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OCCUPATIONAL HAZARDS AND INJURIES AMONG OIL PALM (*Elaeis guineensis Jacq.*) FARMERS IN THE KWAEBIBIREM DISTRICT IN THE EASTERN REGION OF GHANA

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ABSTRACT

Oil palm *(Elaeis guineensis Jacq.)* production in Ghana is associated with high levels of injury mainly because of the use of manual labour with little use of machinery. Using descriptive survey design, 100 oil palm farmers (50 males and 50 females) selected from each of the five-oil palm growing communities in the Kwaebibirem District of the Eastern Region, Ghana, were interviewed to identify the leading occupational hazards and injuries among oil palm farmers. The study showed that the major injuries farmers encountered during pre-planting operations were cutlass injury, stump injury, bee/wasp sting, general body pains and snake bites. Harvesting operations recorded body pains, objects on eyes, harvesting tool injury, snake bites and mattock injury as the major injuries, while post-harvest operations also recorded waist pains, injury on finger nails, cutlass injury and general body pains. Besides, the study showed significant difference between injuries experienced by both male and female oil palm farmers on their farms. The paper calls for sustained safety education and awareness creation on precautionary measures, and first aid operations at the farm level with special emphasis on the mandatory use of personal protective equipment.

Keywords: Oil palm, hazards, injuries, pesticides, pre-planting, post-planting, harvesting, Ghana.

Introduction

Oil palm (*Elaeis guineensis Jacq*.) cultivation is a core part of Ghana's agriculture. It has been selected by the government as a key strategic pillar of agricultural and industry-led growth for poverty reduction because of its potential to provide income for many rural smallholders (GOG, 2013). Oil Palm is the most economically important oil crop in the Palmae family in the world (Moore & Natalie, 2019). It is one of the driving forces of rural agri-business and agro-industries in the Kwaebibirem District in the Eastern Region of Ghana (Huddleston & Tonts, 2007) and has the potential to become one of the leading non-traditional foreign exchange earners for the country. Oil palm production is a common occupation among rural dwellers; however, some oil palm farmers still use the old and crude method for harvesting palm fruits and processing the palm oil. The possibility of exposure to various forms of

physical, biological, chemical, mechanical and psychosocial hazards that are inherent in some arts and trades may not be completely ruled out during oil palm processing.

Occupational hazards, according to the World Health Organisation, can be described as work, material, substance, process, or situation that predisposes, or itself causes accidents or disease, at a workplace (WHO, 2001). Asumeng, Acquah-Coleman & Dadzie (2015) in their study, concluded that hazards only represent potential to cause harm and that whether the harm actually occurs depends on circumstances, such as the toxicity of the health hazard, exposure amount, the extent of the risk factors present and duration of exposure to the risk factors. Many serious injuries may happen to even experienced farmers, either working with familiar equipment in familiar fields or doing tasks that they have been performing for years and even decades. Hazardous agricultural materials including pesticides, fertilisers, flammable liquids and other solvents may be responsible for acute and chronic illness among farm workers and family members. Although the use of tractors and other mechanised equipment have brought about dramatic increase in the cultivated land, mechanisation has also been identified as a contributor to severe injuries in agriculture (ILO, 2009).

Agriculture has undergone tremendous changes over the last 30 years. Technological innovations have increased production, but have also created new health and safety problems. Agricultural workers suffer the broadest and most extensive exposure to injury and disease of any occupational group (Leigh, 2011). According to the International Labour Organisation (ILO), the agricultural sector is one of the most hazardous to health worldwide. Agricultural work possesses several characteristics that are risky to health: exposure to the weather, close contact with animals and plants, extensive use of chemical and biological products, difficult working postures and lengthy hours and use of hazardous agricultural tools and machinery (Cole, 2006).

Half of the world's labour force, an estimated 1.3 billion workers, is engaged in agricultural production, which is one of the three most hazardous sectors of activity, along with construction and mining (ILO, 2011a). According to the ILO, in terms of fatalities, injuries, and work-related ill health, agriculture is one of the three most hazardous sectors of activity (along with construction and mining). ILO notes that an estimated 2.34 million people worldwide died in 2008 from work-related accidents or diseases; 2 million of these deaths were caused by various types of disease and 321,000 by work-related accidents (ILO, 2011a,b). Also, about 2.3 million women and men around the world are prone to work-related accidents or diseases every year; this translate to over 6000 deaths every single day. Worldwide, there are around 340 million occupational accidents and 160 million victims of work-related illnesses annually. Diseases related to work cause the most deaths among workers (ILO, 2011)

About half of more than 300,000 fatal work-related accidents annually occurring worldwide involve agricultural workers (Edmund, 2015). Mortality rates in agriculture have remained consistently high over the last decade, compared with other sectors in which fatal accident rates have generally reduced (ILO, 2000). The most occurring work-related injuries in Thailand were musculoskeletal disorders (MSD) (88.0%) and lower back MSD (59%), and the factors associated with lower back MSD included type of task, heavy

lifting and job stress (Bhuanantanondh *et al,* 2021). Furthermore, the widespread under-reporting of deaths, injuries, and occupational diseases in the agricultural sector means that the real picture of the Occupational Safety and Health (OSH) issues for farm workers is likely to be worse than that indicated in official statistics (ILO 2000; 2009).

Pesticide and weedicide users are the largest occupational group at risk for poisoning, with an estimated 2.5 million poisoned farmers in developing countries each year (Kuye *et al.,* 2008). However, misdiagnosis and under diagnosis mean that the exact magnitude of the problem is unknown. Unintentional poisonings, according to an earlier study by the WHO, kill an estimated 355,000 people globally each year; two-thirds of these deaths occur in developing countries (WHO 2003). According to Rother *et al.,* (2008), high-input agriculture with associated increased use of pesticides is being promoted by nations and the international community via economic, trade and agricultural polices without satisfactory support that will lead to more effective and safe management of pesticides, a situation that exposes farmers, their families, workers and communities to risk. A study conducted on 295 respondents in oil palm industry in Nigeria revealed that, nine out of ten of them consider their occupation as hazardous yet about 78% still suffer from various forms of injury on the job (Bamidele, 2015). This situation points to the existence of the research gap.

Pesticides and weedicides are applied to the environment with the aim of suppressing the impact of plant and animal pests and to protect agricultural and industrial products (Dey *et al.,* 2013). In modern agriculture, pesticides are inevitable inputs in Agro-ecosystems in spite of the variety of problems associated with them. Most pesticides used in agriculture today are synthetic organic chemicals that act by interfering with a vital metabolic process in the organisms to which they are targeted (Mathur *et al.,* 2005). Exposure to pesticides results in both acute and chronic health problems, which range from short-term effects to terminal and chronic diseases such as cancer, reproductive and developmental disorders (Yassi *et al.,* 2001). A study in South Korea (Lee & Hyun-Sul, 2008) highlights another issue – the fact that most of the pesticide-related deaths there were suicides resulting from ingestion. This problem may not be socio-culturally comparable to the situation in West and Central Africa; once again, there are few data.

No documented empirical data concerning the nature and levels of occupational hazards among oil palm farmers in the Kwaebibirem District of the Eastern Region of Ghana currently exist. Hence, to bridge this research gap and bring more clarity to this phenomenon, the study set as its main objective to identify the hazards and injuries encountered by men and women oil palm farmers in the area within the growing season during pre-planting and planting, post-planting, harvesting and post-harvest operations and the effect on farmers and their farm productivity. Besides, it sought to examine if there was a significant difference between injuries encountered by male and female oil palm farmers.

Consequently, countries such as Thailand have proposed that guidelines and training, such as exercise, proper working posture, and stress management, should be provided to the oil palm harvesting workers. Moreover, ergonomically designed tools should be developed for promoting health and safety in oil palm harvesting workers (Bhuanantanondh *et al.,* 2021).

Experimental

Study area

The study was carried out in the Kwaebibirem District, which is located in the South-western corner of the Eastern Region of Ghana, between Latitudes 1 degree 0'W and 0 degree 35.'E and Longitudes 6 degrees 22'N and 5 degrees 75'S. On the North, it is bounded by the Birim North District, on the East by Atiwa District and East Akim Municipal, on the south by Denkyembour District. The major mountain range, the Atiwa, is found in the North-East of the District around Dwenase and Apinamang. Apart from this area, the general climb in the District is less than 500 meters, in between heights are extensive marshlands. The Birim River traverses the District from the North to the South. Besides the Birim, there are other notable rivers such as Kadepon, Kadewa, Pram, Subinsa, Mmo and Apaam. One major feature of these rivers, except the Birim, is that it easily gets flooded during the rainy season which affects large tracts of low-lying lands. The District lies within the semi-equatorial climate zone with a double maximal rainfall regime. The highest annual rainfall of 2024 mm was recorded in 2011. The District's maximum rainfall period coincides with the planting season. The Kwaebibirem District includes both large-scale, out grower schemes linked with large producers/processors and smallholders selling onto the local market.

Study population

A total of 100 oil palm farmers (50 males and 50 females) were sampled for the study due to time and logistical limitations. This was because the target was oil palm farmers who perform any of the major activities involved in oil palm production from land clearing through control of pests and diseases to harvesting. Population for the study was drawn from five oil palm producing communities in the District namely; Nkwantanang, Damang, Otumi, Anweam and Kwae.

Research design, sampling procedures, sample size and data collection

Before pretesting of the instrument within the study catchment area, in consultation with the District Director of Agriculture at Kade in the Kwaebibirim District, the various farmers' association leaders were consulted and briefed about the study. The leaders took the researchers round to the five selected towns for familiarization purposes. The study employed descriptive survey design using quantitative method approach. Ten males and ten females' oil palm famers were randomly selected from a database of farmers in each of the five (5) oil palm growing communities in the district, obtained from the District Department of Agriculture. Structured interview schedule was used to collect primary data from the 100 selected oil palm farmers. The structured interview schedules were administered by the researchers in the *Akan* language and the responses translated by the researchers into the English Language.

Data analysis

The data collected were analysed with the help of IBM Statistical Product and Service Solution (SPSSS) version 22, using descriptive statistics such as frequencies, percentages, and inferential statistics such as Pearson chi-square, continuity correction and Fisher's Exact Probability Test. The descriptive statistics were used to describe the identified hazards and injuries encountered by men and women oil palm farmers in the District, within the growing season during pre-planting and planting, post-planting, harvesting and post-harvest operations and the effect on farmers and their farm productivity.

Results and Discussion

TABLE 1

Distribution of respondents by socio-economic characteristics (n=100).

Characteristics	**Male**		**Female**	
Educational background	Frequency	Percentage	Frequency	Percentage
No formal education	8	16	12	24
Primary	13	26	14	28
JHS	23	46	18	36
Secondary	4	8	4	8
Tertiary	2	4	2	4
Total	50	100	50	100
Age group (Years)				
15-20	5	10	6	12
21-30	8	16	5	10
31-40	12	24	10	20
41-50	12	24	13	26
51-60	13	26	13	26
≥61	-	-	3	6
Total	50	100	50	100
Farm size (Hectares)				
<2	34	68	37	74
2-3	13	26	11	22
4-5	3	6	2	4
Total	**50**	**100**	**50**	**100**

Source: Field Data, 2019

The study revealed that occupational hazards encountered by oil palm farmers in the Kwaebibirem District comprised of snakes, bees/wasps, ants, cutlasses, hoes, mattocks, fires set on farms, tree stumps, thorns, agrochemicals such as pesticides, weedicides, and harvesting tools. These hazards resulted in the following injury types snake bites, bee/wasp attacks, cutlass wounds, mattock wounds, injuries from fire, wounds from tree stumps, pains from awkward working postures and injuries from harvesting tools. Health ailments arising from agrochemical use (pesticides, weedicides, among others) were also identified.

Table 2 showed that 72% of the males and 32% of the females reported cutlass injury within the growing season. Additionally, 72% of the males and 32% of the females reported stumps/thorn injury under the same land clearing activity while 76% of the males and 24% of the females reported bee/wasp sting during land preparation. Pearson chi-square test was conducted to examine if there were significant differences between male and female oil palm farmers with respect to the

hazards and injuries they went through. It was found out that there were highly significant differences in cutlass injury (0.000**), stump/thorn injury (0.000**) and wasp stings (0.000**) at $p < 0.05$ between male and female oil palm farmers. There were also significant differences in general body pains (0.008*) and snake bites (0.006*), however, there were no significant differences in burns (0.500) and mattock injury (1.00) at $p < 0.05$ between male and female oil palm farmers. This is not surprising because men are noted for clearing fields (farmlands) for planting in agriculture, hence the numerous injuries they are likely to encounter during pre-planting operation compared with females.

TABLE 2

Pearson chi-square showing significant differences between male and female oil palm farmers and the injuries they encounter during pre-planting (n = 100)

Types of Injury	Male Yes (%)	Female Yes (%)	Pearson Chi Square	Continuity Correction*	Fisher's Exact Test	Sig*
Cutlass injury	36 (72)	16 (32)	16.026	14.463		0.000**
Stump injury	36 (72)	16 (32)	16.026	14.436		0.000**
Snake bite	19 (38)	6 (12)	9.013	7.680		0.006*
Mattock injury	12 (24)	11 (22)	0.056	0.000	1.000	1.000
Burns	2 (4)	1 (2)	0.344	0.000		0.500
Wasp sting	38 (76)	12 (24)	27.040	25.000		0.000**
General body pains	36 (72)	22 (44)	8.046	6.938		0.008*

Source: Field Data, 2019. $P < 0.05$ **= highly significant, *= significant

On injuries associated with post-planting activities as indicated in Table 3, the study showed that 56% of the males and 60% of the females had cutlass injury during farm maintenance within the study period. Similarly, 74% of the males and 32% of the females reported ant bites, while 10% of the males and 18% of the females reported hoe injury. This finding can be explained on account of the fact that ant bite is a hazard associated with rodent control which is mostly performed by the males. Pearson chi-square test was conducted to find out if there were significant differences between male and female oil palm farmers with respect to the injuries they sustain during the post planting activities. It was realized that there was a highly significant difference in only ant bites (0.000**) at $p< 0.05$ between the male and female oil palm farmers. The rest of the injuries, cutlass injury (.639), mattock injury (.387), snake bites (.326), stump/thorn injury (.061) and waist pains (.101) recorded no significant difference between male and female oil palm farmers at $p< 0.05$.

TABLE 3

Pearson chi-square showing significant differences between male and female oil palm farmers and the injuries they encounter during post planting activities (n= 100)

List of Injury	Male Yes %)	Female Yes %)	Pearson Chi Square	Continuity Correction*	Sig*
Cutlass injury	28 (56)	30 (60)	0.164	0.041	0.639
Ant bites	37 (74)	16 (32)	17.704	16.058	0.000**
Mattock injury	5 (10)	9 (18)	1.329	0.748	0.387
Snake bites	13 (26)	8 (16)	1.507	0.964	0.326
Stump injury	27 (51)	37 (74)	4.340	3.516	0.061
Waist pains	15 (30)	24 (48)	3.405	2.690	0.101

Source: Field Data, 2019. P< 0.05 **= strongly significant, *= significant

Responses from the oil palm farmers with regard to effects of application of chemicals showed that, 50% of the males and 56% of the females experienced skin irritation during and after spraying (Table 4). The percentages of males and females who experienced skin irritation could be an indication that majority of them did not use personal protective equipment (PPE). Majority of the oil palm farmers reported other ailments associated with the use of agro-chemicals, some of which included eye irritation (80% male and 40% female), respiratory problems (100% males and 64% females), a situation which may have arisen because they did not use any form of protective clothing apart from wearing of long sleeved shirts and a pair of trousers. PPE such as appropriate nose masks, goggles, or waterproof long-sleeved shirts and pair of trousers were obviously not used. Some of these non-injury ailments reported may also be as a result of repeated exposure (chronic toxicity) to the chemicals, because most of the oil palm farmers in Kwaebibirem District reported that they had about four to six separate oil palm farms where these chemicals were sprayed at least, three times in a growing season.

Pearson chi-square test conducted indicated that there were highly significant differences between male and female oil palm farmers in eye irritation (0.000**) and respiratory problems (0.000**) at $p<0.05$. In addition, there were significant differences in severe fever (0.001*) and nausea (0.027*) between the genders. However, there were no significant differences in dizziness (0.057), skin irritation (0.689) at $p<0.05$ between male and female oil palm farmers. Olowogbbon (2011) reported in his study 'Health and Safety in Agriculture and Food Security Nexus' in Nigeria that 65% of his respondents did not use PPE in their farming activities resulting in a lot of injuries among the farmers.

TABLE 4

Pearson chi-square showing significant differences between male and female oil palm farmers and the non-injury ailments encounter during Agro-chemical application (n= 100)

Non-injury Ailments	Male Yes (%)	Female Yes (%)	Pearson Chi Square	Continuity Correction*	Fisher's Exact Test*	Sig*
Skin irritation	25 (50)	28 (56)	0.361	0.161		0.689
Eye irritation	40 (80)	20 (40)	16.667	15.042		0.000**
Respiratory problems	50 (100)	32 (64)	21.951	19.580		0.000**
Dizziness	22 (44)	12 (24)	4.456	3.610		0.057
Severe fever	22 (44)	6 (12)	12.698	11.161	0.054	0.001*
Nausea	12 (24)	4 (8)				0.027*

Source: Field Data, 2019. P< 0.05 **= highly significant, *= significant

Harvesting is one of the intensive activities under oil palm production. Consequently, it is mostly undertaken by men, especially, when farms are large. It involves the use of harvesting tools such as cutlass, sickle to detach the palm fruit bunches from the tree and particles often fall into the eyes of farmers. In Table 5, it was found that 56% of the males and 29% of the females reported injuries of the hand from the harvesting tools after every harvesting session. Major roles played by females during harvesting were gathering of the harvested palm bunches and the lose nuts. Due to this, majority (66%) of the females complained of body pains as against (44%) for the males. Pearson chi-square test conducted revealed that there was a significant difference in harvesting tool usage (.015) between male and female oil palm farmers. However, there were no significant differences in snake bites (.359), mattock injury (.181) and body pains (.307) at p<0.05 between male and female oil palm farmers.

TABLE 5

Pearson chi-square showing significant differences between male and female oil palm farmers and the injuries they encounter during harvesting (n= 100)

Injury	Male Yes (%)	Female Yes (%)	Pearson Chi Square	Continuity Correction*	Fisher's Exact Test*	Sig*
Harvesting tool injury	28 (56)	15 (29)	6.895	5.875		0 .015*
Snake bite	4 (8)	1 (2)	1.895	0.842		0.359
Mattock injury	1 (2)	4 (8)	1.895	0.842	0.362	0.181
Particles in the eyes	40 (80)	8 (16)	41.026	38.502		0.000**
Body pains	27 (54)	33 (66)	1.500	1.042		0.307

Source: Field Data, 2019. P< 0.05 **= highly significant, *= significant

It was observed from the results in Table 6 that 96% of the females against 60% of the males reported injuries on the fingers. Majority (56%) of both males and females reported waist pains/lower back musculo-skeletal stresses due to the continuous seating position. Also, there were few cases of ant bites due to sitting on the ground. From the

results, waist pain was observed as a chronic disease for the adult farmers in particular. To confirm this, data from the National Institute for Occupational Safety and Health (NIOSH) reveals that older farmers are more likely to suffer from age related conditions such as arthritis, hearing or vision problems and this makes farming potentially hazardous for them (Hernandez–Peck, 2004). Pearson chi-square test conducted found out that there was a highly significant difference between male and female oil palm farmers in injuries on fingers (0.000**) at $p < 0.05$. However, there were no significant differences in waist pain (1.00), ant bite (0.100), general body pains (0.469) and trap injury (1.00) between male and female oil palm farmers at $p < 0.05$. Generally, females are more involved in processing activities in agriculture than males. According to Ministry of Food and Agriculture, Ghana (2001) report on gender and agricultural development strategy, the ratio of male to female labour requirement in agricultural processing was 10%: 90% respectively. This confirms the prevalence of more injury among the female oil palm farmers than males, especially, finger injury.

TABLE 6

Pearson chi-square showing significant differences between male and female oil palm farmers and the injuries they encounter during post-harvesting operations (n= 100)

Injury	Male Yes (%)	Female Yes (%)	Pearson Chi Square	Continuity Correction*	Fisher's Exact Test	Sig*
Waist pains	28 (56)	28 (56)	0.000	0.000		1.00
Injury on fingers	30 (60)	48 (96)				0.000**
Ant bite injuries	8 (16)	3 (6)			0.200	0.100
General body pains	9 (18)	13 (26)	0.932	0.524		0.469
Trap injury	9 (18)	10 (20)	0.065	0.000		1.000

Source: Field Data, 2019. $P < 0.05$ **= highly significant, *= significant

Conclusion

This study revealed that occupational hazards encountered by oil palm farmers in the Kwaebibirem District comprised of snakes, bees/wasps, ants, cutlasses, hoes, mattocks, fires set on farms, tree stumps, thorns, harvesting tools and agrochemicals such as pesticides, weedicides, among others. Injuries from snake bites, bees/wasps attack, cutlass and mattock use, fires and tree stumps, awkward working positions and harvesting tools were also identified. Occupational injuries encountered by male and female oil palm farmers during the planting operations were cutlass injury, stump injury, injury from wasp stings, snake bite injuries and general body pains, which were the most significant. Similarly, ant bites were the most significant injury experienced by the farmers during post planting activities. Majority of the oil palm farmers reported other ailments associated with the use of Agro-chemicals such as eye irritation and respiratory problems. Again, it was found that both males and females reported injuries of the hand from the harvesting tools after every harvesting session. The results further showed that, there was significant difference between injuries experienced by both male and female oil palm farmers on their farms. It also revealed that males are more prone to injuries than females due to exposure to different physical and psychological risks

on the farm. Both male and female farmers also experience non-injury events such as respiratory problems, dizziness, nausea, skin irritation, severe fever and eye irritation. The body parts affected by injuries and non-injury ailments were head, neck, eyes, hands, wrist, fingers, skin, leg, knee and foot.

The study recommends that, the Department of Agricultural Extension Services (DAES) of the Ministry of Food and Agriculture in the Kwaebibirem District should educate oil palm farmers on precautionary measures and first aid operations at the farm level. The education must focus on the use of personal protective equipment such as wellington boots (to protect the feet), goggles (for eye protection), helmets (to protect the head from injuries), hand gloves (to protect against palm injuries), nose masks (to protect against inhalation of chemicals which mitigate respiratory problems) and protective clothes covering the entire skin during their farming activities, in order not to discourage the youth from venturing into oil palm plantations. Finally, oil palm related NGOs and other stakeholders in the oil palm industry should sponsor mass media education on the need to use personal protective equipment, especially when applying Agro-chemicals on farms and possibly supply or facilitate sales at reduced costs. Further research and interventions are required to improve the working conditions of this ever-growing workforce.

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