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Sale, storage and use of legal, illegal and obsolete pesticides in Bolivia

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Abstract: Unregulated selling practices, bad storage habits and the use of illegal pesticides in Bolivia are widespread, with increasing negative consequences on public health and the environment. The present study describes the selling, storage and use of legal, illegal and obsolete pesticides among pesticide retailers and farmers in Bolivia. A cross-sectional study was conducted on 191 pesticide-using farmers and 40 pesticide retailers. Data were gathered in 2009 in La Paz County, Bolivia. A questionnaire was used to evaluate pesticide handling practices and observational data on pesticide stocks and storage was assessed through direct visits on site. Banned, outdated and highly toxic pesticides were found stored on most smallholder farms. A mean of 299 g of pesticides was found on each farm, of which 60% were obsolete. Knowledge on pesticide toxicity and safe handling practices were lacking among both retailers and farmers, and poisonings were frequently reported. Significant figures of obsolete pesticides were found outside of the officially recognized dumping sites. This underlines the necessity of including the small but numerous amounts of pesticides stored at farms, when calculating a country's total amount of obsolete pesticides. Better regulations of imports, sale and storage and an improved use of safety measures when handling pesticides needs to be urgently addressed.

Subjects: Environment & Agriculture; Environmental Studies & Management; Environmental Change & Pollution; Environment & Health; Occupational & Environmental Medicine; Occupational Health & Safety

Keywords: pesticides; agriculture; obsolete pesticides; pesticide retailer; low-income countries

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PUBLIC INTEREST STATEMENT

Unregulated pesticide use in low-income countries are a widespread problem, with increasing negative consequences on public health and the environment. In many low-income countries, pesticides no longer in use are being accumulated in larger dumping sites and in farmers' own properties, when in reality they ought to be disposed of to prevent environmental pollution and harm to the surrounding wildlife and populaces. The present study describes the selling, storage and use of legal, illegal and obsolete pesticides among pesticide retailers and farmers in Bolivia.

In this paper, an obsolete pesticide is defined as a pesticide with at least one of the following characteristics; (a) lacking an intact label, (b) lacking a Ministry of Agriculture stamp, (c) being outdated, (d) not showing expiry date, (e) being prohibited for use in Bolivia or (f) not stored in its original container.

1. Introduction

Widespread pesticide use in low-income countries has entailed a number of challenges to human health and the environment over the past few decades. Agrochemicals have been imported to low-income countries and economies in transition since the late 40s, mainly in an attempt to control vector-borne diseases or to be used in the agricultural sector as crop protection. Today, however, selling practices of agrochemicals have become highly problematic. In many low-income countries, pesticide imports are sold to licensed retailers via wholesalers, who then supply the end users, predominantly farmers and livestock keepers. Each of the distributional steps is characterized by bad pesticide handling, poor regulatory control, illegal trade and poor knowledge of their inherent danger (Pereira, Boysielal, & Siung-Chang, 2007; United Nations Environment Programme Chemicals [UNEP], 2003). Access to pesticides is often uncontrolled and challenges, such as unauthorized dealing and selling to minors, have previously been documented (Pereira et al., 2007; Yang et al., 2014). Highly toxic pesticides can be found on the streets, in markets and are available almost anywhere to anyone. Also, great informational deficiencies in every chain of transaction between buyer and seller exists, where pesticide retailers commonly act as the main source of information on pesticide toxicity and handling to the users (Stadlinger, Mmochi, & Kumblad, 2013; Yang et al., 2014). Despite the key role retailers seem to play as information source to the pesticide users, they remain a poorly studied group in scientific literature.

Another problematic aspect of widespread pesticide use is the ongoing stockpiling of toxic chemical waste in low-income countries. Pesticides that are outdated, banned or simply unwanted are accumulating in inadequate storage sites and are posing a serious threat to the safety and health of the local populaces (Aqiel Dalvie, Africa, & London, 2006; Dvorská et al., 2012). In places where public resources are limited and clean-up is pricey, pesticide-using farmers might end up with large quantities of chemicals on either their properties or other unofficial dumping sites, since they lack the knowledge and the means to safely remove them (Aqiel Dalvie et al., 2006; Dasgupta, Meisner, & Wheeler, 2010; Haylamicheal & Dalvie, 2009). Stockpiles are found badly sheltered or even outdoors, which leaves them exposed to a diverse climate including heavy precipitation, thus risking leakage and corrosion. This may cause the chemicals to disperse and contaminate the surrounding soil and groundwater (Alamdar et al., 2014; Dvorská et al., 2012; Querejeta et al., 2012). Contamination of food products, such as eggs and milk, after pesticide dumping or drift from near-by spraying has also been described (Asmus et al., 2008; Essumang, Asare, & Dodoo, 2013; Gałuszka, Migaszewski, & Manecki, 2011; Hernández, Vidal, & Marrugo, 2010; Veiga, Silva, Veiga, & Faria, 2006).

In Bolivia, where nearly half of the population earns their living through the agricultural sector, import of pesticides has increased with a factor 2.5 over the last decade (Food and Agriculture Organization of the United Nations, 2013). The country's obsolete pesticides, including contaminated earth, building materials and containers, in known stocks were calculated to be approximately 614,619 kg in 2011, which is an increase of 62.4% since 2003 (Food and Agriculture Organization of the United Nations, 2003, 2013). The number of pesticides alone in 2011 was 377 tons (Food and Agriculture Organization of the United Nations, 2013). This increase has naturally been a challenge for the Bolivian Ministry of Agriculture in efficaciously managing pesticide handling and usage. Calculations of what farmers have at home of obsolete and other pesticides have to our knowledge never been described, but there is a possibility, due to practical reasons, that large amounts of pesticides are being stored at home. Previous research show that the regulation of pesticide imports and sales is poor, that little knowledge of safe pesticide use is common, and that there is inadequate use of personal protective equipment (PPE) among farmers in Bolivia (Jørs et al., 2006, 2013). In addition, evidence of the negative health effects of pesticides is increasing globally, including in Bolivia (Arrebola et al., 2012; Jørs et al., 2006, 2007, 2013, 2014; Mercado et al., 2013), which has led to many international restrictions and bans on pesticide import and sales, where also Bolivia has signed treaties (UNEP, 2001; United Nations Treaty Collection, 1998).

The aim of the present study is to describe selling practices of agrochemicals among pesticide retailers as well as the management and storage of obsolete pesticides by Bolivian farmers. The

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results of this study will add to our understanding of the hazards of sale and use of unregulated and obsolete pesticides, and will bring us closer to addressing the problems of widespread pesticide use in small-scale farming.

2. Materials and methods

The data in this article was collected as part of the PLAGBOL project. The study sample included a total of 231 cases, divided into 191 farming households and 40 pesticide retailers, surveyed in 2009. The study area (see Figure 1) consisted of small villages in La Paz County. Of the 2.7 million people in the county, a calculated 170,000 families live in farming households (pers.comm. PLAGBOL, 2009). The area has 52 officially registered pesticide retailers (Ministerio de Desarollo Rural y Tierras, 2009), but the number might be more than tripled, considering the numerous street and market vendors mostly selling illegal or non-certified pesticides. The villages included were situated in the Altiplano and in the surrounding valleys, with their climate varying from temperate to subtropical, making it possible to grow a variety of crops, such as maize, potatoes, fruits, coffee, tea, groundnuts and cereals.

Figure 1. Map of study area with La Paz County marked in dark grey.

2.1. Participants and information gathering

Thirty pesticide retailers from La Paz were volunteers recruited at a pesticide safety workshop conducted by PLAGBOL. The remaining 10 pesticide retailers were recruited at their stores in La Paz. Inclusion criteria for the pesticide retailers were that they (1) were at least 18 years of age, (2) had been employed selling pesticides in the same conditions for at least one month and (3) were employed in La Paz, Bolivia. Interviews were performed by Spanish speaking personnel from the non-governmental organization (NGO) PLAGBOL, and all of the recruited pesticide retailers were able to complete the study.

Farmers were recruited through visits to their village by interviewers going from house to house and inviting them to participate on a voluntary basis when found at home or in the field. The villages included were the villages of Aymara (indigenous nation) female farmers having attended a course on integrated pest management and later volunteering to participate in the study as interviewers in collaboration with the PLAGBOL team. This approach was chosen, as it secures trust between the study team and the farmers, enables a high response rate and prevents cultural misunderstandings, since the interviewers were farmers from the same villages themselves. Before data collection, all interviewers were trained in using the questionnaires, instructed in which observations to make and how to assess the quantities of pesticides found on the farms by weighing of the pesticides or measuring the cc's with a syringe if the pesticides were liquids. The goal was to get approximately 200 smallholder farms surveyed, of which 198 were executed and 191 could be included in the study. Inclusion criteria for the farmers were that they had personal experience with pesticide-spraying operations and that they were over the age of 18. Interviews with farmers were performed in either Aymara or Spanish.

For both groups, descriptive data was gathered through a questionnaire and observational data through direct visits on site. The survey data included information about pesticide stocks, the handling, storing and reuse of pesticide containers, the participants' knowledge and experience with pesticide use, the hygienic measures taken by farmers and retailers, and the safety and hygiene of pesticide stores.

The questionnaire was formed as a semi-structured face-to-face interview, lasting about 1 h and was based on pilot-tested questions used in previous studies (Jørs et al., 2006, 2013). Observational data on pesticide storage practices and employee workplace habits was collected using a stockpile and workplace checklist (Appendix A).

2.2. Data analysis and ethics

Results from the interviews and observational audits were entered into Excel and SPSS, and descriptive statistics were applied, as well as χ^2 test for comparing pesticide retailers with farmers where possible. To get an estimate on the average amounts of obsolete pesticides on each farm, variables were formed by aggregating the amounts of pesticides in the containers with the following characteristics putting them into the category as obsolete: date of expiry can not be seen on container label, date of expiry has passed, pesticides are not in their original container, container has not got a label with product information on it, pesticide are not allowed for use in Bolivia, the container has not got the Ministry of Agriculture stamp on it. The quantities of pesticides found in farmers stockpiles were measured in grams and cc's. To get an overall estimate of the amounts on each farm, the cc's and grams were summed assuming that one cc weighs one gram.

Confidentiality was assured and no incentives were offered for participation. The study was in compliance with the Helsinki Declaration and a written informed consent was obtained by each participant prior to study start.

3. Results

3.1. Demographics, knowledge and experience with pesticides

The farmers were slightly older than the pesticide retailers. There were more females among the retailers and the retailers were also better educated (Table 1). Significantly more pesticide retailers reported that they had received training in safety and handling of pesticides. This was, however, not reflected in their knowledge or practice when handling pesticides, since no significant difference

Table 1. Descriptive data on Bolivian pesticide retailers (*N* = 40) and farmers (*N* = 191)

Variable		Student's *t*-test, *p* value
Mean age in years (SD)		
Farmer	44.3 (11.28)	<0.001
Retailer	35.3 (11.33)	
		χ^2-test, *p* value
Sex (Females)		
Farmer	152/191 (27.2%)	<0.001
Retailer	23/40 (57.5%)	
Education (Primary school or less)		
Farmer	95/191 (49.7%)	<0.001
Retailer	10/40 (25%)	
Can read Spanish		
Farmer	182/191(95.3%)	0.53
Retailer	39/40 (97.5%)	
Have received courses in pesticide handling		
Farmer	81/191 (42.4%)	<0.001
Retailer	30/40 (75%)	
Knows colour of most toxic pesticide		
Farmer	90/191 (47.1%)	0.14
Retailer	24/40 (60%)	
Use gloves when handling pesticides		
Farmer	74/191 (38.7%)	<0.001
Retailer	35/40 (87.5%)	
Use apron when handling pesticides		
Farmer	14/191 (7.3%)	<0.001
Retailer	18/40 (45%)	
Wash hands after pesticide handling		
Farmer	182/191 (95.3%)	<0.001
Retailer	27/40 (67.5%)	
Change clothes after pesticide handling		
Farmer	123/191 (64.4%)	<0.001
Retailer	13/40 (32.5%)	
Eats at work/while handling pesticides		
Farmer	60/191 (31.3%)	0.26
Retailer	9/40 (22.5%)	
Has felt ill after handling pesticides within the last year		
Farmer	62/189 (32.8%)	0.06
Retailer	7/40 (17.5%)	

Table 2. Farmers' buying of pesticides and their relationship with pesticide retailers

Variable	Number (*N*)
Knows what to buy and what the pesticide is used for	121/190 (63.7%)
Use advice from pesticide retailers for choosing the right pesticide	133/188 (70.8%)
Buy their pesticides from a pesticide retailer	132/191 (69.1%)
Receives advice from retailer when buying pesticides	153/190 (80.5%)
Buy pesticides in original container	181/191 (94.8%)

was seen among the two groups on knowledge of pesticide toxicity as expressed by the colour code on the containers (see Table 1). Likewise regarding safety measures, such as personal hygiene when handling pesticides, farmers tend to be more careful than pesticide retailers. This might reflect the more direct contact farmers have with pesticides when mixing and spraying, in comparison with the retailers who only sell the products (see Table 1). The majority, but not all of the farmers, buy their pesticides from pesticide retailers, often being the farmers' only source of information when choosing a pesticide and getting knowledge on how to use it (see Table 2).

3.2. Observation of pesticide retail stores and farmers stockpiles

As seen from Table 3, many of the pesticide retail stores lack basic conditions for safe sale and storage of pesticides. Seven of the stores were crowded and were estimated to be over 60% capacity. Food was being sold within 25 m distance of eight stores, often outside the front door by street vendors, even though none of the pesticide retailers reported selling food themselves. Most worrying is that only half of the stores sell PPE for handling pesticides, less than half use relevant PPE themselves, some have children as sellers in the shop and one subject even reported selling pesticides to children (Table 3). The pesticides most frequently sold by the retailers were reported as WHO class II (57.1%), WHO class I (23.2%), WHO class U (14.3%) and WHO class III (5.4%).

Almost 90% of all the pesticides stored on farms belonged to either WHO class I or II (Table 4) in accordance with what the pesticide retailers sell. Pesticides most often belonged to the chemical class of organophosphates and pyrethyroids. By commercial names, Tamaron (32.5%) was the most commonly found pesticide, followed by Karate (26.2), Folidol (6.3%) and Mapex (5.2%). All four are insecticides and belong to WHO toxic class I and II. 59.9% of the stored pesticides were found to be obsolete characterized by either lacking an intact label, lacking a Ministry of Agriculture stamp on the container, being outdated or not showing expiry date, being prohibited for use in Bolivia or not stored in their original container, as seen from Table 4. A minority of the farmers stored their pesticides locked up and a majority were reachable by children. The mean number of grams of pesticides stored per farm was 299 g (0–2500 g), corresponding to a mean of approximately 180 g of obsolete pesticides per farm.

3.3. Pesticide intoxications

Farmers reported more symptoms of intoxication after handling pesticides than retailers did (Table 1). Farmers' knowledge and experience with pesticide intoxications was investigated and 95.5% of the farmers knew of a serious pesticide intoxication in their village within the last year. Twenty-four per cent of these were due to accidents, 20% due to occupational accidents and 60% were due to suicide attempts. 6.1% farmers knew of a deadly pesticide intoxication in their village within the last year, of which 7.1% were due to occupational accidents and 92.9% were due to suicides.

4. Discussion

The present study identifies a number of negative trends seen in the study population of pesticide retailers and pesticide-using farming households in La Paz district. Illegal and obsolete pesticides were found in the farmers' personal inventories, including banned and highly toxic pesticides. The amount of obsolete pesticides among smallholder farming households adds considerably to the

Table 3. Summary of visual observation of 10 pesticide retail stores in Bolivia

	Yes (*n*/10)	No (*n*/10)	Missing (*n*/10)
Infrastructure			
Has sanitary services (bathroom/shower/etc.)	5	5	
Spacious store	2	7	1
Well ventilated area	2	8	
Has a cement floor (impermeable to liquids)	8	0	2
Has a first-aid kit	7	3	
Has absorbent material in case of a pesticide spill (sawdust, dirt, sand)	6	3	1
Pesticides are stored on shelves or pallets	10	0	
The shelves are metal	8	2	
The fertilizers, seeds, animal feed and veterinary products are stored next to the pesticide products	7	3	
The products are separated according to their level of flammability and biologic action (insecticides, herbicides, fungicides)	4	6	
If the products are not separated, the most toxic should be on the bottom and the liquids below the powders/dusts	1	5	4
The store is at more than 60% capacity	7	1	2
The sale and storage areas are separate	7	3	
The sales counter is orderly	6	3	1
Has a fire extinguisher	1	9	
The store has a pesticide odour	9	1	
Has warning symbols or signs: no smoking, no lighting of matches, etc.	1	9	
Has means of communication (phone, radio, etc.)	9	1	
Located in an urban area	10	0	
Food is being sold within 25 m of the store	8	1	1
Food, drinks or medicine are sold next to pesticides	1	7	2
Personnel			
Have a permanent technical advisor	9	1	
Have a medical insurance	3	7	
Employees are trained in the handling of pesticides	8	2	
Have personal protective equipment (mask, safety goggles, gloves, etc.)	5	5	
Use personal protective equipment	4	6	
Get regular medical check-ups	2	8	
Minors work at the store	3	7	
Pesticides are sold to minors	1	9	

officially estimated amounts. If we assume that there is approximately 775,000 smallholder farming households in Bolivia (Ministerio de Desarollo Rural y Tierras, 2014), and that these farming households have about the same amounts and characteristics of pesticides stored, it would mean that roughly 232.5 tons of pesticides are stored on smallholder farms, of which 59.9% (139 tons) are obsolete. This calculation adds one third to the amount of 377 tons of pure obsolete pesticides already calculated by the Food and Agriculture Organization (FAO) and Servicio Nacional de Sanidad Agropecuaria e Inocuidad Alimentaria (SENASAG) (Food and Agriculture Organization of the United Nations, 2003, 2013). As the climate differs considerably in different parts of Bolivia, this estimate might be insecure, but even restricting the estimate to La Paz County with approximately 170.000 smallholders, it would still add a considerable amount of obsolete pesticides on top of what has been estimated from the official dumping sites.

Table 4. Summary of visual observation of farmers' stocks of pesticides found in their homes and on their properties

Variable	Number (*N*)
Indicate active ingredient	278/312 (89.1%)
WHO class	
I = Highly hazardous	137/312 (43.9%)
II = Moderately hazardous	148/312 (47.4%)
III = Slightly hazardous	3/312 (1%)
U = Unlikely to present acute hazards	12/312 (3.8%)
O = Obsolete	12/312 (3.8%)
Chemical class	
Organophosphates (OP)	153/312 (49%)
Pyretheroids (PY)	125/312 (40.1%)
Carbamates (C)	9/312 (2.9%)
Organochlorides (OC)	2/312 (0.6%)
Others	23/312 (7.4%)
Lack an intact label	57/310 (14.8%)
Not stored in original container	44/312 (10.9%)
Lack Ministry of agriculture stamp	116/312 (37.2%)
Do not show expiry date	125/312 (40.1%)
Expired pesticides on the containers with expiry dates	15/187 (8%)
Illegal pesticide	39/312 (12.5%)
Storage of pesticides	
Store pesticides unlocked	1008/191 (56.5%)
In reach of children's	94/181 (54.5%)
Beside food	2/186 (1%)

The accumulation of obsolete pesticides has several causes according to the FAO, where commercial interests are mentioned among others (Food and Agriculture Organization of the United Nations, 1995). As part of these interests, the pesticide retailer has a central role in promoting the buying of pesticides in larger quantities (Food and Agriculture Organization of the United Nations, 1999). This contributes to the accumulation of pesticides at the end user. On country level, an excessive amount of imports and donations has been crucial in the stockpiling of pesticides in Bolivia and the amounts of obsolete pesticide stocks are yet increasing (Food and Agriculture Organization of the United Nations, 2003, 2013). Lack of staff trained in storage management has also been suggested as one of the reasons for the accumulation of obsolete pesticides (Aqiel Dalvie et al., 2006). It is also interesting to point out that even though pesticide retailers do not sell banned pesticides, illegal pesticides are found in the farmers' stockrooms and are somehow circulating and being sold in an illegal fashion. In fact, more than a third of all the pesticide found in the farmers personal inventories lacked a Ministry of Agriculture stamp (Table 4). These pesticides could also be remnants from old country stocks, which are being repackaged and resold.

As can be seen from the results section, the most frequently sold pesticides belong to WHO toxicity class II and I, corresponding to what we observed in the farmers' own stockrooms (Table 4). Similar observations were made in a Chinese study on small-scale farmers, where over 85% of the subjects claimed to use illegal pesticides (Yang et al., 2014).

The observational visits to the retail stores showed that many of the stores lack basic safety and sanitary measures, such as fire extinguishers, bathrooms and proper ventilation. Unsafe, contaminated and overly packed pesticide stores appear to be commonplace in many low-income countries to varying degrees. A South-African study from 2006 described comparable figures, where unwanted pesticides were being mixed with the ones being used, and where a majority of the surveyed pesticide stores had obvious spillings on the floors (Aqiel Dalvie et al., 2006). Other research in developing nations points in the same direction (Stadlinger et al., 2013).

As previously mentioned, pesticide retailers are a rarely studied group in scientific research. Despite that, they seem to play a vital role in the spread of information about pesticide handling to the local community. This is exemplified in the questions about the utilization of advice from the retailer when one determines which pesticide to use, as well as receiving advice from the pesticide retailer during the purchase itself (Table 2). Local customs and word of mouth seem to be the preferred methods when choosing a pesticide. This phenomenon is emphasized in a Caribbean study from 2005, were pesticide retailers were asked whether or not buyers seek their advice when buying pesticides. The study reported that 9 out of 10 retailers said customers requested their advice on precautions for use and storage of pesticides, and an absolute majority reported that customers asked about management of accidental exposure or ingestion of these agents (Pereira et al., 2007). The data we have so far on knowledge and practice when handling pesticides, does however not support the notion that the pesticide retailer is much more knowledgeable than the farmer.

Another negative trend observed in the present study is the unsafe storing of pesticides among the study population of farmers, where a majority reported keeping their pesticides unlocked and thus easily accessible to children and young adults. In Bolivia, self-poisoning with pesticides is the leading method for committing suicidal attempts and is most numerous among adolescents (Jørs et al., 2014). Other studies have documented an increased risk of suicides with exposure to pesticides postulating that not only is this increased risk caused by easy accessibility, but also that low-grade pesticide exposure in itself causes depression and mood disorders, thus increasing the risk of suicides (Meyer et al., 2010; Parrón et al., 1996). It is also common for farmers to store the pesticides outdoors or even inside their own residences (Table 4). This unsafe storing might explain the high number of suicidal attempts and accidental poisonings reported by the farmers in their villages.

The possibility of non-response and selection bias due to the simplicity of the study design and sampling method must be taken into consideration when analysing the data and interpreting the results. Since most of the pesticide retailers were recruited at a pesticide safety workshop as volunteers, they may be more aware of and interested in pesticide safety than the average retailer. Thus, the outcome for the whole region could be even worse than what the present study suggests. Moreover, information bias may have affected the reports on handwashing and PPE use, since the visual observations performed at the 10 pesticide stores showed that half of the surveyed stores lacked sanitary services and only half of them had PPE available on site. It is, therefore, improbable that the percentages on handwashing and PPE use are correct.

The strength of the present study lies in the fact that data were collected using both questionnaires as well as observational visits to the study sites. Direct visits on site adds another perspective, and can spot mismatch between the reporting of the subjects and the observations made at site, as seen in the previously mentioned reports of PPE.

In spite of this being a very simple study, mainly based on descriptive analysis, we hope that the results of this study together with other research from the area may benefit in the attempt to reduce malpractices in pesticide handling, primarily in Bolivia, but also in surrounding regions.

5. Conclusion

The study shows limited knowledge on pesticides safety measures and use of PPE, both among pesticide retailers and farmers. The very toxic WHO class I and II pesticides were found sold by the retailers and stored in the farmers homes. Sixty per cent of the pesticides found among the farmers were obsolete and an estimation of the accumulated amounts of obsolete pesticides that exist outside of the officially recognized dumping sites showed figures that exceed previous estimates by FAO and SENASAG. This underlines the necessity of including the small but numerous amounts of pesticides stored on farms, when calculating the total sum of obsolete pesticides in a country that needs to be gathered and destroyed. Moreover, the little knowledge on safe pesticide handling among the retailers need to be addressed as information from the retailers often are the only guidance farmers have to safer pesticide use and alternatives. In conclusion, better regulations of imports, sale and use of pesticides needs to be addressed by the government and other responsible parties.

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Appendix A

Pesticide store checklist

Checklist	**Fecha: Nombre de tienda**		
	Sí	No	Observaciones
A. Infraestructura de comercialización			
1. Cuenta con servicios sanitarios (baños, duchas, etc.)			
2. Local amplio			
3. Local ventilado			
4. Tiene piso impermeable a líquidos (piso de cemento)			
5. Hay muros completos			
6. Cuenta con botiquín de primero auxilios			
7. Posee material absorbente en caso de derramamiento de plaguicidas (aserrin, tierra, arena)			
8. Los plaguicidas están almacenados en estantes o palets			
9. Los estantes son metálicos			
10. Estan guardados fertilizantes, semillas, forrajes y/o productos de aplicación veterinaria junto con los productos fitosanitarios.			
11. Estan separados los productos por su grado de inflamabilidad y accion biológica (insecticidas, herbicidas, fungicidas)			

(*Continued*)

Appendix A (*Continued*)

Checklist	Fecha: Nombre de tienda		
12. Si los productos no están separados, los mas toxicos deben estar abajo y los liquidos debajo de los polvos			
13. La tienda esta mas del 60% de su capacidad de almacenamiento			
14. Están separados los sitios de expendio y de deposito			
15. El almacen de expendio es ordenado			
16. Cuenta con extintor			
17. Se siente olor a plaguicidas			
18. Tienen simbolos a letreros de advertencia: No fumar, no encender estufas, etc.			
19. Hay medios de comunicación (teléfono, radio, etc.)			
20. Está ubicada en una área urbana			
21. Existe venta de alimentos a menos de 25 m de distancia			
22. Si venden alimentos, bebidas o medicamentos estan al lado de los plaguicidas			
B. Del personal			
23. Cuenta con un asesor técnico permanente			
24. Tienen seguro médico			
25. El personal es capacitado en el manejo de plaguicidas			
26. Posee equipo de seguridad (máscara, lentes, guantes, etc.)			
27. Se usa el equipo de seguridad			
28. Se someten a chequeos médicos frecuentes			
29. Existen menores de edad en el local de expendio			
30. Se venden plaguicidas a menores de edad			

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