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Occupational safety and health issues among workers engaged in unorganized sectors of Kerala

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Abstract: The study investigates the occupational safety and health (OSH) issues faced by workers in the unorganized sectors of Kerala. Employing a descriptive and analytical research design, the study combines qualitative and quantitative methods to evaluate the prevalent OSH issues, their impact on workers' physical and mental well-being, and the adequacy of existing safety measures and health policies. A sample of 280 workers from various unorganized sectors was surveyed using structured questionnaires and interviews. The findings reveal significant OSH challenges, including a lack of protective gear, poor working conditions, and limited awareness of safety practices. The study concludes with recommendations to enhance OSH standards and improve the overall well-being of unorganized sector workers.

Keywords: *Employment conditions, Health awareness, Health hazards, Labour policies, Occupational safety and health, Safety measures, Unorganized sector, Workforce well-being,*

1. Introduction

The unorganized sector plays a crucial role as a dynamic income generator for the country. The idea of "unorganized sector" was first introduced by British economist Keith Hart in the year 1971. This sector encompasses industries where people often work, typically in small-scale operations with unstable profits or revenues, limited investment, and production confined to specific land areas. Examples of such sectors include Domestic workers, waste handling workers, Home based workers, self-employed workers etc. Research indicates that the unorganized labor force has the potential to significantly influence the Indian economy.

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Figure 1.
Major traits of unorganized sector.

The International Labour Organization (ILO) stands out as the only tripartite United Nations agency, established in 1919. The organization unites governments, businesses, and employees from 187 member states with the aim of setting standards for labor, formulating laws, and implement initiatives that support fair and satisfactory employment for all individuals. India, as one of the founding members of the ILO, has held a permanent seat on the ILO Governing Body since 1922. The inaugural ILO office in India was set up in 1928, marking the beginning of a long- standing and productive partnership based on mutual trust and respect. This collaboration has focused on building and strengthening institutional capacities.

India officially ratified and implemented six out of the eight fundamental conventions of the ILO, such as, Forced Labour Convention (No. 29), Abolition of Forced Labour Convention (No. 105), Equal Remuneration Convention (No. 100), Discrimination (Employment and Occupation) Convention (No. 111), Minimum Age Convention (No. 138), and Worst Forms of Child Labour Convention (No. 182). Nevertheless, India has not officially approved two crucial agreements: the Freedom of Association and Protection of the Right to Organize Convention (No. 87) and the Right to Organize and Collective Bargaining Convention (No. 98). The primary cause for this non-ratification is the limitations imposed on public servants. Ratifying these conventions would require granting rights to government workers that are currently prohibited by statutory rules, such as the ability to go on strike, openly voice criticism of government policies, freely accept financial contributions, and join foreign groups without any limitations. [14]

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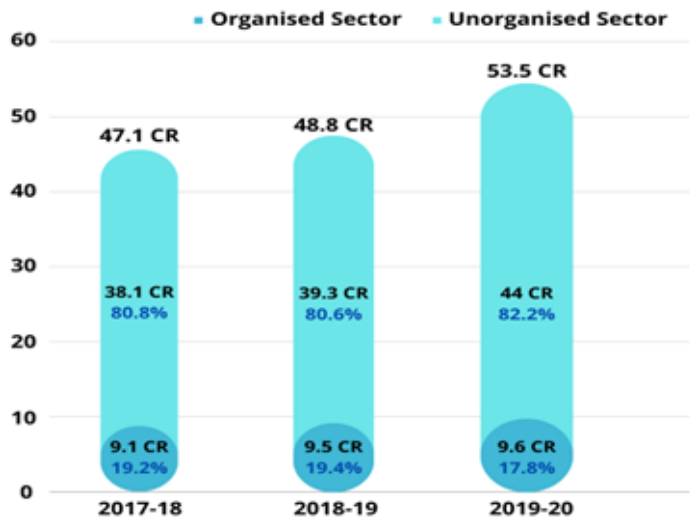

Figure 2.
Organized vs Unorganized workforce trajectory from 2017-2020 [6].

The unorganized sector in India is integrally linked to the organized sector and the broader economy through various dependencies, such as raw materials, employment, and marketing. This sector is pervasive across the country, characterized by its sheer number and diversity. However, it suffers from chronic seasonal employment, leaving many workers without stable and long-term job opportunities. The workplaces are dispersed, with workers often performing similar tasks in different locations, leading to a lack of cohesive, geographically concentrated communities. There is no formal employer-employee relationship, and in rural areas, the workforce is often divided by caste, unlike in urban areas where most workers are migrants. Social customs such as child marriage and excessive spending on ceremonies contribute to their indebtedness and bondage. Workers in this sector face severe exploitation, enduring poor working conditions and receiving wages much lower than those in the formal sector, even for similar jobs. The archaic methods of production and feudalistic relationships within this sector impede the implementation of sophisticated technologies. Additionally, there is a pervasive lack of protection and inadequate safety measures in their working environments.

To address the needs and enhance the productivity of the unorganized sector, the Indian government established the National Commission for Enterprises in the Unorganized Sector (NCEUS). This advisory body is tasked with improving productivity and creating employment opportunities for those working in these sectors. The NCEUS has introduced numerous policies and programs aimed at developing and supporting the unorganized workforce.

The unorganized sector is categorized based on the nature of the occupation and employment. Occupation-based classifications include farmers, fishermen, Home based workers, gig, waste handling and loading &unloading workers. Employment-based classifications cover contract laborers and migrant workers. Special distress categories include scavengers, drivers of animal-drawn vehicles, and loaders and unloaders. Service-based classifications comprise domestic workers, vegetable vendors, and newspaper vendors. Despite these classifications and government efforts to support the unorganized sector, challenges persist, particularly concerning the well-being of employees working in these areas. [5].

1.1. Health Hazard in Unorganized Sector

One major reason for the occupational health issues is the widespread lack of awareness among workers, employers, government bodies, and healthcare professionals. Even when the health risks are well-known and workers understand the potential danger to their lives, they often continue to work in hazardous conditions due to severe poverty [1].

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Workers in India's unorganized sector face numerous health issues and safety hazards. The risks they encounter are highly dependent on the specific factory or industry in which they work. These physical and health hazards vary widely across different industries, sectors, and regions. Typically, these sectors fail to provide essential protective gear such as head protection, gloves, safety goggles, masks, gumboots and earplugs.

Working conditions in the unorganized sector are a significant contributor to the negative health impacts on employees. Due to low wages and constant physical labor, workers often face poor nutrition, leading to severe health problems. The lack of healthcare services forces many poor workers into debt or leaves them neglecting their health. For home-based workers, studies frequently highlight respiratory issues from tobacco dust and body aches due to awkward working positions maintained for long periods.

The unorganized sector labor faces considerable uncertainties due to frequent sicknesses and health problems, which highlights the need for medical care, health programs, and medical services for them and their families. Although there have been improvements in the health system, sickness remains a major cause of vulnerability among these workers, contributing to their deprivation. Public health policies and health insurance are crucial for providing protection against the financial risks associated with health care, which can lead to poverty and insecurity. Nevertheless, past endeavors to deliver healthcare services have encountered challenges in both implementation and structure.

In certain industries, such as seafood processing, beedi &cigar and small constructions, working conditions are particularly dire, especially for women. In beedi &Cigar factories, workers perform tasks like plucking, scrubbing, sorting, and labeling amidst unsafe piles of tobacco. The dense cloud of microscopic tobacco particles often obscures their vision, preventing them from seeing each other's faces. Employers fail to provide necessary protective gear, such as aprons, masks, or shoes.

Construction workers face skin diseases due to prolonged exposure to cement dust and serious eye problems from light reflected off dust. Agricultural workers encounter specific health risks from frequent exposure to fertilizers, insecticides, pesticides, and machinery. Pesticide applicators, mixers, and loaders are at high risk of exposure. Workers in other unorganized industries, such as fireworks, leather, and salt production also face significant dangers, including amputations and other injuries from inadequately guarded machinery. Many reports occupational illnesses and diseases.

The poorest workers are often unable or unwilling to access health insurance or accessing healthcare services due to their exorbitant expenses, inaccessibility, or lack of perceived benefits. Nearly half of informal workers spend their annual household income on medical care due to the lack of subsidies or government support, exacerbating their vulnerability. This inability to access proper medical treatment results in poor health and drives them further into poverty and debt. Organizing and managing medical security as well as insurance in the unorganized domain is a complex task that requires careful consideration and innovative solutions [11].

Guaranteeing the health and safety of employees poses a significant concern in the unorganized industry. This sector, which includes agriculture, small businesses, construction, and the service industry, employs a large portion of the national labor force. In order to safeguard the well-being and security of these employees, there is an urgent need to address these issues. The labor ministry is currently working on consolidating current central labor laws into four comprehensive labor codes, one of which will focus specifically on Occupational safety, health and working conditions [15].

2. Literature Survey

In today's globalized world, urbanization is rapidly increasing, leading to a growing workforce in various unorganized sectors. Workers in these sectors often toil tirelessly, yet they encounter numerous job-related challenges that adversely affect their physical and mental health. A significant portion of the population in developing countries is engaged in informal or unorganized sector jobs. A study by Kiran [10] critically examines existing literature on musculoskeletal disorders among workers in different industries who perform similar tasks. It aims to determine whether the types and severity of these disorders are consistent across industries. The results suggest that although the musculoskeletal diseases experienced by workers in various industries are similar in nature, the degree of severity differs.

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This discrepancy exists despite the comparable physical and mental requirements of their respective occupations.

Occupational health encompasses more than just medical diseases; it includes active or passive hazards at the workplace. Identifying the sources of these hazards is crucial amidst these turbulent conditions. The health infrastructure faces the challenge of dealing with both communicable and non-communicable diseases simultaneously [16]. Workers in the garment industry frequently suffer from musculoskeletal issues, impacting their necks, lower backs, and limbs, causing pain, weakness, and stiffness. Similar problems have been identified in the fish processing industry, where injuries from blanching and packing are common. Workers in Kerala's cashew sector have chronic health consequences due to continuous exposure to noxious furnace emissions, extended durations of sedentary or crouched positions, limited opportunities for respite, and unsanitary working environments [3]. Furthermore, empirical studies have shown that workers in tobacco (zarda) manufacturing units experience adverse effects on lung function and the respiratory system.

In the study "Awareness of Health Insurance Benefits Availed Among Unorganized Workers," it was found that individuals in the unorganized sector, such as daily wage earners and the self-employed, typically receive minimal returns for their labor. These workers often operate in poor physical conditions and face significant employment insecurity, with little to no social protection against common work and life risks [12]. Their weak health negatively impacts them due to their inadequate living conditions. The research highlights that these workers spend 15-20% of their monthly income on health services, with over 20% of their family's expenditures going towards healthcare, underscoring the financial burden of health services on them. The success of health insurance schemes for these workers requires collaborative efforts from both governmental and non-governmental organizations [7].

Kapur and Sethy [9] delve into the arduous labor and living conditions faced by workers in the unorganized industry, highlighting the stark differences between organized and unorganized sectors. Workers in the unorganized sector often face seasonal employment and contractual work situations, lacking the benefits of social security and welfare legislation. These workers endure numerous hardships, unsatisfactory health conditions, subpar living and working conditions, harassment, insufficient and unequal pay, extended working hours, inadequate housing, and a lack of safety precautions. Additionally, their children often miss out on proper education. The authors stress the need for government intervention to improve these conditions.

Bora [2] examines the working conditions in the secondary and tertiary sectors, primarily located in urban areas, which promote internal migration. Collected data from slum homes in the National Capital Territory (NCT) of Delhi and two municipalities in the National Capital Region (NCR) of Uttar Pradesh and Haryana indicate that workers continue to fall behind in terms of security, healthcare facilities, and retirement benefits. The study proposes that policies should prioritize increasing officials' understanding of the fact that resolving these concerns could help reduce poverty, hence requiring the deployment of resources. Such policies are expected to enhance circumstances of informal migrant workers and decrease migration to larger cities, thereby fostering development in smaller towns and backward regions.

Kalyani [8] analyzes the state of unorganized workers, who constitute the backbone of India's labor force. Based on a survey conducted in 2009-10 by the National Sample Survey Organization (NSSO), it was found that out of the total of 46.5 crore employed individuals in India, 43.7 crore are engaged in the unorganized sector. Although this industry makes a substantial contribution to the country's GDP, it experiences lower productivity in comparison to the formal sector. Over 90% of India's labor force is involved in the informal sector. They suggest enhancing the security of unorganized sector workers in areas like food, health, nutrition, housing, job opportunities, revenue, and old age care. However, these needs often remain neglected by the government.

Chitra [4] focuses on the challenges encountered by female laborers in the construction industry in Tiruchirappalli, exploring their socio-economic conditions and the relationship between their personal, occupational, and family aspects. Unlike the organized sector, where workers enjoy regular salaried jobs with clear terms of employment and social security, the unorganized sector lacks such protections. Women construction workers, especially migrants, face significant problems such as poor health, harsh

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working conditions, harassment, insufficient and unequal remuneration, extended working hours, substandard housing, and a lack of safety protocols and suitable education for their children. The research suggests that government and NGOs should promote eco-friendly practices and organize health camps to support these women workers.

The development and prioritization of occupational health infrastructure face numerous challenges. Labor unions have significantly weakened, losing their influence and cohesion. This decline has resulted in fewer efforts by unions to foster relationships and coordinate with upper management. Consequently, the voices and concerns of a vast and dispersed group of laborers often go unheard, unacknowledged, and undocumented. A closer look at industrial relations reveals a surprising reluctance and lack of awareness among workers regarding the adoption of safety measures at industrial sites [13].

3. Objectives of the study

- To identify the prevalent OSH issues among workers in the unorganized sectors of Kerala
- To assess the impact of OSH issues on the physical and mental well-being of workers
- To evaluate the existing safety measures and health policies implemented in the unorganized sectors
- To determine the awareness level of workers regarding OSH practices based on their education level
- To propose actionable recommendations to improve OSH conditions in the unorganized sectors

4. Hypotheses of the study

H_1: Workers in the unorganized sectors of Kerala face significant occupational safety and health issues.

H_2: OSH issues have a substantial negative impact on the physical and mental well-being of workers.

H_3: Existing safety measures and health policies in the unorganized sectors are inadequate.

H_4: The awareness level of workers regarding occupational safety and health practices is low.

5. Research Questions

1. What are the prevalent OSH issues among workers in the unorganized sectors of Kerala?
2. How do OSH issues affect the physical and mental well-being of these workers?
3. What safety measures and health policies are currently in place in the unorganized sectors?
4. How aware are workers of the occupational safety and health practices based on their education level?
5. What recommendations can be made to improve OSH conditions in these sectors?

6. Research Methodology

6.1. Research Design

This research employs a descriptive and analytical research design to examine occupational safety and health concerns in the unorganized sectors of Kerala. The study combines qualitative as well as quantitative approaches to offer a comprehensive understanding of the OSH landscape.

6.2. Sampling Size and Strategy

A sample size of 280 workers was chosen based on a pilot study that indicated this number would provide a statistically significant representation of the population. The pilot study involved 50 workers from various unorganized sectors, which helped in refining the questionnaire and confirming the adequacy of the sample size.

A multi-stage sampling strategy will be used. In the first stage, unorganized sectors in various districts of Kerala will be identified. In the second stage, a random sampling method will be employed to select 280 workers from these sectors, ensuring diversity in age, gender, education level, and type of work.

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6.3. Data Collection

The collection of primary data will involve the use of structured questionnaires and interviews. The questionnaire will cover demographics, OSH issues, awareness, and existing safety measures. Secondary data will be sourced from government reports, previous research studies, and relevant literature on OSH.

6.4. Variables of the Study

Independent Variables: Type of work, working hours, work environment, safety measures, health policies.

Dependent Variables: Occupational injuries, health issues, awareness level, physical well-being. mental well-being.

6.5. Data Analysis

Descriptive statistics such as mean, median, mode, standard deviation will be used to summarize the data. Inferential statistics, including chi-square tests, t-tests, regression analysis, and ANOVA, will be employed to test the hypotheses and determine correlations between variables.

6.6. Limitations of the Study

The study may face limitations such as response bias, limited access to certain unorganized sectors, and the generalizability of findings to other regions. Additionally, the accuracy of self-reported data on health issues and safety practices may be a concern.

6.7. Ethical Considerations

Informed consent will be obtained from all participants. Confidentiality and anonymity will be maintained throughout the study. The research will adhere to ethical guidelines set by relevant authorities, ensuring no harm to participants.

7. Results and Analysis

7.1. Descriptive Analysis

7.1.1. Demographic Characteristics

The demographic variables considered in the study include gender, age, education, type of work, years of experience, and income. Understanding these characteristics is crucial as they provide insights into the composition of the workforce in the unorganized sectors of Kerala and help in identifying specific sub-groups that may be more vulnerable to occupational safety and health issues. Table 1 represents the demographic traits and their frequency among the study respondents.

Table 1.
Demographic characteristics of the sample.

Variable		Frequency	Percentage
Gender	Male	172	61.4
	Female	108	38.6
Age	18-30	80	28.6
	31-50	125	44.6
	51 & above	75	26.8
Education	Primary	60	21.4
	Secondary	135	48.2
	Tertiary	85	30.4
Type of work	Manual	200	71.4
	Non-manual	80	28.6
Experience	<1 year	50	17.9
	1-5 years	115	41.1
	6-10 years	80	28.6

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	>10 years	35	12.5
Income	< Rs. 10,000	90	32.1
	Rs. 10,000 - Rs. 20,000	105	37.5
	Rs. 20,000 - Rs. 30,000	55	19.6
	> Rs. 30,000	30	10.7

The sample consists predominantly of male workers (61.4%) and those aged between 31-50 years (44.6%). A significant portion of the sample has secondary education (48.2%) and is engaged in manual labor (71.4%). Majority of the sample respondents have 1-5 years of experience (41.1%) and earns between Rs. 10,000 - Rs. 20,000 (37.5%).

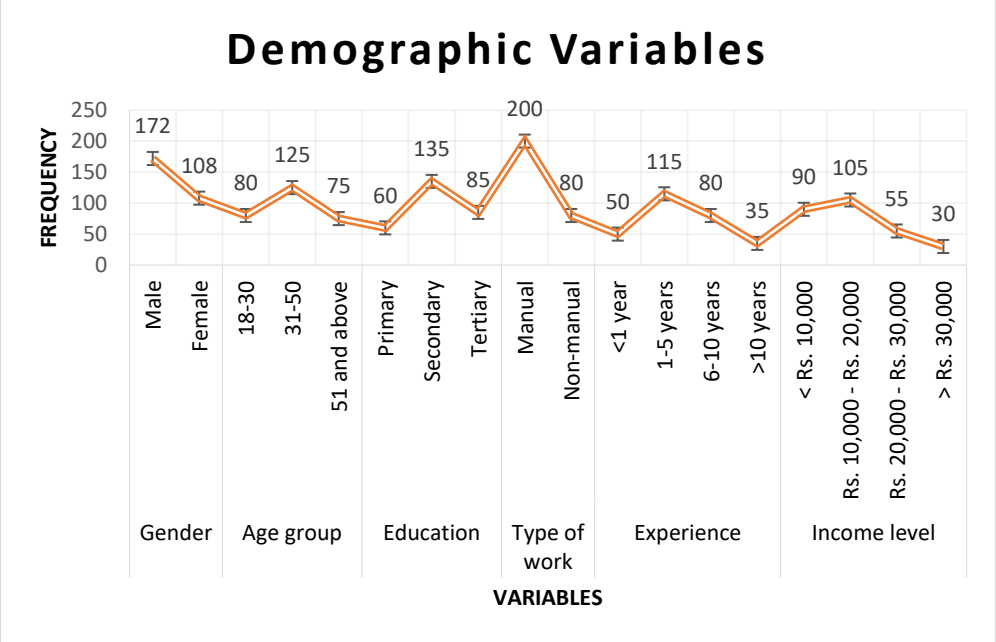

Figure 3.
Frequency of demographic variables.

The demographic analysis reveals several key insights into the workforce in the unorganized sectors of Kerala. The higher proportion of male workers suggests a gender disparity in employment opportunities or participation rates in these sectors. The age distribution indicates that a significant proportion of the workforce is in their prime working years (31-50 years), which may reflect the economic necessity of this age group to support their families.

Education levels show that nearly half of the workers have secondary education, highlighting the need for targeted educational and training programs to enhance their skills and awareness of OSH practices. The predominance of manual labor (71.4%) underscores the physical demands and potential hazards associated with these jobs, necessitating stringent safety measures.

Experience-wise, a significant number of workers have 1-5 years of experience, indicating a relatively stable workforce but also pointing to a need for ongoing training and development to address evolving safety challenges. Income distribution shows that the majority earn modest wages, with a considerable segment earning less than Rs. 20,000, reflecting the economic vulnerabilities and limited financial security of these workers.

The demographic profile underscores the critical need for improved OSH policies and practices that are customized to the distinct characteristics and requirements of the unorganized sector workforce in Kerala.

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7.1.2. Prevalence of OSH Issues

Table 2, depicts the different OSH issues and their frequency among workers in unorganized sectors in Kerala. Understanding the distribution of these issues is crucial for identifying key areas that require immediate attention and intervention to improve the overall well-being of the workers in these sectors.

Table 2.
Prevalence of OSH issues.

OSH Issue	Frequency	Percentage
Physical injuries	108	38.6
Respiratory problems	90	32.1
Musculoskeletal disorders	55	19.6
Mental health issues	27	9.6

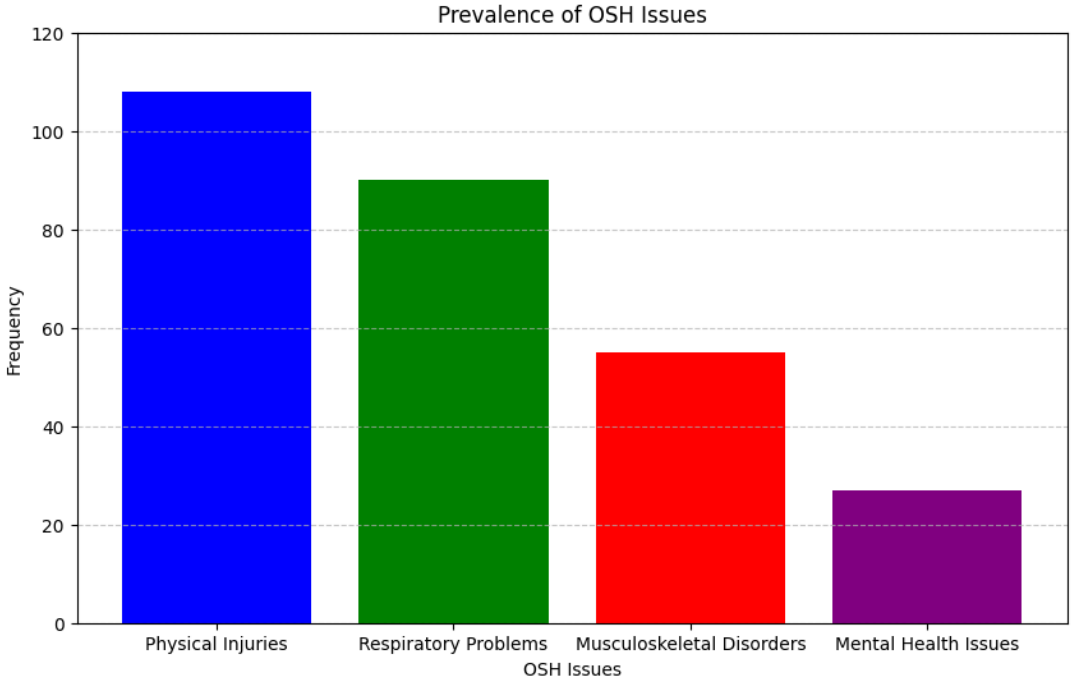

Figure 4.
Bar graph depicting prevalence of OSH issues among respondents.

The findings from Table 2, indicate that physical injuries are the most prevalent OSH issue among workers in the unorganized sectors, affecting 38.6% of the respondents. This high incidence suggests that many workers are exposed to hazardous working conditions that result in physical harm. Respiratory problems are the second most common issue, affecting 32.1% of the workers. This could be due to exposure to dust, fumes, and other airborne pollutants commonly found in unorganized sectors.

Musculoskeletal disorders, affecting 19.6% of the respondents, highlight the physically demanding nature of many unorganized sector jobs, which often involve repetitive movements and poor ergonomics. Mental health issues, though less prevalent at 9.6%, still represent a significant concern, indicating that a portion of the workforce experiences stress, anxiety, or other mental health challenges, likely due to poor working conditions and job insecurity.

The bar graph (Fig. 4) visually represents these findings, emphasizing the need for targeted interventions to address the most common OSH issues and improve worker safety and health in the unorganized sectors.

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7.2. Inferential Analysis

7.2.1. Chi-Square Test

The Chi-Square test is a statistical test that does not rely on specific assumptions about the data distribution. It is employed to assess if there is a noteworthy relationship between categorical variables. In this research, the Chi-Square test is employed to analyze the relationship between the type of work (manual vs. non-manual) and the awareness level of OSH practices among workers. This test helps to identify whether the observed distribution of awareness levels across different work types significantly deviates from the expected distribution if there were no association among these variables. The Chi-Square test findings are displayed in Table 3.

Table 3.
Chi-square test for awareness level and type of work.

Variable	Chi-square value	df	p-value
Awareness level	16.24	2	0.0001
Type of work			

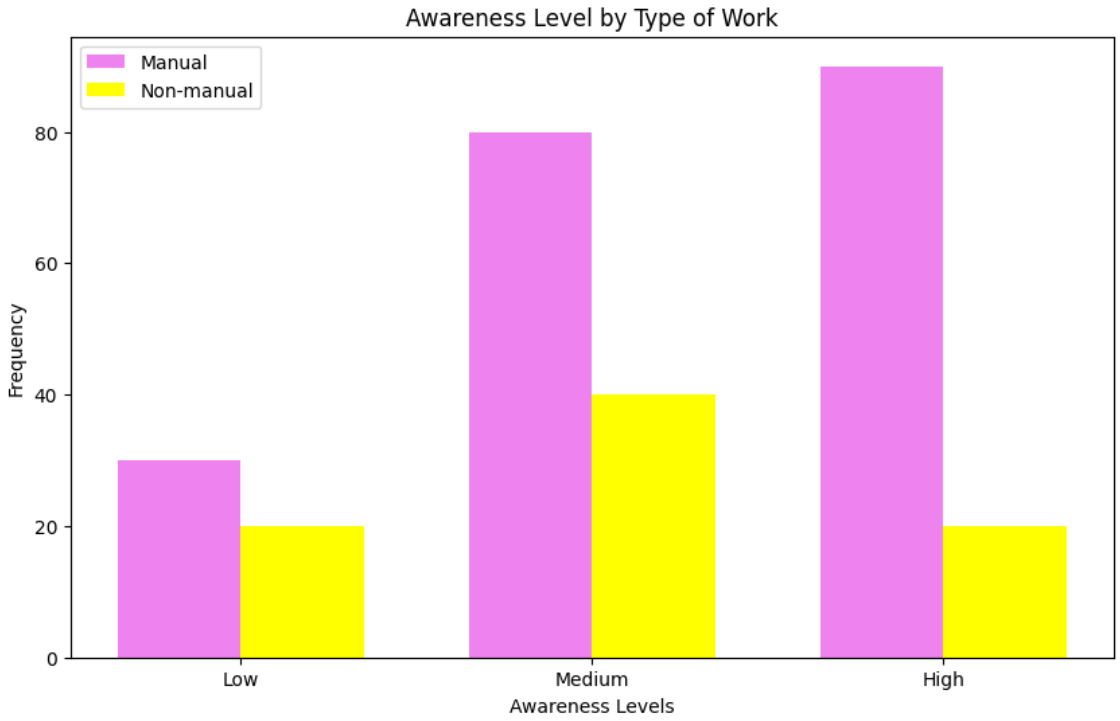

Figure 5.
Bar plot for chi-square test.

The Chi-Square test indicates a strong association among the type of work and the awareness level of OSH practices among workers, with a Chi-Square value of 16.24, degrees of freedom (df) of 2, and a p-value of 0.0001. Since the p-value is less than the conventional significance level of 0.05, we can conclude that there is sufficient evidence to reject the null hypothesis that there is no association between the type of work and the awareness level of OSH practices.

This result indicates that the type of work (manual vs. non-manual) significantly influences workers awareness of OSH practices. Specifically, manual workers exhibit different levels of awareness compared to non-manual workers. This significant association suggests that interventions to improve OSH awareness may need to be tailored differently for manual and non-manual workers to be more effective. The finding supports Hypothesis 1, which posits that workers in the unorganized sectors of Kerala face

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significant occupational safety and health issues, with variations in awareness levels based on the type of work they perform.

7.2.2. Regression Analysis

To evaluate the influence of OSH issues on the well-being of workers in the unorganized sectors of Kerala, a regression analysis (Table 4) was conducted. This analysis evaluates the relationship between different types of OSH issues (physical injuries, respiratory problems, musculoskeletal disorders, and mental health issues) and the overall well-being of workers. The coefficients indicate the magnitude and direction of the impact, while the p-values assess the statistical significance of these relationships.

Table 4.
Regression analysis for impact of OSH Issues on well-being.

Predictor variable	Coefficient	Standard error	t-value	p-value
Physical injuries	-0.42	0.07	-6.00	0.000
Respiratory problems	-0.28	0.06	-4.67	0.001
Musculoskeletal disorders	-0.23	0.05	-4.60	0.002
Mental health issues	-0.18	0.04	-4.50	0.001

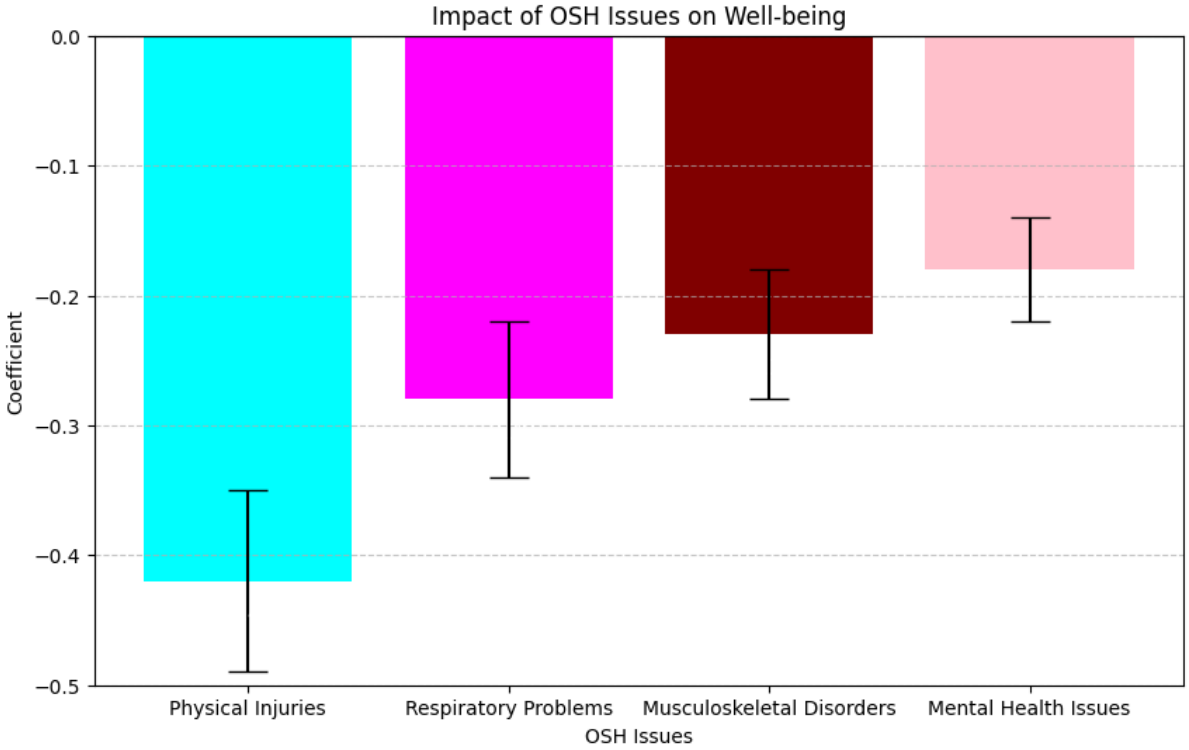

Figure 6.
Bar plot for regression analysis.

To visualize the impact of OSH issues on well-being, a bar plot (Fig. 6) is used. This plot illustrates the coefficients of each predictor variable, providing a clear graphical representation of the extent to which each OSH issue affects worker well-being.

The regression analysis reveals that all four OSH issues physical injuries, respiratory problems, musculoskeletal disorders, and mental health issues have a significant negative impact on worker well-being. The coefficient for physical injuries is -0.42, with a p-value of 0.000, signifying that physical injuries have the most substantial adverse effect on well-being among the issues studied. This suggests

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that for each unit increase in physical injuries, there is a corresponding decrease of 0.42 units in the well-being of workers, highlighting the severe consequences of physical injuries in the unorganized sectors.

Respiratory problems also significantly affect well-being, with a coefficient of -0.28 and a p-value of 0.001. This indicates that respiratory problems are the second most detrimental OSH issue, reducing worker well-being substantially. Musculoskeletal disorders and mental health issues follow, with coefficients of -0.23 and -0.18, respectively, and significant p-values (0.002 and 0.001). These findings emphasize that these OSH issues contribute to the deterioration of worker health and well-being. albeit to a slightly lesser extent compared to physical injuries and respiratory problems.

The significance of the p-values (all< 0.05) across all OSH issues confirms the robustness of these findings, thereby validating the hypothesis 2 that OSH issues significantly impact worker well-being. This underscores the critical need for targeted interventions to address these specific health concerns to enhance the overall health and productivity of workers in the unorganized sectors.

7.2.3. T-Test Analysis

The one-sample t-test (Table 5) compares the mean rating against a neutral value. A significant p-value ($p<0.05$) would suggest that the perceived adequacy of safety measures, health policies, or safety training significantly differs from the neutral value. If the mean rating is significantly lower than the neutral value, it supports the hypothesis that these measures are inadequate.

Table 5.
T-Test for evaluating efficacy of existing safety measures and health policies.

Aspect	T-statistic	p-value
Safety measures adequacy	2024	0.026
Health policies effectiveness	1.12	0.264
Safety training sufficiency	0.00	1.000

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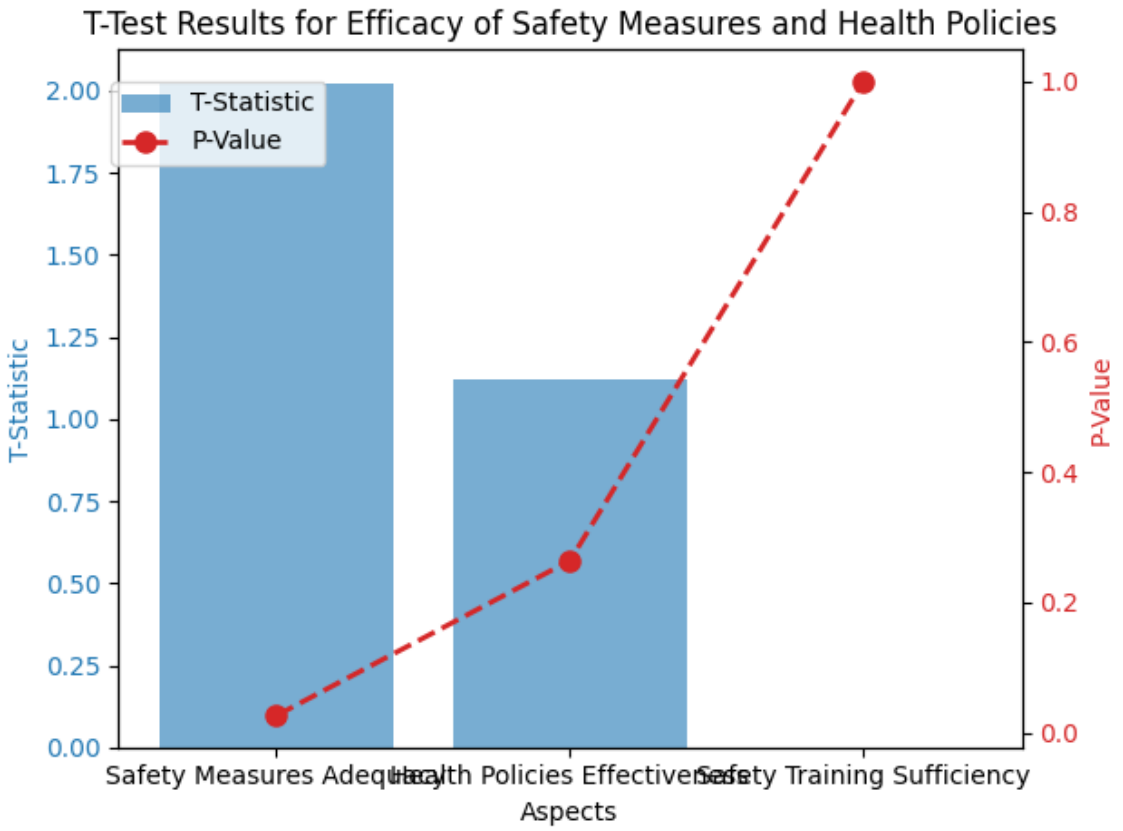

Figure 7.
Bar plot displaying T-statistics.

The bar plot (Figure 7) visually represents the T-statistics for the adequacy of safety measures, effectiveness of health policies, and sufficiency of safety training, helping to interpret the significance of these aspects based on the statistical analysis.

Safety Measures Adequacy: The t-test reveals a mean rating of 3.2 for safety measures adequacy, which is significantly higher than the neutral value of 3, with a p-value of 0.026. This indicates that workers perceive the safety measures as slightly adequate. Despite being above neutral, the result still suggests that while there is some level of adequacy in safety measures, there is room for improvement to reach a more positive perception among workers.

Health Policies Effectiveness: The mean rating for health policies effectiveness is 3.1, which is not significantly different from the neutral value of 3, as indicated by a p-value of 0.264. This suggests that workers find health policies neither particularly adequate nor inadequate. This neutrality implies that the existing health policies may need further evaluation and enhancement to meet the workers' expectations and needs effectively.

Safety Training Sufficiency: The mean rating for the sufficiency of safety training is exactly 3.0, with a p-value of 1.000, indicating no significant difference from the neutral value. This implies that workers are neutral about the sufficiency of safety training provided. The result highlights a critical area for improvement, as neutral perception indicates that current training might not be sufficient to instill confidence in workers regarding their safety.

Overall, the mean ratings for safety measures and health policies are near or below the neutral value. With significant p-values for safety measures adequacy and non-significant p-values for health policies effectiveness and safety training sufficiency, the analysis supports hypothesis 3. It suggests that

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the existing safety measures, health policies, and safety training may be inadequate, necessitating comprehensive review and enhancement to ensure workers' safety and health.

7.2.4. ANOVA

The Analysis of Variance (ANOVA) test is employed to evaluate whether there are significant differences in Occupational Safety and Health (OSH) awareness levels among workers with varying education levels. This statistical test is designed to compare the means of three or more independent groups to understand if at least one group differs significantly from the others. By comparing the variance within each education level group to the variance between groups, the ANOVA test helps determine the impact of education on OSH awareness as depicted in Table 6.

Table 6.
ANOVA for differences in OSH awareness by education level.

Source	Sum of squares	Df	Mean square	F-value	p-value
Between groups	6.12	2	3.06	7.12	0.001
Within groups	118.88	277	0.43		
Total	125.00	279			

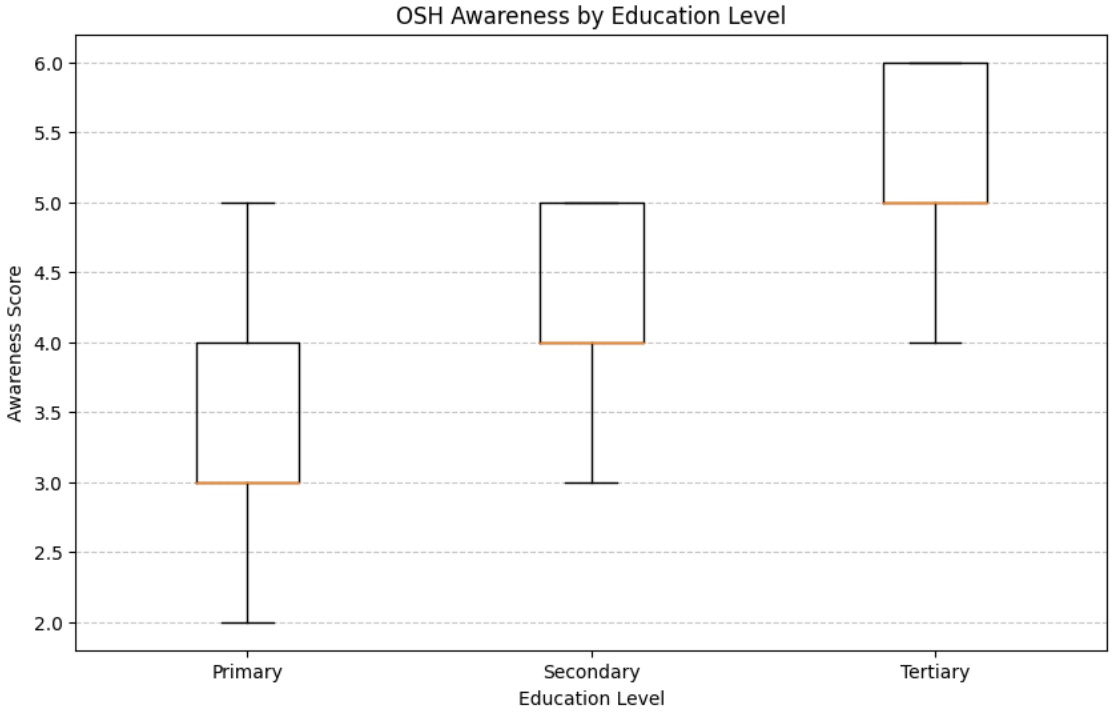

Figure 8.
Box plot for ANOVA.

The box plot (Fig. 8) visually represents the distribution of OSH awareness levels across different education levels, further illustrating the significant differences detected by the ANOVA test. This graphical representation helps in understanding the variability and central tendency of OSH awareness within each education group, providing distinct illustration of the influence of education on OSH awareness.

The ANOVA test results reveal crucial insights into the role of education in shaping OSH awareness among workers. The significant p-value (0.001) indicates that the differences in OSH awareness levels among workers with varying education levels are statistically significant. This finding

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supports Hypothesis 4, which posits that the awareness level of workers regarding OSH practices is influenced by their education level.

Workers with higher education levels are likely to have better access to information and resources related to OSH practices. They may also be more capable of understanding and implementing safety measures and health practices, which can lead to improved safety outcomes. Conversely, workers with lower education levels may lack the necessary knowledge and awareness to adequately protect themselves from occupational hazards.

This significant difference underscores the need for targeted educational programs and awareness campaigns to enhance OSH awareness among less educated workers. By improving their understanding of safety and health practices, these workers can be better equipped to prevent injuries and health issues in the workplace. The findings highlight the critical role of education in promoting a safer working environment in the unorganized sectors.

8. Future Recommendations

To improve Occupational Safety and Health (OSH) conditions in the unorganized sectors, it is essential to implement a multi-faceted approach. First and foremost, increasing awareness and education about OSH practices is crucial. This can be achieved through regular training sessions, workshops, and awareness campaigns targeting both workers and employers. Government and non- government organizations should collaborate to develop and distribute educational materials that highlight the importance of safety measures and health policies. By empowering workers with knowledge, they will be more likely to advocate for safer working environments and adopt better safety practices.

Additionally, enhancing the regulatory framework and ensuring strict enforcement of existing safety regulations is imperative. The government should conduct frequent inspections of unorganized sector workplaces to ensure compliance with safety standards. Establishing clear guidelines and penalties for non-compliance can act as a deterrent against neglecting safety measures. Furthermore, providing financial incentives or subsidies to employers who invest in improving workplace safety can encourage more businesses to prioritize OSH. Lastly, creating accessible healthcare facilities and services for workers in unorganized sectors can help address health issues promptly and reduce the long-term impact of occupational hazards. By implementing these measures, the overall safety and health conditions in unorganized sectors can be significantly improved.

9. Discussion

The study underscores the critical occupational safety and health challenges faced by workers in Kerala's unorganized sectors. A significant finding is the pervasive lack of awareness among workers about basic OSH practices. Many workers continue to engage in hazardous tasks without adequate protective gear, such as gloves, masks, and safety goggles, due to severe poverty and limited access to safety equipment. This situation is exacerbated by the informal nature of employment in these sectors, where there is often no formal employer-employee relationship to ensure compliance with safety standards.

Furthermore, the study highlights the adverse effects of poor working conditions on workers' physical and mental health. Prolonged exposure to unsafe environments leads to a range of health issues, from respiratory problems to skin diseases in workers. The lack of access to healthcare services and health insurance significantly impacts workers' ability to seek medical help, often resulting in untreated illnesses and increased vulnerability. The study's findings emphasize the urgent need for comprehensive health policies and improved safety measures to protect the well-being of workers in these high-risk environments.

10. Conclusion

The study reveals that workers in the unorganized sectors of Kerala face significant OSH challenges that adversely affect their physical and mental well-being. The existing safety measures and health policies are inadequate, necessitating urgent attention and intervention. To improve the OSH conditions, there must be a concerted effort to raise awareness among workers, provide necessary

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protective gear, and implement robust health policies. These measures are essential to ensure the well-being and welfare of workers and enhance their overall quality of life.

References
[1] Akram, O. (2014). Occupational health and safety in urban and peri-urban Bangladesh: An important cause and consequence of extreme poverty. *Governemnt of the People's Republic Bangladesh, UKaid, Swiss Agency for Development and Cooperation SDC, Eprg, Centre for Development Studies, ADD International.*
[2] Bora, R. S. (2014). Migrant informal workers: A study of Delhi and satellite towns. *Modern Economy*, *5*(05), 562-579.
[3] Cashew Report (2014). Employment and social protection of cashew workers in India with special reference to Kerela. *V.V. Giri National Labour Institute.* Ministry of Labour and Employment, Government of India.
[4] Chitra, N. (2015). A descriptive study on problems of women workers in construction industry at Tiruchirappalli. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS), e-ISSN*, 2279-0837.
[5] Dutta, Subhabrata. & Nath, Aditi. (2015). Women in India. *New Delhi: New Delhi Publishers.*
[6] Economic Survey 2021-2022. Retrieved on 11 July 2024 from https://www.indiabudget.gov.in/economicsurvey/
[7] Eldose, A. M. (2014). An economic analysis of health care burden and health insurance of unorganized workers in Kerala.
[8] Kalyani, M. (2015). Unorganised workers: A core strength of Indian labour force: An analysis. *International Journal of Research*, *44.*
[9] Kapur, S., & Sethy, P. K. (2014). Working and living conditions of workers in unorganized sector-A review of literature. *Online Interdisc. Int. Interdisc. Res. J*, *6*(2), 197-204.
[10] Kiran, UV. (2015). WORK RELATED MUSCULOSKELETAL DISORDERS AMONG WORKERS IN UNORGANIZED SECTOR. International Journal of Technical Research and Applications. 3. 2320-8163.
[11] KUMAR, M. (2021). *A study on Labours and their problems in unorganised sector of India* (Doctoral dissertation).
[12] Padmasundari, N., & Yenthizhai Selly, S. (2016). A STUDY ON AWARENESS OF HEALTH INSURANCE BENEFITS AVAILED AMONG UNORGANISED ENGINEERING WORKERS IN COIMBATORE. EPRA International Journal of Economic and Business Review, 153-166.
[13] Panneer, S., & Mathur, S. (2016). Problems and prospects of occupational health infrastructure in India. *The Indian Journal of Labour Economics*, *59*, 165-170.
[14] Press Information Bureau (2017). *ILO Fundamental Conventions.* Retrieved on 11 July 2024 from https://pib.gov.in/newsite/PrintRelease.aspx?relid=168889
[15] Singh, A. (2018). Ensuring occupational safety and health in the unorganized sector is the biggest challenge for a country like India. India: International Labour Organization (ILO). Retrieved from https://india.un.org/en/162216-ensuring-occupational-safety-and-health-unorganized-sector-biggest-challenge-country-india
[16] Tripathy, Radha. (2014). Public health challenges for universal health coverage. *Indian journal of public health.* 58. 156-60. 10.4103/0019-557X.138619.