Work Related Emergencies First Aid: Health Awareness and Practices among Sewage Workers

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Abstract

Background: Sewage workers are vital to public health; they are often subject to occupational hazards and work-related emergencies, which pose risks to their safety. Effective first aid in such instances is dependent on workers' health literacy and ability to respond promptly. **Aim:** This study aimed to assess health awareness and practices of sewage workers regarding first aid in work-related emergencies. **Research design:** A cross-sectional descriptive research design was utilized. **Setting:** The study was conducted at four sewage stations, Elmadina, Qahafa, Dala, and Lotf Allah, all are affiliated to Fayoum Drinking Water and Sanitation Company. **Sample:** A stratified sample was used, and 215 workers were recruited **Tools:** Two tools were used. **Tool I:** An interviewing questionnaire consisted of four parts (socio-demographic and occupational characteristics of sewage workers, healthcare services, availability and use of personal protective equipment, the reported incidence of workplace injury and illness, and medical history) and sewage workers' knowledge about the occupational health hazards. **Tool II:** self-reported practice checklist to assess preventive measures and first aid practices in work-related medical emergencies. **Results:** The study results revealed that the majority (89.3%) of workers were exposed to workplace injuries, and nearly about two thirds (65.1%) of them had unsatisfactory level of knowledge about occupational health hazards, preventive measures, and first aid in work-related medical emergencies, only about one third (33%) of studied sewage workers had an adequate level of practice. There is a strong positive correlation with highly statistically significant between total knowledge and total reported practice scores. **Conclusion:** sewage workers had low knowledge and unsatisfactory practices regarding first aid in work-related emergencies, a high incidence of workplace injuries was observed. **Recommendation:** Targeted training programs in occupational health and first aid to protect workers from work-related medical emergencies.

Key words: Work-Related Medical Emergencies, First Aid, Sewage Workers

Introduction

Occupational health and safety (OHS) is a multidisciplinary field concerned with the well-being, safety and health of individuals in their workplaces. It involves the identification, assessment and control of risks that can arise from physical, chemical, biological, or psychosocial hazards in the work environment. The ultimate goal of OHS is to promote a safe and healthy work culture that minimizes accidents, injuries and occupational diseases. Governments and organizations implement regulations and safety programs to protect workers and improve working conditions across various industries **(Saraswaty & Fadli, 2024).**

Sewage workers operate in highly hazardous environments due to constant exposure to human waste, chemicals, toxic gases and confined spaces. Their daily tasks often involve entering sewer lines, handling contaminated materials and working in conditions that pose serious health and safety risks. These workers are vulnerable to biological hazards such as bacteria, viruses and parasites, as well as to physical injuries from slips, falls, or equipment malfunctions. The nature of their work environment makes it crucial for them to receive proper health education and safety training **(Mokhtar, Makhtar, & Mokhtar, 2022).**

Sewage workers face a wide range of occupational hazards that threaten their health and safety. These include exposure to toxic gases like hydrogen sulfide and methane, risk of infections from pathogens present in wastewater, skin diseases due to chemical contact and physical injuries caused by heavy machinery or slippery surfaces. Despite these dangers, many workers lack adequate training in emergency first aid procedures and are often unaware of how to respond effectively to incidents. This gap in awareness can result in delayed or improper response to injuries, worsening health outcomes and increasing the likelihood of complications or fatalities **(Muzaini, Yasin, Ismail, & Ishak, 2021).**

To address the risks sewage workers face, it is essential to establish first aid protocols that are tailored to their specific work conditions. These protocols should include training on how to deal with chemical burns, respiratory distress, injuries caused by sharp objects and unconsciousness due to toxic gas inhalation. Accessible and well-stocked first aid kits must be available at all work sites and workers should be regularly trained through drills and refresher courses to maintain their readiness. Proper first aid

planning ensures that emergencies are managed swiftly and effectively, minimizing harm and stabilizing victims before medical professionals arrive (**Amereh et al., 2021).**

First aid in the workplace plays a critical role in managing injuries or medical emergencies before professional medical help arrives. Immediate and appropriate first aid can prevent minor injuries from becoming major complications and can even save lives in severe cases. It also contributes to reducing the recovery time of workers and lowering the costs associated with workplace accidents. Training employees in basic first aid skills fosters a safer work environment and empowers them to respond effectively during emergencies, thereby enhancing overall workplace resilience **(Noh et al., 2022).**

Beyond the availability of supplies and training, sewage workers must also be educated on how to recognize early signs of health issues and report them promptly. First aid should be part of a broader health and safety system that includes risk assessments, proper use of personal protective equipment (PPE) and clear communication channels during emergencies. Supervisors and team leaders should be trained to take charge during incidents and ensure that safety protocols are followed. A strong first aid culture, supported by regular evaluation and improvement of emergency response strategies, is essential for safeguarding the health of sewage workers (**Philippe et al., 2022).**

Occupational health nurses play a vital role in preventing workplace hazards by promoting health education and implementing safety programs tailored to the specific needs of workers. They conduct health assessments, monitor the work environment for potential risks and provide training sessions on first aid, hygiene and disease prevention. For sewage workers, these nurses can offer invaluable support by identifying early signs of occupational illnesses and guiding workers on preventive measures. Their proactive approach helps reduce the incidence of work-related health problems and enhances overall employee well-being (**Elsayed, Elahmady, & Abd-Elrazek, 2024).**

In addition to prevention, occupational health nurses are instrumental in managing workplace emergencies and post-incident care. They assist in developing emergency response plans, ensure that first aid procedures are updated and provide follow-up care to workers recovering from injuries or

illnesses. Their expertise bridges the gap between workplace safety regulations and practical application in the field. By collaborating with management and safety officers, these nurses contribute to creating a safer and more responsive work environment, particularly in high-risk occupations like sewage maintenance (**Tolera, 2023).**

Significance of study:

According to International Labor Organization **(ILO. 2023)** 2.3 million workers die annually due to work-related injuries and diseases, nearly 6,300 workers die daily and wastewater management is among the high-risk sectors due to biological, chemical, and mechanical hazards.

Sewage workers in Egypt play a crucial role in maintaining public health and safety, despite this; they encounter numerous work-related health challenges. According to the Central Agency for Public Mobilization and Statistics **(CAPMAS.2024),** there are approximately 50,000 sewage workers employed across the country, operating in around 600 sewage treatment plants and lifting stations, making them a large and significant workforce, despite their vital role, there is limited data available on their health status over the past decade.

Sewage workers have a duty to take reasonable care for their own health and safety at the workplace **(WHSQ, 2021)**.For the purpose of taking care of themselves or helping others in the event of an accident. It is crucial for sewage workers to be aware of first aid practices. That can help in reducing mortality rates and preventing further harm or injury **(Mohammed, Ahmed, Esmat, and Mona, 2022).** It is also important that workers follow strict hygiene protocols and use personal protective equipment (PPE) such as gloves, boots, and masks. Regular vaccination and periodic health screenings are also recommended to reduce the likelihood of infection and to ensure early detection of occupational illnesses **(Nassar, El-Masry, & El-Sayed, 2021).**

Consequently, conducting this study can help the occupational health nurses develop targeted interventions to improve health awareness and first aid practices among sewage workers, which can significantly contribute to enhancing occupational health and safety practices, thereby reducing the risk of work-related injuries and illnesses.

The aim of this study was to -Assess the reported incidence of workplace injury and illness among sewage workers

To assess sewage workers knowledge and reported practices regarding preventive measures and first aid in work related medical emergencies.

Research question

-What is the reported incidence of workplace injury and illness among sewage workers?

-What is sewage workers knowledge and reported practices regarding preventive measures and first aid in work related medical emergencies?

Subjects and Method

Study design: - A descriptive exploratory design was used in this study.

Setting: - The study was conducted at four sewage stations; Elmadina, Qahafa, Dala, and Lotf Allah, all of which are affiliated to Fayoum drinking water and Sanitation **Sample size**

Workers were taken from the chosen stations Total number was 215 workers (193 study sample/22piolt study). According to this powerful equation Company.

Sampling technique: A stratified random sampling technique was employed. The study population consisted of workers from four sewage stations affiliated with the Fayoum Drinking Water and Sanitation Company. The stratification was performed in two stages **:**First Stratum –) Sewage Stations**)** : Four sewage stations were selected to represent the total population of sewage workers.

Second Stratum **(**_Study Subjects**)** : From each of the selected stations, a proportionate number of workers were randomly chosen to make up the total of 215 participants. The distribution was as follows: Station 1: 57 workers, Station 2: 62 workers, Station 3: 50 workers, and Station 4: 46 workers

Study tools: Two tools were utilized for data collection the first Tool an interviewing questionnaire: developed by the researcher after reviewing the relevant and recent literature related to study topic. The tool was used to collect the data required and it was written in simple Arabic language and used for the face-to-face interview. The questionnaire was refilled by the researcher. Consisted of four parts**:**

Part 1 :Socio-demographic and occupational characteristics of sewage workers; including age, level of education, marital status, residence, employment years, working hours per day, and training received. It includes 12 closed ended questions from Q1-Q12.

Part 2: Health care services to sewage workers, availability and using of personal protective equipment. Composed of two parts (9Questions) from Q13- Q21.**Part 3:** was used to

assess the reported incidence of workplace injury; illness and medical history.composed of two parts (4Questions) from Q22-Q25.**Part 4:** Was used to assess sewage workers' knowledge about the occupational health hazards associated with sewage exposure, the preventive measures of occupational health risks, and the first aid measures in work related medical emergencies consist of three parts (29Q) fromQ26-Q54. The first part (8Q) from Q26-Q33 assess workers' knowledge about the occupational health hazards , the second part (7Q) from Q34-Q40 assess **s**ewage workers' knowledge about the preventive measures of occupational health risks, and the third part (14Q) from Q41-Q54 to assess **s**ewage workers' knowledge about the first aid measures in work related medical emergencies . **The second tool** : Sewage workers' self-reported practice checklist :This tool designed to assess sewage workers' self-reported occupational health risks preventive measures, and first aid practices in work-related medical emergencies.It was developed guided by: **(American Red Cross, 2021).**It classified into 2 main parts including; **The first part:** preventive measures for occupational health risks, consists of three subcategories, including basic hygienic practices (11 item), personal habits (7 items), usage of Personal protective equipment (7 items)_**The second part:** it consists of first aid practice for cardiac arrest (9items) asphyxiation (7 items), snake bite (7 items), wound (10 items), fracture (7 items), and drowning (4 items).

Methods

The study was accomplished through the following steps**:**

Administrative process

1- An official permission for data collection was obtained from managers. Meetings and discussions were held between the researcher and the manager's personnel to make them aware of the aims and objectives of the research, as well as to get cooperation during the phases of the research.

2-Ethical considerations

Prior the pilot study, ethical approval obtained from Fayoum University Supreme Ethical Committee for Scientific Research Ethics. Workers' informed consent for participation was acquired after a full explanation of the aim of the study and its procedure. Workers were given the opportunity to refuse participation and were informed that they could withdraw at any time during data collection. They were also assured that any information obtained would be confidential and used for research purposes only. The investigator assured the public that all

collected data was kept anonymous and confidential.

3-Tools development

The study tools were adopted by the researcher based on literatures review modified to suit the level of understanding of all subjects and was tested for translation by experts in English language.

4-Validity of tools.

It was validated by a panel of five experts in community health nursing who revised the tool for clarity, relevance, comprehensiveness, understanding, and ease of implementation, and according to their opinion, minor modifications were applied.

5-Reliability of tools

Cronbach Alpha Coefficient test was used to ascertain the reliability of tools after translation into Arabic language, the reliability was scaled as follows: <0-0.25 weak reliability, 0.25-0.75 moderate reliability, 0.75-<1strong reliability and 1 is optimum. The reliability for this questionnaire was 0.851.

6-Pilot study

A pilot study for tools of data collection was carried out on 10% (22 workers) to test whether they are clear, understandable, feasible, and applicable. For this study, the researcher randomly selected 22 workers to participate in the pilot testing of the questionnaire sheet and checklist. The simple modification was done based on pilot results, and the sample who shared in the pilot study was excluded from the study sample.

7-Data analysis

After data were collected, they were coded and transferred into specially designed formats so as to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid any errors during data entry, frequency analysis, cross tabulation and manual revision were all used to detect any errors. The statistical package for social sciences (SPSS version 20) was utilized for both data presentation and statistical analysis of the results. The level of significance selected for this study was P equal to or less than 0.05.

Results

Table (1): shows the distribution of the studied sewage workers according to their socio-demographic characteristics .it was found that 42.3% of them were from 26to less than 30 years age ranges with a mean of 34.6±5.94 years. 93.0% of them lived in rural areas, and 97.7% had insufficient income, respectively. it was noticed that 36.7% of them were

employed for 6-10 years and more , and 97.7 % of them were working for 8 hours and more per day, only 14% of studied participants attended training courses. While 26.6% attended training about first aid and 16.7% of the studied workers attended training about safety measures, in addition to 36.7% of them receiving training about handling hazardous materials.

Figure (1): Show that, (50.7%) of workers was illiterate, while minority (2.3%) of them were having higher education.

Figure (2): indicates that the majority (89.3%) of workers have experienced exposure to injuries in the workplace meanwhile (10.7%) haven't exposed.

Table (2): Indicate that 75.3% of workers recognizing occupational hazards as risks affecting their health and safety. Most of them (93.0%) acknowledge exposure to occupational hazards, including (87.4%) chemical, (80.5%) physical, (88.4%) biological and psychological hazards (79.1%). Physical hazards, such as heat (68.4%) and noise (34.4%), and mechanical hazards like slipping and falling (63.3%) are prevalent, while biological hazards include exposure to diseases from wastewater (50.2%) and viral infections (47.0%). Chemical hazards, such as lack of oxygen (40.9%) and exposure to toxic gases (32.1%), are also recognized. as regard to psychological hazards 30.2% and 56.7% of them reported social stigma and neglect.

Table (3): Reveal that 65.1% of studied workers stated the signs and symptoms of emergencies that indicate the need for first aid, while 65.1% of them reported the equipment in a first aid bag and 58.6% of them reported the measures to keep the first aid box effective. However, only 9.3% of study participants reported the correct number of compressions per minute during cardiopulmonary resuscitation, and 7.0% cases where cardiopulmonary resuscitation is indicated.

Figure (3): Shows the total level of knowledge which indicates that 34.9% of the participants have satisfactory score level of knowledge, while 65.1% have unsatisfactory level of knowledge.

Figure (4): reveals the total level of practical application of the learned knowledge, with 33% of participants have implemented the acquired information into practice, while 67% have not done so.

Table (4): reveals significant associations between Total Knowledge level and various demographic factors. Higher age (especially 40 or more), higher

education levels (particularly university education), longer employment years (especially more than 15 years), and urban residence were correlated with a higher proportion of satisfactory knowledge ($p < 0.001^*$ in each case). While marital status and working hours per day did not show significant associations, divorced individuals and those working fewer than 8 hours per day exhibited trends toward higher knowledge levels. Income level did not appear to significantly impact knowledge levels in this study ($p = 0.808$).

Table (5): reveals significant associations between total practice score and various demographic characteristics. Findings include a higher proportion of individuals aged 40 or more, those with higher education levels (especially preparatory and university), and those with longer employment years (especially more than 15 years) reporting a higher rate of practice completion ($p < 0.001^*$ in each case). Rural residence and employment years from 1-5 also showed significant associations with practice completion ($p = 0.004^*$ and $p < 0.001^*$, respectively). Other factors such as marital status, level of income, and working hours per day did not demonstrate significant associations with Total Practice.

Table (6): shows that there is a strong positive correlation with highly statistically significant ($r = 0.816$, $p < 0.001^*$) between Total Knowledge and Total reported Practice score

Table (1): Distribution of the studied workers according to their demographic characteristics (n =215)

Items	No	%
Age by years		
20- 25	20	9.3
26 -30	91	42.3
31 -40	74	34.4
40 or more	30	14.0
Mean±SD	34.6±5.94	
Marital status		
Single	22	10.2
Married	178	82.8
Divorced	10	4.7
Widowed	5	2.3
Income per month		
Enough	5	2.3
Not enough	210	97.7
Residence		
Rural	200	93.0
Urban	15	7.0
Employment Years		
From 1-5	32	14.9
from 6-10	79	36.7
from 11-15	74	34.4
more than 15	30	14.0
Working hours per day		
Less than 8 hours	5	2.3
from 8-12	210	97.7
Attendance of training courses		
Yes	30	14.
No	185	86
Types of training courses (N=30)		
Safety measures	5	16.7
proper handling of hazardous materials	11	36.7
First aid	8	26.6

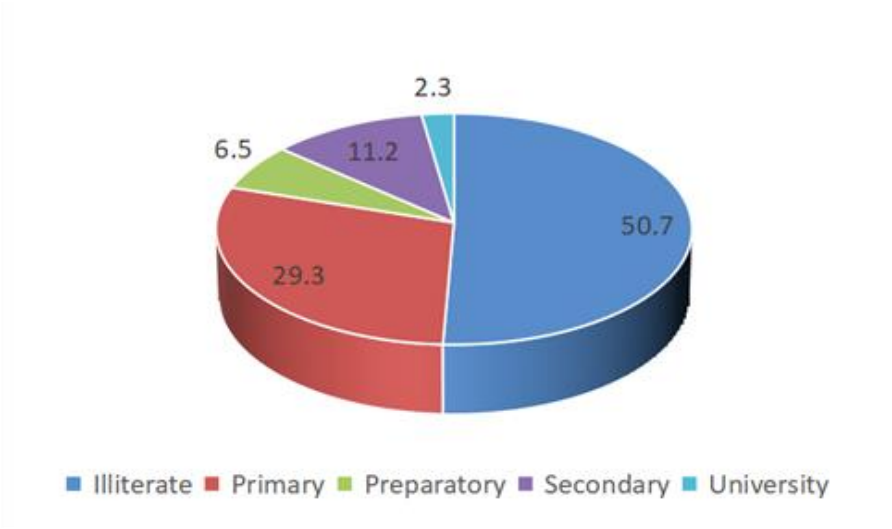

Figure (1): Educational level among the study sample

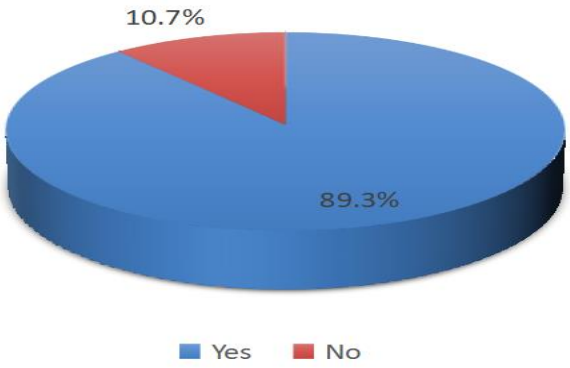

Figure (2): Incidence of workplace injuries among studied sample

Table (2): Distribution of the studied workers according to their knowledge regarding occupational health hazards **(n =215).**

Occupational health hazards	No	%
Definition		
The risks that affect the health and safety of workers	162	75.3
When there are no risks at work environment	53	24.7
Exposure to occupational hazards		
Yes	200	93.0
No	15	7.0
Work-related risks.		
-Chemical hazards	188	87.4
-Physical hazards	173	80.5
-Biological hazards	190	88.4
-Psychological hazards	170	79.1
-Mechanical hazards	133	61.9
Physical hazards		
Heat	147	68.4
Humidity	128	59.5
Noise	74	34.4
Electrocution	44	20.5
Lack of vision	60	27.9
Explosion	65	30.2
Mechanical hazards		
Slipping and fall	136	63.3
Standing for a long period	89	41.4
Repeated bending	112	52.1
Carrying heavy objects	113	52.6
Falling of heavy objects on them	80	37.2
Biological hazards		
diseases resulting from microbes in waste water	108	50.2
Viral infection	101	47.0
Eye and mouth to some droplets	73	34.0
Diseases as a result of some insects and rodents	68	31.6
Chemical hazards		
Lack of oxygen	88	40.9
Toxic gases and asphyxiation	69	32.1
Psychological hazards		
Social stigma	65	30.2
Neglect	122	56.7
not exposed to any psychological problem	98	45.6

Table (3): Distribution of the studied workers according to their knowledge regarding first aid in emergency situations (n =215)

First aid	Correct		Incorrect	
	No	%	No	%
Definition of fist aid	72	33.5	143	66.5
The goals of first aid	70	73.0	145	27.0
Characteristics of first aid provider	65	30.2	150	69.8
The principles of first aid	54	25.6	161	74.4
Signs and symptoms of emergencies that require first aid	92	65.1	123	34.9
First aid kit equipment	86	65.1	129	34.9
Maintaining first aid box effectiveness	90	58.6	125	41.4
Types of injuries that require first aid	71	65.6	144	34.4
Cases in which cardiopulmonary resuscitation indicated	65	7.0	150	93.0
Correct number of compressions per minute in cardiopulmonary resuscitation	80	9.3	135	90.7
First aid measures in case of poisoning	100	4.7	115	95.3
First aid measures in case of wounds and bleeding	96	63.3	119	36.7
The signs of fractures	66	90.7	149	9.3
First aid measures in case of fractures	79	18.1	136	81.9

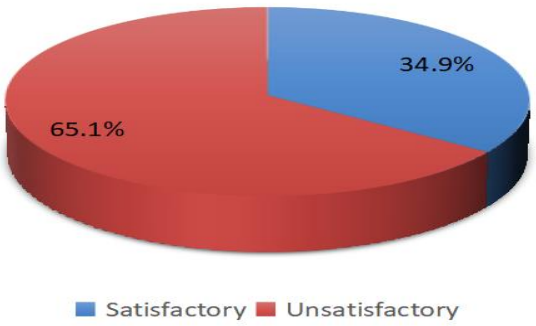

Figure (3): Distribution of the studied workers according to their total level of knowledge regarding the occupational health hazards associated with sewage exposure, the preventive measures of occupational health risks, and the first aid measures in work related medical emergencies.

Figure (4): Distribution of the studied workers according to their total level of reported practice.

Table (4): Relationships between socio demographic characteristics of the studied sewage workers and their total knowledge score about first aid in work related medical emergencies;(n=215)

socio demographic characteristics	Total knowledge score					
	Satisfactory		Unsatisfactory		Chi-square	
	N	%	N	%	X^2	P-value
Age by years						
20- 25	7	35.0	13	65.0	73.728	<0.001*
26 -30	7	7.7	84	92.3		
31 -40	34	45.9	40	54.1		
40 or more	27	90.0	3	10.0		
Marital status						
Single	3	13.6	19	86.4	6.244	0.100
Married	66	37.1	112	62.9		
Divorced	5	50.0	5	50.0		
Widowed	1	20.0	4	80.0		
Level of education						
Illiterate	8	7.3	101	92.7	98.240	<0.001*
Primary	28	44.4	35	55.6		
Preparatory	13	92.9	1	7.1		
Secondary	21	87.5	3	12.5		
University	5	100.0	0	0.0		
Level of income						
Enough	2	40.0	3	60.0	0.059	0.808
Not enough	73	34.8	137	65.2		
Residence						
Rural	63	31.5	137	68.5	14.450	<0.001*
Urban	12	80.0	3	20.0		

Employment Years						
From 1-5	9	28.1	23	71.9	60.999	<0.001*
from 6-10	9	11.4	70	88.6		
from 11-15	30	40.5	44	59.5		
more than 15	27	90.0	3	10.0		
Working hours per day						
Less than 8 hours	2	40.0	3	60.0	0.059	0.808
from 8-12	73	34.8	137	65.2		

Table (5): Relation between socio demographic characteristics of the studied sewage workers and their total reported practice score about first aid in work related medical emergencies (n=215)

socio demographic characteristics	Total practice score					
	Done		Not done		Chi-square	
	N	%	N	%	X^2	P-value
Age by years						
20- 25	9	45.0	11	55.0	60.261	<0.001*
26 -30	7	7.7	84	92.3		
31 -40	31	41.9	43	58.1		
40 or more	24	80.0	6	20.0		
Marital status						
Single	4	18.2	18	81.8	3.058	0.383
Married	62	34.8	116	65.2		
Divorced	4	40.0	6	60.0		
Widowed	1	20.0	4	80.0		
Level of education						
Illiterate	7	6.4	102	93.6	85.359	<0.001*
Primary	29	46.0	34	54.0		
Preparatory	12	85.7	2	14.3		
Secondary	19	79.2	5	20.8		
University	4	80.0	1	20.0		
Level of income						
Enough	2	40.0	3	60.0	0.113	0.737
Not enough	69	32.9	141	67.1		
Residence						
Rural	61	30.5	139	69.5	8.252	0.004*
Urban	10	66.7	5	33.3		
Employment Years						
From 1-5	11	34.4	21	65.6	49.460	<0.001*
from 6-10	8	10.1	71	89.9		
from 11-15	28	37.8	46	62.2		
more than 15	24	80.0	6	20.0		
Working hours per day						
Less than 8 hours	1	20.0	4	80.0	0.393	0.531
from 8-12	70	33.3	140	66.7		

Table (6): Correlation between Total Knowledge and reported Practice scores of studied sewage workers.

Predictor	Total Knowledge score	
	R	P-value
Total reported practice score	0.816	<0.001*

Discussion

The current study results revealed that, more than two fifths of the sewage workers were aged between 26 and 30 years, with an average age of 34.6 ± 5.94 years **(Table 1).** This study is in disagreement with **Bassiouny and Madian (2023),** who performed a study in El-Beheira Governorate, Egypt about "Prevalence and determinants of occupational health hazards among sewage workers in El-Beheira Governorate" and reported that the majority of the studied workers age ranged from 50 to 60 years and more than one third of them were in age group ranged from 30 to less than 40 years. From the investigator's point of view, these results might be due to higher unemployment rates among youth in rural areas and different pattern for employment between regions.

The present study showed that, most of the workers were lived in rural areas, and nearly all of them reported that they having insufficient income **(Table 1).** This finding is supported by **Sullivan and O'Neill (2019)**, in his study titled "Occupational health and safety in the wastewater industry: A review of first aid awareness and training" and found that the majority of sewage workers in rural areas, with a high proportion reporting insufficient income to meet their basic needs. From the researcher point of view, this may lead to limited access to health care services and educational opportunities in rural area, which can further exacerbate by poverty.

Conversely, a study conducted in Sweden by **Bergström, Bodin, Hagberg, Aronsson, & Josephson, (2017)** titled "Work-related symptoms among sewage workers: A nationwide survey in Sweden", Found that sewage workers in urban areas were more likely to report better economic conditions compared to their rural counterparts. The study indicated that urban sewage workers had higher

salaries and better access to health care and social benefits. Additionally, the proportion of workers in rural areas was lower nearly half compared to the higher proportion (most of workers) observed in the present study.

In terms of working hours the present study revealed that, most of the workers' reported working eight or more hours a day **(Table 1).**these findings are consistent with findings from **Degavi et al. (2021),** who reported prolonged work shifts as a common challenge faced by sanitation workers in Ethiopia, contrary to these findings, **Amarille and Balomaga (2021)** reported that sanitation workers in the Philippines had more balanced working conditions.

The finding of the present study revealed that half of the studied workers are illiterate **(Figure 1)**. This finding is supported by a study conducted in Egypt by **Mokhtar et al. (2022),** who stated that a significant portion of sewage workers had minimal formal education, with nearly half reporting illiteracy or only a basic level of schooling. From the researcher point of view Inadequate literacy skills can make it difficult for workers to follow written instructions, participate in training programs effectively, and understand the risks associated with handling hazardous materials.

The findings of the present study indicate that training opportunities are limited, with the majority of workers had not attended any training courses **(Table 1).** This aligns with the study conducted by **Addo and Agba (2024)**, and highlighted a critical lack of training in occupational health and safety among sewage workers, also a significant proportion of workers in hazardous occupations, including sewage management, had minimal exposure to relevant safety and emergency response training, such as first aid, safety measures, and hazardous materials handling. These results contrasted with a study conducted in South Korea by, **Lee, Kim, and Park (2018)** ,titled "Training and safety awareness among sewage workers in South Korea" and observed that training opportunities for sewage workers were more widely available, with the majority of workers receiving at least some form of safety training. According to their findings, more than two fifth of workers received first aid training, safety measures, and half of them trained on hazardous materials handling. This can be explained by the researcher as in such regions; health and safety training are often mandated by law or provided through workplace safety programs.

Regarding the reported incidence of workplace injuries, the present study indicated that the majority of workers have experienced exposure to injuries in the workplace **(Figure 2);** these findings disagreed with those of **Tolera, Tadesse, Abebe, and Gebrehiwot, (2024)** who reported that more than one third of sanitation workers had prevalence of occupational injuries.

The current study showed that, three quarters of studied workers recognize occupational hazards as risks affecting their health and safety **(Table 3).** this study was disagreed with a study carried out by **Hassan and Abad-Elzaher, (2018),** titled "Workers' knowledge and practice about occupational hazards and safety measures in bakeries at Assuit city, Egypt" and discovered that majority of workers had incorrect answers regarding definition of occupational health, personal protective equipment for prevention of occupational hazards.

Most of the workers acknowledge exposure to various hazards, including more than three quarters exposed to chemical, physical, biological, and psychological hazards **(Table 3**). These findings are in agreement with **Abdelhameed and Abdelaty (2023)**, who carried out a study about "Occupational hazards among sewage workers in El-Beheira Governorate", and stated that more than half of workers in waste water environments were exposed to hazards, including chemical, biological, physical, and psychological risks. From the researcher point of view the high level of exposure to occupational health hazards due to non-adherence to the use of personal protective equipment.

The current study revealed that two thirds of workers understand the signs and symptoms of emergencies needing first aid, familiar with first aid kit equipment, and more than half familiar with its maintenance, However, less than tenth of study participants reported the correct number of compressions per minute during cardiopulmonary resuscitation **(Table 4)**. These results of the current study agreed with a study conducted by **Alharthy, Alhossan, and Alghamdi (2020)** in Saudi Arabia about" First aid knowledge and preparedness among workers in high-risk industries in Saudi Arabia" and found a similar gap in first aid knowledge and preparedness among workers, observed that the majority of workers were aware of the importance of first aid and had access to first aid kits, and a significant portion lacked sufficient training in how to effectively use the equipment or handle medical emergencies.

The current study results revealed that more than one third of workers had good total knowledge level and nearly two thirds had poor knowledge **(Figure 3).**These findings in some extent in the same line with a study conducted by **Hossain et al. (2023)** among sewage and sanitation workers in urban Bangladesh found that two fifths of participants had adequate knowledge ,Also the study showed that the majority of workers lacked awareness of basic hygiene practices, such as proper hand washing duration and the need for protective gear when handling wastewater. These findings disagreed with **Sharma, Gupta, and Verma, (2022)** her study titled "Knowledge, attitudes, and practices regarding occupational health risks among sewage workers" revealed that over two thirds of sewage workers demonstrated satisfactory knowledge about personal protective equipment (PPE), hygiene practices.

The current study findings revealed that one-third of sewage workers had adequate level of total practice, while two-thirds had inadequate practice **(Figure 4).** This aligns with previous research by **Ahmed, Elahmady, and Abd-Elrazek, (2024),** who found that nearly two-thirds of workers had unsatisfactory total practices, while over one-third achieved satisfactory levels of practice regarding first aid and protective measures.

the current study revealed significant association between Total Knowledge level and various demographic factors, higher age (especially 40 or more), higher education levels (particularly university education), longer employment years (especially more than 15 years), and urban residence were correlated with a higher proportion of satisfactory knowledge **(Table 4).** These findings are similar to those of **Thompson, Johnson, and Williams, (2017),** who found that workers with more years of experience (particularly those employed for over 15 years) demonstrated better first aid knowledge, Additionally, individuals with higher education levels, especially those with university degrees, were found to have better understanding and adherence to first aid practices. Similarly, urban residents might have more access to training programs and resources compared to those in rural areas, confirming the findings from the current study, similarly findings of **Mokhtar et al. (2022)**, who found that the higher age (especially 40 or more), higher education levels (particularly university education), longer employment years (especially more than 15 years), and urban residence are

significantly associated with higher knowledge levels.

The present study reveals significant associations between total practice score and various demographic characteristics. including a higher proportion of individuals aged 40 or more, those with higher education levels (especially preparatory and university), and those with longer employment years (especially more than 15 years) reporting a higher rate of practice completion **(Table 5)** .This is consistent with research by **Hall, Smith, and Brown (2017),** who found that older workers, who have been exposed to workplace safety protocols for a longer period, have better confidence and experience in implementing first aid, and possess better critical thinking and problem-solving skills. Contrariwise a study by **Garcia, Lopez, and Torres (2018)** and **Mitchell, Lee, and Carter (2020)** argues that although older workers (40 or more) and those with higher education levels might possess more theoretical knowledge, this does not necessarily correlate with effective first aid application in emergency situations. For instance, older workers may be less likely to perform physically demanding tasks or act quickly, while urban residents may have greater access to training resources.

Concerning correlation between Total Knowledge and reported Practice scores of studied sewage workers. This study shows that there is a strong positive correlation with highly statistically significant ($r = 0.816$, $p < 0.001$*) between Total knowledge and Total reported Practice scores **(Table 6)**. Which go in the same line with a study by **Al-Rashidi (2025)** who assessed the effectiveness of a training program on first aid knowledge and practices among students of physical education and sports in Kuwait. Their study found a moderate positive correlation ($r = 0.543$, $p < 0.01$) between posttest levels of knowledge and practice regarding selected first aid measures.

Conclusion: The study concluded that sewage workers had low overall knowledge and unsatisfactory practices regarding first aid in work-related emergencies. Furthermore, a high incidence of workplace injuries was observed among sewage workers.

Recommendation: Targeted training programs in occupational health and first aid to boost sewage workers' ability to respond effectively to work-related medical emergencies.

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