Pesticide sprayers’ knowledge, attitude and practice of pesticide use on agricultural farms of Ethiopia

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Pesticide sprayers from five state-owned agricultural farms took part in a study that evaluated their knowledge, attitude and practice of pesticide use on farms. Demographic features of the sprayers showed that the majority of them had primary-level education. The duration of work as sprayers on the farms ranged from 1 month to ~10 years, with 59% of them having worked as sprayers for <5 years. Their knowledge about hazards from pesticides was indicated by the responses they gave to the standard questionnaire. Careful working was considered to be very important by 93% of them, while only 7% suggested the use of personal protective devices (PPD). On some of the farms, sprayers were provided with inappropriate/unfit and worn-out PPD; 18% of the sprayers had unfit goggles and 29% used worn-out gloves. To minimize risk from pesticide application, 63% suggested avoiding applications during windy and sunny weather, 32% suggested the provision and proper use of PPD, while only 3% of them felt medical check-ups and training were important, and 2% suggested risks from spraying were best controlled by leaving their job. The hygiene and sanitation practices of the sprayers require much improvement. An attitudinal change is needed, together with the provision of better facilities and infrastructure. We recommend that pesticide safety education be given to the sprayers. In addition, appropriate PPD should be used, with regular maintenance and timely replacement of worn-out parts.

Key words: Agricultural farms; Ethiopia; knowledge, attitude and practice of pesticide use; personal hygiene and sanitation; personal protective devices; pesticides; pesticide sprayers.

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Introduction

Pesticides of various kinds have been widely used on farms in Ethiopia for the last four decades. These pesticides are usually organophosphates, carbamates and to some extent organochlorides [1]. Some pesticides that are restricted and banned in industrialized countries are used in many third-world countries [2]. Pesticide sprayers are regularly engaged in spraying pesticides that are applied at different growing stages of a particular crop. The pesticides are prepared in different formulations, and are usually applied as an aerosol produced from knapsacks and simple hand sprayers. The health hazards associated with pesticide handling are little understood by the sprayers. The communities living around the farm fields may also be unaware of the health hazard. However, it is known that extensive use of pesticides has adverse effects on health [3–11], and gradually contaminates the soil, water and surrounding environment [12–14].

The use of personal protective devices (PPD) when spraying can reduce contact with, and inhalation of, pesticides, thereby potentially reducing the acute and chronic health hazards of pesticides to the sprayers. Pesticide sprayers’ knowledge, attitude and practice towards the health hazard of pesticides have not been well

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assessed in Ethiopia. There is a great concern that farm workers should be aware of the adverse effects of pesticide use if not handled properly. In this paper, we present data on the use of pesticides, use of PPD, and knowledge, attitude and practice of pesticide sprayers in the major farms of Ethiopia.

Subjects and methods

Five state farms were included in the study. Four of them—namely, Awara Melka, Nura Era, Tibila and Zewai—are located along the Rift Valley and range in altitude from 700 to 1500 m above sea level. The farms are irrigated using the Awash River. The irrigated farms grow cereals, vegetables, vines and fruit trees. Tseday, the fifth farm, is in the highlands, ~30 km west of Addis Ababa. A variety of pesticides, mainly organophosphates, are applied at different growing stages, whenever pests are rampant. Most farms in the Rift Valley area are similar in their pattern of pesticide use.

The study subjects were male farm workers. They were engaged in mixing the pesticides, and loading them into containers prior to application on the farm fields, as well as in spraying the crops. The aim of the study was explained to the sprayers and they consented to answer the questionnaire. The authors administered the questionnaire, part of which was adapted from the World Health Organization (WHO) Field Surveys of Exposure to Pesticides Standard Protocol [15]. Individual farm workers were interviewed one at a time. The overall response rate was ~95%. The study was conducted over a 2 year period from 1998 to 2000.

The data were analysed using Epidemiological Information (EPI-INFO) 6, Version 6.04b [16].

Results

The demographic features of the 136 sprayers are given in Table 1. The median age of the sprayers was 25 years (range 16–50 years).

Table 2 shows the sprayers’ responses to questions about their knowledge, attitude and practice of pesticide use. The sprayers recommended washing if pesticides splashed on their bodies but did not seem convinced of the benefit of going to a health clinic. A few believed that working with pesticides should not be a problem at all, while the vast majority considered careful working to be essential. Written information on pesticide packaging was not read by the sprayers. Most of them believed that pest control workers should wear protective equipment. The sprayers said that windy and sunny weather were the major problems faced during pesticide applications. As solutions to the problems of pesticide spraying, they suggested, in order of importance, the following: avoid windy and sunny weather; provision and proper use of PPD; medical check-up and training; and leaving the job for alternative employment as there is no solution.

PPD use by the sprayers is summarized in Table 3. The usual types of PPD provided in the farms were overalls, safety shoes, respirators, gloves and goggles. However, these PPD were not always appropriately provided to the sprayers. In addition, even when available, some PPD were classed as inappropriate/unfit or worn out.

Table 4 shows the personal hygiene and sanitation practices of the sprayers. The vast majority of the sprayers washed their hands before they ate or drank. However, a considerable number of them engaged in eating, drinking or smoking activities during work with pesticides, and also kept meals near pesticide containers. Their drinking water sources were often from pesticide-treated areas. The habit of taking a shower was apparently uncommon, though an overwhelming majority of the sprayers changed their clothes before and after pesticide exposures.

Discussion

The median age of the sprayers showed that they were mostly from young age groups. Their level of education was predominantly primary, and the majority were non-smokers (a non-smoker was defined as somebody who had smoked <20 packs in a lifetime or <1 cigarette/day for 1 year; an ex-smoker had smoked previously but had quit for at least 1 year; and a smoker smoked cigarettes regularly). About one-third of the sprayers had worked for <5 years. The half-day shift worked by the large majority of the sprayers indicates that pesticide spraying was usually only performed over certain hours of the day and

Table 1. Demographic features of the sprayers

<table>
<thead>
<tr>
<th>Demographic feature</th>
<th>n (%)</th>
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<tbody>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>76 (55.9)</td>
</tr>
<tr>
<td>Married</td>
<td>59 (43.4)</td>
</tr>
<tr>
<td>Divorced</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>82 (60.3)</td>
</tr>
<tr>
<td>Secondary</td>
<td>33 (24.3)</td>
</tr>
<tr>
<td>College</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Able to read and write</td>
<td>1 (0.7)</td>
</tr>
<tr>
<td>Illiterate</td>
<td>19 (14.0)</td>
</tr>
<tr>
<td>Smoking habit</td>
<td></td>
</tr>
<tr>
<td>Smokers</td>
<td>11 (8.1)</td>
</tr>
<tr>
<td>Non-smokers</td>
<td>125 (91.9)</td>
</tr>
<tr>
<td>Duration of work (years)</td>
<td></td>
</tr>
<tr>
<td>0–5</td>
<td>78 (58.6)</td>
</tr>
<tr>
<td>6–10</td>
<td>34 (25.6)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>21 (15.8)</td>
</tr>
<tr>
<td>Work shift</td>
<td></td>
</tr>
<tr>
<td>Full time</td>
<td>5 (3.7)</td>
</tr>
<tr>
<td>Half day</td>
<td>131 (96.3)</td>
</tr>
</tbody>
</table>
did not necessitate exposure for the whole day. This is usually the case in similar farms in other countries [17]. The problem of pesticide spillage was mainly attributed to improper fitting of the lids of the containers. This was a significant problem, and the sprayers stated that when they carried the motorized knapsacks their clothes often got wet. Provision of properly fitting lids could alleviate this problem. During pouring and loading by hand, pesticides could also come into contact with the hands or other parts of the body of the sprayers. Pesticide exposure is increased by such inappropriate practices.

Many of the sprayers believed that washing would remove pesticides from contaminated body surfaces. Others suggested visiting health clinics. However, there were a few who said there was no problem with pesticide exposure, suggesting that some of them were not knowledgeable about the hazardous nature of these chemicals. The majority felt that careful working with pesticides was more important than using PPD. Care is advisable in this kind of work, but the use of PPD can further minimize the risk of direct contact and inhalation of aerosol pesticide formulations. There is a need to raise the awareness of the sprayers and bring some attitudinal change towards their conventional practices. The level of education of the sprayers could be one of the reasons for such behaviour. Most of them could not read or understand instructions on pesticide packages, which are often written in foreign languages. Anecdotally, there was a report that even when able to read, some farm workers were reluctant to read manufacturer’s labels [18]. An alternative approach could
have been that their immediate supervisor(s) would explain the labels on packages to them and urge them to give attention to appropriate safety practices. As Wasserstrom and Wiles [19] noted in their study, farmers reported a greater awareness of safety issues after training and successfully modified their behaviour to better protect themselves. Hwang et al. [20] reported that among the participants in their study group, the perception that PPD were useful was associated with at least a high school education. Many sprayers considered windy and sunny weather as the major problem in the area. Wind plays a role in pesticide spraying. If it is against the spraying direction, it can distract the proper spraying manoeuvre and take the chemical off target. Sunny weather usually results in rapid evaporation of the chemical formulations, which is undesirable.

Provision of PPD—including gloves, respirators and goggles—was a problem in some of the farms. Contamination of the skin is a major route of absorption. Some sprayers were reluctant to wear gloves in hot weather. Such unsafe practice was also reported among pesticide sprayers in the Mississippi Delta [21]. Studies have shown negative attitudes towards special protective clothing [22,23]. In the study by De Jonge et al. [24], farm workers felt positive towards a traditional workshirt-and-jeans-type outfit. As an alternative to standard, often uncomfortable PPD, the use of traditional work clothing fabrics with selected chemical finishing has been suggested [25].

In the absence ofoggles, the eyes and nose also serve as routes of pesticide poisoning. This has been documented and studied by other workers. Dementi [26] reported that in Japan the incidence of visual problems was significantly correlated with agricultural organophosphate dispersions.

The personal hygiene and sanitation of the sprayers could also be improved. The farm community should have the right to clean water and avoid using water sources near pesticide-treated areas. Most of the sprayers either ate, drank or smoked during pesticide work. Similar behaviour was reported by Gomes et al. [23]. Such an attitude contributes to the total body burden of pesticide. Many of the sprayers did not bother to shower regularly. The attitude of the workers towards hygiene and sanitation must be improved, and there is scope for the provision of better facilities and infrastructures. Finally, our own data as well as recent studies conducted on pesticide handling practices and pesticide exposure beliefs [27,28] emphasize that there is a great need for pesticide safety education, which seems to be a universal problem in pesticide spraying.

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**References**


