Original Research Article

ASSESMENT OF FACTORS INFLUENCING EASE OF ACCESS ON INTENTIONAL ORGANOPHOSPHATES SELF-POISONING AMONG PERSONS AGED 15-30 YEARS IN KERICHO COUNTY, KENYA.

ABSTRACT

Suicide has been among the leading causes of death in 15-29-year-old people worldwide. Over three quarters (79%) of all suicides occur in lower and mid-level economic groups. In Kericho County, 525 patients aged 15-30 were diagnosed with organophosphate self-poisoning in the year 2019. The aim of this study was to assess factors that influence intentional self-poisoning among patients aged 15-30 years in Kericho County. The study's specific goal was to assess the influence of ease of access on intentional self-organophosphate poisoning among persons aged 15-30 years in Kericho County, Kenya. The study adopted cross-sectional study design and purposive sampling technique. A sample size of 100 respondents was used. Data was collected from respondents who were attended and recovered during the study period from December 2021 to March 2022. The collected quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) version 21. Correlation and regression analysis were carried out to establish relationship between variables. Chi-square also was used to measure correlations of variables. The analyzed data were presented in tables, charts and the corresponding thematic areas. Statistical significance was set at $p<0.05$. The ethical clearance was sought from Hospital ethical committee, National commission for science, technology and innovation (NACOSTI) and Mount Kenya University ethical review committee before data was collected. The results indicated that ease of access on is strongly related with self-poisoning. The study recommends that more psychological counselors to be employed and deployed to the community level to handle high risk groups at early stage.
Also recommends that policies should be enacted at County and National assemblies to regulate and restrict sales of these lethal poisons. On the same note, government should bring on board less lethal agrochemicals to substitute the current one on market which are toxics. This will eventually reduce these cases of self-poisoning in our Counties and Country at large.

1.0 Introduction

1.1 Background Information

Organophosphate (OP) is a number of a collection of compounds typically derived from phosphonic, phosphoric and phosphonic acids. In 19th century, the prototypic Ops were

initially synthesized, and similar compounds are currently found in most of the products used globally such as fire retardants, pesticides, prescription drugs, fuel additives, plasticizers, nerve agents (*Costa,2018*), lubricants, defoliants and industrial solvents. OPs are majorly prevalent in morpheme commonly referred as pesticides, comprising of herbicides, fungicides, anthelmintic and insecticides. The contributions of the compounds across the world in decades is development of agricultural productivity through improved quality product by controlling plant pathogens, nematodes and insects and higher crop yields. Furthermore, they have also minimized machinery, the amount of labor and fuel used for mechanical weed-control (*Fernandez-Cornejoe et al.,2014*).

This study aimed to investigate the incidence, distribution, trends, and determinants of suicide by self-poisoning among patients presenting at Menoufia Poison Control Center (MPCC) and Tanta Poison Control Center (TPCC), serving two significant Egyptian provinces, in light of the rising trend of self-poisoning and as demonstrated by past statistics on its incidence in Egypt are grossly insufficient, making comparison of the past figures potentially ineffective and inconclusive. (*Kasemy et al.,2021*).

Contrary to a pesticide ban, which should go into effect more quickly, factors like age, religion, and gender distribution vary slowly over time, causing the step adjustment in the trend of suicide rate seen in this data. In addition, self-poisoning with pesticides is a common way for people to injure themselves, affecting people of all ages and genders, so any regulations would probably affect the entire population. As observed in Taiwan, bans may have distinct effects on rural and urban areas, and rising rural-to-urban migration may have a negative impact on suicide rates (*Bonvoisin et al.,2020*). Self-injury in adolescents is typically accompanied by a psychological illness. Adolescent self-poisoners must be thoroughly evaluated in order to provide information that will be useful to those who are caring for these individuals clinically.

Substance misuse is increasingly linked to psychiatric issues that cause self-harm in teenagers. The most prevalent determinant identified In our investigation of four cases of self-poisoning with a history of substance misuse, we discovered that interpersonal conflict, followed by family conflict and conflict with the mother and father, is a psychosocial component contributing to acute poisoning. Academic and romantic failure were identified as the main causes of school-related problems. Family conflicts are characterized by recurrent outbursts of rage and aggressiveness, poor nurturing, and particularly icy, unhelpful, and uncaring disagreements. These kinds of families run the risk of subjecting their kids to a wide range of physical and mental abuse. Most frequently, events that have resulted in a suicide attempt are interpersonal conflicts between the adolescent and their classmates and family. These interpersonal issues could play a significant part in the emergence of suicidal ideas.(*Kumar et al.,2018*).

1.2 Statement of the Problem

Globally, it is estimated that approximately 800,000 people succumbs to suicide every year.an estimate provided a prediction that about 1.5 million people would succumb to suicide in 2020. People die as a result of suicide at a rate of 10.7 people for every 100, 000 persons meaning that there is a single death due to suicide in every 20 seconds. Suicide is ranked at position 15 in the leading causes of deaths in the world since it translates to 1.4% of all deaths worldwide (*WHO, 2017*). Over 79% of suicidal deaths are accounted by people from low and middle income earners (LMICs). An extremely vulnerable group is represented by adolescents who self-harm (*WHO, 2019*). A study done in Kericho County Referral Hospital reported that 5% of all admissions are due to poisoning (*Sang et al., 2016*).

1.3 Purpose of the study

The study aimed at assessing influencing factors on intentional organophosphate self-poisoning among persons aged between 15-30 years in Kericho County, Kenya and establishing measures to curb the predicament.

2.0 LITERATURE REVIEW

2.1 The influence of ease of access of poisons on intentional self-poisoning

The key element of suicide prevention strategies is restriction. (*Fleischman et al., 2016*). In Sri Lanka, studies have shown that easy accessibility of pesticides in farming households is the main reason why it is the most common premise that people use for self-harm (*Weerasinghe et al., 2014*).The extent of successfulness in every society is to deal with risk issues on ease of access sine it is eye opener to limit attempt of self –harm. Some questions are commonly asked from the Authorities if chemicals could be the etiology of demised of human being affected was due to drug abuse around the time of committing the said crime. However, abuse of drugs and substances play important role in committing self- crime where it has been established that there are little researched conducted in this field in the Iranian country where toxicological study was done to check through autopsy whether chemicals were caused of death in legal medicine facilities.

Within a period of five years.(*Kordrostami,2017*). Scheduling should lower ease of availability of poisons where assessing the impact in mitigation measures in across section study survey. . India, being an agricultural country, uses organophosphate pesticides in controlling pests among crops. This makes the farmers access the OP compounds readily and thus these are the agents of choice for self-poisoning (*Falia et al., 2017*).

Bundotich and Gichuhi (2015) conducted a study in General Hospital, Nakuru, Rift Valley region, Kenya on acute Poisoning found out that pattern of poisoning and gender biasness in relation to various toxic agents. The study indicated that there was a high use of Amitraz poisoning in male and high usage of zinc phosphide poisoning in females. Differences in cultural roles of males and females in the society can be used to explain this bias. Culturally, the males often carry out the management of livestock disease. As a result, male are more exposed to the animal pesticides compared to females.

2.2 Safe custody of poisons (storage)

There have been various recommendations that have been made to sensitize the community against self-poisoning. The World Health Organization (WHO) and their counterparts; The International Association for Suicide Prevention (IASP), have jointly advocated for the adoption of lockers so that the pesticides can be stored well to prevent high rate of suicide due to misuse of harmful pesticides. This advocacy is termed as “safer storage” *(Arensman 2017 and WHO 2016*), Furthermore, other interventions to reduce the rate of self-poisoning include the use of less dangerous pesticides instead of dangerous pesticides in pest control.

2.3 Influence of sales of poisons

Regulation of pesticides usage in state government is governed by the Insecticides Act. The Act is mandated to give licenses to manufacturing companies who are concerned in the manufacturing, selling, stocking, exhibiting and distribution of pesticides. In case of safety concerns, the Act allows the states to ban the use of pesticides for 60 days. In some cases, the Act permits that the policy is extended for another 30 days in case the concern is out of hand. Other states such as Kerala, Punjab and Sikkim have developed additional policies concerning the use of pesticides, and as a result, they have totally restricted the use of HHP within the respective states (*Government of Punjab, 2018).*In rural Asian communities, the problem is most severe in instances where the availability and the accessibility of the pesticides is easy through buying from shops and homes (*Weerasinghe et al., 2014*). People who choose to use other poisons due to the absence of HHPs have high probability to survive

suicidal attempts in what is known as transient suicidal crisis. This is an instance where restriction of some poisons can reduce the rate of suicide (*Gunnell et al., 2017*).

3.0 RESEARCH METHODOLOGY

This research was conducted in Kericho County. The study employed a cross-sectional survey. It was a study of all cases of intentional organophosphate self- poisoning and relied majorly on the diagnosis made by clinicians at emergency departments. It was based on presenting symptoms and history from the respondents and outcomes of laboratory investigations of respondents of ages between 15-30 years. All respondents brought to hospital presenting to emergency department with a history of intentional organophosphate self- poisoning were recruited for the study depending on their eligibility. The aim was to sample 100 participants during the study period.

4.0 RESULTS AND FINDINGS.

4.1 Descriptive Statistics on Ease of Access to Organophosphate poison (n=100)

Table 1: Descriptive Statistics on Ease of Access to Organophosphate poison (n=100)

Description=Xi (independent variable)	**Yes**		**No**	
	N	%	n	%
Do you engage in farming activities in your family	72	72	28	28
Does your family use agrochemicals	60	60	40	40
Do the sellers of pesticides ask for any prescription from veterinary officers before sale?	2	2	98	98
Is there any family member prohibited from accessing the pesticide storage room or area?	57	57	43	43
Have you ever been trained on safe use of pesticides, herbicides or Integrated Pest-Management (IPM)?	29	29	71	71

Regarding ease of access to organophosphate poison, the respondents were asked questions to which they were supposed answer 'yes' or 'no'. First, they were asked if they were engaged in farming activities in their family; 72% said yes while 28% no. The study also wanted to find out if the family used agrochemicals; 60% said yes while 40% said no. The researcher tried to find out if there was any family member prohibited from accessing the pesticide storage room or area; 57% said yes while 43% said no. concerning training on safe use of pesticides, herbicides or Integrated Pest-Management (IPM), 29% of the respondents said they had been trained while 71% said they not been trained on Integrated Pest-Management. This study is fitting what Weerasinghe (2018) recommendation on training of vendors since it was found that 71% of the respondents have never been trained on IPM to enhance them with knowledge in employing response strategies, suicide and its prevention, as well as pesticide poisoning. Furthermore, the session also gave the vendors the knowledge on how to identify customers at high suicidal risk. Vendors were as well trained to observe unusual behaviors in their customers. (*Weerasinghe et al., 2018*).

The findings are consistent with those made by Weerasinghe (2014), who discovered that pesticides are frequently used as a means of self-harm in farming households due to their easy access in the home environment. In-case of this study, Kericho County is an agricultural region where application of this poisons for the purpose of food is security is in place.

4.2 Agrochemicals that your family uses on regular basis (n=60)

The researcher sought to know the agrochemical that the respondents used on a regular basis and the respondents were as follows; other agro chemical was leading with 16%, acaricides 12%, Herbicides8 (8%), followed by Insecticide 14%. It was then followed by fungicides at 6%. Rodenticides were the least used chemicals represented by 4(4%). These findings agreed

with a study conducted by Benedict (2019) which stated that domestic poisons are easily available for any household member to use them for deliberate self-poisoning.

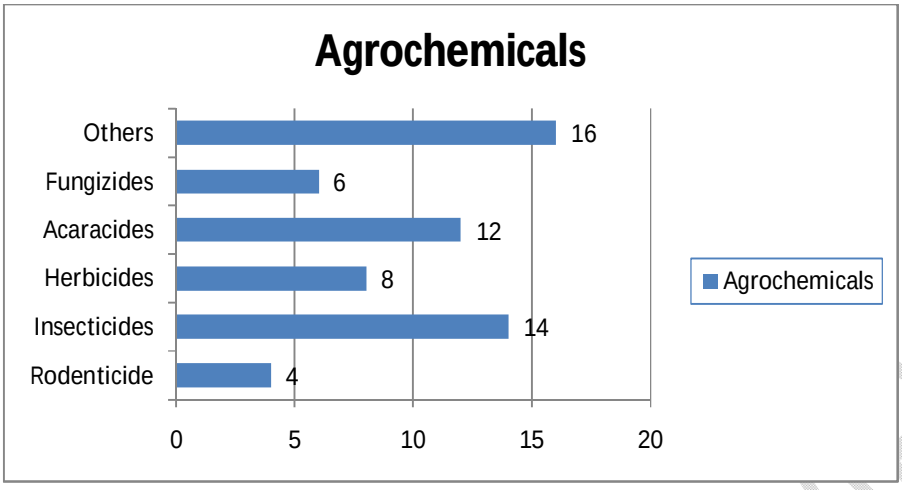

Figure 1: Agrochemical used

4.3 From where does your family buy the pesticide for use in the farm? (n=100)

The respondents were asked to establish where they get their agrochemicals and the following wee the respondents. Out the total respondents, 42% said they got them from agrovets, 36% from other sources, 14% from retail shops. Only 8% of the respondents said they obtained them from open-air markets. The results of this study matched another study in rural Asian communities, where the problem was most severe in instances where the availability and the accessibility of the pesticides were easy bought

from shops and homes (Weerasinghe *et al*., 2014).

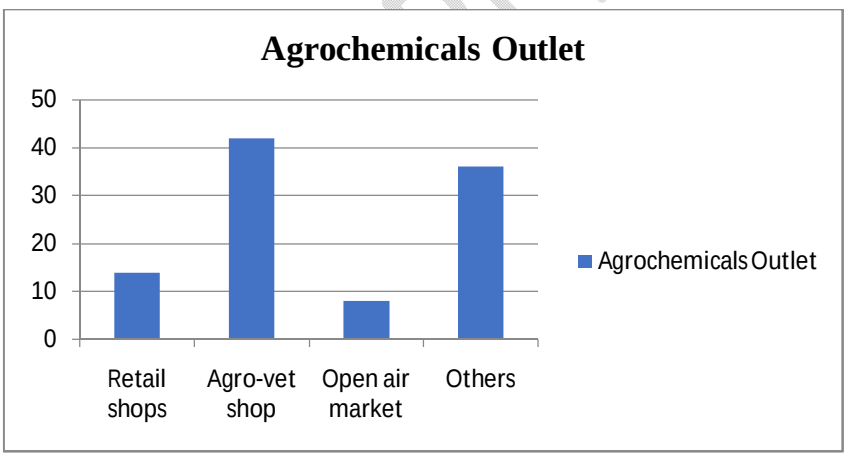

Figure 2: Agrochemical outlet

4.4 On average how much money in Kenya shillings does your family spend on pesticides in a season in a year?

From the information on table 2 below, it is evident that most of the respondents (32) 32% spend between Ksh 5000-10,000 on pesticides in a season in a year. This was followed by those respondents who spent over Ksh 10,000 represented by 24 (24%). Those who spent between Ksh 1,000-5,000 were 27 (27%). Only 17 (17%) of the respondent s spent less than Ksh. 1,000.

So far there was not study found to have been done assessing on the cost of these poisons commonly used for self –harm in our country and beyond. In this study, it was not captured clearly on the quantity in terms of millilitres per seasons since consumers buy them according to size of the farms.

Table 2: Expenditure on pesticides

Amount	Frequency	Percentage
Less than 1,000	17	17
KShs. 1,000 – 5,000	27	27
Kshs. 5,000 – 10,000	32	32
Over KShs. 10,000	24	24
Total	**100**	**100**

4.5. Where does your family store pesticides?

The researcher sought to know where the family stored pesticides and the following were the responses: 63 (63%) said they stored them in farmhouse/store whereas 37(37%) said they store them at home. As part of a comprehensive suicide prevention strategy known as "safer storage," the International Association for Suicide Prevention (IASP), WHO, the pesticide industry, and others have promoted the use of improved community and household storage, with locked lockers or boxes, to prevent pesticide self-poisoning." (*WHO 2016*) and *Arensman.(2017).*

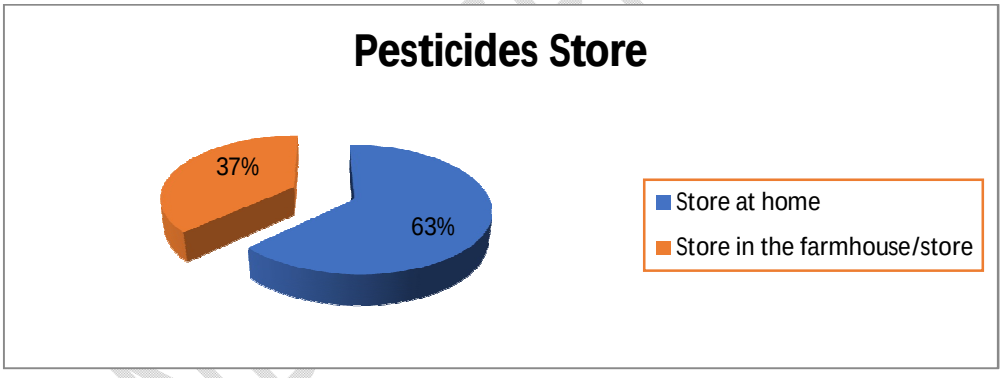

Figure 3: Pesticides store

4.6.Which family member is not allowed in the pesticide storage room or area? (n=56)

Figure 4: Family member not allowed

The researcher sought to know family members who were not allowed in pesticide stores and the response were as follows: 38% said children followed by sick family members represented by 12%. Others were represented by 4% and lastly mothers represented by 2%.

This study's findings indicated that there was laxity in storage of this poisons, which therefore it gave leeway to the community members to use them for unintended purposes, like self-poisoning.

On the other hand, various interventions such as using less hazardous pesticide instead of more hazardous pesticides have major advantages and benefits. The benefits include reduction of rates. Such regulations for example were reinstated in Sri Lanka and the effects is measurable as the rate of suicide reduced in the country by 75% an estimation of about 93,000 saved lives for more than 20 years now, and they have as well improved agricultural sector (*Knipe et al., 2017).*

The outcome of this study revealed that the sale of organophosphate poisons was *on a-willing-buyer-willing-seller* basis (*Zalsman et al., 2016*). Knipe's study (2017) reported that poisons are likely to land in the wrong hands for self-poisoning.

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary on the ease of access to organophosphate poisons.

On engagement in farming activities in the family, 72% said yes while 28% no. The study also wanted to find out if the family used agrochemicals. Of these, 60% said yes while 40% said no This indicated that many people in the county are farmers and therefore, they need pesticides and herbicides for their farms resulting in availability of these poisons at home and shops closer to the villages in this county.. The study tried to find out if there was any family member prohibited from accessing the pesticide storage room or area. Of these, 57% said yes while 43% said no. This revealed that 57% of community members were aware of toxicity of the poisons if handled by a sick member or children since they could use the poisons for self-harm. Concerning training on safe use of pesticides, herbicides or Integrated Pest-Management (IPM), 29% of the respondents said they had been trained while 71% said they had not been trained on Integrated Pest-Management. The study found out that agrochemicals

used on a regular basis were: acaricides 12%, Herbicides 8 (8%), followed by Insecticide 14%. It was then followed by fungicides at 6%. Rodenticides were the least used chemicals represented by 4(4%). Others -16% of which respondents were not able to remember their names. This study established that the acaricides and herbicides which accounted for 20% of the all the poisons, were available in the market and participants' homes despite majority of users having not been trained on dangers and benefits of their benefits and risks. This could have resulted in failure to observe stringent storage directions, giving room to those who wanted to self-harm to actualize their suicidal thoughts. The study established that out of the total respondents, 42% they got poisons from agrovets, 14% from retail shops and 36% from other sources. Only 8% of the respondents said they obtained them from open air market. This indicated that pesticides and herbicides are regularly used by farmers to improve their farm outputs. The chemicals were readily available especially in agrovets and shops. The study revealed that many farmers bought poisons for farming evidenced by the amount of money spent (56% of the respondents spent over ksh. 10,000 on the poisons per year). The farmers kept these poisons in their homes often in readiness for application in their farms. On storage of organophosphate poisons, the study found that most of the farmers stored the poisons in farmhouses and others in their living rooms. The storage areas were not safe and anyone could access the poisons any time. Therefore, those who wanted to ingest the poisons for the purpose of self - harming could succeed.

5.2 Conclusions

It can be concluded that ease of access to organophosphate plays a role in intentional self-poisoning. The stakeholders need to put measures in place to restrict and regulate sales of these poisons or substitute the lethal organophosphate ones in the market with those that are less poisonous. This will reduce the chances of the risk group getting the poisons. Since the study indicated that most of the respondents were farmers and use agrochemical therefore there is need of pesticides in guaranteed. These poisons available in shops, agro vets and open air market these shows no restrictions on sales therefore there is need to pass roles and regulation to regulate sales and distributions. It was concluded that ease of access predisposed the high-risk group to feel helplessness and lose hope. Life could become unbearable, leading to suicidal ideations and eventually, intentional self-poisoning.

5.3 Recommendations

The research recommends the use of a multi-sectoral strategy to try to overcome these challenges. The two governmental levels have the most role to play, followed by the community, health service providers, and other experts in the medical and counseling fields.

The government should:

i. Reinforce and strengthen policies through national and county assemblies to pass and enact laws regulating and restricting sale and use of lethal organophosphate poisons or substituting the same with less toxic but effective ones.

ii. Train and employ more psychological counselors to be deployed to the villages and initiate psychiatric screening programmes to facilitate the counseling and screening of those who are at the risk of self-poisoning early enough. This is in commensurate with mental health amendment bill June 2022 which has been passed by senate to give way for county government

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