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

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ABSTRACT

Aims: The aim of this study was to assess factors influencing ease of access on intentional organophosphate self-poisoning among persons aged 15-30 years in Kericho County,Kenya...

Study design: The study adopted prospective cross-sectional study design and purposive sampling technique.

Place and Duration of Study: The study was conducted in 3 level 4 health facilities(Kericho County Referral Hospital,Kapkatet Sub- County Hospital and Sigowet Sub- County Hospital) in Kericho County,Kenya. Which were systematically sampled base on the highest monthly workload one year prior to the study period. Study was conducted between December 2021 and March 2022. .

Methodology: 100 participants of age between 15 year and 30 years old were included in the study(88 males and 12 females). It was a study of all cases of intentional organophosphate self- poisoning, relied majorly on the diagnosis made by clinicians and doctors at emergency departments. Participants were sampled based on the presenting symptoms and history from the respondents. 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 where only respondents who were admitted and recovered after treatment were enrolled after signing or assenting to the consent voluntarily.

Results: A sampled of 100 participants were eligible and managed to have 100% response rate. The study found out that there was a statistical relationship between the parameters since the chi square value were 0.001 which was less than the standard p value which is 0.05 at 95% confidence interval. Bivariate analysis showed a strong positive correlation was found between self-poisoning and easy access to organophosphate ($p<0.05$, $r=0.631$). With regard to easy access to organophosphate, the majority indicated yes with 71(71%) responses while those who indicated no were 29 (29%) respondents out of 100 respondents.

Conclusion: It was concluded that ease of access of organophosphate poisons predisposed the high-risk group to find easiest way of committing suicide when they encountered challenges in their daily lives, therefore, laxity on sales ,storage and distribution of pesticides give those at risk a chance.

Keywords*:Suicide,organophosphate,self-poisoning,ease of access,Deliberate self-harm,Intentional*

1.0 INTRODUCTION

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 [1]. .Suicide is a global disaster claiming over 800 000 deaths each year. In 2012, suicide led among causes of death in persons aged 15– to 29- year.[2]. 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 [3]. Pesticide use is still the commonest method of committing self-harm in non- urban regions of Sri Lanka. Pesticides which were previously known for majority of suicides were substituted by less hazardous chemicals serving the same purpose in agricultural yields have shown significance reduction in suicides cases. This restriction and substitution of these pesticides will significantly reduce intentional and non- intentional poisoning agricultural areas in Sri Lanka.[2]. Kasemy (2021) study, aimed at investigating 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. [4]. 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 Bonvoisin's study (2020). 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. [5]. Pesticide suicide was the eighth most common contributing factor to death among 125 committing suicide in the year 2018 as per the Centers for Disease Control and Prevention.[6]. Self-poisoning and mortality due to suicide report was released in the last month of year 2019 by Vermont Department of Health (VDH) . [7]. 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.[8]

1.2 Statement of the Problem

Approximately 800 000 persons lost live by self-poisoning yearly. Self-harm using chemicals bring upto one-fifth of the global self-harm and have been known to cause an alarming challenge in public health issues mostly in agriculture productive regions especially in developing countries in Asia. [9]. In 1950s, during introduction of Agrarian Revolution which were accompanied by pest control chemicals which

were hazardous at the same time, approximately fourteen million early deaths were reported to have been associated with intentional self-poisoning.[2],[10]. 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 [11]. 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 [12]. Public health and medical fields have raise an alarm on the rising adolescent intentional self-poisoning which have been noted in November 2019 report that adolescent adolescent attempted self-poisoning has been on the rise. [13]. A study done in Kericho County Referral Hospital reported that 5% of all admissions are due to poisoning [14]. The data base report (facility registers for the year 2017 to 2019) in the study sites showed an uptrend reported cases of self-poisoning .Following that report, researcher opted to conduct a study to assess factors influencing ease of access on self-poisoning among persons aged 15-30 years.

1.2 Purpose of the study

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

1.3 Hypothesis.

Ha: Ease of access of organophosphate poisons influence intentional self-poisoning among persons age 15-30 years.

H0: Ease of access of organophosphate poisons do not influence intentional self-poisoning among persons age 15-30 years.

2.0LITERATURE REVIEW

2.1 The influence of ease availability of organophosphate poisons.

The key element of suicide prevention strategies is restriction.[15]. 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.[16]. In agricultural nations such as Asia mostly use organophosphates for pesticides control resulting in easy availability of these chemicals to the community. These poisons have been a challenge in emergency department in Nepal. Nepal is one of the developing countries, therefore, agriculture is commonly practice and availability of pesticide poisons across the country posing a challenge issue as in developed countries like United States. Globally, it is estimated that about three million incidences of attempted self-poisoning reported yearly resulting a mortality rate of 6% - 30% in developing countries.[17]. Agricultural practices are commonly witnessed in San Quintin Valleys and Mexicali Valleys which are marketable in return demand for pesticides as a requirement for pest controlled goes hand in hand with agricultural activities therefore, availability of toxic chemicals which increase risk to farmers.[18]. Attempted suicide following ingestion of organophosphate poisons among women in agrarian population unlike in United States ,where the same self-attempted suicide are either as a result of intentional or accidental dermal

exposure or ingestion by farm workers.OP pesticides are easily available following community members doing their farming their vicinities.[19].High gender bias (female) suicide attempt) reported incidences in Nepal are as result of cultural and social roles bestowed on them by the community showing inequity in the gender roles. Leading to domestic abuse early marriages ending in suicide attempted by women in the country. [17]. 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. [20].

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”.[21],[22]. Poor storage of pesticide procedures can be extra crucial way of risk exposure to man and livestock in research area due to storage of full, half-full or empty containers of poisons in their households.[23].Laxity of standardized IPM(Integrated Pest Management) format of approach which employ both modern and traditional measures dealing with the environmental ways of IPM in a multidisciplinary study approach. Implementation of IPM entirely depend on several factors for instance ,educational level, social and economic status ,restrictions, thinking capacity ,governing policies,accessability of IPM instruments .consumer demand and retailing price.[24].

IPM is a portion of modern agricultural model to ensure food security globally influenced by many issues which affect the quality and quantity of farm produce. All stakeholders in the crop production and experts including consumers have an important role to play in IPM as far as food productivity is concern. The IPM model accommodates all stakeholders in this process. The guidelines for the IPM model will ensure the producer enjoy profits, consumer to get the farm produce on pocket friendly price and the world to ensure food security for her bulging population.[25].

2.3 Influence of sales of poisons

Regulatory bodies have a responsibility to ensure there that poisons are safe to the environment and its habitats. Some countries who have acted on substituting the hazardous pesticides with less toxic ones are less costly and sustainable where many lives are saved and several agricultural significance like safe farming practices, low food poisoning, conservation of environment hence climate change adhered to.[26]. All poisons bans stand the most relevant way to prevent self-poisoned or unintentional exposure to toxic pesticides therefore neutralizing the equation to less toxic substitute.Wonderfully,USA is still reluctant in banning or getting away with hazardous pesticides despite being advised by leading agricultural bodies may be due to lack of legislation in the Country.[27].Hazardous poisons are still in use in India despite being threaten to human lives. On the other hand ,some

poisons were banned resulting in positive outcomes as the cases of both self-poisoned and suicide in general has drop significantly with minimum effect of farm produce.[28]. Regulations were implemented in the year 1986 where there was significant drop on fatalities from 2648 cases in 1986 to 221 cases in 2019(92% reduction).Lowered utilization of toxic poisons with less concentrated formulations correspond with reduce the number of mortalities reported.[29]. 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. [30].

3.0 MATERIAL AND METHODS .

3.1 Location of the study

This research was conducted in Kericho County. Kericho County is one of the 47 counties in Kenya. This county borders Bomet County to the south, Kisumu County to the west, Nandi and Uasin Gishu to the North and Nakuru County to the east. This County is about 256 kilometers from Nairobi. Kericho County is known for its large- and small-scale tea-farming and most of its residents rear livestock as well. It covers an area of 2479 square kilometers and is divided into six sub-counties. As per the 2019 census, the population of this County was 901,777. The study was conducted in Kericho County Referral Hospital and three other selected sub-county hospitals within Kericho County, namely, Sigowet , Londiani Sub-County Hospital and Kapkatet. The study sites were selected depending on the traffic of patients seeking medical attention in these hospitals, which provide curatives, preventives, promotives and rehabilitative health services, and also based on geographical distribution.

3.2 Research Design

The study employed a prospective 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 of ages between 15-30 years.

This was justified by previous studies which showed that this age group was majorly involved in self-poisoning and also encounters teenage and youth life changes with accompanying challenges. This design provided insight into factors that influence youth and teenagers in Kericho County, leading to organophosphate self-poisoning. The design was appropriate for the study since the researcher was able to collect information without manipulation of variables. Ease of access to poisons dwells on the availability, storage of poisons at homes, the market-cost, and regulations in place on sales. The researcher used researcher administered questionnaires which were both quantitative and qualitative in nature. The quantitative section of the questionnaire enabled the researcher to link the influencing factors to intentional organophosphate self-poisoning.

3.3 Target population

All clients who reported in Emergency Departments at study sites with a history of poisoning within the study period.

3.4 Sample population

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.

3.5 Sampling Procedure and Techniques

The recruitment procedure was purposive sampling for all those respondents who seeked medical help in during the period of study preceded by intentional self-organophosphate poisoning. The sampling study sites were the hospitals in the 6 constituencies in this county where the researcher placed these hospitals in terms of health facilities to the Northern, Western, Southern and Eastern part of the county. They were then listed in the order of the highest to lowest number of patients who had attended each facility per month (general monthly workload). Sampling of all number ones was done, informed by larger number of patients seen in hospital monthly workload from each of the four parts of the County where 4 facilities were selected by systematic random sampling. These were: to the north, comprising Ainamoi constituency and represented by Kericho County Referral Hospital; to the south comprising Bureti constituency and represented by Kapkatet Sub- County Hospital; the west comprising Belgut and Sigowet-Soin constituencies and represented by Sigowet Sub- County Hospital; and the east comprising Kipkelion East and Kipkelion West and represented by Londiani Sub-County Hospital.Based on the data reviewed from the registers MOH 735 from the previous years' i.e. 2017 (292), 2018 (220) and 2019 (525).

3.6 Construction of research Instruments

The instrument was pre-tested before actual study. The qualitative section of the questionnaires enabled the researcher to collect data in the actual context so that findings and conclusions about the study were made based on the situation on the ground. The study covered all those cases occasioned by self-poisoning during the study period where respondents were interviewed when they had recovered in the study sites and eligible for study.

3.7 sampling size

The aim was to purposely sampled 100 participants(The study employed Fischer formula to estimate the sample size (Mugenda & Mugenda, 1999). during the study period from December 2021 to March 2022) Interviewed administered questionnaires were used to cater the data from respondents

The study employed Fischer formula to estimate the sample size (Mugenda & Mugenda, 1999).

$$n = \frac{Z^2 Pq}{d^2}$$

In this formula, n represented the desired sample size when the study population is over 10 000 and Z is the standard normal deviate normally set at 1.96 and corresponds to 95% confidence interval (CI). On the other hand, p was the proportion of target population estimated to have the desired characteristic and was 0.07% (q=1-p=1-0.07=0.93), while d is the degree of accuracy usually set as 0.05. The prevalence of intentional organophosphate poisoning in Rift Valley-Regional was 0.07 %. Hence the desired sample size (n) was determined as follows;

$$n = \frac{Z^2 P q}{d^2}$$

$$n = \frac{1.96^2 \times 0.07 \times (1 - 0.07)}{0.05} = 100$$

3.8 Data analysis and presentation.

The collected data were sorted and coded. Microsoft Excel was used. Statistical Package for Social Sciences (SPSS) version 21.0 was used to carry out data analysis of factors influencing ease of access to poisons of the persons aged 15-30 years. Correlation and regression analysis were carried out to establish relationship between variables. Chi-square also was used to measure association 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.

4.0 RESULTS

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, 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.

4.2 Researcher wanted to know if family uses agrochemicals 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%)..

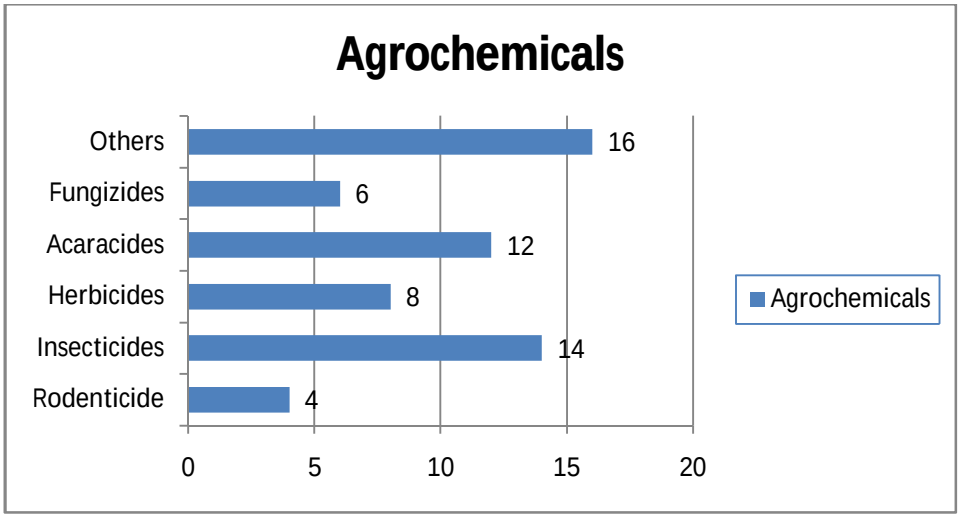

Figure 1: Agrochemical used

4.3 Researcher sought to know where 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 were the responses; 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.

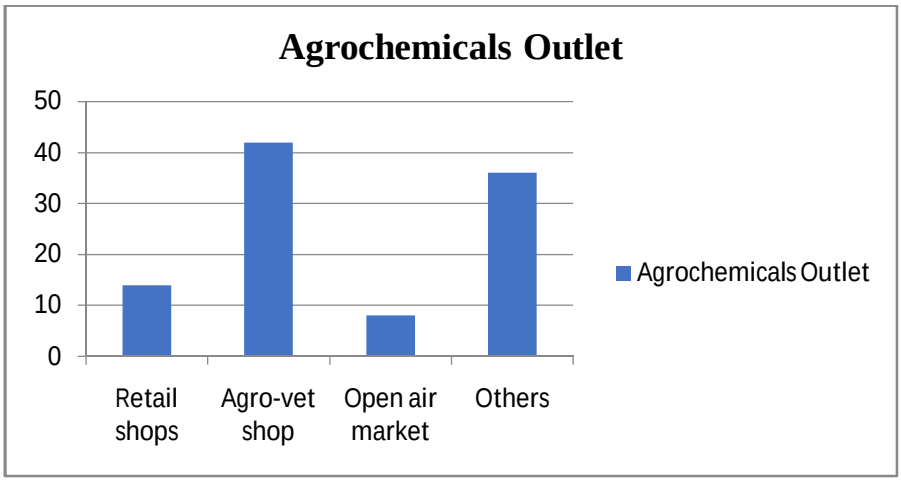

Figure 2: Agrochemical outlet

4.4 On average study sought to established how much money in Kenya shillings a family spent on pesticides in a season (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.

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. Study sought to know Where does 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.

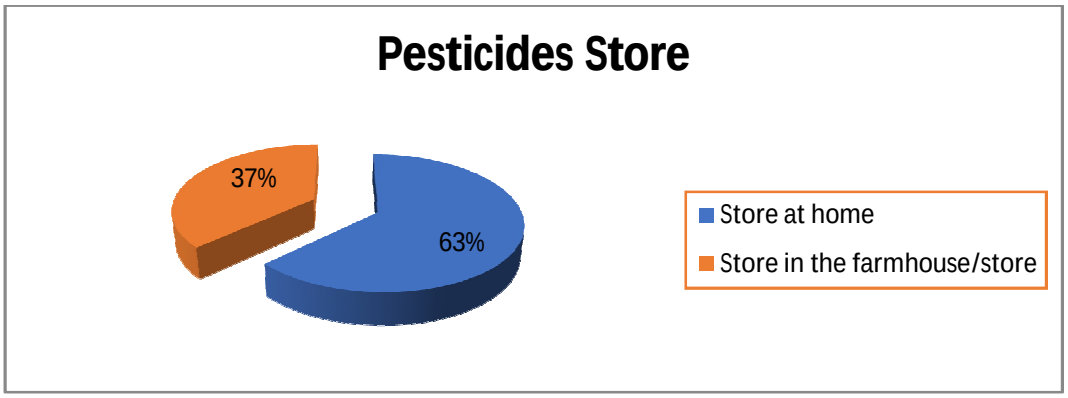

Figure 3: Pesticides store

4.6.Researcher was interested in establishin whether there were any family member who was not allowed in the pesticide storage room or area. (n=56)

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%.

Figure 4: Family member not allowed

4.7 Measure of Association

Table 3. Chi Square measure of association

Variable	Chi-Square Value	Df	*P-Value*
Easy Access to organophosphate	39.856	1	0.001

The study found that there was a statistical relationship between the parameters since the chi square value were 0.001 which was less than the standard p value which is 0.05 at 95% confidence interval.

4.8 Non-Parametric Association

Bivariate analysis was determined and the results obtained were represented on table below that shows that self-poisoning was association to respondents having easy access to organophosphate, family challenges, personal specific events and psycho-social factors. A strong positive correlation was found between self-poisoning and easy access to organophosphate ($p<0.05$, $r=0.631$). The model was also significant with a Hosmer and Lemeshow test of $p>0.05$.

Table 4. Non-Parametric Correlation

			Self-Poisoning	Easy Access to organophosphate
Spearman's rho	Self-Poisoning	Correlation Coefficient	1.000	
		Sig. (2-tailed)	.	
		N	100	
	Easy Access organophosph ate	Correlation Coefficient	.631**	1.000
		Sig. (2-tailed)	.001	.
		N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).

5.0. DISCUSSIONS.

The findings are consistent with those made by Licata et al.,(2019) who discovered that pesticides were frequently used as a means of self-harm in farming households due to their easy access and availability in the home environment due to farming activities . In-case of the concluded study, Kericho County is an agricultural region similar to Nepal community described by *Licata's(2019*) and other similar studies ,*Bird's (2019*) and Serrano's(2019) explained the influenced of availability of these pesticides have impact on ease of access of the poisons. These findings agreed with a study conducted by *Benedict et al.(2019*) which stated that domestic poisons are easily available for any household member to use them for deliberate self-poisoning.

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. *Ndayambaje,'s(2019*) study found similar outcomes as this study's results. *Rezaei,(2019)* and *Dara (2019*) studies explained the use of IPM model which significantly reduced unnecessary handling of poisons by those at risk of suicide ideation.

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 milliliters per seasons since consumers buy them according to size of the farms.

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.

The outcome of this study revealed that the sale of organophosphate poisons was *on a- willing-buyer-willing-seller* basis Donley(2019) and WHO,2019 studies concurred with this study where restriction on sales of these pesticides are not in place therefore, these poisons are likely to land in the wrong hands for to be used for self-poisoning by those at risks.. *Eddleston et al*.(2022) found out that banning and restriction of sale on toxic pesticides resulted in marked reduction in reported cases of suicide using poisons.

6. CONCLUSION

Since the study indicated that most of the respondents were farmers and use agrochemical therefore, use of agrochemicals in their farms is beyond any doubt in order to yield quality farm product.

The study concluded that ease of access of organophosphate poisons predisposed the high-risk group to find easiest way of committing suicide when they encountered challenges in their daily lives, therefore, laxity on sales, storage and distribution of pesticides give those at risk a leeway to commit suicide using these chemicals when life become unbearable, helplessness and lose hope leading to suicidal ideations.

These poisons were found by the study to be easily available in shops, agro vets and open air market which showed that no restrictions on sales are in place.

The study recommends that policies should be enacted at County and National assemblies on regulations/ restrictions on sales, storage of lethal pesticides as well as consideration of alternative less toxic pesticides to phase out the lethal ones.

Recommend training of farmers on integrated pest management should be implemented by agricultural extension officers. Also, psychological counselors should be employed and deployed to the community level to handle high risk groups at early stage. This will eventually reduce these cases of self-poisoning in our Counties and Country at large.

7. LIMITATIONS

Despite successful completion of the study we encountered the following challenges;

1. Unwillingness of some respondents to share some vital information: Resolved by reassuring and reminding them on our confidentiality and anonymity in this matter.
2. Some respondents were not promising us to meet them at certain places other than hospital set up ,therefore sharing contact were not that ease due to unknown reasons: Resolve that by allowing them to feel at ease and feel free to be accompanied by close or confidant persons.

SUGGESTED RESEARCH IN FUTURE.

1. Assessment of the impact of psychological counseling during follow up among suicide poisoning survivors.

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COMPETING INTERESTS

Authors have no conflicting interest

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Authors LKS. ,RM. and WMT.Author LKS. came up with concept paper and they designated the study. LKS collected data. Authors RM and WMT. conducted analysis. Author LKS. drafted the manuscript. Authors RM.and WMT. revised the manuscript. All authors read and approved the manuscript.

CONSENT AND ETHICAL APPROVAL.

The researcher obtained research authorization letter from Mount Kenya University Ethical Review Committee. A research permit was sought from the National Commission for Science, Technology and Innovation (NACOSTI) before conducting the study. Authorizations were sought from the County government, the County Commissioner, the County Director of Education, the management of: Kericho County Referral Hospital, Kapkatet Sub-county hospital, Sigowet Sub-county hospital and Londiani Sub-county Hospital. In addition, the researcher explained the importance of the research to the respondents to obtain free consent and no one was coerced to take part in the study. The participation was voluntary. The researcher assured the respondents that information obtained from them would be treated with utmost confidentiality and their privacy was guaranteed as anonymity would be assured by the use of numbers/codes to identify respondents. Additionally, the researcher assured respondents that no one would suffer any form of harm in the event of information utilization since the information was particularly for academic purposes and respondents had the freedom to withdraw with no consequences.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

TPCC-Tanta Poisons Control Centre
MPCC-Menoufia Poisons Control Centre
LMIC-Low and Middle Income earners
IPM- Intergrated Pest Management