



## Research article

# We get affected too: Women's occupational safety and health hazards in the fish processing subsector in Tanzania demystified

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## ARTICLE INFO

**Keywords:**

Women  
FPPs  
OSHHs  
Gender-based analysis

## ABSTRACT

While there have been numerous studies in the occupational safety and health hazards (OSHHs) domain in the heavy and beleaguered manufacturing industries, where men are quantitatively dominant, the same level of attention has not been accorded to lighter and small-medium enterprises such as the fish processing subsector, where most women sell their labour-power. This apathy is the failure to acknowledge the existence of numerous OSHHs and their gendered-differentiated effects in such spaces. This paper demonstrates how women got affected in less considered environments, particularly the fish processing subsector. The findings used in this paper were obtained from the study conducted in the five fish processing plants (FPPs) in Tanzania, which involved 157 respondents. Questionnaires, focus group discussions, in-depth interviews, and observations were used to collect data. Findings revealed that women in the FPPs were confronted with various OSHHs emanating from the physical, environmental, mental, psychological, and cultural domains that significantly affected their health in the short and long run. Thus, a gender-based analysis in studying, recommending, and addressing OSHHs is highly recommended.

## 1. Introduction

*"We deserve equal opportunities and treatment but not without specificities"*— Prof. Wangari.

Gender<sup>1</sup> stereotypes are among several other human categorisations that play a significant role in the recruitment, job allocation, promotion, and remuneration of workers—men and women in most informal and private enterprises worldwide [1]. In the end, it is such categorisations that systematically inform who should be exposed more to an occupational hazard and how much and the nature of risks one will be exposed to. Nevertheless, efforts adopted in identifying, studying, and devising mechanisms to obviate occupational hazards have far been too generalised. Mostly, they combine men and women and, at best, speak of either men or heavy industries (manufacturing) and ignore soft industries (processing) where women make a significant share of workers [2–4].

This demonstrated sense of dominance, marginalisation, and exclusion of one sex category over the other has become a norm in

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<sup>1</sup> In the context of African traditional life and culture, which greatly influence the political and socioeconomic dynamics of the continent, the concept of sex is primarily understood in terms of biological and physical traits and physiological characteristics. On the other hand, the concept of gender is primarily understood in relation to societal duties and functions. This pertains to the concept of gender roles and marital relationships within African society. This divide significantly impacts the options individuals are presented with, the societal positions they can assume, the nature of activities they should perform, and the nature of their interpersonal connections. See Idang [44]. This contextual fact, however, inevitably limits the generalisability of the findings of this study in other societies where sex and gender have come to be regarded as non-binary.

<https://doi.org/10.1016/j.heliyon.2024.e26259>

Received 6 September 2023; Received in revised form 31 January 2024; Accepted 9 February 2024

Available online 10 February 2024

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most developing countries' policy-making structures [5,6], contravening international and local pronouncements on human rights and the rights and obligations of employers and workers in particular. This discriminatory tendency has not only confined itself to work and workplaces but is reflected in almost all spheres of life, leading to misreporting and underreporting of gendered life experiences. While this paper acknowledges the unacceptable presence of "men victimisation" in numerous policy statements, women have so far been heavily affected [4,6]. In a time when there is a plethora of information on human progress, little is available to explain women's experiences in the workplace, particularly the challenges they face and their consequential impact on their health. In her indictment on the subject, Criado [7] argues that the political structures have unconsciously but inevitably crafted the world as "male"—designing, explaining, and innovating while reflecting "a male" ways of life.

One area that has generated a worrying concern for women is the processing subsector, which employs a greater number of female workers [6]. Given its relatively low level of investment in most developing countries [8], the subsector is said to be characterised by the low level of technology, a perfect recipe for worrying OSHHs [9]. However, despite the above domain having demonstrated a potentially sizable share of occupational health risks, many studies on OSHHs have thrown their weight behind the men-dominated heavy industries. In such domains, heavy equipment, long working hours, more precision, and entry qualifications barriers for women are higher compared to the processing subsectors, where most women are employed. Furthermore, in this subsector, production is primarily characterised by small-scale, lighter and automated technology, routinised activities, and lower and relaxed entry qualifications for women. Such attributes have inevitably produced a disproportionate concern [10]. This situation has also significantly contributed to women's work and occupational hazards to go unrecognised, unnoticed, and uncounted in most developing countries like Tanzania [5,11]. Their lack of consideration is further compounded by the fact that most are employed in the informal sector, such as fisheries, beyond the reach of workplace laws, trade unions, pensions, and even data collection [6,12].

Having registered a notable contribution and participation in fishing and various related activities, women have further demonstrated even greater involvement and competency in fish processing.<sup>2</sup> Women make up to 57% of all people who are entirely dependent on fish processing activities to eke out their living in the world [6], making it the most depended upon population by the fisheries sector for its growth and sustenance by more than 54% [13]. Whereas this population category constitutes more than 84 % of the labour force in the FPPs [13], thus forming such a fundamental part of the fish processing subsector, disregarding such a population is tantamount to discounting the subsector itself. Within the fish processing domain, women's prominent roles are more conspicuous inside the processing chain where cleaning, freezing, de-boning, peeling, deveining, de-heading, and packing are performed instead of in the management and supervisory roles [14].

Despite the subsector being downtoned in the mainstream literature, given the nature of the activities and the quality of products and labour standards the subsector must uphold, fish processing stands out as one of the most arduous activities in the fisheries sector [8]. Given the instantaneous perishability nature of fish and fish products, health risk-laden preparation, preservation, and handling processes and procedures are paramount for them to last longer while maintaining their nutritional value and freshness [13]. These include grinding, skinning, filleting, slicing, cutting, deheading, eviscerating, icing, freezing, refrigeration, vacuum packing, and the use of chemicals such as acids to control microbial loads, among others, most of which engaged women than men.

Generally, there is no significant difference between women's and men's biological responses to physical, biological or chemical hazards in the fish processing subsector [10]. The difference in the level and nature of health risks generated in the process between male and female workers is, therefore, not so much derived from their biological differences but the nature of the technology used and activities and settings where each category participates. Generally, while most men are mostly engaged in several other fish processing-related activities, including management and supervision, waste management, automated processes management, transportation, groundworks, and quality and safety monitoring, more than 80% of women are engaged in potential health risk-laden fish processing activities enumerated above [14]. It is from these painstaking, concatenated, and exhaustive consistent processes and schedules that OSHHs-related hazards are thought to affect women more than men in the fish processing subsector [10,15].

Moreover, according to the UN-Women report [16], it is in the less developed and less-bureaucratic small-medium enterprises employing up to 100 workers, most of which operated out of labour laws where most abuse and violations of labour standards were found. This characterisation fits the description of most FPPs available in Tanzania [17,18]. In situations where OSHHs are absent or significantly reduced in the workplace, numerous advantages are anticipated for the workers and enterprises. Such benefits include enhanced health and safety outcomes, decreased expenses linked to incidents and accidents, enhanced employee morale and relations, improved operational effectiveness, highly reduced insurance premiums, facilitated financial accessibility, bolstered confidence, improved efficiency and productivity, and facilitates organisational growth and community's prosperity [9,19].

Considering the impact OSHHs have on every worker in whichever enterprise, regardless of their size and nature, and the existing paucity of understanding of the risks facing the different genders, particularly women, this paper, therefore, seeks to demonstrate how women get affected in the supposedly less perilous working domains such as the fish processing subsector where a great majority has been employed.

## 2. Materials and methods

The study focused on the FPPs that processed and exported fish products in Tanzania. The primary purpose was to examine the

<sup>2</sup> Despite directly referring to fish (fresh or chilled), the process extends beyond the fish to include fish products (fish fillet, livers, roes, and other fish meats) and covers all types of seafood. The process begins when fish are harvested or caught from fish farming, aquaculture, or wild fisheries to the final stage, where an end product is delivered to the market. See Ref. [45].

nature and extent of OSHHs affecting women working in that particular working space. Of all the 13 FPPs, the study was conducted in August 2020 in only one plant, which had also requested its identity be withheld, citing severe local and international restrictions and penalties the company is likely to encounter, leading to a ban or closure. The rest were only *visited* to gather *situational* information.<sup>3</sup> Hence, in ensuring the respondent's right to confidentiality and anonymity, the company name will be referred to as 'X' in this study. The solicited full cooperation to the researcher was to be determined by this prerequisite. Unlike the rest of the plants, it had more workers (213); the rest ranged between 131 and 30 workers; combined both manual and modern technology, which demanded different skills, thus, different exposure to OSHHs; had all its operations running during Covid-19 pandemic, and it is relatively older than the rest and therefore stood a good chance of rendering more experience on the subject in question. Of the 12 FPPs, 9 (69.2%), whose major market is in Europe, had their production reduced by more than 50% due to restrictions imposed by the European market because of the COVID-19 pandemic. This made such plants operate with less than 40% of their workers. Such an environment would have inevitably affected the validity and credibility of the information sought. The other 3 plants operated at the lower and local levels, with not more than 30 workers<sup>31</sup>, and produced for the local market only. These plants are those which had experienced periodic closures for over 5 years due to financial and operational constraints. Their level of investments in technology, human, and physical infrastructure was relatively low.

Drawing from the nature of the research question, the study descriptive and exploratory research designs to answer the *why* and *how* questions, produce familiarity with basic details and concerns, obtain information concerning the current status of the phenomena and describe "what exists" with respect to OSHHs in the fish-processing subsector, thus necessitating the mixed research approach. However, owing to the nature of the research question, its exploratory character, and sociological tradition, all of which emphasise reporting on the personal quality experiences of research participants, qualitative inquiries dominated the empirical information in this study. This triangulation has helped to increase the credibility and validity of the results and provided a more detailed and balanced picture of the OHS and OSHHs situation in the fish processing subsector.

The population sample involved in this study included female and male fish processing workers, workers' representatives, supervisors, administrators, and leaders. This study believes that with this range and nature of participants, it has been able to make sense of the question under investigation. This is a mix of those who have directly and indirectly been interacting with the working environment and the workers.

Owing to the nature of the respondents needed by this study, respondents were obtained using stratified random<sup>4</sup> and purposive sampling techniques. Stratified sampling was imperative since the population from which a sample was drawn constituted male and female workers, with the latter being the most targeted population. The involvement of the former helped validate women's experience and share their knowledge regarding the OSHHs in their workplace. The number of respondents drawn from each stratum followed the method of proportional allocation, under which the sizes of the samples from the different strata were kept proportionate to the sizes of the strata. This means each stratum was equitably represented in the sample, depending on the total number of elements making each stratum. A sampling frame of all fish processing workers, which was accomplished by using the employees' records from the human resource office (HRO) indicating the name, speciality/category, tribe, residence, and age, was used to determine the sample used in the study.

As a result, a total of 157 workers (47 men and 110 women)—about 74% of the entire working population were included in the quantitative inquiry. This number was determined by Cochran's formula, although the recommended number was exceeded by 10% for credibility purposes. These were the ones to whom questionnaires were administered to. On the other hand, the purposive sampling technique was used to identify informants for the qualitative inquiry, which involved physical and prior identification of all potentially informative respondents for the study. A total of 32 informants were involved in the qualitative inquiry. Having been granted permission from the plant leadership, all identified respondents and informants, upon their consent, were relieved from their duties for 1 h. The administration granted researchers 12 days to conduct the study, excluding Saturdays and Sundays. The leadership instructed participants to pick the specific day and time they would wish to participate within the provided 12 days. This arrangement allowed the researcher to plan for the data collection exercise effectively. Generally, therefore, a wide range of data collection methods was employed. This included in-depth interviews (IDIs), focus group discussions (FGDs), and observations for qualitative inquiries,<sup>5</sup> and a survey for quantitative information.

In the quantitative inquiry (survey), a questionnaire with about 47 questions for fish processing workers was administered to respondents. Specifically, a questionnaire was used to obtain quantitative information on several issues, which assisted in answering the grand and several other specific research questions. Such information includes respondents' profiles, orientation, affiliations, and context in general. Other issues include respondents' awareness, knowledge and experience on workplace hazards, policies and procedures, occupational health and safety, participation in occupational health and safety, and perceived and diagnosed occupational safety and health hazards.

On observation, non-participant observation was used. This method enabled the researcher to validate the information shared by

<sup>3</sup> The information sought was primarily on the number of workers, gender-specific, nature of operations, categories of workers, duration of operation, production capacity, workers' union, rate of accidents, most common accidents, and market.

<sup>4</sup> This technique was performed by writing the name of each element of a finite population on a slip of paper, putting the slips of paper into a box, mixing them thoroughly and then drawing (without looking) the required number of slips for the sample one after the other without replacement. In so doing, the researcher ensured that each of the remaining elements of the population had the same chance of being selected while picking. This procedure also resulted in the same probability for each possible sample.

<sup>5</sup> A *theoretical closure* informed the extent of the informants needed in the qualitative inquiries.

respondents and informants and to observe events, the physical conditions of workers, and the workplace directly. In an event to demonstrate how the facility had suffered from the COVID-19 pandemic, the researcher was given a tour to witness the effects. It was during this period when the researcher partly participated in the study, and several other observations were conducted by administering the questionnaires and conducting interviews.

Regarding the FGDs, this method was used to explore the workers' perceptions, opinions, and feelings with regard to the respondents' awareness, knowledge and experience of workplace hazards, policies and procedures, occupational health and safety, participation in occupational health and safety, and perceived and diagnosed occupational safety and health hazards. Each FGD comprised eight (8) informants with different characteristics yielding greater insights and experiences. The discussion lasted for an hour. This method sought to provide qualitative data that enabled the researcher to describe and explain the causal processes in relation to the problem under study. An interview guide comprising topics of relevance to this study was prepared and used. Having sought consent from the informant, a tape recorder was used to record the conversation, enabling the interviewer to concentrate on what the informants were sharing rather than taking notes. Because the study population involved men and women, the researcher ensured that representation was considered. Thus, two mixed and two unmixed (only women) FGDs were held.

Lastly, on IDIs, this method was used to generate qualitative data that enriched the description and explanation of the key issues regarding OHS and existing and potential OSHHs in the fish processing subsector and X-FPP. With the assistance of the HRO, the researcher identified all key informants, including three supervisors, one operational manager, the Chief Executive Director, one human resource manager, one workers' representative, and one production manager, with their consent to conduct the interviews. Interview guiding questions were used to obtain and probe more into their life experiences, views, and perceptions of the issues above. The tape recorder was also used on informant consents. All interviews were conducted at the convenience of the informants' time and day.

While the subsequent analysis and interpretation of quantitative data were aided by SPSS (version 24), two forms of analyses—the manual (content and thematic) and software-aided (NVivo 12 version) were used for the qualitative information. These two forms of qualitative analyses were used to ensure that no information escaped the researcher's consideration, given the weaknesses inherent in each form of analysis indicated above.

In an attempt to ensure the validity and reliability of this study, several actions were taken. These include: first, data collection methods and instruments were appropriately chosen in accordance with the research objective. Second, the data were drawn from a representative and adequate sample size. Third, the data were analysed using appropriate data analysis tools and techniques. Fourth, data were interpreted and reported accurately. Fifth, the data collection exercise was extended by two weeks to enable the Chief Executive Officer's (CEO) extended interview to happen for a detailed account. Sixth, the study used "low inference descriptors" to capture the actual feelings and experiences of participants. Seventh, data collection methods and analysis triangulations were performed. Eighth, findings (feedback) were presented to workers and management for validation. Ninth, findings have been peer-reviewed by specialists in sociology, OHS, and OSHH. Finally, data were accurately recorded.

Three discernible limitations within this study may be addressed in subsequent research endeavours. First, the study focused on one fish-processing plant due to other plants' weaknesses in production, scope, and the number of employees. In the future, it would be interesting to conduct comprehensive and comparative studies to gain more understanding of the subject. Second, despite implementing various strategies to ensure the validity and reliability of the findings, the study did not conduct a pilot study to test the tools. Lastly, while the study used a mixed method approach to understanding the subject, the quantitative data and analysis have nominally been used owing to the nature of the subject and the discipline within which the subject is prosecuted. A more quantitative analysis study in economics and biomedicine might be ideal for explaining the magnitude and pattern of OSHHs in the fish processing subsector.

### 3. Women and OSHHs in the fish processing subsector: a theoretical account

Occupational hazards have long been a subject of paramount importance, both from a health and economic standpoint, dating back to the 19th century. Henceforth, many endeavours have been undertaken by the International Labour Organization (ILO), various nations, and esteemed organisations to advance the cause of occupational health and safety (OHS). The primary objective of this noble endeavour is to foster and uphold the utmost level of physical, mental, and social well-being for the labour force within their respective work environments [20]. While the OHS field has indeed encompassed a wide range of sectors, including fish processing, it has predominantly concentrated its efforts on a select few established industries such as manufacturing, agriculture, mining, and various other industrial sectors. These sectors have historically employed a substantial workforce and made substantial contributions to the overall Gross Domestic Product (GDP) of nations, particularly in more developed regions [21]. The aforementioned trajectory suggests that any work that did not align with the designated sectors, such as the processing of fish, was given inadequate or negligible consideration, thereby neglecting the welfare of its workers. Furthermore, due to the limited extent of industrial development, OHS was predominantly observed in industrialised nations, as noted by Schulte et al. [22].

Nevertheless, as a consequence of the expeditious socioeconomic shifts witnessed in developing nations since the 1980s, which have compelled a transition from manual labour to mechanisation in key sectors of productivity, including manufacturing, mining, agriculture, and presently, fisheries, it is expected that a multitude of potential occupational health implications will arise. This transformation has additionally engendered a shift in the composition of the workforce in its entirety, encompassing an upsurge in the utilisation of female labourers, predominantly engaged in pliable, laboriously demanding, technologically undemanding, and unregulated domains, such as the processing of aquatic fauna, wherein the circumstances of employment are predominantly arduous [23].

The ongoing socioeconomic transformation observed in developing countries is evident in the fish processing subsector. Many classical economic theorists have drawn parallels between this trend and two distinct historical epochs, resulting in the emergence of OSHHs. The first epoch draws comparisons to the Industrial Revolution in Europe,<sup>6</sup> characterised by a predominantly male workforce engaged in heavy manufacturing industries and factories, enduring exceedingly harsh working conditions. The second epoch harkens back to the preindustrial revolution era, where a larger proportion of women were employed in cottage industries, facing arduous working conditions that demanded manual labour rather than creative input [24]. The consistent allocation of women to supposedly softer but sedentary and repetitive tasks, which are more susceptible to OSHHs compared to their male counterparts, can be comprehensively explained through the lens of the sexism theory within the feminist tradition.

This theory is intrinsically connected to the philosophical underpinnings concerning the inherent essence of femininity and masculinity and the societal expectations dictating their respective roles. Sexist presuppositions pertaining to the female and male genders, which materialise in the form of gender stereotypes, possess the capacity to establish a hierarchical order wherein one gender is deemed superior to the other. The cognitive framework of hierarchical thinking can assume various forms, ranging from deliberate and antagonistic to inadvertent, wherein it materialises as latent bias. Sexism, a pervasive social phenomenon, possesses the capacity to impact individuals across the gender spectrum, albeit with a distinct proclivity towards disproportionately affecting women. Gender stereotypes serve as the foundational framework upon which sexist behaviour and practices are constructed. Gender stereotypes, in their deleterious effects, need not necessarily manifest in overt hostility to engender harm. Numerous workplace dynamics have been influenced by the notion that individuals of different genders possess distinct and complementary attributes. This includes the perception that men tend to exhibit individualistic and dominant tendencies, whereas women are often associated with caring and collaborative qualities. Nevertheless, it is worth noting that traditionally, attributes associated with masculinity have often been accorded greater esteem compared to those associated with femininity. However, it is important to acknowledge that a shred of evidence exists suggesting a shift in this paradigm [25].

Gender-biased presumptions and methodologies possess the potential to impede employees' progress, thereby directing them towards ill-suited positions. It has been observed that women often encounter barriers that hinder their access to high-ranking positions, leading to their exclusion or redirection towards roles that are traditionally associated with stereotypically 'feminine' attributes and skills. It has been observed that individuals of the male gender exhibit a propensity to expeditiously disengage from occupations predominantly populated by their female counterparts, primarily due to the prevailing social stigma associated with such circumstances. In certain instances, these individuals even display a preference for being devoid of gainful employment altogether [26]. This endeavour can be deemed as an inefficient allocation of human resources. Research has elucidated the deleterious impact of gender-biased expectations and conduct on employees' cognitive output, sense of inclusion, psychological well-being, and overall job contentment [25]. The manifestation and normalisation of sexist conduct and customs have been empirically demonstrated to have adverse effects on the occupational well-being of employees, as evidenced by the research conducted by Sojo [27]. The intricate interplay of societal, cultural, and cognitive constructs has significantly contributed to the nuanced perspectives held by employers, researchers, and policymakers regarding the conceptualisation of gender roles within the fish processing industry in Tanzania. Furthermore, these multifaceted influences have shaped the self-perceptions of male and female workers in relation to their professional identities within this subsector.

As a result of the sexism effect, it is widely hypothesised that a larger proportion of women, relative to men, are impacted by various hazards. This discrepancy can be attributed to the types of activities typically undertaken in certain departments of the industry, the higher representation of women within the workforce, and, to some extent, biological differences and sociocultural obligations.

## 4. Findings and discussion

### 4.1. Women workers and the working environment

Essentially, this research delved into examining OSHHs experienced by women working in the fish processing subsector in Tanzania. Therefore, it is imperative to grasp the different arguments presented in this article within the context of this inquiry. In essence, it is generally acknowledged that any vocation, irrespective of its inherent characteristics and modalities, presents an array of occupational hazards that have the potential to inflict significant harm upon workers in the absence of adequate precautionary measures [27,28]. This assertion challenges prevailing notions held by certain factions, which argue that predominantly weighty, extensively mechanised, financially resource-intensive, and imbued with masculine characteristics, occupations present substantial hazards [2,22]—[4]. Before elucidating the plight of female employees who have endured occupational safety and health hazards in overlooked domains like the fish processing subsector, it was imperative to ascertain the characteristics of their work environment and the inherent proclivity for the emergence of occupational perils. In an inquiry seeking to ascertain the operational conditions wherein individuals are prone to encountering OSHHs, a comprehensive set of 25 globally acknowledged OHS attributes was employed. Among the 25, it was ascertained that a significant majority of workers were consistently exposed to at least 17 of these circumstances almost

<sup>6</sup> The Industrial Revolution, commonly referred to as the First Industrial Revolution, denotes a pivotal epoch in which the global economy underwent a profound metamorphosis, marked by the proliferation of manufacturing practices that were both more extensive and refined. This transformative era followed the Agricultural Revolution and was initiated in Great Britain, subsequently spreading to continental Europe and the United States. The Industrial Revolution spanned approximately from 1760 to 1820–1840, encompassing a period of substantial transition and advancement. See Ref. [46].

daily. Henceforth, it is imperative to refute the contention that in the majority of non-manufacturing sectors, OSHHs are not of a grave nature.

Considering women's characteristics in correlation to OSHHs, the average age of fish processing plant workers far exceeded the ILO's minimum working age. Although the fundamental convention sets the minimum age for admission to jobs or works at 15 years (13 for light work) and the minimum age for hazardous work at 18 years (16 in some strict conditions) [29], the female fish and shellfish processing labour force in Table 1 was mainly made up of young to middle-aged women, many of whom had family obligations.

... 'Most women here have husbands or live with men, and those who do not, have children to care for. As a result, they must get up early to plan and prepare something or resolve family problems before going to work' ... [IDI-HRO: X-FPP].

In the sample used for this study, slightly more than half of the women were married, divorced, or widowed, and nearly half were household heads (more than twice the national average of 24%). Working hours for women were usually longer than the legal limit of 48 h a week. They did routine manual work that was time-sensitive and sequential. More than 73% had finished primary school (standard seven). Years of experience were the key factor in deciding their job assignments, and these women had an average of 4.1 years of experience.

While jobs were separated by gender, the particular tasks performed by women varied depending on the fish processing plant's production process. Washing raw materials, moulding, de-boning, sorting, filleting, packing, and extracting viscera were the main activities performed by women in the fresh-chilling and fresh-fish freezing processes in that order. Women were also responsible for de-shelling, bottling, sorting, wrapping, moulding, and marking on the pickling line. However, there were more men than women loading, filleting, and extracting viscera on the fresh-chilling and freezing sides. They dominated cooking, receiving, loading, and stamping the seals on the pickling line. Based on the results of this analysis, Table 2 shows the degree to which certain activities are feminised.

Women were usually assigned to specific roles on a daily basis, but there was some rotation to other roles or other women's positions on the processing line. The majority of women's work consisted of a series of activities. For example, the people who eviscerated the fish also washed it, graded it, measured and weighed it, and then placed it on a conveyor belt or hung it up to be finished by another male or female worker. The task of de-boning was an exception. Because of the rigour and exactitude required for this task, this category of women workers performed only this activity with minimal, but in most cases, without rotations. Similar phenomena were also observed in less-developed FPPs in Bangladesh, Mexico, Brazil, and the Philippines, where processing is still performed manually to a large extent [21]. De-boning of most seafood and sometimes its byproducts frequently necessitate a higher level of perceptual and cognitive sensitivity, besides experience, skills, and dexterity [30]. Human operators continuously integrate sensory inputs, for example, touch and sight, with their accumulated skills. In the opinion of the production manager in X FPPs, '... it is one of the tasks that require the heart, mind, and sensory inputs to get it right'. Some plants were far more highly automated than others, and where there was far less automatization, women carried out their tasks manually using basic tools like scissors, pliers, and knives.

Women's employment did not necessitate rigorous formal education or training. In the recruiting process, manual skills and job experience were respected more than formal education or credentials. Gender stereotypes also played a part in the recruitment process. The leadership admitted to having gender-based preferential employment requirements in almost half of the plants. They identified manual dexterity, meticulousness, hygiene, pace, stamina, responsibility, and patience with culturally based gender norms in which women fitted the pick.

... 'If you were born and raised along the coast, this becomes your first qualification for working in this industry. Moreover, if any of your family members is (was) a fisherman, it becomes even easier to be employed. These are regarded as important qualifications because they believe you would know properly how to prepare fish, which is mainly done here. Most of us have accumulated tons of experience in selling and preparing fish. If you do not know how to prepare fish thoroughly, you may get hurt or peel fillet along with bones' ... [FGD-Women Informant: X-FPP].

Generally, the nature, extent, and types of work in which women participated in the FPPs often resulted in both acute and chronic health problems, as will be demonstrated in the following section. These issues may not be drastic in the immediate

**Table 1**  
Social-demographic characteristics of female fish processing plant workers.

Status	Unit	Measure
The youngest employee	Age	19.0
Oldest employee	Age	49.0
Single	%	43.3
Widow	%	1.0
Married	%	51.4
Separated	%	4.3
Head of household	%	49.2
Workers with primary school education	%	73.0
Workers with secondary school education	%	4.1
Number of children	Average	4.2
Trained before employment	%	7.0

Source: Field data, 2020: (N = 110: Only women in the sample size).

**Table 2**  
Percentage of female workers by task.

Task	Percentage
De-boning	96.0
Sorting and measuring	87.5
Moulding	80.6
De-shelling	57.5
Removing viscera	43.3
Cooking	21.0
Bottling	100.0
Labelling	96.0
Washing raw materials	86.0
Packaging	62.0
Trimming	57.1
Filtering	26.6

Source: Field data, 2020: (From the HRO Records in X-FPP).

future, but they may make women's lives difficult on a daily basis in the long run. Social constructed gendered roles exacerbated the extent of the effects.

#### 4.2. OSHHs, symptoms, and risks

In the OSHHs space, women have inescapably found themselves in what was traditionally regarded as 'the man's world', where their biology, jobs, and social background are often unfamiliar to those who judge them. Despite the numerous advantages associated with fish processing, several health and safety concerns, including bacteriological, chemical, ergonomic, and physical, among others, have been noted throughout the world, although to varying extents depending on gender positionality, type of tasks, and technology deployed [31]. However, owing to their greater participation in processing industries, it is anticipated that women are likely to be exposed to occupational risks and suffer significant losses [9].

During the survey conducted at the esteemed X-FPP, employees were requested to provide an exhaustive list of the various health symptoms they encountered while working at the plant. In descending order of prevalence, physical fatigue (100%), hand pain (84%), muscle pain (80%), back pain (73%), headache (70%), numbness (68%), bone pain (58%), and visual fatigue (54%) were the most common health symptoms recorded. On the other hand, the less frequently reported symptoms include hip pain (48%), dizziness (45%), mental exhaustion (40%), hearing distress (38%), neck pain (29%), anxiety (15%), kidney pain (15%), and stomach pain (11%). Such findings suggest that each individual within the selected group of employees exhibited a specific set of symptoms that indicate a particular occupational hazard, albeit not necessarily in every case [32].

Tendon (36%) and lumbago (44%) inflammation were two work-related disorders that mainly affected women. Lumbago was a common muscular-skeletal issue in fish plants, and it was attributed to the uncomfortable body positions that workers had to hold for long periods, as well as other factors in the workplace. According to Barret [30], tendon inflammation is among the most concerning workplace health issues for businesses and healthcare facilities. Excessive use of the upper extremities combined with extreme effort or repeated movements cause tendonitis and tenosynovitis (as in tasks such as de-boning). As a result, the tendons become inflamed, causing discomfort in the affected region that worsens as the tendon moves. Heat, erythema (swelling), and oedema (swelling) are all symptoms associated with wrist, elbow, or shoulder bursitis [30]. Returning to work for workers affected by these illnesses can be daunting because they are often chronic, and there were few fish processing plant-related jobs where workers could be put to minimise the risk of relapse.

*... 'Waist pain, backache, forehead pain, heel pain, dizziness, numbness, and muscle strain are some of the most common complaints. We have now gotten used to the fact that these are normal, and luckily, we were informed from the beginning that these are some of the challenges of this work. However, when OSHA (Occupational Safety and Health Authority) people visited us last year, they promised that these challenges would be worked on soon. Nevertheless, since then, apart from some of us being threatened and given warnings, nothing positive has ever happened. They told us that these should not be regarded as challenges, but the recklessness of our employer' ... [IDI-Workers' Union Leader: X-FPP].*

Health issues that have been obliquely linked to their working environment were also reported by several workers in the survey when they were asked to enumerate other physical working environment health-related situations thought to have suffered because of working in the plant. The most commonly recorded were otitis (earache) 43%, cystitis 18%, respiratory problems (bronchitis, colds, tonsillitis) 74%, allergies 70%, chilblains 22%, foot or hand numbness 54%, rheumatic fever 30%, chest infection 10%, pneumonia, 36%, and tuberculosis, 8%. Even though none of these is categorically categorised as occupational illnesses, the cold and humid climate in which these women worked was most likely a factor. The environment in which such workers were subjected at all times of operation inside the plant could partly be captured in the conversation with the operational manager.

*... 'A big part of our working environment requires hygiene and a chilly environment to preserve and protect fish. That is why, unlike in other processing plants, electricity here is one of the fundamental elements of production. We cannot afford to run the industry with only the national grid electricity; backup heavy-duty generators are needed' ... [IDI-Operational Manager: X-FPP].*

A further examination of the specific health and safety concerns women encountered in fish processing was conducted. There are five specific critical areas of reference from which such concerns stemmed from. These include the physical effort, physical climate, environmental pollutants, mental and psychosocial burdens, and sociocultural spheres, as elaborated hereinafter.

#### 4.2.1. Physical effort

Static and dynamic physical efforts are the two forms of physical efforts in which health and safety complications could be located. The situation is categorised as static effort when muscle contraction is continuously sustained [33]. The body postures of standing and sitting and the unceasing lifting of heavy objects require static effort. When muscles are alternately tensed and relaxed, as when lifting or moving loads and transferring them horizontally or vertically, this is known as dynamic effort [33]. On a working day, both men's and women's fish processing jobs usually required both forms of effort. In some workers, however, one prevailed over the other.

Regarding static effort, fish processing plant workers spent most of their time standing up, leaning over, and stretching their arms to the front for more than 55 min of every hour. Leg congestion (17%), oedema (14%), and varicose veins (13%) are the most common side effects of standing for long periods [30,33]. Most of the work required them to stand and lean on chairs or stools, causing workers to adopt awkward and forced postures to maintain a better working place. For static jobs, rest periods are recommended [30]. Almost all of the plants investigated had limited rest times, the most important of which was the regular 60-min meal break.

*... 'Honestly, I do not see anything new. We are doing almost the same thing every time. What you are doing today is the same task you will be doing tomorrow, except when you are told to migrate to another section, which you will still eventually be doing the same task. There is no creativity; it is just a routine. You just need to pay close attention to what you are told to do, concentrate, and will gain momentum little by little' ... [FGD-Male Informant: X-FPP].*

Lifting, lowering, and carrying loads are all examples of dynamic effort [33]. The women workers in X-FPP lifted an average of seven trays of raw material every hour, walking about 25 m with a loaded tray and returning the same distance, each weighing 20 kg, and deposited them at one-to-one point 5 m above ground level. Workers were expected to move trays of raw material weighing approximately 18 kg horizontally, the most common activity involving load carrying. Vertical moving of trays up staircases and sloping platforms occurred ten times per hour, and it involved walking 1 m with uneven loads and returning.

*... 'Most of the tasks here involve standing, walking, and lifting. I remember when I started, we were many, around 40 in my unit, but as time went by, one by one dropped off. Some because of working challenges, sickness, interdiction from the husbands, and some because of getting other places better than this, which gave them time to go home early' ... [FGD-Female Informant: X-FPP].*

Tasks involving gestures and quick movements also fall under the dynamic effort category. This form of effort is needed for activities that require routine rather than occasional behaviour. Repetitive activity is when a set of well-defined, more or less multiple operations is repeated regularly and frequently. The repetition is related to a fixed-duration work cycle in which the same process happens repeatedly. Repetitive dynamic effort tasks may cause muscle hardening and inflammation at the inflexion point [33].

During the study, 90% of the job categories surveyed were categorised as repetitive, with women occupying the majority (78%) of the positions. A task circle lasted on an average of 43 s from the start of the operation to the completion of the same task. The study also examined how much effort the hand and arm muscles needed to complete a mission. According to their experiences, the study asked the workers to identify the strength of effort as light, medium, or high. They more commonly defined low and medium effort levels for hands and medium and heavy effort levels for weapons. Biceps, triceps, finger muscles and arm pain were mentioned by every woman the study interviewed in a group or individually.

*... 'Tell me, ladies, is there anyone here who is not suffering from any disease? Some are complaining about headaches, some backaches, some muscle strain, some wrist and arms, some numbness and so forth. When you complain about anything, you will either be given painkillers (Aspirin/Panadol) or be allowed to rest for some minutes or return home. In the meantime, someone else will cover your post until you get better if you are lucky, but not more than seven days. Some of us have cesarean scars and maternal backaches (lumbago), which, when added up to this work, it becomes inevitable for you to work for the whole month' ... [FGD- Workers' Union Leader: X-FPP].*

The physical effect of continuous dynamic effort can be reduced by taking frequent short breaks [30,34]. Only three of the fifteen FPPs in the sample provided a five to 10-min break with compensatory exercises twice a day during the work shift to enable workers to recover from the strenuous efforts needed to complete the work.

#### 4.2.2. Physical environment

The perishable nature of the raw material dictated a temperature range of five to 15 °C in the plants. Workers treated cold goods and used cold water almost daily. There were no special floors, grills, platforms, or other ways of insulating workers against the cold and humidity in many plants. The only means of protection from the cold and damp were rubber boots, aprons, and groves, and their consistency seldom reached certified requirements. While most equipment available were ideal for product handling and workers' protection against humidity, dirt, or wounds, it could not provide sufficient protection against the cold. Workers' protection when handling cold materials is usually dictated by the temperature of the materials as well as the frequency and length of the contract.

Furthermore, while lighting can seriously affect workers' health and safety, it is also crucial for quick and accurate work [35]. The majority of the tasks required exceptional vision and manual precision. De-boning, for example, allowed workers to be careful in handling small objects and paying attention to details. However, only a few workers (44%) expressed satisfaction with the lighting. Another important aspect contributing to OSHHs was the machinery equipment and working space challenge as well put by one of the



workers' supervisors:

... 'This is not a secret because you can as well testify yourself if you really know fish processing machines. I would not say the working environment here is the worst compared to other plants I have worked for before, but indeed, some improvements need to be made, especially on working equipment that consumes much of workers' energy. Most machines are electrical in nature, but the two most important machines have recently been changed into manual mode, thus using much energy to operate them. Everyone who has ever worked on such machines complains of muscle and backbone pains. Generally, many are in poor condition, and they need to be replaced. It is expensive for the company to keep them running for at least six months compared to the profit it is making. Most of what you see here is imported from China since Tanzania has no such equipment. In China, they are costly yet not durable. For example, the company needs to spend up to Tshs. 20,000,000 per three months for equipment maintenance only. This is too expensive' .... [IDI-Supervisor: X-FPP].

Although most contemporary studies indicate that technology positively affects people's well-being, technological innovations at work may also have negative health consequences depending on when they were adopted and their nature [27]. The findings indicated that those who operated machines were diagnosed with bulging disks (44%) and neck and carpal tunnel syndrome (41%), among other health risks. Others complained about stress (64%), depression (52%), damaged eyesight (22%), overweight (14%), and sleeping disorders (30%), leading to severe health conditions.

The study also discovered the issue of overcrowdedness in the studied plant. When new production lines or new workers were brought in at peak production times, a workplace built for a small number of workers frequently had more than twice that number. This situation could potentially lead to a rapid spread of infectious diseases such as tuberculosis and covid-19, rheumatic fever, meningococcal disease, and several other respiratory infections such as pneumonia, chest infections, bronchiolitis, bronchitis, common cold, sinusitis, and tonsillitis [36], which some were commonly reported among the workers. Such health conditions could be relatively more debilitating to pregnant women, who most did not report their situations during the embryonic stage due to the fear of being laid off. This is, however, not to suggest that such infections were directly related to infrequent overcrowdedness but potentially despite several other working conditions that could have contributed to such situations, as indicated earlier.

Notwithstanding the dearth of substantial evidence to correlate the confined working space with the maladies above, in a question aimed at ascertaining the frequency and degree to which employees were subjected to adequate ventilation in their workplaces daily, only 44% of respondents provided an affirmative response. The veracity of this circumstance was somewhat corroborated by the plant's operational manager, who asserted that "the structure utilised for production purposes is indeed inappropriate, initially intended for warehousing". He further expounded that there remains substantial scope for further improvements, notwithstanding the extensive modifications undertaken to align with local and international standards and benchmarks. However, according to the CEO, plans were underway to build a modern structure with new technology.

Overall, it was found that the working physical environments where most women operated in were moderately pleasant but capable of generating various OSHHs. The study, therefore, found issues with workstation architectural designs. The working space could not sufficiently accommodate all workers, and extra working pieces of equipment and adaptation of modern technological equipment, facilities, and resources to the psychological attributes of the workers to ensure workers' safety, comfort, and well-being while improving the production system operation.

#### 4.2.3. Environmental contaminants

Excessive noise in workplaces forced workers to put in extra effort to isolate themselves from the disruption. This effort can cause them to lose focus and lead to fatigue and nervous exhaustion, decreasing their ability to perform tasks requiring speed, concentration, and agility [37]. Noise was a major environmental risk factor in the fish plants studied. The level of noise produced exceeded the maximum permissible exposure limit recommended by the Occupational Safety and Health Authority (OSHA) of 85 A-weighted decibels (dBA) for eight working hours workers by 7dBA. The majority (83%) of women served in workplaces with continuous, temporary, or intermittent background noise. Machines were the most popular source of noise, accompanied by conveyor belts and music. Permanent background noise levels in pickling plants and lines were higher than on other lines. Ear security, which consisted primarily of cotton or rubber earplugs, was worn by less than 20% of the workers. Other environmental pollutants such as gases, vibration, chemical compounds, and steam were also present in all workplaces. They did not, however, consider these to be major issues.

... 'We were instructed by OSHA (Occupational Safety and Health Authority) to allow workers to converse moderately to release the tension which could have been mounting inside, alternatively, to play some soft music. However, men, in particular, love loud music, which is against our working environment policy. Imagine you work in an environment full of machines' noise, people's noise, and loud music! Will this, for a fact, translate into production or chaos? We have decided not to entertain this behaviour unless we see there is, indeed, the need to do so. So yes, it is allowed occasionally and not daily' ... [IDI-Production Manager: X-FPP].

#### 4.2.4. Mental and psychosocial burdens

The amount of mental activity required varies depending on the task's complexity and the worker's ability to complete it. The workload is influenced not only by job characteristics but also by external factors such as individual characteristics as well as the essence of the working environment [38]. As previously stated, most women's occupations consisted of a series of tasks performed in a specific order. The activities were usually timed and had to be done within a specific time. Typically, the workers carried the item from a tray or conveyor belt to be worked on, completed the tasks, and then returned it to the belt or another location before the next piece

arrived. Anything else that slowed her down amounted to a disturbance.

A conveyor belt assembly was more than just a piece of machinery that enabled materials to be transported from one station to the next. It also sets the tone for workers' tasks by dictating how quickly they ought to function. Any error or delay affected subsequent and previous tasks performed. As indicated by Griffiths [19], workers can be harmed by the intense demands of sensory-motor tasks that are repetitive in nature and are subject to a consistent rhythm and speed. Such a need to follow an imposed speed and work within the specifications and constraints of each task created time pressure in repetitive tasks. It took them some time to get into the necessary rhythm and speed. Despite a few reported cases of failing to cope with the technology, overall, workers were able to accomplish the necessary level of efficiency but at the cost of fatigue. For the most part, supervisors decided how long tasks could take or when production targets were to be met, and the quickest workers set the tempo for the others. Since most women's jobs involved little automation, other workers, because of their character and experience, often dictated the assembly line's speed in many ways.

Furthermore, in FPPs that produced for the export market, strict product specifications had to be followed, as was well articulated by the CEO of X-FPP earlier, and workers had little autonomy over job efficiency or work organisation. Limited autonomy and a hierarchical work organisation continued to result in monotonous work, which added to workers' mental pressure. In his study on women's mental health, Koss and Bernard [39,40] established that the monotonicity and repetitive nature of most work performed by women in the textile industries in Asia led to stress, which manifested in mental health. Despite the tedious nature of the job, women had to maintain a high degree of concentration during the movement of tasks. The level of focus demanded from workers in the plant increased depending on tasks that required a high level of manual and visual precision. According to operation and production managers, the high cost of materials needed in production, potential penalties for recklessness, and the possibility of incidents placed greater demands on their attention. Whereas the ability to converse while working could indicate that such a task demands less focus and, thus, less health risks, given the requirements associated with the quality standards and speed of the work, the women in the processing units could only exchange a few sentences. The silence was enforced by a ban on talking and the constant presence of noise, particularly in pickling machines.

To avoid deterioration and ensure market acceptance, products for international markets demanded extra-careful considerations and handling. This added to the mental effort needed for the work. For the most part, workers, particularly women, used their expertise and commitment to turn raw materials into useful goods. If these workers were rewarded with social recognition and equal pay for their work, they could feel a sense of pride and commitment, which could have a positive psychosocial effect.

#### 4.2.5. Sociocultural environment

Women's workloads, however, are affected not only by conditions in the workplace but also by situations outside of it [37,19]. In view of cultural traditions associated with domestic gender relations, these external conditions were appropriate for the female fish processing plant workers in the study areas. Women were responsible for domestic work and child-rearing in addition to fish processing work. On average, women spent more than 17 h on such activities over and above the assistance they earned from female friends, maids, and, less often, husbands. This amount of time sabotages their psychological and physical well-being even further when combined with the more than 46 h spent at work every week.

*... 'Despite being hard workers, women are leading in being absent from work, latecomers, and receiving visitors, mostly from family members (husbands, children, and relatives). When they receive a call from home, some sneak out and make excuses just to go home to take care of issues. Among other things, their behaviour has forced the management to prohibit workers from entering with their phones. All phones are left at the door. When they get an emergency, a call should be made to a receptionist until 4:00 pm when they retire from work' .... [IDI-Supervisor: X-FPP].*

The gender-based division of labour in households and societies assigns several routines, time-consuming, and repetitive chores to women before and after work, including on weekends and holidays. Emotional responsibility is another aspect of a woman's domestic duty. In addition, they must compensate for public communal obligations which contribute to their workload. This form of unpaid effort ought to be regarded as a second "work shift" that intensifies or exacerbates the fatigue they built up at work. Women who return home from work exhausted and stressed will find it difficult to recover at home [33]. The conditions in the social setting worsened health issues caused by the challenging working environment at the plants.

## 5. The need for a gendered holistic approach in addressing OSHHs

While OHS legislation and procedures focus on shielding workers from exposure to harmful substances, accidents, injuries, and psychological and mental stress, among other adverse effects, fundamentally, they are meant to ensure efficiency at work, high productivity, and a healthy working environment [41]. Regrettably, such regulatory frameworks are never gender-specific nor consider household obligations for women [6,34]. As such, women's double labour in a day is often overlooked as a possible factor in their occupational health and safety. Women in Africa are keepers and managers of their households' social, emotional, nutritional, economic, hygiene, and educational welfare [42,43]. Given their active participation in a globalised, competitive, and prejudicial market economy, such responsibilities place heavy burdens on their already weakened shoulders. Suffice it to affirm that women's workload has increased twofold with the transforming socioeconomic situation in Africa.

While this situation has opened a long-standing rarity of opportunities for women to actively participate in what used to be a "men-only" working domain, thus shifting the balance of gains against women, it has, on the other hand, exposed working women to the more hazardous working environment and increased tons of psychological stress. Such OSHHs have been affecting their health, the most notable being their reproductive system [34,36].

The proposed more gender-informed and integrated approach to working and health-related domains will better understand how different and similar work environments impact women's and men's health differently. Owing to the exclusion of women from deciding what is considered OSHH conditions, as well as the gendered division of labour, women's occupational health concerns are often misconstrued and, therefore, misunderstood. When assessing these issues and risks for both women and men regarding the wage structure, the cumulative number of hours used, job assignments, and work climate, other aspects related to unpaid and paid work should be considered. These considerations must also be included in legislation and policy on OSHHs.

Both industrial and health researchers often overlook variables that could aid in the identification of links between workloads, psychological effects, and biological characteristics for men and women [12]. This habitude helps obscure the origins of women's workplace health issues. Such practitioners assume that women's housework or unpaid work is simple, smooth, safe, and risk-free, attributing their health issues to emotional and psychosomatic causes [12]. They are oblivious that women's work demands can be very high, particularly when their unpaid work is considered.

In effecting the desired changes, gender-disaggregated qualitative and quantitative data cannot be overemphasised. This, among other efforts, will provide a fairer view of the avenues where men and women work, the nature of their work, the challenges they face, and which aspect is not being paid for. Besides that, more efficient and ingenious use of the existing information, linking it with other sources of data, for example, information on business registries, employment records, trade, and households, could enable to track down and monitor the entrepreneurial undertakings and employment statuses of men and women at the specific individual workplace.

While the United Nations Industrial Development Organization (UNIDO) and ILO advise researchers, policy analysts, and legislative bodies on how to design and conduct occupational-related inquiries and encourage governments to gather more detailed information on women in the non-conventional sectors of the economy, governments in many developing countries, on the other hand, have either been reluctant to accept or slow in the implementations [10,12]. Most governments cite logistical and financial constraints [10], hindering the implementation of most labour-related recommendations and conventions. Such commonly discoursed excuses risk intensifying the existing challenges, making it more difficult to craft and implement appropriate policies that will ensure justice and equity to men and women alike in the productive sectors but also propel more production while safeguarding the interest and the health of workers. Suffice it to suggest that the existing unfavourable working conditions and associated health consequences cannot be divorced from the apathy reflected in the government's responses.

## 6. Conclusion

The fish processing subsector holds great significance in the Tanzanian economy, providing employment opportunities for a substantial number of individuals, especially women. Despite its contribution, this subsector is said to have been crowded with various OSHHs owing to the nature of the technology used, the nature of activities performed, and its simple and sometimes local operational and organisational nature, often beyond the reach of workplace laws and trade unions. This study needed to record women workers' undertakings in the FPPs and the OSHHs they encountered in the event. This served to debunk the casuistry that, by and large, OSHHs exist in heavily beleaguered manufacturing industries where men are most dominant compared to lighter and small-medium processing enterprises such as in the FPPs where the number of women is relatively higher. It is evident from the research findings that various physical environments, physical effort, environmental contaminants, mental and psychological issues, and sociocultural-related OSHHs were found to have affected a good number of women workers in the studied fish processing plant. Such OSHHs have had significant impacts on their well-being. The nature and magnitude of OSHHs women experienced were substantially influenced by the characteristics of the spaces and activities in which individuals were involved in. The activities most women engaged in were predominantly sedentary and repetitive in nature, hence contributing to the acceleration of OSHHs. However, generally, both women and men experience varied OSHHs in either space equally and otherwise depending on the gender of the worker and the nature of duties assigned, among other human categorisations.

Owing to the different nature of OSHHs affecting the different genders working in the same organisation due to their nature of job description and sometimes biological make-up, the paper recommends a gender-sensitive approach in studying and analysing OSHHs in enterprises. Furthermore, learning from the findings of this study, the paper recommends that studies be undertaken in every type of enterprise regardless of the size and nature of employees. Equally, authorities responsible for overseeing and observing labour standards in place of works should focus on all avenues in which production and manufacturing take place and not on conventionally selected few.

## Ethical statement

All participants in this study willingly and without coercion chose to take part. In accordance with the principles outlined in the Helsinki Declaration, participants in this study were required to submit both written and verbal agreement prior to their involvement. Throughout the study, measures were taken to protect their confidentiality, rights, and dignity. The present work received ethical approval from the Institutional Research Review Board (IRREB), with reference number 84/261/61/27.

## Funding statement

No funding was received for this work.

## Data availability

Data associated with this study have not been deposited into a publicly available repository but will be made available on request.

## Additional information

No additional information is available for this paper.

## CRediT authorship contribution statement

**Nelson Mwesiga Ishengoma:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

## Declaration of competing interest

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgements

The author is grateful to several colleagues at the University of Dodoma (UDOM), the University of Dar es Salaam (UDSM), and several experts in the field of health and OSHs at the Muhimbili University of Health and Allied Sciences (MUHAS) for their critical reviews and expertise on the subject on earlier and final drafts. Of particular significance, the author thanks the Tanzania Sociological Association (TSA) for its logical support.

## References

- [1] B. Onuka, D. Richard, Distribution of roles by gender, *J. Behav. Sci.* 46 (1) (2020) 35–54.
- [2] N. Ngozi, H. Rodgers, Occupational segregation patterns of gender in the informal sector, *Int. J. Priv. Sect. Manag.* 30 (1) (2020) 91–102.
- [3] Eurofound, *The Organisation of Working Time: Implications for Productivity and Working Conditions*, Eurofound, Dublin, Ireland, 2017.
- [4] M. Duncan, *Gendered Jobs: Occupational Segregation According to Gender in the World*, ILO, Geneva, Switzerland, 2018.
- [5] ILO, *A Quantum Leap for Gender Equality for a Better Future of Work for All: for a Better Future of Work for All*, ILO, Geneva, Switzerland, 2019.
- [6] ILO, *Empowering Women at Work: Company Policies and Practices for Gender Equality*, ILO, Geneva, Switzerland, 2020.
- [7] C.P. Criado, *Invisible Women: Exposing Data Bias in a World Designed for Men*, Chatto Publisher, Colchester, England, 2018.
- [8] UNCTAD, *Fishery Exports and the Economic Development of Least Developed Countries: Bangladesh, Cambodia, Comoros, Mozambique, Myanmar, Tanzania, and Uganda*, United Nations, New York, USA, 2020.
- [9] P. Katsuro, C.T. Gadzirayi, M. Taruwona, S. Mupararano, Impact of occupational health and safety on worker productivity: a case of Zimbabwe food industry, *Afr. J. Bus. Manag.* 4 (12) (Oct. 2010) 644–651.
- [10] J. Larsen, *Women in Industry – Why We Need More Gender-Sensitive Statistics*, United Nations Industrial Development Organization, New York, 2020.
- [11] OECD, *Enabling Women's Economic Empowerment: New Approaches to Unpaid Care Work in Developing Countries*, OECD Publishing, Paris, France, 2019.
- [12] ILO, *Women and Men in the Informal Economy: a Statistical Picture*, ILO, Geneva, Switzerland, 2018.
- [13] FAO, in: *Promoting Gender Equality and Women's Empowerment in Fisheries and Aquaculture*, FAO, Rome, Italy, 2016 [Online]. Available: <https://www.fao.org/3/i6623e/i6623e.pdf>.
- [14] S. Pervin, B.K. Basak, S. Islam, M.M. Hossain, Female worker in fish processing industry: a study on atlas seafood industry Ltd., Khulna, Bangladesh, *Int. J. Business, Manag. Soc. Res.* 12 (1) (Jul. 2023) 619–626, <https://doi.org/10.18801/ijbmsr.120123.66>.
- [15] A.J. Garcia Lozano, et al., Decent work in fisheries: current trends and key considerations for future research and policy, *Mar. Pol.* 136 (1) (Feb. 2022) 1–10, <https://doi.org/10.1016/j.marpol.2021.104922>.
- [16] UN-Women, *Handbook: Addressing Violence and Harassment against Women in the World of Work*, 2019 [Online]. Available: <https://www.cdcgroup.com/wp-content/uploads/2020/07/Addressing-gender-based-violence-and-harrasment.pdf>.
- [17] URT, *Investment Opportunities in the Fisheries Industry*, Ministry of Livestock and Fisheries, Dar es Salaam, Tanzania, 2018.
- [18] URT, *Livestock and Fisheries Commodity Value Chain Briefs. Brief No. 6*. Dodoma, Tanzania, Ministry of Livestock and Fisheries, 2019.
- [19] A. Griffiths, Healthy work for older workers: work design and management factors, in: W. Loretto, S. Vicker-workers, P. White (Eds.), *The Future for Older Workers: a New Perspective*, Policy Press, Bristol, UK, 2017.
- [20] J. Howard, Nonstandard work arrangements and worker health and safety, *Am. J. Ind. Med.* 60 (1) (Jan. 2017) 1–10, <https://doi.org/10.1002/ajim.22669>.
- [21] S. Torp, J. Reiersen, Globalization, work, and health: a Nordic perspective, *Int. J. Environ. Res. Publ. Health* 17 (20) (Oct. 2020) 7661, <https://doi.org/10.3390/ijerph17207661>.
- [22] P.A. Schulte, G. Delclos, S.A. Felknor, L.C. Chosewood, Toward an expanded focus for occupational safety and health: a commentary, *Int. J. Environ. Res. Publ. Health* 16 (24) (Dec. 2019) 4946, <https://doi.org/10.3390/ijerph16244946>.
- [23] S. Felknor, J. Streit, M. McDaniel, P. Schulte, L. Chosewood, G. Delclos, How will the future of work shape OSH research and practice? A workshop summary, *Int. J. Environ. Res. Publ. Health* 18 (11) (May 2021) 5696, <https://doi.org/10.3390/ijerph18115696>.
- [24] B. Lemire, "Women, Gender and Industrialisation in England, 1700–1870. By Katrina Honeyman. New York: St. Martin's Press, 2000, Pp. Viii, 204. \$59.95.," *J. Econ. Hist.*, vol. 61, Mar. 2001, <https://doi.org/10.1017/S0022050701233178>. S0022050701233178.
- [25] G. Rippon, *The Gendered Brain: the New Neuroscience that Shatters the Myth of the Female Brain*, Random House, New York, USA, 2019.
- [26] M. Torre, in: "The Flip Side of Segregation: Men in Typically Female Jobs", London School of Economics and Political Science Business Review, 2019. <https://blogs.lse.ac.uk/businessreview/2019/01/29/the-flip-side-of-segregation-men-in-typically-female-jobs>.
- [27] V.E. Sojo, R.E. Wood, A.E. Genat, Harmful workplace experiences and women's occupational well-being, *Psychol. Women Q.* 40 (1) (2016) 10–40, <https://doi.org/10.1177/0361684315599346>.
- [28] F. Diawuo, A.K. Issifu, Exploring the African traditional belief systems (totems and taboos) in natural resources conservation and management in Ghana, in: J. Chimakonam (Ed.), *African Philosophy and Environmental Conservation*, Routledge, London, UK, 2017, pp. 209–221.
- [29] ILO, "Statistics on Women,", 2023. <https://ilostat.ilo.org/topics/women/>.

- [30] N. Barret, J. Zenawi, Industrial health hazards—a critical literature review, *Med. Sci. Sport. Exerc.* 8 (2) (2017) 489–500.
- [31] J. Olaoye, O.J. Odebiyi, T. Abimbola, Occupational hazards and injuries associated with fish processing in Nigeria, *J. Aquat. Sci.* 3 (1) (Mar. 2015) 11–35.
- [32] M.B. Mshelia, J.U. Bassey, N.L. Wanas, Garba, A review of some potential occupational, environmental hazards and injuries associated with fish production in Nigeria, *African Sch. J. Agric. Agric. Technol.* 5 (1) (Sept. 2019) 72–88.
- [33] J. Zeichen, M. Griensven, U. Bosch, The proliferation response of isolated human tendon fibroblasts to cyclic biaxial mechanical strain, *Am. J. Sports Med.* 28 (2) (Nov. 2000) 88–92.
- [34] B. Henderson, Effects of cyclic loading on torn flexor tendons. *Hand, Surgery* 22 (2) (2016) 67–73.
- [35] S.M. Pauley, Lighting for the human circadian clock: recent research indicates that lighting has become a public health issue, *Med. Hypotheses* 63 (4) (2004) 88–102.
- [36] R. Larry, Light, space, and noise, *Br. Med. J.* 188 (1) (2017) 28–43.
- [37] O. David, S. Ogot, “PUP 250 an Introduction to Noise and Vibration, Their Effects and Control in the Occupational Environment,” Brisbane, 2019.
- [38] M.T. Gideon, Mediating determinant of psychological distress, *Hum. Med.* 68 (12) (2018) 2199–2205.
- [39] M.P. Koss, The women’s mental health research agenda: violence against women, *Am. Psychol.* 45 (3) (Mar. 1990) 374–380, <https://doi.org/10.1037/0003-066X.45.3.374>.
- [40] P. Bernard, Women’s mental health research agenda, in: *Women’s Mental Health*, National Institute of Mental Health, Rockville, USA, 2016.
- [41] H.G.B. de la Cruz, L. Swepston, G. Von Potobsky, *The International Labor Organization : the International Standards System and Basic Human Rights*, Westview Press, Colorado, USA, 2019.
- [42] L. Juan, A. Davidson, *Work for Women or Just Workers*, Oxford University Press, London, UK, 2019.
- [43] G. Martin, *Gender and Careers Development*, Macmillan Press, London, UK, 2017.
- [44] G.E. Idang, African culture and values, *Phronimon* 16 (2) (Jan. 2015) 97–111, <https://doi.org/10.25159/2413-3086/3820>.
- [45] FAO, *Processing Fish and Fish Products*, FAO- Fisheries and Aquaculture Department, Rome, Italy, 2011.
- [46] J. Horn, L.N. Rosenband, M.R. Smith (Eds.), *Reconceptualizing the Industrial Revolution*, MIT Press, London, UK, 2010.