had a litter problem which created an environment that was both unsafe and unpleasant to live with. The children requested a clean community which was free of broken glass identified on the street and playing surface of a public basketball court. Some examples of the photographs that were taken are provided in Figure 1. [Figure 1 about here]

Researcher observation

It was evident that at the beginning of the study areas within the community had large amounts of litter including broken glass. It appeared efforts were made to keep the entrance to the community and the main street relatively tidy. In contrast, the back streets, sporting facilities, and play areas had an abundance of litter and smashed glass littering footpaths. Litter surrounding streets, homes, ovals etc. consisted mainly of papers and plastics, discarded food and product containers, wrappers, and plastic bags. Less frequently sighted were larger littering objects which included mechanical parts, old signs, parts of broken fences and unwanted building products such as wood, and sheet metal. As the broken glass was primarily either clear or brown, sources most likely would be soft drink bottles, windows, windscreens, beer bottles, or spirit bottles. The broken glass was observed in many states, from small as a pin head enough to cause a glass splinter, to half beer bottles enough to cause a deep laceration.

On commencement of the research there was a distinct lack of community waste facilities - both community bins and household bins as residents. These shortages were also identified by the community as was inconsistent and sometimes total lack of waste removal from residential areas for periods of time. Additionally the waste dump site for the community was poorly maintained resulting in unsecured litter and inappropriate dumping.

Injury data

Data was collected from the laceration clinic at the Primary School for eight months (April-December 2010). A total of 70 presentations were recorded of which

69 were for Indigenous children. The peak of injuries occurred in the 5-7 age group and declined with age. Males had a slightly higher rate of injury, 57%. Glass was the injury factor on 14 occasions, resulting in open wounds 100% of the time. The majority of injuries from glass occurred while playing.

Data collected from the Hospital from September 2009 to November 2010 resulted in a total of 200 injury presentations to the emergency department. The peak age group for the injury presentations was 15 to 44 years. Results also identified a greater representation of males (57.5%). The greatest incidence of injury was that caused by another person (n=57) and glass was only indicated in 4.5% of injuries (n=9).

Discussion

The Community Injury Prevention and Safety Promotion Project (CIPSPP) had been presented with information that glass injury was a problem that needed addressing. These data were anecdotal and the research confirmed through its various methods that broken glass is a hazardous problem for the community. Beer bottles were identified as the major contributing source of broken glass, along with spirit bottles, soft drink bottles, and windows.

The methodology was complementary; results of written questionnaires completed more by women coincided with the verbal responses of interviews. Information from children concurred with those results and observations from both the researchers the children presented visual evidence. It is interesting that the Photovoice technique also identified other potential sources of injury within the community. Requests to improve road safety, animal management, unsafe housing, lack of recreational facilities and infrastructure including lighting, alcohol and violence were presented to CIPSPP.

The exact incidence of lacerations could not be reliably determined because of self treatment, although more than half of adults, and all the children who were surveyed or interviewed, had been cut by broken glass. It was interesting that despite this anecdotal evidence of high laceration rates cause by glass, injury data collected from the hospital and school indicated incidences of injury from broken glass were low when compared to other injuries. Within the school those other injuries were largely abrasions as a result of playground falls; however hospital data indicates the highest incidence of injury resulted from being struck by or

colliding with another person. This result suggests that injury and safety promotion around all aspects of lifestyle require considerable attention.

As expected the wearing of footwear was found to reduce the likelihood of injury from broken glass, however footwear did not prevent all lacerations to the lower limb area. It is suspected that those injured while wearing footwear were wearing open shoes such as sandals and thongs.

A lack of litter bins, behaviour and attitude of people to litter were considered major factors why people in the community litter. Of particular interest, the results confirmed a significant difference in perception towards litter between age groups. Results indicate that those over 40 years of age are more likely to view litter within the community as a problem. This could be an indicator that litter has increased over time and younger generations see litter in their environment as normal.

One of the most frequent solutions provided to resolve the broken glass litter problem, was to increase the number of bins and this is comparable to other studies which revealed that one of the main causes for littering was a lack of bins^{9,10}. Other solutions were to recycle, improve peoples' behaviour and to ban glass; however this last solution was seen as impractical to the community and surrounding communities.

Results of the study were presented to the IPSPP reference group and to the Aboriginal Shire Council, and strategies to reduce the amounts of broken glass were identified. Negotiations led to the partnering of a waste management plan which saw the purchase and placement of 10 community bins in locations of high pedestrian traffic. These community bins were complimented by new wheelie bins for each household. Additionally a public awareness campaign was launched, aired on the local radio station, informing of household rubbish collection days and the people of the community to dispose of rubbish appropriately and to take pride in their community.

Further with the education theme, consultation with the Primary School led to the development of anti-litter posters which were distributed throughout the community and placed on the community bins. The Aboriginal Shire Council has now planned to develop a local recycling plant. Recycling may offer a solution to not only keep glass off the streets but a productive solution to utilise the discarded material and create work for local people. Due to time constraints the effectiveness of these strategies will be measured over time through the CIPSPP.

Conclusion

Data collection methods were effective in determining the community's problem with litter, and specifically glass, and the methods also proved useful in ascertaining solutions. Information gathered from the community supported a multi-strategic approach to reduce litter and broken glass. Working synergistically with partners using a combination of strategies is likely to offer the greatest and most sustainable response.

References

1. National Public Health Partnership. *The National Injury Prevention and Safety Promotion Plan:2004-2014*. Canberra:NPHP;2004
2. Australian Institute of Health and Welfare, *Injury Prevention and Control*. Canberra:AIHW; 2010.
3. Australian Institute of Health and Welfare. *Australia's Health 2006*. Canberra:AIHW;2006
4. Carson B, Dunbar T, Chenhall, R, Bailie, R (eds). *Social Determinants of Indigenous Health*, Allen and Unwin:Sydney;2007.
5. Karolína R, Eade C. An Environmental Education Program of the Prague Post Endowment Fund. *The Prague Post* 2003;4(9). Viewed February 19 2010, www.praguepost.cz/PPEF/09SC030219.pdf.
6. Makary MA. Reported incidences of injuries caused by street glass among urban children in Philadelphia. *Injury Prevention* 1998;4:148-9
7. Wang C. Burris MA. Photovoice: Concept, methodology, and use for participatory needs assessment. *Health Education & Behavior* 1997;24(3):369-87.
8. National Health and Medical Research Council. 2003, *Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research*. Canberra:Commonwealth of Australia; 2003
9. Araphat HA, Al-Khatib IA, Daoud R, Shwahneh H. Influence of socioeconomic factors on street litter generation in the Middle East: Effects of education level, age, and type of residence. *Waste Management & Research* 2006;25(4):63-70
10. Al-Khatib IA. Childrens' perceptions and behaviour with respect to glass littering in developing countries: A case study in Palestine's Nablus district. *Waste Management* 2009;29(4):1434-7