PESTROP Project

Pesticide use in Smallholder Farms: Challenges and Opportunities for Health, Environment and Policy in Uganda

HIGHLIGHTS

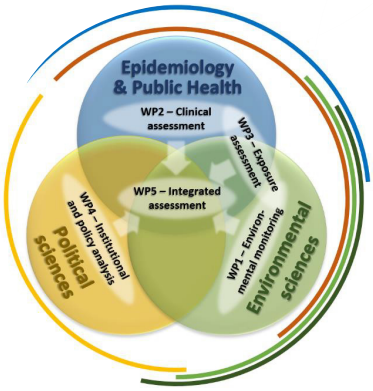
- Analysis of urine samples from smallholder farmers in Wakiso District showed that conventional farmers are particularly exposed to synthetic pesticides. Surprisingly organic farmers also showed high levels of pesticide exposure.
- Analysis of water samples from River Mayanja, its feeder streams and community drinking water sources revealed relatively high pesticide residue levels in surface water bodies.
- Pesticide use and handling practices among the surveyed smallholder farmers predisposes them risk of exposure and the resultant negative effects on environmental and human health.
- Information on alternative methods to synthetic pesticides is not readily available to smallholder farmers when needed.
- To protect human health, the Ministry of Agriculture Animal Industry and Fisheries, through its extension workers should offer more trainings on responsible pesticide handling, integrated pest management and alternative farming practices to smallholder farmers in their localities. Furthermore, access to affordable and climate friendly personal protective clothing should be promoted by the Government of Uganda.
- To protect water, good pesticide lifecycle management practices have to be promoted. These include among others; mixing only recommended doses away from water sources, maintaining of buffer zones when applying pesticides, designated areas for disposing waste water from pesticide washings and triple rinsed, punctured empty containers.
- To sustainably manage pesticide lifecyle, multi-sectoral collaboration is paramount, especially amongst Ministry of Agriculture Animal Industry and Fisheries, Ministry of Health, Ministry of Water and Environment, National Drug Authority, and National Environment Management Authority.

1.0 INTRODUCTION

1.1 Brief background to this policy brief

This policy brief presents the main research findings of the "Pesticide use in Tropical Settings" (PESTROP) Project and implications of two overarching research questions for Uganda;

1. *What are the human and environmental health effects of pesticide use?*
2. *Which changes in pesticide use practice and policy are needed to efficiently reduce human and environmental exposure to pesticides?*



Pestrop Project Working Package

Extensive field data related to the environmental, health and institutional aspects of pesticide use among smallholder farmers was gathered between September and November 2017. The main results are summarized here for decision-makers, to illustrate policy implications, and to provide recommendations on how to close the observed policy-practice gap to better protect human health and the environment.

1.2 Pesticide use by smallholder farmers in Uganda

The agricultural sector plays an important role and is characterized by mostly smallholder farmers. With low temperature variability and two rainy seasons, Uganda largely has fertile agricultural land. In Wakiso District, subsistence farming and supply of the local market dominate the use of the small agricultural plots. A growing number of farmers is cultivating horticultural products for commercial purposes. To protect their horticultural crops, livestock and households, farmers frequently apply synthetic pesticides, some of which are highly hazardous. These chemicals have potential negative effects for human and environmental health.

1.3 Information gap

In Uganda, there is a lack of empirical studies that investigate: (i) how smallholder farmers use pesticides under tropical conditions; (ii) how these use patterns are influenced by the institutional settings of a given country; and (iii) how farm practices subsequently affect human and environmental health. At the same time, decision-makers are pressured to come up with policies that regulate pesticide use and human and environmental protection in a way to ensure economic productivity while maintaining physical and environmental integrity.

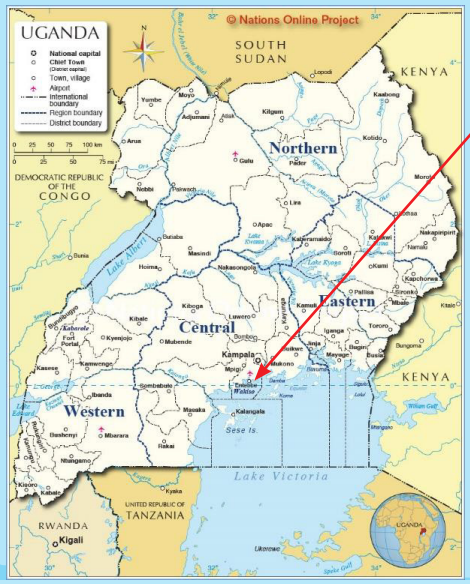
Wakiso District case study

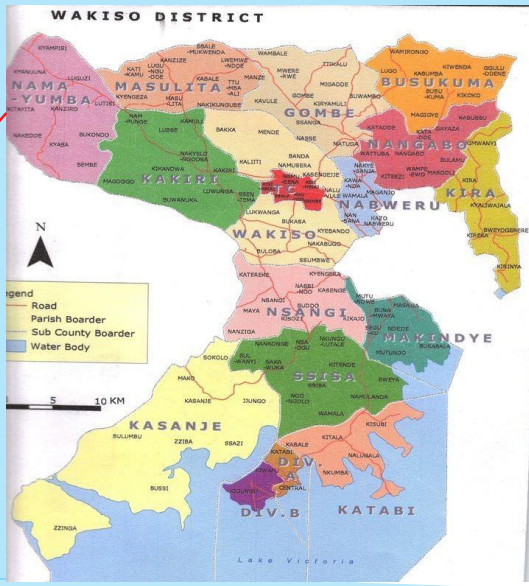
* Study area: River Mayanja catchment areas in Wakiso District (72 km2, 1100 to 1300 meters above sea level)

* The topography is rolling to slightly hilly

* Major crops: beans, maize, sweet potato, banana, cassava, coffee, tomatoes, and groundnuts

* Use of a broad range of hazardous pesticides: 2,4-D, Glyphosate, Mancozeb, Cypermethrin, Profenofos



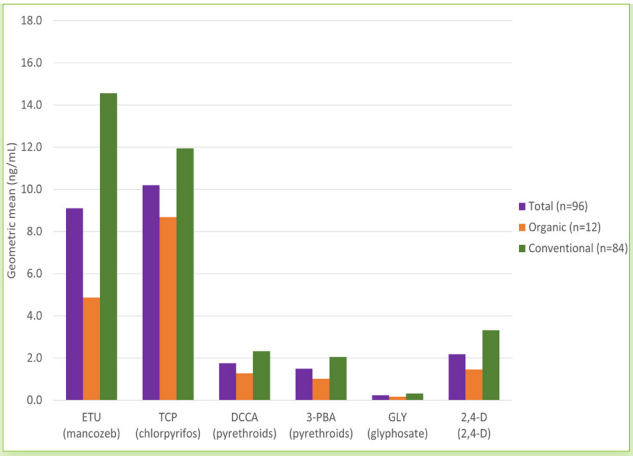


2.0 RESULTS and IMPLICATIONS

2.1 Health assessment

In 2017, a study with 302 smallholder farmers applying different pest management strategies such as the use of synthetic or natural pesticides was conducted in the Wakiso District in the Sub-Counties of Mende, Masulita and Gombe. A questionnaire was administered in combination with clinical assessments and the collection of urine, hair, toenail, and blood samples. Tests were applied to study the farmer's memory and ability to concentrate.

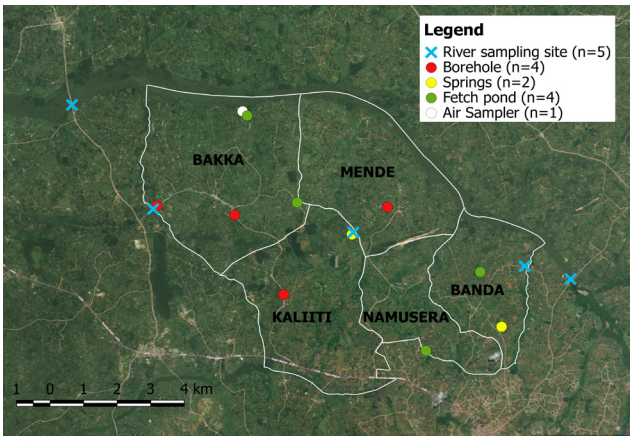
Only one in four (23%) farmers had received training in pesticide use, such as proper application techniques, storage, or safety procedures. Among the users of synthetic pesticides, numbers were even lower (14%). The analysis of 96 urine samples from conventional and organic farms showed elevated levels of pesticide metabolites in almost all urine samples. Concentrations were higher in conventional farmers. In terms of health effects, a connection between the application of synthetic pesticides and psychiatric distress, symptoms of depression, anxiety and somatization was found.



Concentration of pesticide metabolites in urine

2.2 Environmental assessment

In 2017, water samples were taken at five locations along the streams of Mayanja river basin. Moreover, grab samples were taken at different drinking water sources (4 boreholes, 4 fetch ponds and 2 springs). Out of 40 different pesticides and transformation products detected in the catchment, 32 were found in fetch ponds and 16 in Mayanja river and its side streams. In the river, concentrations of the herbicide 2,4-D were highest (up to 790 ng/L). In the boreholes and springs, 21 and 2 different pesticides were found, respectively in low concentrations (< 30ng/L). Overall these findings indicate that pesticide levels are increased mainly in surface water bodies, which require better protection.



Sampling sites in Mende Subcounty

2.3 Behavioural assessment

Among 50 smallholder farmers in-depth interviews were conducted to understand their need for information on pest management, how they search, acquire and use it. Farmers use different information sources depending on pest management strategy. Information about synthetic pesticides is locally available. Organic strategies aren't easily accessible in farming communities. Moreover, 309 smallholder farmers were interviewed about personal protective equipment (PPE). Most farmers did not see many others using PPE. Farmers who have received education on PPE use it more often, which shows the value of trainings. They are aware of the health risks related to pesticide use and feel more vulnerable when using less protection. Most feel proud when using more PPE and believe in the effectiveness of protective measures. Some farmers were not aware of the safety labels on pesticide containers, which can help to inform correct application and safe handling.

2.4 Institutional assessment

Due to the concerns about negative effects on human and environmental health caused by pesticides, most countries have introduced legal regulation of their use. To assess Uganda's institutional setting governing pesticide use on the one side and resource protection on the other, public policies and ownership rights were analysed in-depth and interviews with key representatives of governmental institutions, academia and civil society organizations were held. Findings showed that several policies exist to protect occupational health from pesticide exposure. However, existing policy measures do

RESULTS and IMPLICATIONS

not address farmers and generally the informal sector directly, which means that this group does not enjoy the necessary protection from pesticide exposure. Policies related to water exist and mostly consider pesticides as a problem for the aquatic ecosystem and drinking water. Policy measures in place target polluters in general, not specifically addressing farmers and their pesticide use as potential source of water contamination.

Recommendations:

- The Ministry of Agriculture Animal Industry and Fisheries should strengthen promotion of ecological farming, especially Integrated Pest Management amongst smallholder farmers. For instance building the technical capacity and support to extension workers.
- The Ministry of Gender Labour and Social Development should revise existing occupational health and safety regulations to incorporate regular inspection and protection of informal sector workers like farmers.
- Deliberate efforts should be put in place to promote biopesticides. The Ministry of Agriculture Animal Industry and Fisheries should expedite their approval process. Uganda Revenue Authority should subsidize taxes levied on biopesticides and other non-chemical alternative technologies.
- The Ministry of Agriculture Animal Industry and Fisheries should expedite passing and popularisation of regulations under the Agricultural Chemicals Control Act, 2006 on personal protection to guide on importation of PPEs that are adapted to tropical climate conditions. In addition, we recommend application of waiver taxes on such imported PPEs to make them readily available and affordable by smallholder farmers.
- The Ministry of Agriculture Animal Industry and Fisheries to undertake frequent inspection of agro-dealers to guarantee quality of advice passed on to farmers.
- To safeguard community water sources and rivers, the government should put in place incentives to compel farmers to return empty triple rinsed and punctured pesticides containers to pesticide shops or to central collection points for further proper disposal.
- Local leaders at Sub County put in place by-laws that discourage farmers from applying pesticides upstream and/or close to known community water sources.
- More persuasive policy measures are needed to promote self-protection and protect occupational health, in particularly farmers from pesticide exposure. For instance, the wide network of radio stations across the country broadcasting in more than 30 local languages should be leveraged to broadcast pest safe use messages (on public health, environmental conservation and sustainable production).

Project Information:

This research was part of the inter- and transdisciplinary research project "Pesticide use in Tropical Settings" (PESTROP) which aimed at better understanding the use of agricultural pesticide in tropical settings by studying its environmental, health and institutional dimensions. The PESTROP project was conducted in Uganda and Costa Rica.

The research has been conducted in a collaboration with partners in Uganda and Switzerland: Uganda National Association of Community and Occupational Health (UNACOH), Makerere University, Directorate of Government Analytical Laboratory (DGAL), the Swiss Institute of Tropical and Public Health (Swiss TPH), the Swiss Federal Institute of Aquatic Sciences and Technology (Eawag), and the University of Bern.

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Swiss TPH Swiss Tropical and Public Health Institute | eawag aquatic research | swiss network for international studies | u b University of Bern | MAKERERE UNIVERSITY | UNACOH "Health for All & By All" | DIRECTORATE OF GOVERNMENT ANALYTICAL LABORATORY Ministry of Internal Affairs