

# Exposure to Pesticides, Fertilizers and Crop Preservatives during Agriculture and Food Storage in a Cameroon Health District

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## Abstract

**Introduction:** Pesticide use has increased over the past 20 years in Cameroon. Studies reported that most pesticides applicators are ignorant of pesticide toxicity, applications techniques and safety. Many works related adverse health effects associated with pesticides users in Cameroon have been documented. The aim of this study was to describe the use of pesticides, fertilizers and crop preservatives during agriculture and food storage in a Cameroon health District (Dschang, west region).

**Method:** It was a descriptive cross-sectional study conducted in the health district of Dschang. Included were household agricultural workers who consented to participate. A multistage sampling was done. Data collection by face-to-face questionnaire administration from 17 to 21th may 2018. "Epi Info 7" was use for data analysis.

**Results:** Were interviewed, 191 household agricultural workers. Labour force was dominated by female (140; 73.2%) of more than 50 years (61; 31.9%). Herbicides were the least used agrochemical (36.6%). Most participants did not know the type used (29.3%) but Glycophosate was the most used type stated (5.8%). Fertilizers were most frequently used (95.8%). Organic fertilizers accounted for 17.2% but the most type used was 20-10-10 (42.4%). About 70.1% used crop preservatives and Poudrox was mostly used (43.4%). Insecticides users accounted for 42.9% but most of them did not know the name of the type used (38.7%). Training (09.4%) and use of personal protective equipment (31.4%) were poor. Respiratory symptoms (cough and dyspnoea) were the most stated complaints.

**Conclusion:** pesticides, fertilizers and crop preservatives are effectively used during agriculture. Training and safety measures are rare. Risk of work-related health problem is a serious concern. Training on all aspect of these agrochemicals with safety measures should be reinforced.

**Keywords:** Pesticides • Autophagy by Cameroon • Fertilizers • Agriculture

## Introduction

Pesticide is a toxic chemical substance or a mixture of substances or biological agents that are intentionally released into the environment in order to avert, deter, control, an/or kill and destroy populations of insects, weeds, rodents, fungi or other harmful pests [1]. Agrochemicals in general are extensively used worldwide in agriculture allowing for a noticeable increase in crop yields and food production [2]. Modern farming relies on pesticides, fertilizers and crop preservatives to produce and preserve an abundance of high-quality food. They improve also nutritional value, are economic, labor-saving and efficient tool of pest management with great popularity in most sectors of agricultural population [3]. Despite the popularity and extensive use of pesticides by farm household's serious concerns about the health risks arising from the exposure to pesticides when mixing or applying in working fields or residues

on food or drinking water [4]. Exposure to pesticides occurs among farmers and professional applicators of pesticides [5,6] or in the general population individuals may be exposed to pesticides residues in food and drinking water on a daily basis or to pesticide drift in residential areas to spraying areas [7].

Adverse health effects may arise due to acute or chronic pesticide poisoning either from contaminated food or occupational exposure in agriculture. Temporary acute effects may be abdominal pain, dizziness, headaches, nausea, vomiting, skin problems, irritation of the eye while chronic health effects could be diseases like cancer, reproductive and developmental disorders as well as central nervous system disorders like convulsion, loss of memory and coma [8].

Adverse health effects due to pesticides exposure has increased worldwide [9]. About 18.2 per 100000 agricultural workers worldwide experienced work-related unintentional pesticide poisoning yearly [10]. More than 168,000 persons die from pesticide self-poisoning every year with most of them in developing countries [11].

In Cameroon, Agriculture is a very vital economic sector since 45% of its Gross Domestic Product (GDP) depends on it [12]. The household farming system is mostly traditional therefore farmers rely mostly on pesticides use to its low cost for pest control and to meet demand because crop destruction will have paralyzed many households [13]. Pesticide use has increased over the past 20 years, highest in low-income countries (Cameroon, Ethiopia, Burkina Faso). In modern and high-income countries was a less marked increased [14]. Despite this rise in pest use in Africa, information about the health and safety of agricultural workers as well as updated pesticides utilization are limited. Many studies conducted on pesticide application in Cameroon [15,16] have reported many adverse health effects associated with pesticides users. A study done in the north west region of Cameroon has revealed that pesticides applicators are ignorant of pesticide toxicity, manufacturer instructions, applications techniques, safety measures and dosages [17].

There exists a knowledge gap on the extend and types of pesticides use, safety measures available and related health events in agricultural workers in rural Cameroon; This is why we sought to examine the exposure patterns to pesticides during agriculture and food storage in a Cameroon health District (Dschang, West Region). Specifically, this paper uses a descriptive approach to present the socio-demographic profile of agricultural workers exposed to pesticides, to identify the common pesticides used and pesticide related health complaints among peasant agricultural workers in the study area.

## Materials and Methods

### Study design

It was a descriptive community-based cross sectional survey conducted on 191 Household and not agricultural worker NB: Households are sample unit and agricultural worker sample element to collect data related to sociodemographic characteristics, types of pesticides, fertilizers and crop preservative used and occupational health complaints.

### Study area

Dschang health district is a semi-urban area found in the Menoua division, West Region of Cameroon. It is geolocated on the north and east hemisphere. It is made up of 22 health areas, with a total population in 2018 of about 226 964 inhabitants. Agriculture is the major economic activity practiced. It has as surface area 1060 km<sup>2</sup>.

### Study population

Were included in the study all reachable households with a member practicing agriculture who consented to participate in the study from selected health areas of the health district.

### Sampling procedure and data collection

A multi-stage sampling was done. Five health areas (Maka, Fometa, Mbeng, Siteu and Baleveng) were selected using purposeful sampling based on their intense cropping activities. Using random sampling two villages per health area were selected then from each village, 20 households were randomly selected.

Data was collected by the research team using a face-to-face pre-tested questionnaire administered to 191 agricultural household workers during May 2018. The questionnaire focused on workers demographic data (age, gender, profession), pesticide used (type, name), use of personal protection equipment, and likely occupational health complaints.

### Data analysis

Data collected was coded, entered, cleaned and analyzed using Epi Info version 7.2, [Centers for Disease Control and Prevention (CDC), Atlanta, USA]. Relative frequencies and their 95% confidence intervals (95% CI) were presented for categorical variables, while normally distributed continuous numerical variables were presented as means with their standard deviations.

## Results

### Sociodemographic characteristics of participants

Two hundred and eight (208) household were eligible for the study, 199 met inclusion criteria and 191 consented to participate in the survey computing to a 95.9% response rate. Their mean age was  $41 \pm 18$  years. Most of the participants were more than 50 years old (31.9%). Majority of participants were female (73.2%) and had agriculture as main profession (42.2%). Table 1 shows the distribution of participants according to age, sex and main profession.

### Crops cultivated

Farmers of the Dschang health district mostly practice a traditional system of farming whereby they cultivate a variety of food and cash crops simultaneously. The crops mostly cultivated simultaneously include tubers, cereals, vegetables and banana (41.4%) while the less cultivated was the cash crop coffee (00.5%) (Table 2).

### Pesticides, fertilizers and crop preservatives used

The most used agrochemical was fertilizers (95.8%) followed by crop preservatives (70.1%). Pesticides used accounted for 36.6% (herbicides) and 42.9% (insecticides). Most farmers using pesticides did not know the name or active substance in it; [herbicides (29.3%), insecticides (38.7)]. Most

**Table 1:** Distribution of participants according to age, sex and main profession.

Socio-demographic	Frequency (n)	Percentage (%)
<b>Age interval (years)</b>		
<20	24	12.6
[21-30]	49	25.6
[31-40]	37	19.4
[41-50]	20	10.5
>50	61	31.9
<b>Sex</b>		
Male	51	26.8
Female	140	73.2

**Table 2:** Most cultivated crops in Dschang health District.

Crop	Frequency (n)	Percentage (%)
Banana	2	1.1
Vegetables	2	1.1
Tubers	3	1.3
Gramineae	17	8.9
Coffee,	1	0.5
Both Gramineae, vegetables and banana	20	10.5
Both Tubers gramineae and vegetables	38	20
Both Tubers, gramineae, vegetables and banana	79	41.4
Both Tubers, gramineae, vegetables, banana and coffee	29	15.2

**Table 3:** Distribution according to pesticides used.

Agrochemical used	Name used	Frequency(n)	Percentage (%)
<b>Herbicides</b>	Devrinol	1	0.5
	Glyphosate	11	5.8
	Paraquat	1	0.5
	Terraklene	1	0.5
	Don't know	56	29.3
	Total (N=70)	70	36.6
<b>Fertilizers</b>	20-10-10	81	42.4
	Organic fertilizers	33	17.2
	Glycophosate	4	2.9
	Yara	20	10.5
	Ammonium sulphate	9	4.7
	'All[1]	18	9.4
<b>Crop preservatives</b>	Don't know	18	9.4
	Total (N=183)	183	95.8
	Refined oil	2	1.1
	Poudrox	83	43.4
<b>Insecticides</b>	Don't know	49	25.6
	Total (N=134)	134	70.1
	Carzol	4	2.1
	Supracide	4	2.1
	Don't know	74	38.7
	Total (N=82)	82	42.9

**Table 4:** Experience and training in using agrochemical among participants.

Factors considered	Frequency (n)	Percentage (%)
Experience (years)		
<10	42	21.9
[10-20[	42	21.9
[20-30[	50	26.2
>30	57	29.8
Training		
Yes	18	9.4
No	173	90.6

**Table 5:** Distribution of participants according to safety measures used.

Safety measures used	Frequency (n)	Percentage (%)
Gloves	9	15
Boots	3	5
Nose mask	6	10
Face mask	1	1.7
Long dress	1	1.7
Boots, gloves and nose mask	25	41.7
Boots, gloves and long dress	6	10
All protective clothing	3	5

stated herbicides used was glyphosate (05.8%). Carzol and supracide were equally used as insecticides (02.1%) meanwhile 20-10-10 was the most used fertilizer (42.4%) (Table 3).

### Training and experience in agriculture and pesticide use

Approximately 78% of agricultural workers using agrochemical have reported

to have had at least a 10-year experience in their occupation but just a few (9.4%) of them had ever had a formal training in agricultural practice (**Table 4**).

### Safety measures

To limit or prevent negative health effects agricultural workers use some Personal Protective Equipment (PPE) when operating. Sixty (31.4%) of participants agree having a safety measure. and about 68.6% do not use any protective materials. Among those using a PPE, most of the farmers wear a combination of boots, gloves and nose mask (41.7%). **Table 5** shows the distribution of participants according to the safety measures used.

### Type of health problems reported by participants

The most common health complaints reported were respiratory symptoms such as persistent cough (19.9%) and dyspnea (09.4%).

### Discussion

The aim of this study was to describe the use of pesticides, fertilizers and crop preservatives among agricultural workers in Dschang health District. Majority of participants were female with more than 50 years. This suggest that that main working force is female of the post-active age. Other studies done in west region of Cameroon showed contrasted results with a predominant male working force in active age [18]. Our findings could be explained by the fact that in the study population the husbands of these elderly women are already tired or for others death. Since is a rural zone where the multiple cropping system of farming has always been practicing for family subsistence women are obliged to take over their husband in the main activity they have grew-up in since evidence suggest that youth of active age are not interested in farming [19]. More generally this result is in accordance with the Food and Agriculture organization of united nation which stated that women comprises half or more of agricultural labour force in developing countries [20].

The study revealed that fertilizers, crop preservatives and pesticides were used by agricultural workers in Dschang health district. Fertilizers was the most used agrochemical while herbicides as pesticides were the least used. These findings suggest that farmers are more interested in applying fertilizers for rapid and abundant growth of crops than to control pests. This could be explained by ignorance of the farmers since very few are trained on agricultural techniques and pesticide use. Studies have revealed that most farmers are uneducated on agrochemical use particularly pesticides [18]. The least pesticide was herbicides. This corroborates with a study conducted in the west region of Cameroon [21]. Manual weeding with hands, cutlasses, hoes done by the farmers and family members on their small-scale farm could explain why they don't frequently use herbicides [22].

Analysis revealed that a great number of farmers are exposed to agrochemicals for over a long duration of time that is more than 30 years and only a few numbers of participants have agreed of haven been trained on agrochemical usage. The fact that the majority of the population have more than half of a century and has as main activity agriculture of subsistence reflected the longevity in the domain and much experience. This result is in contrast with a study done in south west region were most of the participants had less than 10 years of experience [23]. This may be due to a difference in age composition of our sample size.

More than half of the farmers did not wear any PPE. A study done in Bamenda, Cameroon is in line with this result, the use of PPE was poor [13]. A study conducted in the NW region has revealed that safety measures taken by farmers were not enough for the majority [24]. This could be due to poor knowledge and not enough training to conveniently take enough precautions for their health [18].

The most common health complaints were respiratory system afflictions; persistent cough and asthma. Studies have revealed other work-related complaints like headache, dizziness, backache, visual problems and skin injuries [3]. The scarcity of work-related illnesses in our study could be due to the fact that farmers difficultly related their health problem to their occupation and consider it as benign common health problem with other causes. Furthermore, they could accept a certain level of illness as an expected and normal part of work as described in an African country Tanzania [25].

### Conclusion

Pesticides, fertilizers and crop preservatives are effectively used during agriculture. Farmers are exposed since a long period time meanwhile training and safety measures are rare. Risk of work-related health problem is a serious concern. Training on all aspect of these agrochemicals with safety measures should be reinforced

### Competing Interests

Authors declare no competing interests.

### Author Contributions

INN and DMO conceived and conceived and supervised collection of field data and guided the study design; BMD participate to the collection of data in the field; INN and RPN analyzed the data and drafted the final manuscript; All authors have read and agreed to the final version of this manuscript and equally contributed to its content.

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