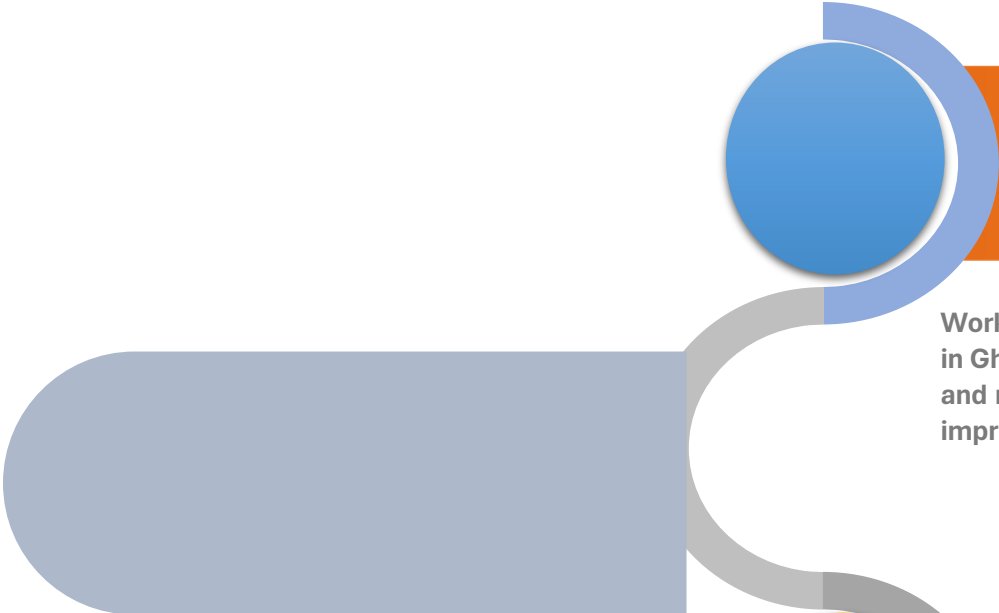




WORKING PAPER

Workers risk exposure to pesticides and agrochemicals in Ghana's oil palm plantations. Capturing workers' use and risk perception of pesticides and agrochemicals to improve OSH practices.



1.0 Background

The oil palm industry is a key component of Ghana's economy, playing a vital role in both the agricultural and industrial sectors. As the second most important industrial crop after cocoa, it significantly contributes to the livelihoods of rural communities and the national economy (Asante, 2021). The crop's versatility, being used in both local food preparation and industrial applications, highlights its economic importance. Nonetheless, the industry confronts challenges such as underperformance and inefficiencies that must be tackled to fully realise its economic potential (Asante, 2021).

The economic benefits of oil palm extend to the creation of employment and poverty alleviation. In Ghana, the oil palm industry offers employment to thousands of smallholder farmers and workers involved in cultivation, harvesting, and processing activities. This employment is essential for rural development, providing a consistent income and enhancing the standard of living for many households (Asante, 2021). Furthermore, the government's classification of oil palm as a strategic crop for poverty reduction emphasizes its potential to drive economic growth and development in rural areas (Government of Ghana, 2013).

Ghana's economy relies heavily on the oil palm sector's contribution to export earnings. Although the country imports a substantial amount of palm oil to fulfil local demand, the potential for increasing exports remains promising. By tackling the sector's challenges, such as enhancing yield and processing efficiencies, Ghana can improve its export performance and reduce the trade deficit (Asante, 2021). Moreover, embracing sustainable practices and adhering to international standards can strengthen market access and competitiveness in the global market (CABI, 2020).

The consequences of pesticides and other agrochemicals on the health of oil palm workers in Ghana are extensive and multifaceted. The pesticides utilized in oil palm plantations can lead to severe acute and chronic health problems among workers. Acute side effects include headaches, dizziness, nausea, skin rashes, and respiratory problems, while chronic exposure can result in more severe outcomes such as cancers, disruptions in endocrine function, reproductive health issues, and long-term neurological damage. Despite the potential risks, workers often lack adequate training on the safe handling and application of these chemicals, which further increases their risk of exposure and subsequent health issues (World Rainforest Movement, 2017).

The problem is further exacerbated by the inadequate supply of personal protective equipment (PPE) and poor working conditions that are frequently substandard. Research has indicated that numerous workers apply pesticides without adequate protective clothing, putting themselves at risk of direct exposure to hazardous substances. This lack of protection is associated with a higher incidence of pesticide poisoning, which remains largely underreported due to fear of losing one's job and inadequate healthcare support. Misuse of pesticides, including inadequate labelling and handling, elevates the likelihood of dangerous exposure. (World Rainforest Movement, 2017; Rembold et al., 2017).

The potential long-term health consequences of pesticide exposure are particularly disturbing. Chronic exposure to these chemicals has been associated with a range of systemic health problems, including cancers and reproductive issues, which can have an impact on future generations. The endocrine-disrupting properties of many agrochemicals pose a significant threat to pregnant women and developing fetuses, potentially leading to developmental and cognitive impairments in children. This not only compromises the health of current workers but also jeopardizes the well-being of entire communities and their future economic stability (World Rainforest Movement, 2017; Luke et al., 2019). It is essential to have effective regulatory frameworks and rigorous enforcement of safety measures to mitigate these health risks.

The ILO, 2011 report, outlined the contribution of the General Agricultural workers Union of Ghana towards the advocacy campaign on the ratification of ILO convention 184 (Safety and Health in Agriculture). The convention, which was adopted in June 2001 by the ILO, was ratified by Ghana in 2011¹. The adoption however, appears to be a mere bowing to pressure by Government than the demands of the Union because the core convention on occupational health and safety (i.e., Convention 155) has not been ratified². Nonetheless, the recently promulgated labour Act of 2003, Act 651 has a section on Occupational Safety and Health (OSH) (i.e., Section 15), making C187-Promotional Framework for Occupational Safety and Health Convention which has been ratified by Ghana very difficult to be operationalized within the country.

1.1 Research Objectives

The main goal of the research is to review on-going changes in policy and practice in relation to workers risk exposure to pesticides and agrochemicals in Ghana's oil palm plantations while capturing the risk perception and use of pesticides and agrochemicals.

Specifically, the objectives of the research are to;

- ❖ analyse the situation of pesticides users by unionised workers employed at oil palm plantations, and to identify OSH risks faced by workers in charge of spraying pesticides.
- ❖ analyse the policies on the use and effects on workers of pesticides and other agrochemicals adopted by downstream buyers of palm oil from Ghana.
- ❖ analyse the legislative framework on the use of pesticides and agrochemicals in the palm oil sector in Ghana and their effects on workers.
- ❖ map current academic literature on health effects on workers of pesticides and other agrochemicals.
- ❖ provide recommendations for workers, unions, employers, buyers, RSPOs and other actors in the palm oil supply chain, as well as governments, on the safe use of pesticides and agrochemicals.

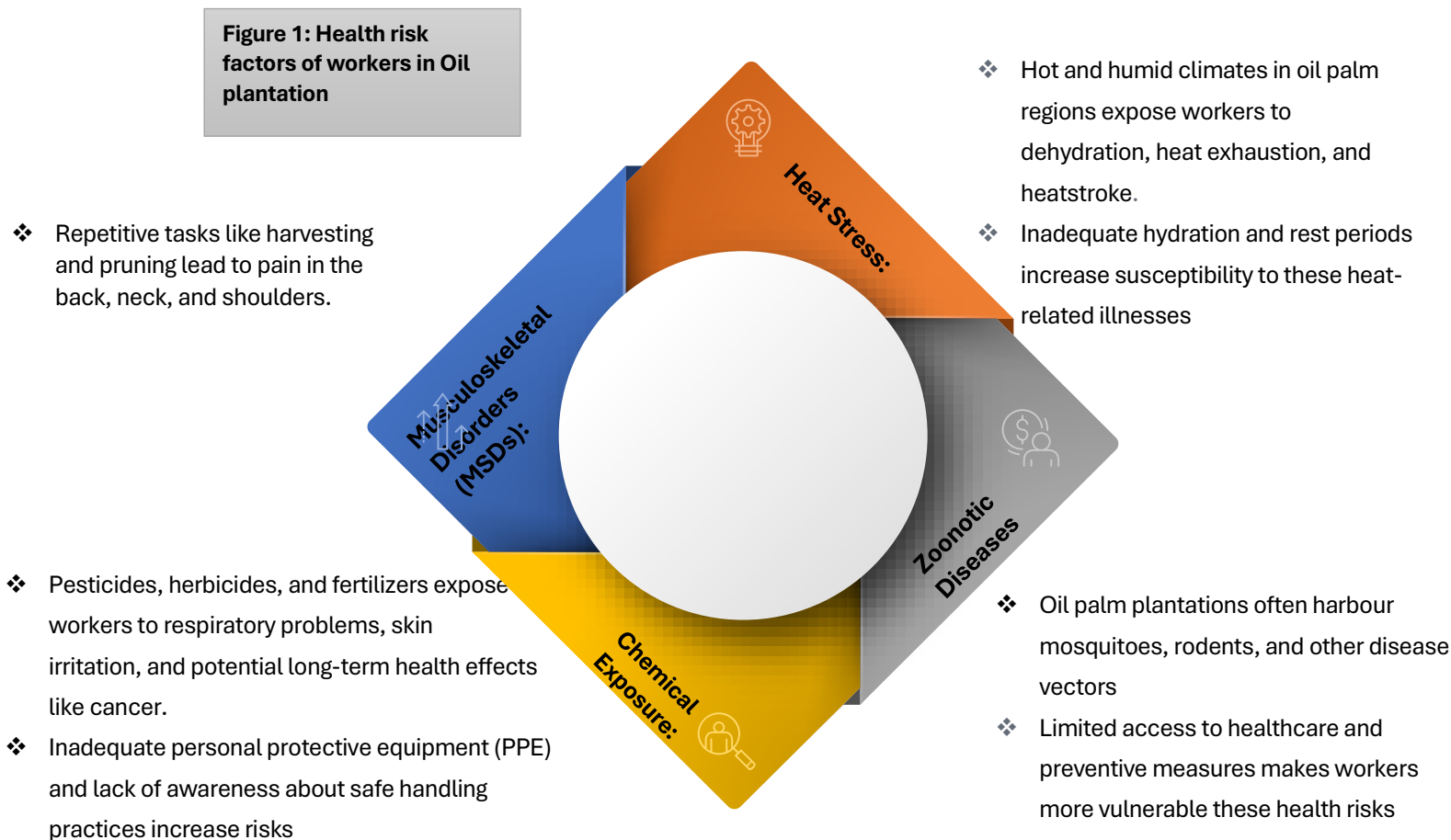
1.2 Methodological Approach

The methodology employed was the review of existing policy and research papers relevant to the issues as discussed. In all, the search resulted in 31 papers identified, of which 7 were duplicated and removed. After excluding 7 articles according to the exclusion and inclusion criteria mentioned above, 24 articles were left for analyses. The review sampled articles from 2012 to 2022 as a unit of analysis. Search engines such as google scholar, PubMed, were used in searching for articles relevant for review.

2.0 Occupational Safety and Health risks faced by workers in charge of spraying pesticides

Oil palm plantation workers in Ghana are exposed to significant occupational health and safety risks, particularly from pesticides and other agrochemicals. A study conducted in the Kwaebibirem District of Ghana's Eastern Region revealed that workers faced various injuries and hazards during pre-planting, planting, post-planting, harvesting, and post-harvest operations (Decker et al., 2021). The report highlighted those major injuries included cutlass injuries, stump injuries, bee/wasp stings, body pains, and snake bites. The study further found that the high injury rates among oil palm workers in Ghana can be attributed to the use of manual labor with little machinery (Decker et al., 2021).

Figure 1: highlights the health risk of workers in oil palm plantation:



Source: Author's own elaboration

A comprehensive examination of 25 pertinent investigations, 19 of which were carried out in Malaysia, with one each taking place in Ghana, Indonesia, Myanmar, Papua New Guinea, and Cameroon, disclosed that in addition to physical injuries, oil palm labourers are also subjected to risks of musculoskeletal issues, psychosocial disorders, and contagious diseases such as malaria and leptospirosis. (Myzabella et al., 2019).

A study conducted by Nana-Otoo (2016) indicated that workers in the oil palm industry were exposed to hazardous chemicals, including pesticides and agrochemicals, which posed significant health risks. This exposure resulted in both acute and chronic health issues, and the lack of proper protective measures made the situation worse. Furthermore, Nana-Otoo (2016) found that informal manufacturing sector workers were often unaware of the necessary health and safety measures, including the use of Personal Protective Equipment (PPE), due to a lack of resources and technical means.

The safety measures in the informal manufacturing sector, particularly in palm oil production, are often insufficient (Nana-Otoo, 2016). Workers in this industry often cannot afford or are not provided with protective clothing, making them vulnerable to injuries and illnesses. Furthermore, a reliance on "divine protection" and experience instead of proper safety measures exacerbates the risk of accidents and health problems (Nana-Otoo, 2016).

Ghana's occupational health and safety legislation is influenced by the ILO. Principal ILO conventions relating to occupational health and safety which have been ratified by Ghana include: Underground Work (Women) Convention 1935 (No. 45); Radiation Protection Convention 1960 (No. 115); Guarding of Machinery Convention 1963 (No. 119); Hygiene (Commerce and Offices) Convention 1964; Working Environment (Air Pollution, Noise and Vibration) Convention, 1977; and Labour Inspection Convention 1947.

2.1 Policies on the use and effects on workers adopted by downstream buyers

Ghana is a major producer of palm oil, exporting significant quantities to international markets. Downstream buyers, such as food manufacturers, cosmetic companies, and biodiesel producers, have increasing leverage in influencing practices within the palm oil industry, including those impacting pesticides use and workers' health. In Ghana, there are six (6) large scale companies in the oil palm industry and also have collaboration with multinationals from OECD countries that are bonded by the human rights due diligence principle. The guidelines³ lay recommendations for responsible business conduct among others include regulations for; human rights, employment and industrial relations, environment, combating bribery, taxation, and consumer interest. This report however reviews the human rights section and how it connects to core responsibilities and expectations of buyers under the due diligence framework while addressing the oversight role on the business conduct of suppliers.

Also, achieving complete traceability of palm oil up to the plantation level presents a significant obstacle for downstream buyers. The cumbersome supply chains with numerous intermediaries make it hard to track the origins of palm oil (Murphy et al., 2021).

❖ Human Rights

Buyers under the OECD guidelines must ensure that suppliers avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved (OECD, 2011). Also, employers must seek ways to prevent or mitigate adverse human rights impacts that are directly linked to their business operations, products or services by a business relationship, even if they do not contribute to those impacts. Also, employers must carry out human rights due diligence as appropriate to their size, the nature and context of operations and the severity of the risks of adverse human rights impacts.

Aspects of the human rights emphasize that, addressing actual and potential adverse human rights impacts consists of taking adequate measures for their identification, prevention, where possible, and mitigation of potential human rights impacts, remediation of actual impacts, and accounting for how the adverse human rights impacts are addressed. It further recommends that enterprises avoid causing or contributing to adverse human rights impacts through their own activities and address such impacts when they occur. 'Activities' here can include both actions and omissions at the enterprise. In the case where an enterprise causes or may cause an adverse human rights impact, it should take the necessary steps to cease or prevent the impact taking into consideration the steps as prescribed by the OECD guidelines; (1) embed responsible business conduct into policies and management systems; (2) identify and assess adverse impacts in operations, supply chains and business relationships; (3) cease, prevent or mitigate adverse impacts; (4) track implementation and results; (5) communicate how impacts are addressed; and (6) provide for or cooperate in remediation when appropriate. In addition, if an enterprise contributes or may contribute to such an impact, it should take the necessary steps to cease or prevent its contribution and use its leverage to mitigate any remaining impact to the greatest extent possible.

Considering the power available to these multinational buyers, many large-scale buyers have adopted sustainability policies aiming for responsible sourcing and reduced environmental impact. These can include commitments to; **(1) Reduce pesticide use:** Encouraging suppliers to adopt integrated pest management (IPM) strategies and minimize reliance on harmful chemicals. **(2) Improve worker safety:** Promoting adherence to labour standards and implementing measures to protect worker health from pesticide exposure. **(3) Traceability and transparency:** Ensuring they source palm oil from plantations with responsible practices and documented compliance with standards. (Ahmadi, Z., & Bell, A. 2024).

Impacts of agrochemical regulation on the Business and worker Health

- Potential for Positive Change: Downstream buyer pressure and support for sustainable practices can lead to reduced pesticide use, improved worker training and access to PPE, and better overall working conditions, ultimately benefiting worker health.
- Accountability and Monitoring: Downstream buyers have a responsibility to monitor their suppliers' practices and ensure they are adhering to commitments related to worker health and pesticide use.
- Downstream buyers of palm oil from Ghana have significant influence on the industry's practices and can play a crucial role in promoting worker health and reducing pesticide use. By implementing strong sustainability commitments, collaborating with stakeholders, and ensuring transparency throughout the supply chain, they can contribute to a more responsible and equitable palm oil sector in Ghana. **Find below the large-scale suppliers with their respective buyers**

Table 1: List of local suppliers and their respective buyers⁴

Suppliers (Oil palm companies in Ghana)	Buyers (Multinational Companies)
Ghana Oil Development Company (GOPDC)	CIAT
Benso Oil Palm Plantation (BOPP)	Wilmar
Twifo Oil Palm Plantation (TOPP)	Unilever
Plantation Socfinaf Company Ltd (PSG)	Socfin
Serendi Palm	Dr. Bronners
NorPalm Ghana Ltd (NGL)	Norpalm AS and African Tiger Holdings

Source: Data received from GAWU, 2022

2.2 **Legislative framework (i.e., laws and regulations created to establish rules, rights, and responsibilities) in Ghana on the use of pesticides and agrochemicals in the palm oil sector**

Occupational health and safety legislation is a means by which the work environment can be controlled to ensure the safety, health and welfare of employees and persons likely to be adversely affected by the work environment are protected (Tettey et al., 2009). As a result, the Government of Ghana has over the years enacted certain laws to protect workers and prevent workplace accidents.

The use of pesticides and agrochemicals in Ghana's palm oil sector is regulated by several key pieces of legislation and associated regulations. For the purpose of the review, the paper identifies four legislative frameworks; **Environmental Protection Agency (EPA) Act, 1994 (Act 490)**; **Pesticides Control and Management Act, 1996 (ACT 528)**; **Workmen's Compensation Act of 1987 and Labor Act, 2003 (Act 651)**. All these frameworks speak to the usage of pesticides and general guidelines for managing Occupational Safety and Health risks.

2.2.1 **Environmental Protection Agency (EPA) Act, 1994 (Act 490)**

Ghana has a legislation on pesticide, part II of the Environmental Protection Agency (EPA) Act (Act 490), which governs the whole pesticide life cycle assure that pesticides are used in an effective and proper way that does not harm the user. The EPA is the sole agency responsible for the registration of pesticides as well as its management. This process is to ensure that the pesticides are properly labelled, distributed, stored, transported, used and applied by following the accepted procedures and processes. The agency also monitors pesticide use and, if needed, react against illegal use, and issues pesticides importation and use licences. Michael, O., et al (2018)

2.2.2 **Pesticides Control and Management Act, 1996 (ACT 528)**

Part II of Act 528 (Pesticides Control and Management) governs the entire lifecycle of pesticides in Ghana, including registration, importation, distribution, storage, transportation, use, and disposal of pesticides. Part II of the Act explains licensing of pesticides dealers under section 17 stating that no

person shall import, export, manufacture, distribute, advertise or sell any pesticide except in accordance with a license issued under the Act. The EPA is responsible for enforcing these regulations, issuing licenses for pesticide use and importation, and monitoring compliance. Section 17 (2) further states that any license issued under this Act shall be subject to such conditions as may be specified in relation to it and to any other conditions as the Agency may from time to time prescribe for the license.

This regulation specifies which pesticides can be used on specific crops, including oil palm. The Act outlines safe handling and application practices for these pesticides. Under section 1 of the Act, the law states that no person shall import, export, manufacture, distribute, advertise, sell or use any pesticide in Ghana unless the pesticide has been registered by the Environmental Protection Agency in accordance with the Act. The law further classifies pesticides and their use under section 4 as (a) for general use; (b) for restricted use; (c) suspended; or (d) banned. Pesticides classified under subsection (1) as restricted, suspended or banned are subject to the Prior Informed Consent Procedure defined in section 41 of the Act.

2.2.3 Labour Act, 2003 (Act 651)

Section 24(1) of the 1992 Ghanaian Constitution states that “Every person has the right to work under safe and healthy conditions....” This fundamental human right has been upheld by the Labour Act of 2003 (Act 651). The act establishes general guidelines for worker safety and health in all sectors, including the agricultural sector. It requires employers to provide a safe work environment and to take measures to protect workers from health hazards.

The Labour Act, 2003 (Act 651) was established to assist unemployed and employed persons to find suitable employment and assist employers to find suitable workers from among such persons as well as to protect the interests and concerns of both the employer and employee to ensure a harmonious working environment. Part XV of Act 651 concerns the health and safety and environment of workplaces. Under this Act, it is every employer’s duty to ensure employees work under satisfactory, healthy and safe conditions. Other sections of the Labour Act which impact health and safety include: protection of employment relationship; general conditions of employment; protection of remuneration; unions; employers’ organisations and collective bargaining agreements; National Tripartite Committee; and, labour inspection.

In cases of injuries the Act sets out modalities for calculation of the earnings of workers and payments of compensations to workers who sustain injuries. Act 651 further states that an employer shall: Provide and maintain at the workplace, plant and system of work that are safe and without risk to health; Ensure the safety and absence of risks of health in connection with use, handling, storage and transport of articles and substances; And, provide the necessary information, instructions, training and supervision having regard to the age, literacy level and other circumstances of the worker to ensure, so far as reasonably practicable, the health and safety at work of those other workers engaged on the particular work. The Act again states that an employer who, without reasonable excuse, fails to discharge any of these health, safety and environment obligations commits an offence. The Act under section 118 states that an employer shall not be liable for injury suffered by a worker whose injury is caused solely by non-compliance by the worker. Section 118 (5) further states that an employer who, without reasonable excuse, fails to discharge any of the obligations under subsection (1) or (2) commits an offence and is

liable on summary conviction to a fine not exceeding 1000 penalty units¹ or to imprisonment for a term not exceeding 3 years or to both. The provisions therefore establish all the punishments for both employer and the employee for any breach.

2.2.4 Workmen's Compensation Act of 1987

The Workmen's Compensation Act of 1987 was enacted to compel employers to ensure safe working environment for workers. The Act imposes employer liability to pay compensation to employees incapacitated by accidents arising out of, and in the course, of their employment. Compensation payment to accident victims is independent of negligence on the part of the employer or a fellow-worker. The employer is also required to bear the hospital expenses of the injured worker. In cases where the injured worker only requires treatment, he/she is entitled to his/her earnings while undergoing treatment for injuries he/she sustained through an accident arising out of, and in the course of his/her employment.

There are exceptions to employers' liability to pay compensation. These exceptions are: where the injury is due to the workman having been under the influence of intoxicating liquor or drugs at the time of the accident or where the injury was deliberately self-inflicted or where the workman knowingly misrepresented to the employer that he/she was not suffering or had not previously suffered from that or similar injury. The law applies to persons employed by both public and private organisations.

Ghana's occupational health and safety legislation is informed by the International Labour Convention. Principal ILO conventions relating to occupational health and safety which have been ratified by Ghana include: Underground Work (Women) Convention 1935 (No. 45); Radiation Protection Convention 1960 (No. 115); Guarding of Machinery Convention 1963 (No. 119); Hygiene (Commerce and Offices) Convention 1964; Working Environment (Air Pollution, Noise and Vibration) Convention, 1977; and Labour Inspection Convention 1947.

It is clear from the above review that laws on occupational health, safety and environment in Ghana are silent on sanctions for factories and business on their environmental impact or business establishments on the macro-environmental habitat, where non-workers reside. Thus, the laws were silent on the responsibilities of business organisations in maintaining environmental quality standards and ensuring the activities and sources of livelihood of other people are not negatively affected by the operations of the companies. The laws are, rather, more concerned about the micro-environmental habitat of the businesses in terms of the risks and safety mechanisms established for workers. This could easily lead to community-company confrontations to have some of their concerns addressed. Such actions could also disrupt operations of companies.

2.2.5 Collective agreement between GAWU and employers

The collective agreement between the General Agricultural Workers Union (GAWU) and Benso Oil Palm Plantation (BOPP) Plc details provisions on child labour prevention at the workplace. The Agreement provides conditions for which the working relationship between employees and the employer ought to be regulated. There is a provision for child labour and two (2) provisions for health and safety. Article I of the agreement states that the employer shall be committed to the prevention of child labour and forced labour within the Company and shall, in conjunction with the Union, take necessary action to ensure

¹ Notes; "Penalty units" refers to such units established by the Fines (Penalty Units) Act 2000 (Act 572). The monetary value of penalty units stands at GHC12.00

that child labour is absent from the Company. Article XXII of the agreement emphasizes the occupational health and safety provision expected at the plant. Article XXII (a) states that it is the responsibility of the Employer to ensure a safe and healthy working environment, the details of which are enshrined in the Company's Safety, Health, Environment and Quality (SHEQ) Policy. Further to this provision, the Employer is required to provide adequate protective clothing to certain categories of Employees whose nature of work calls for protection of the body as and when necessary and at the discretion of the Employer in consultation with the Health and Safety Committee.

Within the bigger plantation where **GAWU** represents, there is a strong adherence to wearing of safety equipment's. On the job, workers who are mostly on contract employment, for fear of losing their jobs, are mostly afraid to vacate a job or a task which they deem as unsafe. Again, the decision as to whether the environment is classified as safe or unsafe depends largely on employer.

2.3 Gaps identified in the policy frameworks regarding the use of pesticides

Ghana has established robust mechanisms to oversee the sale and use of pesticides. The Environmental Protection Agency of Ghana (EPA) is tasked with implementing environmental policies to ensure that planning aligns with the national goal of maintaining environmental quality over the long-term. Additionally, the agency is responsible for promoting the environmentally sound and efficient utilization of both renewable and non-renewable resources in the course of national development. It also plays a key role in guiding development to prevent, reduce, and, whenever possible, eliminate pollution and activities that diminish the quality of life. (Kwakye et al., 2018).

The Ministry of Food and Agriculture (MoFA) oversees the Plant Protection and Regulatory Services Directorate (PPRSD), which is authorized by the Pesticide and Fertilizer Regulatory Division Act 803 (2010) to support the EPA. This involves the supervision and training of pesticide inspectors, the registration and inspection of pesticide vendors, and the provision of informational materials and training on pesticides to retailers and farmers, among other duties. Furthermore, to address the issue of illegal pesticide trade, the Ghana Revenue Authority's Customs Division is tasked with regulating all imports into Ghana, including chemicals, as stipulated in Act 791 (2009) (Kwakye et al., 2018).

Under the authority of the EPA, the customs division verifies the authenticity of documents and certificates issued by the EPA to substantiate the claim of the bearer regarding a specific importation. Customs officers are granted the jurisdiction to search for certain individuals, premises, and baggage, and to confiscate prohibited items, including pesticides, as stipulated in Act 791 (Kwakye et al., 2018). The Food and Drugs Authority of Ghana is mandated to ensure the safety and wholesomeness of food, as well as the safety and effectiveness of household chemicals, including pesticides.

There are unregistered and banned pesticides in the hands of farmers and on the shelves of dealers (Afari Sefa et al., 2015; Dari et al., 2016), unregistered applicators, transporters and distributors, and improper disposal of pesticide waste and containers in Ghana.

Kwakye et al. (2018) after a survey on the pesticides policy implementation in Ghana concluded that the implementation has not adequately dealt with non-state actors like pesticide importers, dealers' and farmers with respect to the choice of particular pesticides for a given problem, technical knowledge on field diagnosis of pests and diseases, professionally dispensing of pesticides to farmers, and the use of PPEs. State actors on the pesticides policy implementation also has challenges with the availability of pesticide user manuals to be effectively used by pesticide dealers; lack of accredited laboratories to

test the quality of pesticide products; the lack of financial benefits and bonuses; inadequate inspectors assigned to dealers and users of pesticides, and lastly inadequate transportation facilities to easily access pesticide dealers and users (Kwakye et al. 2018).



Source: Author's Construct

2.4 Literature on health effects of pesticides and other agrochemicals on workers

Studies have outlined a number of health effects associated with the use of pesticides and other agrochemicals. Despite the provisions in the legal frameworks, concerns still remain with the effectiveness of these laws in addressing the negative health impacts of pesticides and agrochemicals on workers and other people in Ghana's palm oil sector. These health effects include:

- Acute Health Effects: Skin irritation, respiratory problems, eye irritation, headaches, and poisoning from accidental ingestion or exposure exceeding safety limits.
- Chronic Health Effects: Increased risk of cancer, neurological disorders, reproductive problems, and respiratory illnesses.
- Limited Enforcement and Awareness: Inadequate enforcement of regulations, lack of awareness among workers about safe handling practices, and limited access to personal protective equipment (PPE) contribute to these health risks. **Table 2** illustrates a mapping of research papers highlighting the effects of pesticides and other agrochemicals on workers.

Table 2: Mapping academic literature on health effects of pesticides and other agrochemicals on workers

Thematic Area 1: Literature on acute health effects on workers		
DISEASES	AUTHOR	KEY FINDINGS
Skin irritation	Aidoo, A. K & Arthur, S (2019).	i. Frequent contact with agrochemicals caused dermatitis, rashes, and itching
Eye irritation	Afrifa et al., 2017 & Akpan et al., 2017. Afari et al & (2017)	ii. Splashing or exposure to fumes can lead to conjunctivitis, redness, and pain. This is commonly due to direct contact with pesticides during spraying, mixing, and application
“	Agyei et al. (2017) and Ofori et al. (2018).	iii. Conjunctivitis and other eye problems were reported by workers
Gastrointestinal problems	Afari, et al 2015	iv. Nausea, vomiting, diarrhoea, and abdominal pain can occur due to accidental ingestion or inhalation
Neurological symptoms	Aidoo, A. K & Arthur, S (2019).	v. Headaches, dizziness, and tremors can be associated with exposure to certain organophosphate pesticides
“	Afrifa et al., 2020	vi. Long-term exposure to certain pesticides has been linked to Parkinson's disease, Alzheimer's disease, and other neurological conditions. While research in Ghana specifically on oil palm workers is limited, studies elsewhere suggest potential risks. Studies by Agyei et al. (2017) and Ofori et al. (2018) suggested a potential link between pesticide exposure and increased risk of neurological disorders like dizziness, tremors, and headaches
Respiratory problems	Aidoo, A. K & Arthur, S (2019).	vii. Inhalation of pesticide fumes can cause coughing, wheezing, and difficulty breathing. The study found that oil palm workers in Ghana had increased risk of respiratory symptoms compared to non-exposed individuals.

“	Agyei et al., 2017; Ofori et al., 2018	viii. Exposure to organophosphate pesticides has been linked to respiratory issues like cough, wheezing, and shortness of breath.
“	Aidoo, A. K & Arthur, S (2019).	ix. Moreso, chronic obstructive pulmonary disease and asthma are potential long-term consequences of repeated inhalation of agrochemicals
		x.
Nausea, vomiting, and diarrhoea	Aidoo, A. K & Arthur, S (2019).	xi. These symptoms can occur due to acute pesticide poisoning, especially from organophosphates and carbamates. Cases have been reported in Ghana, highlighting the need for proper handling and safety measures
Mental health		
Thematic Area 2: Literature on chronic health effects on workers		
DISEASE	AUTHOR	KEY FINDINGS
Cancer	Mudasir et al 2018	I. The acute or chronic effects associated with the production, distribution, and use of pesticides may be manifested in cytotoxic disorders, genotoxic mechanisms with immunotoxicity, hormonal changes, or carcinogenesis.
Reproductive health problems	Mudasir et al 2018	II. Pesticides can disrupt hormonal balance and affect fertility, pregnancy outcomes, and birth defects. Research in Ghana is limited, but studies in other regions suggest potential risks for oil palm workers
“	Agyei et al. (2017) and Ofori et al. (2018)	III. Studies reported concerns about potential effects on reproductive health, including miscarriages and birth defects. However, more research is needed to confirm this association.

The review also highlights the effect of active ingredients of pesticides used in Ghana and its effects on users. Table 3 shows the group and likely symptoms that are associated with each ingredient used.

Table 3. Some active ingredients of pesticides registered in Ghana and their poisoning symptoms.

Group	Active ingredient used in Ghana	Symptoms	Author
Pyrethriods	Permethrin, Cypermethrin, Fenvalerate, Lambda-cyhalothrin	Fine tremor, reflex hyperexcitability, salivation, horeoathetosis, abnormal facial sensation, dizziness, headache, fatigue, vomiting, diarrhoea and irritability to sound and touch, pulmonary edema, muscle fasciculations, seizures and coma	Roberts and Reigart, 2013; Goel and Aggarwal, 2007
Organophosphates (OPs)	Chlorpyrifos, diazinon, fenithrothion, dimethoate, malathion, methyl parathion (banned),	Early symptoms: headache, nausea, dizziness, sweating, lacrimation, salivation and rhinorrhea. Worsening symptoms: muscle twitching, weakness, tremor, incoordination, vomiting, abdominal cramps and diarrhea. Blurred/dark vision, restlessness, memory loss, confusion and depression, bizarre behaviour resembling alcohol intoxication. In children: bradycardia, muscular fasciculations, lacrimation, sweating, Seizures, lethargy and coma.	“
Carbamates	Carbofuran, Carbendazim,	Malaise, muscle weakness, dizziness, constricted pupils, salivation, slobbering, profuse sweating, incoordination, muscle twitching and slurred speech. Headache, nausea,	‘ “

		vomiting, abdominal pain, and diarrhea. Transient hyperbilirubinemia may occur. Acute pancreatitis, coma, seizures, hypotonicity, hypertension and cardiorespiratory depression	
Dipyridilium or Bipyridyl	Paraquat	Localized injury to tissues of contact skin, hands may become dry and fissured, horizontal ridging of the fingernails. Chronic exposure causes loss of fingernails. Ingestion: Severe inflammation, burns and ulceration of the tongue, oral mucosa and throat, corrosive injury to the gastrointestinal tract, renal tubular necrosis, hepatic necrosis and pulmonary fibrosis, haemorrhagic pulmonary oedema or acute respiratory distress syndrome (ARDS). Moderate poisoning: Vomiting, diarrhoea and dysphagia, followed by mild renal tubular damage with respiratory symptoms (cough, breathlessness and pulmonary opacities), death. Severe poisoning: Ulceration and multi-organ dysfunction. Respiratory problems, renal failure, metabolic acidosis, hepatocellular damage and death.	“
Chlorophenox yacetic herbicides	2,4-D (2,4dichlorophenoxyacetic acid)	Ingestion: Burning, nausea, vomiting, facial flushing and profuse sweating. In large quantities: headache, dizziness, muscle weakness, depression, coma, rhabdomyolysis and respiratory distress. Renal injury produces oliguria and proteinuria.	“
Phosphonate Herbicides	Glyphosate	Mouth and throat pain, nausea, vomiting, diarrhea and abdominal discomfort. Oral exposures: Tachypnea, dysrhythmias, hypotension, non-cardiogenic pulmonary edema, hypovolemic shock, oliguria and respiratory failure. Seizures and depression.	

Source: Aidoo and Arthur (2019)

Health effects on Oil Palm plantation workers

Health and safety issues are exacerbated by a general lack of hazard awareness; the lack of protective clothing, or difficulty in wearing protective clothing in tropical climates; shortage of facilities for washing after use, or in case of accidents; pesticide containers re-used in storing food and drink; illiteracy; labeling difficulties relating either to language, complexity or misleading information; lack of regulatory authorities; and lack of enforcement. Poison surveillance systems are usually maintained only at large urban hospitals. Village health centers may be completely excluded from monitoring reports (Nana-Otoo, A., 2016).

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, and 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 (Decker et al., 2021). Similarly, ant bites were the most significant injury experienced by the farmers during post planting activities.

❖ The use of chemicals and pesticides causing Infertility in men and women

The hazardous nature of agricultural work coupled with the use of chemicals and other pesticides presents diverse implications to women and men. This is because women's bodies respond differently to these chemicals due to their biological make-up and their reproductive roles like the womb, child bearing and rearing, menstrual irregularities, and response to menopause, amongst others. The exposure to chemicals or pesticides may also expose women to high infertility risks and or having children who may suffer some form of disabilities. For men, there has also been discussions on how the constant use of chemicals and pesticides expose them to tendencies of being impotent, amongst other risks (Nana-Otoo, A., 2016)..

It is in this regard that Ghana, even without a national policy on OSHE, captured in the labour Act the need for pregnant women and lactating mothers' task to be changed when their work is deemed to be hazardous. Whiles these have been discussed in several jurisdictions, there has not been any research to document the experiences of women and men. These are some of the reasons why Trade Unions like GAWU have been working with managements to introduce job rotations and women not being sprayers on plantation coupled with the constant medical checks as a mitigation measure in their collective bargaining agreements.

2.4 Conclusion

The use of pesticides and other agrochemicals is widely acknowledged to play a major role in improving Ghana's capacity to provide enough food and fiber that is safe, affordable, and meets its needs. Nonetheless, it is evident that improper handling, use, and disposal of pesticides leads to both acute and long-term health consequences in Ghana. Agrochemical studies have not been conducted extensively in Ghana, according to the evaluation of agrochemical exposure and monitoring. Reduced reliance on pesticide uses through the implementation of integrated pest management (IPM) systems, frequent public awareness campaigns, and a clear connection between pesticide use and healthcare are all necessary to prevent abuse and its ensuing repercussions on people and the environment.

In order to reduce pollution, research is needed to create low-cost personal protective equipment (PPE) that tropical farmers can employ as well as creative methods for gathering pesticide waste. It is also wise for national organizations in charge of keeping an eye on and enforcing laws pertaining to the sale and use of pesticides to have the authority to guarantee tight compliance with the regulations and protect the environment for present and future generations.

2.5 Stakeholder recommendations on the safe use of pesticides

From a stakeholder perspective, the safe use of pesticides requires that all key actors in the palm oil sector collaborate and contribute to overall safety and business conduct. Based on the reviews, the paper outlines key recommendations from the reviewed studies and the gaps identified as follows.

STAKEHOLDER	KEY FINDINGS
Workers	i. Demand training and information: Workers should be actively trained on safe pesticide handling practices, including risks, application methods, protective equipment use, and first aid procedures. ii. Participate in decision-making: Workers should have a voice in decisions related to pesticide selection and application strategies, fostering a culture of safety and shared responsibility. iii. Report unsafe practices: Encouraged to report any unsafe practices or concerns regarding pesticide use without fear of retaliation. iv. Increase awareness and training: workers provided with regular training on safe pesticide handling practices, including PPE use, application techniques, and risk identification. v. Demand safe working conditions: Workers should have the right to refuse unsafe work and report safety concerns without fear of retaliation. vi. Seek medical attention: If experiencing symptoms of pesticide exposure, workers should seek immediate medical attention and report the incident. vii. Join or form unions: Collective bargaining through unions can give workers a stronger voice in advocating for safer working conditions and pesticide practices. viii. Participate in mandatory training on safe pesticide handling and application techniques. ix. Demand and utilize adequate personal protective equipment (PPE) like gloves, masks, and overalls. x. Report unsafe pesticide practices and health concerns to supervisors and relevant authorities
Unions	i. Advocate for worker protection: Lobby for strong national regulations and enforcement regarding pesticide use in agriculture, focusing on worker safety and health standards. ii. Advocate for policy changes: Lobby for stricter regulations on pesticide use and worker protection in the palm oil industry. iii. Advocate for collective bargaining agreements that include pesticide safety protocols and access to healthcare. iv. Provide legal support: Assist workers in understanding their rights and seeking legal recourse in case of pesticide-related harm. v. Offer training and education: Conduct workshops and training programs for workers on safe pesticide handling practices and their rights. vi. Negotiate for safer practices: Include provisions for proper PPE, training, and safe work procedures in collective bargaining agreements.

	vii. Support worker education and training: Provide resources and training programs on pesticide safety for workers. viii. Support workers in reporting and addressing unsafe working conditions. ix. Provide safety training and resources to members on pesticide risks and mitigation strategies (Roundtable on Sustainable Palm Oil, 2023).
Employers	I. Implement integrated pest management (IPM): Prioritize non-chemical pest control methods like habitat manipulation, natural predators, and resistant crop varieties before resorting to pesticides. II. Adopt safer pesticides: Select pesticides with lower toxicity and environmental impact based on independent scientific assessments. III. Provide adequate personal protective equipment (PPE): Ensure workers have access to clean and functioning PPE, including gloves, masks, and protective clothing, and train them on proper use and maintenance IV. Monitor worker health: Implement regular health surveillance programs to monitor for potential pesticide-related health effects and provide medical support when needed V. Utilize safer alternatives to hazardous pesticides whenever possible VI. Invest in proper pesticide storage, disposal, and waste management facilities VII. Conduct regular safety inspections and audits to ensure compliance with regulations and best practices VIII. Invest in safer alternatives: Research and implement less toxic and environmentally friendly pesticides, prioritizing low-risk products. IX. Monitor and enforce safety protocols: Regularly monitor and enforce safety procedures to ensure worker compliance and adherence to best practices.
Buyers	I. Source palm oil from RSPO-certified producers: Support sustainable palm oil producers certified by the Roundtable on Sustainable Palm Oil (RSPO) with strict pesticide use regulations. II. Demand transparency and traceability: Encourage supply chain transparency regarding pesticide use practices and promote systems for tracing palm oil back to its source. III. Support worker empowerment: Partner with NGOs and unions to improve worker voice and agency in decisions related to pesticide use. IV. Support initiatives promoting safer alternatives: Advocate for and support research and development of safer and more sustainable pest control methods in the palm oil industry. V. Increase consumer awareness: Raise awareness among consumers about the health and environmental risks associated with pesticide use in palm oil production. VI. Collaborate with suppliers and stakeholders to implement responsible sourcing practices and improve pesticide management. VII. Advocate for stronger government regulations and industry standards for pesticide use in palm oil production.
RSPO and other Actors	I. Strengthen pesticide use standards: Continuously update and improve RSPO and other certification standards to reflect the latest scientific evidence on pesticide safety and environmental impact. II. Facilitate knowledge sharing: Develop and share best practices on safe and effective pesticide use among certified producers and across the palm oil industry

	III. Support independent auditing: Ensure rigorous and independent audits of certified producers to verify compliance with pesticide use standards IV. Provide resources and support: Offer resources and support to producers on implementing IPM and transitioning to safer alternatives. V. Monitor and enforce compliance: Conduct regular audits and inspections to ensure producers comply with pesticide use standards and best practices. VI. Strengthen pesticide use criteria in the Principles and Criteria for Sustainable Palm Oil Production VII. Provide more robust monitoring and verification mechanisms to ensure compliance with pesticide regulations VIII. Invest in research and development of safer and more effective pest control methods. IX. Align certification standards with best practices for responsible pesticide use in palm oil production. X. Collaborate with RSPO and other stakeholders to develop harmonized standards and improve transparency across the supply chain.
Governments	Formulate and implement stringent regulations: Establish and enforce comprehensive national regulations governing pesticide utilization, placing paramount importance on both worker safety and environmental preservation, in accordance with international standards • Invest in education and training initiatives: Develop training programs targeting pesticide applicators, inspectors, and healthcare professionals, with a focus on fostering safe and responsible pesticide application • Foster research and development endeavours: Allocate support for research and development endeavours aimed at creating pest control methods that are not only safer but also more sustainable within the palm oil industry. • Advocate for alternative pest control methods: Encourage and support the research and development of sustainable strategies for pest control, providing incentives for farmers to embrace Integrated Pest Management (IPM) practices. • Provision of training and resources: Extend training programs and resources to farmers and labourers, emphasizing safe pesticide handling and the adoption of IPM practices. • Ensure producer accountability: Rigorously enforce regulations and hold producers accountable for any breaches of pesticide safety standards. • Strengthen regulations for pesticide registration, labelling, and usage within the palm oil industry: Implement and enforce more stringent regulations concerning the registration, labelling, and usage of pesticides in the palm oil sector.

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¹ https://normlex.ilo.org/dyn/normlex/en/f?p=1000:11210:0::NO:11210:P11210_COUNTRY_ID:103231)

² [Up-to-date Conventions not ratified by Ghana \(ilo.org\)](#)

³ Reference is made to the OECD Guidelines for Multinational Enterprises, 2011 Edition

⁴ The list of suppliers was attained from the link below; <https://www.unilever.com/files/194becaa-f3a6-4153-89d0-a10e23df2f4f/unilever-palm-oil-suppliers-2022.pdf>). Wilmar also buys from Socfin, Benso, and Norpalm, see: https://www.wilmar-international.com/docs/default-source/default-document-library/sustainability/supply-chain/traceability-report--q3'-2022---q2'-2023/destination/ghana_231027.pdf?sfvrsn=6d6499d8_1