Safer Access to Pesticides: Community Interventions

Background

Deaths from pesticide ingestion are a major contributor to premature mortality and the global burden of suicide. An estimated 877,000 people committed suicide in 2002 (Table 1). In attempted suicide, which is considerably more frequent (up to 40 times) than completed suicide, pesticide poisoning results in temporary or permanent disability.

Table 1: Suicide (numbers and proportion of DALYs* per WHO region)

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<tr>
<th>WHO region</th>
<th>Number of suicides</th>
<th>DALYs (%)</th>
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<tr>
<td>Africa</td>
<td>34,000</td>
<td>0.2</td>
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<tr>
<td>Americas</td>
<td>63,000</td>
<td>1.0</td>
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<tr>
<td>South-East Asia</td>
<td>246,000</td>
<td>1.7</td>
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<tr>
<td>Europe</td>
<td>164,000</td>
<td>2.3</td>
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<tr>
<td>Eastern Mediterranean</td>
<td>34,000</td>
<td>0.7</td>
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<tr>
<td>Western Pacific</td>
<td>333,000</td>
<td>2.6</td>
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<tr>
<td><strong>World</strong></td>
<td><strong>877,000</strong></td>
<td><strong>1.4</strong></td>
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* Disability Adjusted Life Years (DALYs) are the sum of years of life lost due to premature mortality in the population and the years of productive life lost due to disability.


While suicidal behaviours have been recognized as a major public health problem, the role of pesticides has received far too little attention. Agricultural pesticides are the substances most commonly used for self-poisoning in low- and middle income countries, particularly in rural areas. Examples come from rural China, where pesticides accounted for over 60% of suicides (Phillips et al., 2002), from rural areas of Sri Lanka, where the proportion of suicides due to pesticides reached 71% (Somasundaram & Rajadurai, 1995), and Malaysia with more than 90% of pesticide suicides (Maniam, 1988). As research evidence suggests that pesticide ingestion accounts for over 60% of suicides in many rural areas of China and South East Asia, Gunnell & Eddleston (2003) estimated that there are around 300,000 pesticide suicides each year in these places alone.

Evidence is emerging that pesticide poisoning is equally important in low- and middle income countries in South America and Africa (Bertolote et al., 2006). In Brazil, for example, the high suicide rates in tobacco growing regions may be due to the wide use and availability of pesticides (Csillag, 1996). Over 80% of suicides were due to pesticide poisoning in one southern rural area of Trinidad (Hutchinson et al., 1999) and in Suriname, a high proportion of both fatal (55%) and non-fatal (44%) episodes of suicidal behaviour involved pesticides.
Graafsma et al., 2005). In Africa, data from Zimbabwe showed that organophosphate self-poisoning accounted for around three quarters of 200 hospital admissions (Dong & Simon, 2001) and findings from Malawi implicated pesticide self-poisoning in almost 80% of suicides (Dzamalala et al., 2005). Although an estimate for these regions or a global estimate is not available due to the lack of large-scale, rigorous surveillance data, we may safely assume that we are confronted with millions of cases of intentional (i.e. suicidal behaviour) and unintentional (i.e. accidental and occupational) pesticide poisoning, hundreds of thousands of which result in deaths in low- and middle income countries each year.

A WHO global public health initiative. The Impact of Pesticides on Health - Preventing Intentional and Unintentional Deaths from Pesticide Poisoning

Recognizing the urgent need for immediate action, three departments in WHO (Mental Health and Substance Abuse, Injuries and Violence Prevention, and the Programme on the Promotion of Chemical Safety) announced a global public health initiative to tackle this problem in collaboration with other relevant UN agencies, governments, academic institutions, nongovernmental organizations and interested parties. In particular, WHO and the International Association for Suicide Prevention (IASP) have signed an agreement for joint action.

Acknowledging the need of an intersectoral (e.g. health, education, media, agriculture) and multi-level (local, national, and global) approach (World Health Organization, 1998), the overall goal of this initiative is to reduce mortality and morbidity related to pesticide poisoning.

The following objectives have been identified:

- Review and recommend improved pesticide regulatory policies;
- Implement sustainable epidemiological surveillance and monitoring of pesticide poisoning in clinical settings and communities;
- Improve the medical management and mental health care of people with pesticide poisoning in health care facilities at different levels;
- Provide training in the safe handling, identification and management of pesticide poisoning at different sectors and levels;
- Develop or strengthen community interventions that minimize risks of intentional and unintentional pesticide poisoning.

Any actions in working towards these objectives should be ideally framed within sound national suicide prevention strategies and pesticide policies, including their implementation at different levels. WHO is ready to provide the relevant technical assistance to its Member States in their development or improvement.
Community Interventions for Safer Access to Pesticides

As part of the broader public health initiative, WHO convened a meeting on community interventions for safer access to pesticides, bringing together leading experts working in the field of pesticide poisoning and self-harm (see Annex 2). The purpose of the three-day meeting, 10-12 May 2006, Geneva, Switzerland, was three-fold:

- identify effective and acceptable community interventions that promote a safer access to pesticides;
- develop an outline for the implementation of those interventions, including monitoring and evaluation (based on multiple outcome indicators); and
- identify potential sites for implementation.

Promising community interventions for safer access to pesticides that have shown clear or some evidence for effectiveness or that have provided preliminary data to support their effectiveness are presented herewith in a concise way (pertaining to rationale, target group, key stakeholders, resource needs, activities, and primary outcomes of evaluation). A detailed presentation in tabular form is found in the Annex 1 (including, in addition, information about evidence of effectiveness, cost-effectiveness, sustainability, potential ethical issues, background monitoring, control group, secondary outcomes of evaluation, process measures, instruments/scales, and timing of evaluation). Special attention has been given to the description of the monitoring and evaluation of these interventions, because every effort needs to be made to provide further information about their effectiveness and cost-effectiveness in different settings.

Three main types of promising community interventions have been identified:

- safer storage (including two different interventions)
- education (including five different interventions)
- psychosocial interventions (including one intervention).
Safer storage: lockboxes for storing pesticides in farming households

**Rationale:** Limiting access to lethal means prevents suicidal behaviour.

**Target group:** All households that use pesticides.

**Key stakeholders:** Local government, lock and box producers, and a coordinating agency (governmental or nongovernmental).

**Resource needs:** Costs of the production of the locks and boxes, the installation of the lockboxes, personnel time in the coordinating agency, education about safe storage and the use of the boxes, and monitoring their use.

**Activities:**
1. Design and production of the boxes.
2. Identification of households that will be given the boxes.
3. Community education about safe storage of pesticides.
4. Training of the households with boxes in their use and maintenance.
5. Monitoring of the use of the boxes.
6. Assessment of the cost of producing and installing lockboxes and of promoting and monitoring their use.
7. Monitoring of all intentional and unintentional pesticide ingestions (fatal and non-fatal) in the community.

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households;
- cost-effectiveness of the intervention.
Rationale: Limiting access to toxic means prevents suicidal behaviour.
Target group: Communities that have high rates of pesticide-related suicides and attempted suicides.
Key stakeholders: Community leaders, administrative authorities, health authorities, agricultural authorities, pesticide retailers, NGOs.
Resource needs: Funds to build and maintain centralized storage facility, facility manager, personnel to conduct public promotion and to deal with complaints of users of the storage facility.

Activities:
1. Discussion of which method of communal storage* would be most acceptable and feasible in the community.
2. Construction of the centralized storage facility and identification and training of the manager(s) for the facility (see training for retailers).
3. Promotion of the utilization of the communal storage throughout the community.
4. Monitoring of the usage of the communal storage and ensuring that there is a mechanism for soliciting complaints about the new system.
5. Assessment of the cost of building and managing the storage facility, and of promoting and monitoring the use of the facility.
6. Monitoring of all intentional and unintentional pesticide ingestions (fatal and non-fatal) in the community.

* (a) centralized location where each farming family has its own locker that they can access at any time; (b) centralized storage that has to be opened by a ‘manager’ before a family can get access to its own locker; (c) centralized storage with individual lockers, but only manager has direct access to pesticides, on request the manager dilutes amount of pesticide the farmer plans to use in the current day; (d) centralized purchase/distribution in each village by a single authorized (or licensed) distributor who provides pre-application diluted form of pesticide for use in current day.

Primary outcomes of evaluation:
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households;
- cost-effectiveness of the intervention.
**Rationale:** Education can change both knowledge and attitudes and, thus, result in changes in behaviour related to the safe storage of pesticides.  
**Target group:** Farmers working in areas with high rates of suicide and attempted suicide using pesticides.  
**Key stakeholders:** Local agricultural experts, health officials, retailers, agrochemical industry, and NGOs concerned about suicide.  
**Resource needs:** Materials for target group, trainers, and trainers for the trainers, distribution system for educational materials, venues to provide training.

**Activities:**
1. The content of the educational intervention* needs to be brief and simple enough so most in the target group can understand it, but detailed enough that it provides all the essential information about:  
   (a) appropriate methods of preparation, application, storage and disposal;  
   (b) description of labelling symbols;  
   (c) health and environmental risks associated with pesticide use; and  
   (d) recognition, first aid, and reporting of acute toxic effects following intentional or unintentional pesticide poisoning.

* Multiple methods have been employed to transmit this educational content, such as peer-led education, group meetings, TV, radio, posters and leaflets, street plays, etc., but there is no clear evidence about the benefits and disadvantages of the different methods. The method(s) chosen need(s) to be appropriate for the educational level and other characteristics of the target community.

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;  
- methods of storage of pesticides in the community households.
**Rationale:** Responsible sale to responsible users, appropriate storage of pesticides within shops, compliance with local and/or national regulations related to the sale of pesticides, training of end users at time of purchase and refusal to sell pesticides to those suspected of suicidal intent should decrease pesticide-related suicidal behaviour and decrease case fatality following intentional ingestion of pesticides (because of restricted access to the most toxic pesticides).

**Target group:** Pesticide retailers.

**Key stakeholders:** All pesticide retailers; manufacturers of pesticides, licensing authorities, and government agencies responsible for monitoring the sale of pesticides.

**Resource needs:** Trained technical staff to conduct regular visits to the retail sites and to classify attempted and completed suicides. Educational materials for retailers to give to end-users, training materials for the retailers themselves, for those who make site visits to retail sites, and for those who assess pesticide-related suicides and attempted suicides.

**Activities:**

1. Regular visits every two months by Community Health Officer or Local Agricultural Officer (or appropriate equivalents) to all retail outlets for pesticides in a defined area to check on retailers.

2. Provision of retailers with educational brochures for end users and instruction on how to train end users in the safe use, storage and disposal of pesticides. Training of retailers about the dangers of suicide by pesticide ingestion and about steps that could be taken if they are suspicious about the intention of a particular purchaser.

3. Education to change the behaviour of non-compliant retailers.


**Primary outcomes of evaluation:**

- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households.
**Rationale:** Farmers' knowledge, beliefs and attitudes about pesticide use are strongly influenced by resource people in the community, so identifying and training these individuals can have a community-wide influence on local practices and, thus, lead to decreased rates of pesticide-related suicidal behaviour.

**Target group:** Agronomists and other individuals farmers use as resource persons to learn about pesticide usage (e.g., experienced or successful farmers, local leaders, retailers, etc.).

**Key stakeholders:** Ministry of agriculture, local government.

**Resource needs:** 'Training the trainers' materials adapted for the target group. Experts to provide the training. Training venues.

**Activities:**
1. 'Training of the trainers' will depend on the resource persons* that exist in the community.
2. Focus of the training on the appropriate use, storage and disposal of different types of pesticides, but also on the suicide risks related to pesticides, and the recognition and first-aid management of the toxic effects following intentional or unintentional pesticide poisoning.
3. Enhancement of the 'resource person' role of the trained individuals in the community.

* This can be government agronomists (-> training packages as part of their government-sponsored continuing education); retailers (-> training as part of the 'retailer intervention', see training retailers); or other community members, e.g. local farmers or officials (-> training sessions suitable to their educational level and availability).

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households.
**Rationale:** Mass media (newspapers, TV, radio broadcasts, etc.) have a strong influence on public attitudes and, thus, can be employed to enhance the effect of educational programmes about pesticides or, negatively, can increase rates of suicidal behaviour by inappropriate glamorization, excessive coverage, and overly detailed reports of suicides.

**Target group:** All local media outlets that are widely available in a target community.

**Key stakeholders:** Government departments responsible for the media, journalists, journalism schools, agencies implementing programmes to decrease pesticide-related suicides in the target community.

**Resource needs:** Guidelines for reporting suicides adapted to needs of local media; suicide experts who can act as consultants for local media, personnel to collect all local media reports about suicide and about the pesticide management programme and to make a qualitative assessment of the appropriateness of the reports.

**Activities:**
1. Identification of media widely available in the target community and arrangement of meetings with media representatives.
2. Encouragement by the media of public support for the pesticide management programme and promulgation of specific educational messages of the programme.
3. Provision of guidelines to the media for 'appropriate' reporting of suicides.
4. Provision of contact numbers of key figures in the pesticide management programme and of suicide prevention experts for help and tutorials.
5. Periodic meetings (every 6 months) between media representatives and programme organizers to discuss the content of media reports.

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households.
**Rationale:** Training children not only educates the coming generation of farmers, but children who have learnt this material can indirectly train the adults in their household and/or encourage appropriate behavioural changes regarding the use, storage and disposal of pesticides by adults in their households.

**Target group:** School age children in communities that have high rates of pesticide-related suicide and attempted suicide.

**Key stakeholders:** Education authorities, teachers, parents, agricultural authorities.

**Resource needs:** Educational experts and agricultural experts will need to work together to develop the teaching materials and to regularly modify the materials; the materials need to be printed and distributed; training sessions for the teachers who will conduct the courses need to be organized; and back-up psychological experts will be needed in case the course content elicits extreme reactions from the students.

**Activities:**
1. Meetings of education authorities, teachers and parent groups to discuss the importance of educating students about pesticides and the best way to incorporate this content into the school curriculum.
2. Development of age-specific teaching materials and teaching manuals that focus on the safe use, storage and disposal of agricultural chemicals (although suicide is not directly mentioned, information about the health hazards related to pesticide use is included).
3. Training of teachers, including instructions on how to discuss pesticide-related suicide if students bring this up as part of the discussion. Provision of back up psychological support.
4. Monitoring of changes in knowledge and attitudes about pesticide use of school-age students and of responses to the course material of students, parents and teachers. Regular modification of the course content and method based on these evaluations.

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning;
- methods of storage of pesticides in the community households.
**Rationale:** A number of moderating factors may influence pesticide-related suicides and adherence to pesticide management and storage recommendations. These include impulsive personality traits, mental disorders, social isolation, acute interpersonal stressors, alcohol use, domestic violence, etc. Psychosocial support strategies can decrease the impact these factors have on the risks of ready access to highly toxic means (i.e., pesticides).

**Target group:** High risk groups with ready access to pesticides, such as communities in remote villages with high suicide rates and heavy use of pesticides. Focus may also be on individuals who have made prior attempts or are at high risk for some other reason (e.g., isolated ill elderly).

**Key stakeholders:** Community-based health workers, government agencies responsible for community welfare services, NGOs.

**Resource needs:** Volunteers and/or professionals to provide the psychosocial support; trainers, training materials and training sites to train the providers of the services; management expertise to select target communities and individuals, to supervise the provision of services, and to conduct on-going evaluations; community locations to conduct group sessions.

**Activities:**
1. Periodic (fortnightly or monthly) individual or group meetings that may be situation specific (focused on a specific stressor) or more generally focused on stress management and/or conflict management. All interventions should include assessment of psychosocial barriers to compliance with proper pesticide management procedures and proactively try to reduce these barriers. Groups may be time-limited with fixed membership or on-going with open membership. Same-sex groups are typical but mixed-sex groups are also possible. Youth groups and elders’ groups should probably be separated from those for married adults.

**Primary outcomes of evaluation:**
- rates and methods of suicide, attempted suicide, and fatal and non-fatal pesticide poisoning.
Recommendations

In view of the magnitude of the problem and the availability of effective and affordable interventions, herewith presented, it is highly desirable that:

- Member States review the list of authorized agricultural products in their country and eliminate those that do not meet the Basel, Rotterdam, and Stockholm Conventions, which cover key elements of the management of hazardous chemicals (www.basel.int; www.pic.int; www.pops.int; last accessed on 1 September 2006).

- Member States explore the impact of suicide in the national mortality profile of their country and the specific role of pesticides therein.

- In countries or regions where intentional and unintentional pesticide poisoning represents a public health problem, the following steps be followed by interested parties (governments, regions, communities, NGOs, etc.):
Recommended steps to assess the feasibility and effectiveness of the proposed community interventions and to adapt them to local conditions

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<tr>
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<th>Selection of intervention(s):</th>
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<tr>
<td></td>
<td>Decide if pesticide suicide is an important concern for the country and, if so, which of the recommended interventions should be assessed in which communities (localities or population subgroups).</td>
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<th>Establishment of a Coordinating Group and a Working Group:</th>
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<td></td>
<td>a) identify individuals (agencies) responsible for coordination, funding, implementation, and evaluation of the activities (there may be different individuals or agencies for each type of intervention);</td>
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<td>b) establish a Coordinating Group (situated in a government ministry or a high-profile NGO) of stakeholders and experts to monitor and adjust the intervention over time;</td>
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<td>c) appoint a Working Group that will be responsible for the day-to-day work of implementing the decisions of the Coordinating Group; and</td>
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<td>d) provide the Coordinating Group and Working Group with the personnel and other resources needed.</td>
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<th>Identification of potential sites for pilot testing of interventions:</th>
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<td>Sites for pilot testing should be reasonably representative of the eventual target population for the interventions. If time and resources permit, different interventions should be conducted in different locations before combinations of interventions are simultaneously conducted in a single location. The alternative method of employing a group of interventions simultaneously, though quicker and less expensive, has the disadvantage that the 'active component' of the intervention will remain unknown until further research is conducted. The number of sites selected and their population need to be sufficient to provide a clear answer about the effectiveness of the intervention.</td>
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<th>Situation analysis in target sites:</th>
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<td>a) assess acceptability of intervention(s) to local leaders, potential target group, and individuals (agencies) responsible for implementation;</td>
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<td>b) collect baseline data (if good-quality retrospective data is available this can be employed; if not, prospective baseline data must be collected);</td>
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<td>c) determine the availability of needed personnel and other resources; and</td>
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<td>d) evaluate local opportunities and constraints for implementing the intervention.</td>
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<th>Adaptation of the intervention(s):</th>
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<td>In collaboration with local community leaders and opinion leaders revise the proposed target groups, activities, and evaluation procedures based on the site-specific situation analysis. Add any feasible supplemental activities that will increase the local acceptability and feasibility of the intervention, and, thus, increase the community 'ownership' of the programme.</td>
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| 6 | **Determination of the structure of formal assessment of the intervention:**

   a) include non-intervention 'control' sites (used for comparison with the intervention sites);
   b) assess reliability and validity of methods of assessing outcome measures;
   c) where possible use single-blind assessment of 'soft' outcome measures (e.g., satisfaction, attitudes, subjective well-being, etc.); and
   d) assess 'fidelity' of application of intervention(s) (i.e., degree to which intervention is administered as intended).

| 7 | **Pilot test, revision and implementation of the intervention:**

   a) develop management procedures to ensure fidelity of application and quality control of the intervention;
   b) provide appropriate training to all persons who provide the intervention or evaluate the intervention;
   c) pilot test the proposed intervention and evaluation procedures in 2-3 representative locations to ensure that the planned activities are feasible;
   d) based on the results of the pilot test, revise the intervention and evaluation procedures as needed; and
   e) implement the intervention in all target sites.

| 8 | **Monitoring of all outcomes of interest:**

   In addition to monitoring intervention-specific outcome measures, reliable monitoring system(s) for the following measures should be established in ALL of the 'intervention' communities and 'control' communities:

   a) access of community members to different classes of pesticides;
   b) proportion of households that appropriately store pesticides;
   c) proportion of pesticide users who follow recommended methods of preparation, usage and disposal;
   d) rates of attempted and completed suicide by all methods (adjusted based on estimates of the rates of missing and misclassified cases);
   e) rates of fatal and non-fatal accidental poisoning with pesticides; and
   f) direct and indirect costs associated with the intervention (to use in the cost-benefit assessment for each specific outcome measure).

| 9 | **Assessment of sustainability, revision of the intervention and promulgation of the results:**

   a) continue administering the intervention in the original target sites beyond the period used to formally evaluate effectiveness and assess the resource needs and changes in activities and evaluation procedures needed to sustain the intervention activity indefinitely;
   b) based on the evaluation, revise the intervention and evaluation activities for application at other (new) locations; and
   c) mobilize community support and government and non-government resources needed to sustain the intervention and to gradually 'upscale' (disseminate) the intervention to other locations in the country.
References


ANNEX 1
Tables of interventions

ANNEX 2
List of participants