



OPEN ACCESS

The role of private pesticide vendors in preventing access to pesticides for self-poisoning in rural Sri Lanka

Manjula Weerasinghe,¹ Melissa Pearson,^{1,2} Ravi Peiris,¹ Andrew H Dawson,^{1,3} Michael Eddleston,^{1,2,4} Shaluka Jayamanne,^{1,5} Suneth Agampodi,⁶ Flemming Konradsen^{1,4}

► Additional material is published online only. To view please visit the journal online (<http://dx.doi.org/10.1136/injuryprev-2012-040748>).

¹South Asian Clinical Toxicology Research Collaboration, Faculty of Medicine, University of Peradeniya, Peradeniya, Sri Lanka

²Clinical Pharmacology Unit, University/BHF Centre for Cardiovascular Science, University of Edinburgh, The Queen's Medical Research Institute, Edinburgh, UK

³NSW Poisons Information Service, Westmead Childrens Hospital, Sydney, New South Wales, Australia

⁴Department of International Health, Immunology and Microbiology, Faculty of Health Sciences, University of Copenhagen, Copenhagen, Denmark

⁵Department of Medicine, Faculty of Medicine, University of Kelaniya, Ragama, Sri Lanka

⁶Department of Community Medicine, Faculty of Medicine and Allied Sciences, Rajarata University, Saliyapura, Sri Lanka

Correspondence to

Manjula Weerasinghe, Faculty of Medicine, South Asian Clinical Toxicology Research Collaboration (SACTRC), University of Peradeniya, Peradeniya 20400, Sri Lanka; manjugaya@yahoo.com

Received 27 December 2012

Revised 22 April 2013

Accepted 29 April 2013

Published Online First

4 June 2013



Open Access
Scan to access more
free content

To cite: Weerasinghe M, Pearson M, Peiris R, *et al.* *Inj Prev* 2014;**20**:134–137.

ABSTRACT

In 15% to 20% of self-poisoning cases, the pesticides used are purchased from shops just prior to ingestion. We explored how pesticide vendors interacted with customers at risk of self-poisoning to identify interventions to prevent such poisonings. Two strategies were specifically discussed: selling pesticides only to farmers bearing identity cards or customers bearing pesticide 'prescriptions'. Vendors reported refusing to sell pesticides to people thought to be at risk of self-poisoning, but acknowledged the difficulty of distinguishing them from legitimate customers; vendors also stated they did want to help to improve identification of such customers. The community did not blame vendors when pesticides used for self-poison were purchased from their shops. Vendors have already taken steps to restrict access, including selling low toxic products, counselling and asking customer to return the next day. However, there was little support for the proposed interventions of 'identity cards' and 'prescriptions'. Novel public health approaches are required to complement this approach.

BACKGROUND

Pesticide self-poisoning is a major public health problem in rural Asia, with an estimated 300 000 deaths annually.¹ In Sri Lanka, pesticide self-poisoning is the most common method of self-harm and causes the majority of deaths from suicide in rural districts.^{2–3} Easy availability of pesticides in the domestic environment of farming households⁴ and unrestricted availability from shops has been highlighted as contributing to the problem.

Three South Asian studies have previously reported that 14% to 20% of pesticides used in non-fatal self-poisoning acts had been purchased from a shop shortly before the episode.^{5–7} However, no research has been performed to study this purchase of pesticides or to determine whether there might be ways to intervene to prevent poisoning events.

In this study, we aimed to explore whether pesticide vendors identified customers contemplating pesticide self-poisoning, and how they responded to these customers. Using this information, the study aimed to assess the possibility of involving pesticide vendors in the prevention of pesticide self-poisoning.

METHODS

This study was carried out in 2 districts in Sri Lanka, Hambantota and Anuradhapura, with high incidences of self-poisoning of 315 per 100 000⁸ and 350 per 100 000,^{2–3} respectively. Five villages with high incidences of poisoning were selected from within these two districts. All pesticide shops located in and around the selected villages were identified for the study. This included 10 shops in Hambantota and 14 shops in Anuradhapura.

A questionnaire-based survey including open and closed questions (see online supplementary appendix 1) was carried out in pesticide shops by two field researchers in Sinhala, the language spoken in the study area. Two strategies were specifically discussed: selling pesticides only to farmers bearing registration cards or customers bearing pesticide 'prescriptions'. Interviews were carried out with the person who had direct contact with the customer and they lasted 45–60 min. The data from the interviews with the vendors were translated into English and transcribed into Word files (Microsoft, Redmond, Washington, USA). Analysis was performed manually for the qualitative data from the open-ended interviews.

Informed verbal consent was obtained from all participants. The study protocol, including the process of consent, was reviewed and approved by the Medical Research Ethics Committee, University of Ruhuna.

RESULTS

Characteristics of pesticide shops

A total of 24 pesticide shops were identified within the study area, of which 22 owners agreed to be interviewed. Six of the interviewed vendors were women and generally they were working in small-scale to large-scale shops. The pesticide shops in our study varied markedly by function and size as seen in table 1.

Registration of the pesticide shops and training of owners

Of the 22 pesticide shops, 19 were registered with the Department of Agriculture. As part of this registration process, owners are required to attend a 1-day training course that focuses on basic knowledge of pesticides, including toxicity, storage, sales practices, and safe handling. At the end of the training course, participants need to pass a written test to fulfil the requirements for registration.

Table 1 Characteristics of the 22 selected pesticide shops, grouped according to their size and function

Small scale (n=3)	Medium scale (n=16)	Large scale (n=3)
Typically unregistered	Government registered	Government registered
Located in rural villages	Located either in small towns or rural villages	Shops were always located in larger towns near agricultural areas
Often untrained vendors involved in selling pesticides	Trained vendors involved in selling pesticides	Several trained vendors were directly involved in the business
Some of these vendors are part time	Most common type of shop	Sell pesticides for a wholesale price to small-scale and medium-scale pesticide shops and also directly to farmers
Newer shops and were operating for less than 5 years	Primarily there was one person involved in selling pesticides	Offer attractive discounts
Pesticides sales are the main business and often only specific brands of certain companies are available	At times others in the household may also sell	Normally, customers exceed 100 per day
	Pesticides sales are the main business and often they had available only specific brands of certain companies	They offer free consultancy services to select the correct pesticides
		The shops have direct links with pesticide companies

Of the 17 vendors who attended training, the majority (14 out of 17, 74%) reported that the current training programme did not contain information about pesticide self-poisoning and they would welcome additional training on how to respond to customers at risk of poisoning themselves. However, the other three vendors implied that the training highlighted the risk issues but did not provide any specific training on how to identify and/or respond.

Identification of customers at risk of poisoning themselves

All interviewed vendors expressed concern about selling pesticides to persons who might use them for self-poisoning. Of the 22 vendors, 20 (91%) could recall, in detail, episodes where customers had come to their shop to purchase pesticides with the intention of poisoning themselves. Some vendors showed reluctance to talk about cases where they had not recognised the customers' intention and had been informed later about the poisoning attempt.

A male vendor from a major town with around 20 years of experience who ran a large-scale pesticide shop stated:

I have recognized more than 100 customers who were seeking pesticides to poison themselves and prevented them from accessing pesticides. But for about 10 customers, I did not recognize the real intent of the customer when they purchased pesticides and they went on to take the poison.

However, vendors acknowledged that they might not hear about all attempts among customers since information may not get back to them. They thought that there might be many cases where they had sold pesticides without recognising a customers' intention.

Characteristics of customers intending to use pesticides to self-poisoning

All the vendors perceived that men were more likely than women to purchase pesticides for self-poisoning; four vendors had little or no experience with women customers who intended to poison themselves.

The vendors recognised two broad categories of customers intending to poison themselves. The first group exhibited unusual behaviour such as sadness, excessive sweating, nervousness, shyness, dishevelled appearance, aggressiveness, garbled speech and trembling. The second group appeared to be legitimate purchasers and were hard to recognise as they hid their feelings well.

One medium-scale male vendor from a small city highlighted the difficulties for vendors:

Some customers with suicidal intent are very tricky; they really mislead us and buy pesticides pretending to be in a happy mood. Once they have ingested the pesticide, we feel that we fell in their trap.

Vendors reported that they were suspicious about the intent of customers aged between 13–18 years.

Prevention strategies

The vendors reported a number of practices and strategies to avoid selling pesticides to customers they perceived as being likely to use the pesticides for self-poisoning. One male vendor with 3 years experience who sold non-agricultural items in addition to pesticides commented that:

I am not selling pesticides after 6 pm, even to a well-known customer; I ask him to come the following day.

The vendors' immediate response to customers perceived to be at risk for self-poisoning varied significantly. A total of 11 out of 22 vendors refused to sell pesticides and requested the customer to leave. One medium-scale vendor reported asking the customer to return the next day, one medium-scale vendor reported selling a non-toxic product, and two male vendors from small cities alerted other vendors or family members and even attempted to take the customer's money to prevent them from accessing pesticides from other outlets. Two male vendors from rural villages reported responding dependant on the situation, and had no specific strategies. Four female vendors and one male vendor reported that they attempted to talk with the customers and listen to their problems, as seen in the following quote:

I try to talk to customers and listen to their problem if I think they are at risk of suicide, except for the customers under the influence of alcohol. If I am unsure, I just sell the customer a non-toxic product.

Vendors were asked for their views on two interventions designed to limit access to pesticides to customers intending to self-poison: farmer 'identity cards' and 'prescriptions' for pesticides. A farmer identity card system would allow only registered farmers to purchase pesticides. Prescriptions would require farmers to obtain a prescription from an authorised individual or entity to purchase pesticides.

Table 2 Barriers and facilitating factors identified by vendors for interventions involving vendors to prevent self-poisoning in rural Sri Lanka

Barriers	Facilitators
No community pressure to change sales practices	Vendors reported willingness to participate in training initiatives about self-poisoning
No training or support to identify or respond to customers attempting to access pesticides for self-harm	Willingness of some vendors to support prevention, for example, intensive questioning, offering support to distressed customers
Difficult to identify individuals for self-poisoning where there is no visible distress	Vendors capable of identifying vulnerable customers who may go on to self-harm
Difficult for large-scale vendors who may not be connected to the community to identify individuals risk	

Only one medium-scale vendor supported the idea of identity cards as an effective intervention. Most vendors reported that as they personally knew the majority of their customers, identity cards would not ensure that the product purchased was used for farming. In addition, they stated that other household members sometimes had to purchase pesticides on behalf of the farmer. Overall, the prescription method had some support but vendors felt that it would be difficult to implement due to insufficient numbers of authorised officers.

Our study highlights some of the barriers and facilitating factors to individual and structural suicide prevention strategies with pesticide vendors, as seen in table 2.

Community reactions

Vendors revealed that the community and relatives neither blamed the vendor nor took action against them, even when it was known that the poison had been obtained from their shop. Similarly, vendors had no experience of any investigations from either the Department of Agriculture or the police following a death from pesticide self-poisoning.

DISCUSSION

Individual-level suicide prevention strategies are often targeted at individuals considered to be at risk. Gatekeeper training and screening programmes have become popular strategies in vulnerable communities.^{9–10} Structural interventions such as limiting physical access,¹¹ instituting waiting times^{12–14} and restrictions on package sizes^{15–16} have been used to limit access to highly dangerous means of suicide and have been found to reduce the overall suicide rate. The basis of most of these strategies has relied on creating physical and/or temporal barriers to purchase, and often use inconvenience as a strategy to deter purchase.

Although there is limited support for two proposed interventions; ‘farmers identity cards’ and ‘pesticide prescriptions’, in general, the vendors reported a willingness to be more involved in community prevention and several had already taken steps to restrict access. However, there are significant challenges in identifying vulnerable customers. In addition, there is limited availability of trained mental health professionals^{17–18} available in rural settings and little pressure from the community to change practice. As a result, individual strategies may only be partially effective. However, structural interventions could be implemented in Sri Lanka where the Control of Pesticides Act (1980) regulates all aspects of the sales of pesticides. Further work with the Department of Agriculture is needed to identify effective interventions that could be implemented.

Accessing pesticides through vendors appears to be a common method for self-poisoning in rural Sri Lanka. Some vendors have already taken steps to limit access. Therefore, to some extent, vendors may be interested in acting as ‘gatekeepers’. However, identification of customers who may go on to

self-poison remains challenging given the range of pesticide outlets and their proximity to their communities. Thus, individual-level strategies targeted at identifying vulnerable customers may be only partially effective. Structural interventions targeting pesticide sales and purchasing were seen as more acceptable because strategies could be implemented in Sri Lanka and their feasibility should be studied further. Consideration needs to be given to the best way to engage communities to ensure pesticide sales are conducted in a responsible manner.

Limitations

Studying the community perspectives and the interactions between vendors and customers who wanted to purchase pesticides for self-poisoning was not possible in the scope of this study, and the findings are only relevant to rural Sri Lankan settings. In addition, this study was primarily qualitative and aimed at understanding vendor perspectives so we were unable to study the relative importance of each of these factors. Further, the categorisation of customers who were suspected by vendors might be subjective.

What is already known on this subject

- ▶ Self-poisoning with pesticides is a major public health burden in Asia
- ▶ Easy access to pesticides in rural Asian communities is seen as a contributing factor to high rates of suicide from self-poisoning.
- ▶ Several studies have found that around 15% to 20% of pesticides used for self-poisoning had been directly bought from a vendor.

What this study adds

- ▶ Pesticide vendors were aware of many individuals who had tried to buy pesticides from them for acts of self-harm.
- ▶ Vendors were interested, to some extent, in acting as ‘gatekeepers’.
- ▶ Vendors acknowledged the difficulty of distinguishing some customers at risk from legitimate customers but they would like additional training.

Contributors MW, MP, RP, AHD and FK were involved in designing the study and the format for data collection. MW and RP were responsible for the data collection and data entry. MW was responsible for the data analysis and produced the first draft version of

the paper. MP, FK, ME, SJ, SA and AHD contributed input of the revisions of the manuscript. All authors approved and agreed to the final manuscript.

Funding This work was jointly funded by WHO Sri Lanka and the South Asian Clinical Toxicology Research Collaboration. SACTRC provided the funding through a Wellcome Trust/NHMRC International Collaborative Research Grant GR071669MA.

Competing interests None.

Ethics approval Medical Research Ethics Committee, University of Ruhuna.

Provenance and peer review Not commissioned; externally peer reviewed.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/3.0/>

REFERENCES

- Gunnell D, Eddleston M, Phillips MR, *et al.* The global distribution of fatal pesticide self-poisoning: systematic review. *BMC Public Health* 2007;7:357.
- Eddleston M, Sheriff MHR, Hawton K. Deliberate self harm in Sri Lanka: an overlooked tragedy in the developing world. *Br Med Assoc* 1998;133–5.
- Eddleston M, Sudarshan K, Senthikumar M, *et al.* Patterns of hospital transfer for self-poisoned patients in rural Sri Lanka: implications for estimating the incidence of self-poisoning in the developing world. *Bull World Health Organ* 2006;84:276–82.
- Konradsen F, Hoek W, Peiris P. Reaching for the bottle of pesticide—a cry for help. Self-inflicted poisonings in Sri Lanka. *Soc Sci Med* 2006;62:1710–19.
- Eddleston M, Karunaratne A, Weerakoon M, *et al.* Choice of poison for intentional self-poisoning in rural Sri Lanka. *Clin Toxicol* 2006;44:283–6.
- Mohamed F, Manuweera G, Gunnell D, *et al.* Pattern of pesticide storage before pesticide self-poisoning in rural Sri Lanka. *BMC Public Health* 2009;9:405.
- Bose A, Sandal Sejbaek C, Suganthy P, *et al.* Self-harm and self-poisoning in southern India: choice of poisoning agents and treatment. *Trop Med Int Health* 2009;14:761–5.
- Manuel C, Gunnell DJ, van der Hoek W, *et al.* Self-poisoning in rural Sri Lanka: small-area variations in incidence. *BMC Public Health* 2008;8:26.
- Mann JJ, Apter A, Bertolote J, *et al.* Suicide prevention strategies: a systematic review. *JAMA* 2005;294:2064–74.
- Hendin H, Phillips M, Vijayakumar L, *et al.* *Suicide and suicide prevention in Asia*. WHO Press, World Health Organization, 2008.
- Yip PS, Law CK, Fu KW, *et al.* Restricting the means of suicide by charcoal burning. *Br J Psychiatry* 2010;196:241–2.
- Ludwig J, Cook PJ. Homicide and suicide rates associated with implementation of the Brady Handgun Violence Prevention Act. *JAMA* 2000;284:585–91.
- Bridges FS. Gun control law (Bill C-17), suicide, and homicide in Canada. *Psychol Rep* 2004;94(3 Pt 1):819–26.
- Ozanne-Smith J, Ashby K, Newstead S, *et al.* Firearm related deaths: the impact of regulatory reform. *Inj Prev* 2004;10:280–6.
- Hawton K. United Kingdom legislation on pack sizes of analgesics: background, rationale, and effects on suicide and deliberate self-harm. *Suicide Life Threat Behav* 2002 Fall;32:223–9.
- Hawton K, Simkin S, Deeks J, *et al.* UK legislation on analgesic packs: before and after study of long term effect on poisonings. *BMJ* 2004;329:1076.
- Mahoney J, Chandra V, Gambheera H, *et al.* Responding to the mental health and psychosocial needs of the people of Sri Lanka in disasters. *Int Rev Psychiatry* 2006;18:593–7.
- van der Hoek W, Konradsen F. Risk factors for acute pesticide poisoning in Sri Lanka. *Trop Med Int Health* 2005;10:589–96.

No minicar received a 'good' safety ratings

After Insurance Institute for Highway Safety crash tests on 2013 and 2014 minicars, only one was rated 'acceptable', and six, including the best-selling Nissan Versa were rated 'poor'. In the worst performers, the driver's space was 'seriously compromised' in the crash. The institute put the cars through its newest trial which replicates what happens when the front corner of a vehicle collides with another vehicle or a solid object at 40 mph. (noted by IBP).

Study casting doubt on child car seats replicated

Jones and Ziebarth, economists in the Policy Analysis and Management faculty at Cornell University, posted the PDF of their paper that is still under review. It purports to have replicated findings by Levitt reported in 2008 that child car seats for 2–6-year-olds are no safer than seat belts, and that their improper use actually increases the risk of injury. To say the least, this is disturbing. Before rushing to change anything, it would be wise to wait until the paper is peer reviewed and published in a respectable journal. Also bear in mind that all these analyses are by economists whose assumptions often differ from those of epidemiologists. However, what I read was troubling. (noted by IBP).

Appendix 1: Questionnaire Details

First Interview

1. General characteristics of shop

- (i). Geographical location
- (ii). How old is the outlet (years)
- (iii). Shop observation

2. Type of the outlet

- (i). Nature of the business
- (ii). Shop hours
- (iii). Pesticide sales
- (iv). Registration
- (v). If registered year
- (vi). Where pesticide obtained

3. Respondent details?

- (i). Category
- (ii). Gender
- (iii). Experience of pesticide selling (years)

4. Training participation

- (i). Did you participate any training related to pesticide selling before?
- (ii). Description of training

5. About the customers

- (i). Coverage area
- (ii). Distance farmers travelling
- (iii). How farmers approach shop

- (iv). Your recommendations to farmers on pesticides
- (v). Farmer concerns on pesticides
- (vi). Farmer knowledge of colour coding
- (vii). Changes in trends of purchase impact of IPM

6. Banning questions

- (i). Awareness of any bans
- (ii). Knowledge of bans
- (iii). Reasons for bans
- (iv). Substitute pesticides
- (v). Information to farmers
- (vi). Responses to farmers about bans
- (vii). Customer reactions
- (viii). Vendor reactions to bans

7. Impact of banning

- (i). Views on bans for your business
- (ii). Other vendors reaction to bans
- (iii). Impact on farmers
- (iv). Community reaction to bans

8. Possible Interventions to regulate pesticides

- (i). Government responses
- (ii). Phasing out

Second Interview

1. About the suicide risk customers

- (i). Are you worried about selling pesticides to a people who may use it for suicide?
- (ii). Can you describe an experience where you had a high risk buyer trying to buy pesticides?

2. Identification of risk customers

- (i). Do you find it hard to recognize people with suicidal intent?
- (ii). Do you notice a difference between male and female desperate buyers?
- (iii). What are the methods/ tools that you use to distinguish high risk buyers?

3. Responses to risk customers

- (i). What was your immediate response once you recognized the high risk buyer in your shop?

4. Previous Experiences

- (i). Do you have any previous experience of selling pesticides to desperate buyers where they went on to use it for poisoning?
 - (a). If yes, please describe an example where this happened; "
 - (b). Was there any reaction in the community in this example?

5. Prevention

- (i). What support do you think is needed to help dealers recognize high risk buyers?
- (ii). Have you had any training to help recognize high risk buyers?
 - (a). If yes, was the training useful and why?
- (iii). What support do you think is needed to help suicidal people thinking about buying pesticides?

(iv).What do you think other in the government or companies could do to reduce poisoning?