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Assessment of work safety analysis performance among rural hospitals of Chirumanzu district of midlands province, Zimbabwe

Tapiwa Shabani^{1*}, Steven Jerie¹ and Takunda Shabani¹

Abstract

Ensuring workplace safety for healthcare workers is vital considering the important role they play in various societies which is to save life. Healthcare workers face different risks when performing tasks in various departments within hospitals, hence there is a need to assess work safety analysis procedures among healthcare workers. As a result, this study aims to assess the effectiveness of work safety analysis procedures among healthcare workers at Muvonde and Driefontein Sanatorium rural hospitals in Chirumanzu district. The research applied the descriptive cross-sectional design, combining quantitative and qualitative data collection methods. A questionnaire with both closed and open ended questionnaire was used for data collection among 109 healthcare workers at Muvonde hospital and 68 healthcare workers at Driefontein Sanatorium hospital. Secondary data sources, observations and interviews were also included as data collection methods. Quantitative data collected during the study was analysed using SPSS version 25. Braun and Clarke (2006)'s six phase framework was applied for qualitative data analysis. Ethical approval form was obtained from the District Medical Officer and Midlands State University. Findings of the study indicated that risks identified at Muvonde and Driefontein Sanatorium rural hospitals are classified as ergonomic, physical, chemical, psychosocial and biological risks. Respondents specified that these risks occur as a result of inadequate equipment, poor training, negative safety behaviour, poor management and pressure due to high workload. Safety inspection, safety workshops and monitoring of worker's safety behaviour were mentioned as measures to manage risks. However, the strengths and weaknesses of the current safety procedures need to be assessed to highlight areas for improvement to reduce occurrence of risks within the hospitals.

Keywords Work safety analysis, Hospital risks, Risk identification, Rural hospitals, Healthcare workers and risk management

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Introduction

Professionals in hospitals save the lives of people in various communities as a result, this job requires a high level of commitment [1, 2]. However, the community must not forget that healthcare workers who save their lives are exposed to various risks during work. [3] opined that the nature of tasks performed by healthcare workers in hospitals expose them to risks. Healthcare facilities, including rural hospitals, are work environments where workers are exposed to different work-related risks regularly [4, 5]. Duties performed by healthcare workers involve lifting and transferring patients, dealing with patients with unpredictable behaviour, and handling infectious materials and exposure to chemicals [6–8]. This implies that healthcare workers are affected with both ergonomic, biological, chemical, psychosocial and physical risks. However, the protection of healthcare workers from risks depends on the effectiveness of work safety analysis procedures within the healthcare facility [9, 10]. Therefore, guaranteeing the efficiency of work safety analysis procedures is important for reducing risks affecting healthcare workers and creating a safe work environment. In the healthcare industry, where employees are exposed to various risks, it is essential to have effective work safety analysis procedures in place to minimize the risks of accidents and injuries [2, 11].

Insufficient work safety measures can prompt a scope of negative results in the healthcare facilities [12, 13]. According to [14] and [15] results of inadequate work safety analysis procedures within the workplace include work-related illness, injuries, accidents, stress and reduced productivity. Ergonomic risks affecting healthcare workers as a result of tasks they perform expose them to upper and lower back pain, muscular strain and neck pain [16, 17]. In healthcare facilities healthcare workers always report high levels of musculoskeletal injuries related to ergonomic risks. Musculoskeletal disorders expose healthcare workers to acute and chronic injuries [8, 18, 19]. According to [20] and [21] healthcare workers are also affected with work-related pressure which expose them to stress, fatigue and anxiety which are categorised as psychosocial risks. Work-related stress is common among healthcare employees as a result of long working hours, shift work and dealing with patients who are critically ill [22, 23]. Biological risks affecting healthcare workers globally expose them to tuberculosis, HIV/AIDS and hepatitis B/C [24, 25]. In healthcare facilities, piercing materials such as needles are used; however, they result in sharp injuries among healthcare workers [26, 27]. Nurses are mostly affected with physical risks such as needle stick injuries and pricks/cuts as well as ionizing and non-ionizing radiation [28, 29]. Allergies, eye and skin irritation are affecting hospital workers as a result of different chemicals used during

hospital procedures [30, 31]. This denotes that healthcare workers are exposed to chemical risks when performing their duties.

In sub-Saharan Africa the issue of work-related risks affecting healthcare workers increase as a result of ineffective safety procedures [32, 33]. This means poor work safety analysis, negative safety behaviour, inadequate resources and poor safety training expose healthcare workers to risks. In less developed countries hospital employees are affected with occupational risks due to shortage of labour [4, 5]. Due to shortage of labour in African countries during the outbreak of Covid-19 they increased the time of shifts for healthcare workers to cope with the high rate of hospitalization [34, 35]. However, this increases mental and physical exhaustion among healthcare workers. In developed countries measures used to manage risks affecting workers in healthcare facilities are effective compared to developing countries [6, 10, 16]. This occurs because in developing countries such as Zimbabwe the use of effective work safety analysis procedures is commonly applied in timber, mining and manufacturing companies neglecting healthcare institutions.

Health workers are usually vulnerable to work related risks since issues of safety are always neglected in the health sector, specifically in hospitals located in marginal areas [36, 37]. Therefore, this study assesses the effectiveness of work safety analysis procedures among healthcare workers at Muvonde and Driefontein Sanatorium rural hospitals in Chirumanzu district. As rural healthcare facilities Muvonde and Driefontein Sanatorium hospitals, they face unique challenges related to staffing constraints, resource limitations and infrastructure deficiencies. As a result, assessing the effectiveness of work safety analysis procedures at Driefontein Sanatorium and Muvonde rural hospitals is significant for understanding the existing safety protocols and identifying areas for improvement that are tailored to their operational context.

Through a thorough evaluation of the work safety analysis performance in these particular healthcare facilities, the research pinpoint important areas that require improvement and create focused recommendations to improve workplace safety procedures. This will result in the use of cutting-edge technologies for risk assessment and hazard identification, the creation of a culture of continuous improvement in work safety procedures, the introduction of new safety protocols, and the execution of customized training programs. Ultimately, the research findings may improve the health and safety of medical staff in remote hospitals while also acting as a template for raising occupational health and safety standards in similar environments around the world. The findings of the study would help the rural healthcare

centres to achieve the demands of Sustainable Development Goal number 3 which focus on good health and well-being.

Materials and methods

Descriptive cross-sectional design was used during the study. The study was conducted at Muvonde and Driefontein Sanatorium rural hospitals. The two hospitals serve as referrals for clinics and other hospitals in Chirumanzu district and outside Chirumanzu district. The study population were medical and paramedical staff within the hospitals. The sample size was calculated using Yamane (1967) formula shown below:

$$n = \frac{N}{1 + N(e)^2}$$

Where: **n** is the sample size, **N** is the total population and **e** is the margin of error.

After calculations a sample of 68 healthcare workers were selected as questionnaire respondents at Driefontein Sanatorium hospital and 109 healthcare workers were selected as questionnaire respondents at Muvonde hospital as indicated by Table 1. Healthcare workers who participated as questionnaire respondents were selected randomly from every strata. Key informants interviewees were selected purposively. A questionnaire with both closed and open ended questionnaires was prepared and self-administered during data collection to reduce margin of error. The questionnaire is shown in Appendix 1. The pilot study of the questionnaire consisted of 10% of the participants from each of the two rural hospitals which were considered during the study. This conformed to [38] that 10% of the target population is used for pilot study before the main survey is done. At Muvonde hospital 10% of 109 questionnaire respondents were considered during the pilot study. This entails that 11 healthcare workers participated during the pilot study of the questionnaire at Muvonde hospital. At Driefontein

Sanatorium hospital 10% of 68 healthcare workers were selected for pilot study. This clearly means 7 healthcare workers were taken as participants during the pilot study at Driefontein Sanatorium hospital. The participants who take part during the pilot study provide their suggestions and recommendations on how to improve the drafting of questionnaire items. Test-retest reliability has also been used to assess response stability over time, making sure that the questionnaire produced consistent answers when it was administered again. Experts in healthcare management and work safety analysis examine the questionnaire items to make sure they comply with industry best practices and standards in order to improve validity. To further increase validity and reliability, a pilot test including a sample of rural hospitals in Chirumanzu District was conducted to evaluate the questions' clarity and relevance.

Semi-structured interviews were prepared to conduct interviews with the Nurse in Charge, Hospital Manager (Matron), Medical Superintendent, Head of Environmental Health department and Human Resource Manager at each rural hospital participating during the interviews. The District Medical Officer and National Social Security Officer were also taken as interviewees to collect the information regarding the objectives of the study. Observations were carried out using an observation checklist focusing much on work environment, equipment, duties performed by healthcare workers and safety procedures used within the hospitals. Rural hospitals' weekly inspection reports, monthly reports, annual reports and incidents reports as well as review articles and journals were used as secondary data sources.

Quantitative data collected using a questionnaire was analysed using Statistical Package for Social Sciences version 25.0. Quantitative data was presented in the form of tables, pie-charts and graphs which were produced by the SPSS. Braun and Clarke (2006)'s six phase framework for doing thematic analysis was applied during qualitative data analysis. Ethical approval forms were obtained from

Table 1 Sample size for questionnaire respondents

Hospital name	Number of health workers	Grouping of workers according to their occupation	Required sample size using Tara Yammane formula $n = \frac{N}{1+N(e)^2}$	Sample size to represent each strata $\frac{\text{Required Sample Size}}{\text{Population size}} \times \text{strata size}$	Total
Muvonde Hospital	150	Nurses 121, Counselors 3, Laboratory technicians 4, Physiotherapist 3, Radiologic technologist 3, Anesthetist 2, Eye optician 1, Cleaners 12 and 1 Dentist.	109	Nurses 88, Counselors 2, Laboratory technicians 3, Physiotherapist 2, Radiologic technologist 2, Anesthetist 1, Eye optician 1, Cleaners 9 and 1 Dentist.	109
Driefontein Sanatorium Hospital	81	Nurses 58, Counselors 2, Laboratory technicians 4, Physiotherapist 1, Radiologic technologist 2, Anesthetist 2, Eye optician 1, Cleaners 10 and 1 Dentist.	68	Nurses 48, Counselors 2, Laboratory technicians 3, Physiotherapist 1, Radiologic technologist 2, Anesthetist 2, Eye optician 1, Cleaners 8 and 1 Dentist.	68
Total of questionnaire respondents					177

Table 2 Demographic characteristics according to gender, age and marital status

Variable	Category	Muvonde hospital		Driefontein sanatorium hospital	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Gender	Male	33	30	21	31
	Female	76	70	47	69
	Total	109	100	68	100
Age	18–25 years	17	15.6	7	10.3
	26–33 years	22	20.2	18	26.5
	34–41 years	29	26.6	23	33.8
	42–49 years	15	13.8	9	13.2
	50–57 years	11	10%	5	7.4
	58–64 years	9	8.3%	4	5.9
	65 + years	6	5.5%	2	2.9
	Total	109	100	68	100
Marital Status	Single	32	29.4	16	23.5
	Married	52	47.7	42	61.8
	Divorced	8	7.3	3	4.4
	Widowed	17	15.6	7	10.3
	Total	109	100	68	100

Source Field Survey (2023)

Table 3 Demographic characteristics according to level of education and work experience

Variable	Category	Muvonde Hospital		Driefontein sanatorium hospital	
		Frequency	Percentage (%)	Frequency	Percentage (%)
Level of education	Certificate	32	29.4	17	25
	Diploma	57	52.3	37	54.4
	Bachelor's degree	8	7.3	5	7.4
	Master's degree	4	3.7	2	2.9
	Doctorate (PhD)	0	0	0	0
	Other	8	7.3	7	10.3
	Total	109	100	68	100
Work experience (years)	4 Years and below	22	20.2	18	26.5
	5–10 Years	46	42.2	28	41.2
	11–15 Years	21	19.3	13	19.1
	16–20 Years	14	12.8	7	10.3
	20+ Years	6	5.5	2	2.9
	Total	109	100	68	100

Source Field Survey (2023)

the District Medical Officer and Midlands State University before data collection starts. All participants participated voluntarily. Every participant was enlightened that participating during the study was voluntary.

Results

Socio-demographic characteristics

Demographic characteristic according to gender, age and marital status

Table 2 presents the demographic characteristics of the respondents according to gender, age and marital status. From the results, the majority (70%) of the healthcare workers who participated during the study at Muvonde hospital were females. At Driefontein Sanatorium

hospital most (69%) of the questionnaire respondents were females. At Muvonde hospital (26.6%) of the participants identified 34–41 years as their age group while at Driefontein Sanatorium hospital revealed that they were aged 34–41 years as indicated in Table 2. The majority (47.7%) respondents at Muvonde hospital are married and at Driefontein Sanatorium hospital majority (61.8%) of the healthcare workers who participated during the study were married.

Demographic characteristics according to level of education and work experience

Table 3 shows demographic characteristics of the healthcare workers according to level of education and work

experience. Based on the feedback provided by the questionnaire, the respondent majority (52.3%) of the participants at Muvonde hospital are holders of diplomas. At Driefontein Sanatorium hospital most (54.4%) designated diplomas as their highest level of education as indicated in Table 3. Results in Table 3 demonstrate that the majority (42.2%) of the questionnaire respondents at Muvonde hospital specified their work experience between 5 and 10 years. Most (41.2%) of the healthcare workers who participated as questionnaire respondents at Driefontein Sanatorium hospital indicated their work experience between 5 and 10 years.

Risks identified at muvonde and driefontein sanatorium rural hospitals

Different types of risks were identified at Muvonde and Driefontein Sanatorium rural hospitals notably ergonomic, chemical, biological, physical and psychosocial risks as illustrated by Fig. 1. Majority (44%) of the questionnaire respondents at Muvonde hospital identified ergonomic risks as the main risks affecting them. However, at Driefontein Sanatorium hospital most (30.9%) of the healthcare workers who participated as questionnaire respondents reported biological risks as the risk which mainly affect them at work. At Driefontein Sanatorium hospital psychosocial risks recorded the least percentage (10.3%) while at Muvonde hospital psychosocial risks recorded (11.9%) as designated by the results shown in Fig. 1.

Distribution of risks identified at muvonde and driefontein sanatorium hospital

Distribution of ergonomic risks

The distribution of ergonomic risks is illustrated by Fig. 2. Based on the findings of the study on distribution of ergonomic risks, the majority (33.9) reported standing for a long time while (20.2%) specified repetitive work at Muvonde hospital as shown in Fig. 2. Some (17.4%) of the

participants indicated lifting patients, manual therapy (11.1%), uncomfortable position (10.1%) and lifting of medical devices was reported by (6.2%) of questionnaire respondents at Muvonde hospital. Based on the results of distribution of ergonomic risks obtained at Driefontein Sanatorium hospital majority (27.9%) reported standing for a long time, lifting of patients (25%), repetitive work (17.6%), manual therapy (11.8%) and (5.9%) indicated lifting of medical devices as a concern as illustrated by Fig. 2.

Distribution of physical risks

Regarding the distribution of physical risks at Muvonde hospital the majority (28.4%) reported sharp injuries, extreme temperatures (cold/hot) (24.8%), noise (22%), slips and falls (15.6%), radiation (5.5%) and electric shock (3.7%). Results obtained at Driefontein Sanatorium hospital indicated that the majority (30.9%) of the study respondents specified sharp objects, extreme temperatures (cold/hot) (26.5%), noise (20.6%), slips and falls (13.2%), radiation (5.9%) and electric shock (2.9%). The distribution of physical risks is indicated in Fig. 2.

Distribution of biological risks

Majority (39.4%) of the healthcare workers who participated as questionnaire respondents at Muvonde hospital reported blood spillage while at Driefontein Sanatorium hospital the majority (31%) regarded breathing contaminated as the major biological risk Fig. 2. Findings at Muvonde hospital shows that (17.4%) of the study participants specified breathing contaminated air, vomitus, sputum or urine of patients (16.5%), contact with wounds (15.6%) and viral infection (11%) was considered as the least biological risk among the biological risks. Furthermore, at Driefontein Sanatorium hospital (25%) of questionnaire respondents stated blood spillage, viral infections (16%), vomitus, sputum or urine of patients

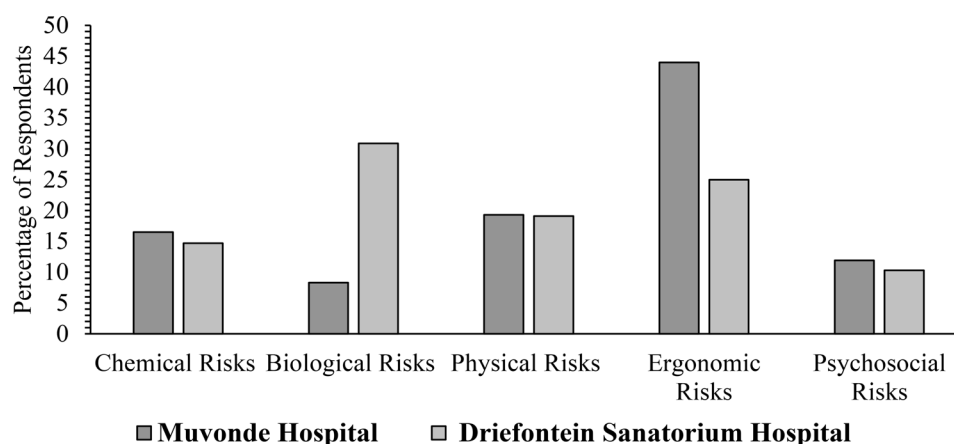


Fig. 1 Types of risks identified at muvonde and driefontein sanatorium hospital. Source Field Survey (2023)

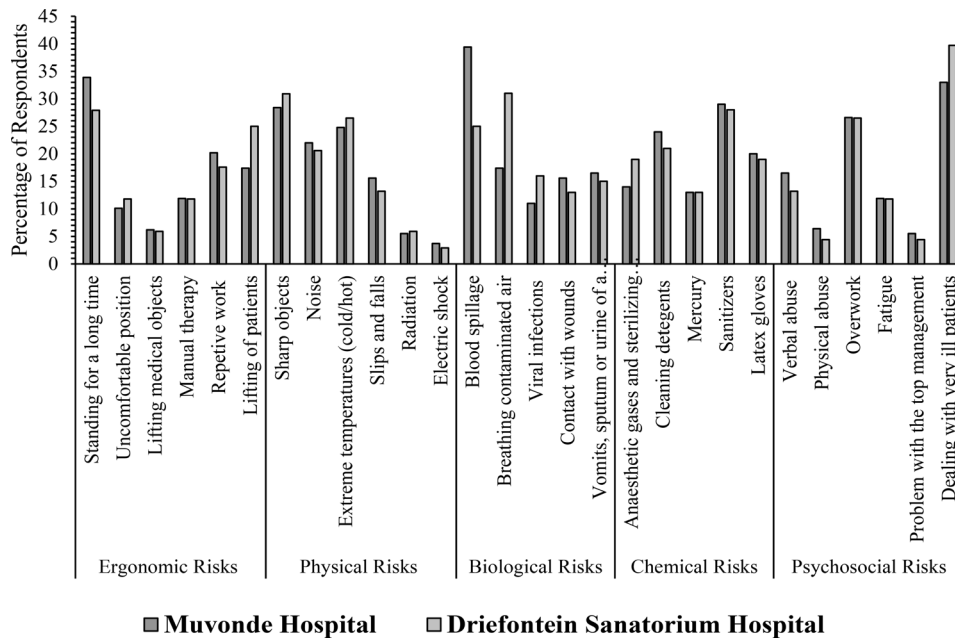


Fig. 2 Distribution of risks identified at Muvonde and Driefontein Sanatorium Hospital. Source Field Survey (2023)

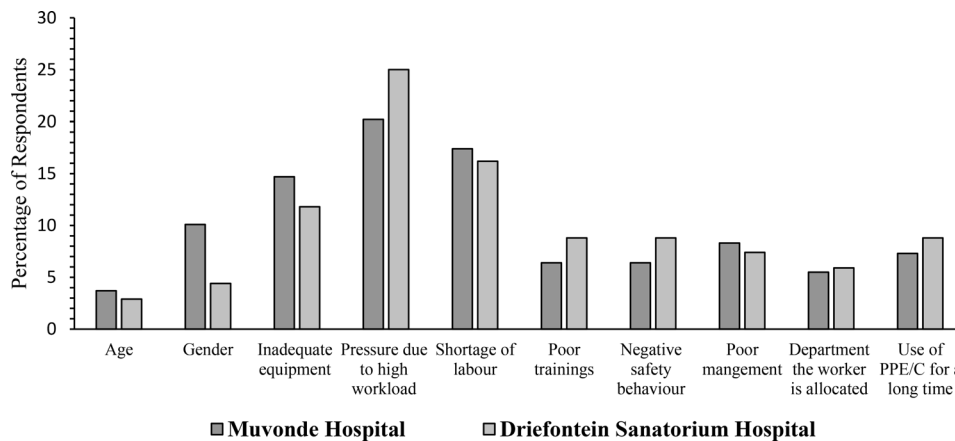


Fig. 3 Causes of risks identified at Muvonde and Driefontein Sanatorium Hospital. Source Field Survey (2023)

(15%) and contact with wounds (13%) were reported as biological risks.

Distribution of chemical risks

The study (Fig. 2) provides data about the distribution of chemical risks at Muvonde hospital as sanitizers (29%), cleaning detergents (24%), latex gloves (20%), anaesthetic gases and sterilizing agents (14%) and mercury (13%). Sanitizers (28%), cleaning detergents (21%), latex gloves (19%), anaesthetic gases and sterilizing agents (19%) and mercury (13%) were reported by questionnaire respondents as chemical risks prevailing at Driefontein Sanatorium hospital as shown in Fig. 2.

Distribution of psychosocial risks

Regarding the distribution of psychosocial risks at Muvonde hospital majority (33%) reported dealing with very ill patients, overwork (26.6%), verbal abuse (16.5%), fatigue (11.9%), physical abuse (6.4%) and problems with the top management was specified by (5.5%) of participants Fig. 2. During the study at Driefontein Sanatorium hospital the majority (39.7%) of the questionnaire respondents indicated dealing with severely ill patients however, (26.5%) specified overwork, and (13.2%) indicated verbal abuse, (11.8%) reveals fatigue, and (4.4%) reported physical abuse and (4.4%) stated problems with the top management as a risk among psychosocial risks.

Causes of risks identified at muvonde and driefontein sanatorium hospital

Study participants were asked to indicate causes of risks identified at Driefontein Sanatorium hospital and Muvonde hospital. Based on the findings shown in Fig. 3 majority (20.2%) of the healthcare workers who participated as questionnaire respondents at Muvonde hospital reported that risks occur as a result of pressure due to high workload, followed by (17.4%) who specified shortage of labour, (14.7%) indicated inadequate equipment, (3.7%) designated age, gender (10.1%), poor trainings (6.4%) and negative safety behaviour (6.4%). However, findings of the study at Muvonde hospital indicated that (8.3%) of the respondents reported poor management, department the worker is allocated (5.5%) and (7.3%) of the healthcare workers reported that use of personal protective equipment/cloth for a long time exposes them to risks Fig. 3.

At Driefontein Sanatorium hospital the majority (25%) specified that they are exposed to risks as a result of pressure due to high workload, followed by (16.2%) who stated shortage of labour, (11.8%) indicated inadequate equipment and (2.9%) and (4.4%) pointed out age and gender as the factors which expose them to risks respectively Fig. 3. Results obtained at Driefontein Sanatorium hospital shows that (8.8%) of the study participants indicated that they are exposed to risks as a result of poor training and this was similar to (8.8%) healthcare workers who indicated negative safety behaviour as a factor which expose healthcare workers to risks. Poor management was designated by (7.4%), the department the worker is allocated was specified by (5.9%) and (8.8%) use of personal protective equipment/cloth for a long time were

reported as a factors which expose healthcare workers to occupational risks in hospitals as indicated by Fig. 3.

Effects of risks identified at muvonde and driefontein sanatorium hospital

Effects of ergonomic risks

Study findings at Muvonde hospital shows that the majority (51.4%) specified back injuries regarding effects of ergonomic risks Fig. 4. Based on the results (21.1%) reported neck pain while (16.5%) indicated shoulder discomfort followed by muscular strain which was designated by (11%) of the questionnaire respondents at Muvonde hospital. Regarding effects of ergonomic risks at Driefontein Sanatorium hospital most (57.4%) indicated back injuries while neck pain and shoulder discomfort was reported by (19.1%) and (13.2%) respectively Fig. 4. However, at Driefontein Sanatorium hospital muscular strain was designated as an effect of ergonomic risks by (10.3%) of the study participants.

Effects of biological risks

Regarding effects of biological risks at Muvonde hospital (29.4%) of the respondents reported Covid-19 virus while (6.4%) specified tuberculosis, (3.7%) indicated hepatitis B/C and very few (1.8%) designated HIV/AIDS Fig. 4. However, the majority (58.7%) of the study participants at Muvonde hospital specified that none of the infections related to ergonomic risks. Based on the findings obtained at Driefontein Sanatorium hospital pertaining effects of ergonomic risks, the majority (33.8%) specified Covid-19 virus whereas (25%) reported tuberculosis, (13.2%) specified hepatitis B/C and (1.5%) indicated HIV/AIDS. Nonetheless, (26.5%) designated that they never

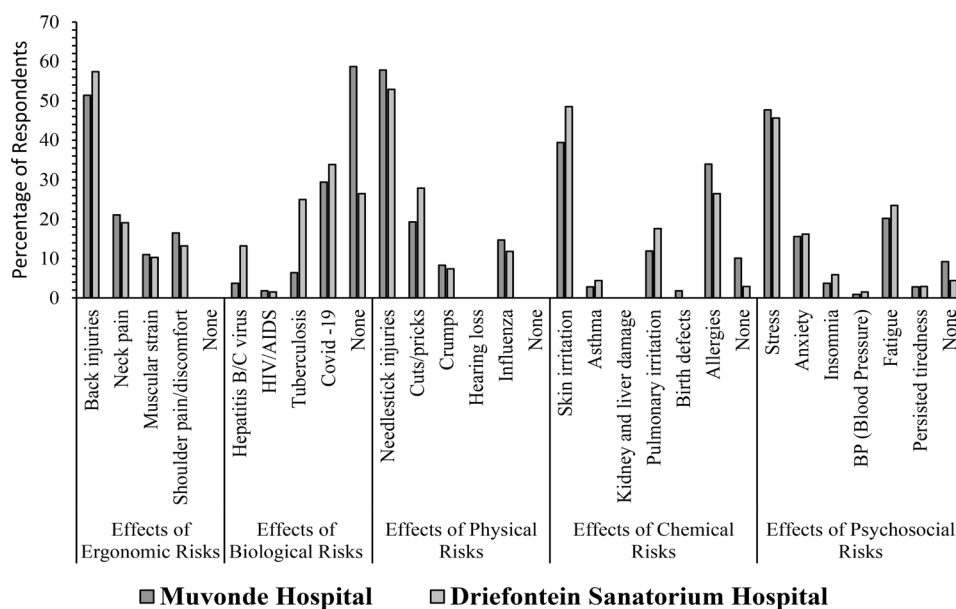


Fig. 4 Effects of risks identified at muvonde and driefontein sanatorium hospital. Source Field Survey (2023)

experienced any infections related to biological risks at work as shown by Fig. 4.

Effects of physical risks

Effects of physical risks were examined at Muvonde hospital and Driefontein Sanatorium hospital. Results shows that more than half (57.8%) of the questionnaire respondents at Muvonde hospital reported needlestick injuries. Figure 4 also indicated that (19.3%) of the healthcare workers at Muvonde hospital specified cuts/pricks, (14.7%) indicated influenza and (8.3%) of the study participants designated cramps. Based on the findings regarding effects of physical risks at Driefontein Sanatorium hospital most (52.9%) stated needle stick injuries. Cuts/pricks were reported by (27.9%) healthcare workers, (11.8%) specified influenza while (7.4%) designated cramps among effects of physical risks at Driefontein Sanatorium rural hospital.

Effects of chemical risks

Considering effects of chemical risks at Muvonde hospital most (39.4%) of the study participants reported skin irritation, followed by allergies specified by (33.9%) respondents, (11.9%) stated pulmonary irritation while (2.8%) of the participants identified asthma. However, (10.1%) of the questionnaire respondents indicated they never experienced effects of chemical risks related to tasks they perform at Muvonde hospital and the least (1.8%) indicated birth defects as effects of chemical risks Fig. 4. At Driefontein Sanatorium hospital the majority (48.5%) of the healthcare workers who participated as questionnaire respondents specified skin irritation regarding effects of chemical risks. Allergies were reported by (26.5%) study participants, (17.6%) indicated pulmonary irritation and (4.4%) stated asthma among the effects of chemical risks they experienced at Driefontein Sanatorium hospital Fig. 4. Nonetheless, very few (2.9%) did not report any effect of chemical risks at Driefontein Sanatorium hospital.

Effects of psychosocial risks

Majority (47.7%) of the questionnaire respondents at Muvonde hospital indicated stress as an effect of psychosocial risks Fig. 4. However, some (20.2%) of the respondents reported fatigue, (15.6%) specified anxiety, (3.7%) stated insomnia, and (2.8%) of the participants pointed out persistent tiredness as effects of psychosocial risks they experienced at Muvonde hospital. Blood pressure was specified by the least (0.9%) of the healthcare workers at Muvonde hospital while (9.2%) of the healthcare employees specified that they never experienced any challenges related to psychosocial risks. Figure 4 also indicates effects of psychosocial risks reported by healthcare workers at Driefontein Sanatorium hospital. Most

(45.6%) of the study participants at Driefontein Sanatorium hospital indicated that they experienced stress as a result of psychosocial risks. At Driefontein Sanatorium hospital fatigue was reported by (23.5%) respondents, anxiety was specified by (16.2%) participants, insomnia (5.9%) and (2.9%) participants indicated persistent tiredness. Nevertheless, minority (1.5%) of the questionnaire respondents indicated that they are affected with blood pressure as a result of psychosocial risks and some (4.4%) specified that they never experienced effects of psychosocial risks.

Work safety measures used to manage risks identified at muvonde and driefontein sanatorium hospital

Study participants at Driefontein Sanatorium hospital and Muvonde hospital were requested to indicate work safety measures used for coping with work-related risks. Regarding work safety measures at Muvonde hospital the majority (38%) of the questionnaire respondents indicated personal protective equipment/cloth Fig. 5. However, at Muvonde hospital (13%) of the study participants specified safety inspection, (12%) of healthcare workers reported proper waste disposal, (11%) designated monitoring of workers' safety behaviour, (9%) safety training and (9%) of the respondents stated safety workshops as methods used to manage risks. Other (8%) of the healthcare workers who participated as questionnaire respondents indicated other measures that can be used to manage risks for example screening health workers for diseases such as hepatitis B/C virus, Covid-19 and tuberculosis as indicated by Fig. 5.

Based on the results obtained at Driefontein Sanatorium hospital pertaining safety measures the majority (40%) stated personal protective equipment/cloth as indicated by Fig. 5. At Driefontein Sanatorium hospital safety inspection was reported by (10%) of the questionnaire respondents, proper disposal of waste (9%), monitoring of workers' safety behaviour (7%), safety training (6%) and safety workshops was specified by (6%) of the healthcare workers. However, Fig. 5 indicated that (22%) of the questionnaire respondents at Driefontein Sanatorium hospital stated other safety measures such as screening healthcare workers for diseases for example Covid-19, tuberculosis and hepatitis B/C.

During the study survey at Driefontein Sanatorium hospital the Matron indicated that, As a hospital which is focusing on maintaining high standard of sterility using available resources to promote quality healthcare service in Chirumanzu district and beyond we put safety informative charts for the benefit of both patients, visitors and workers. The Matron go on to indicate that we also provide safety facilities such as washing hand facilities. This was supported by observations results. During observations informative charts and washing hand facilities were

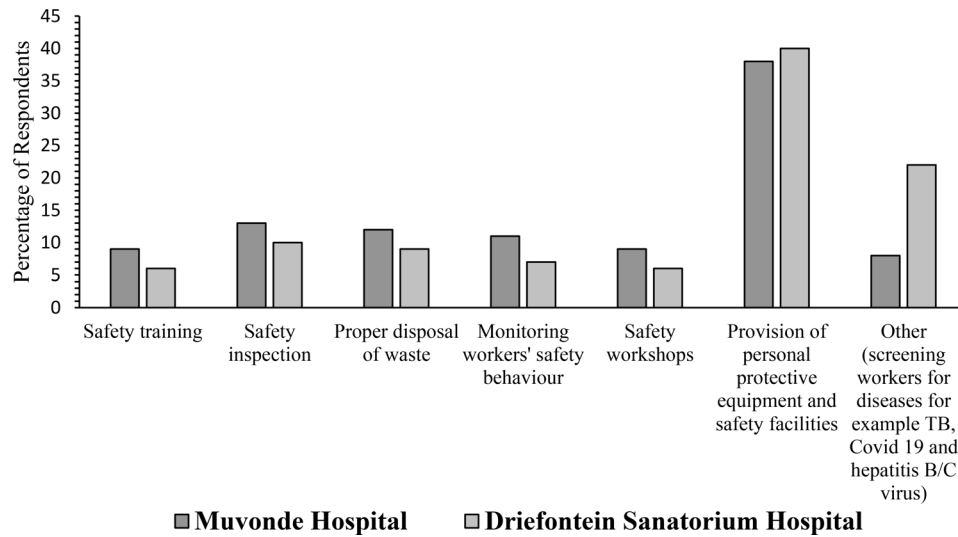


Fig. 5 Work safety measures used to manage risks identified at Muvonde and Driefontein Sanatorium Hospital. Source Field Survey (2023)

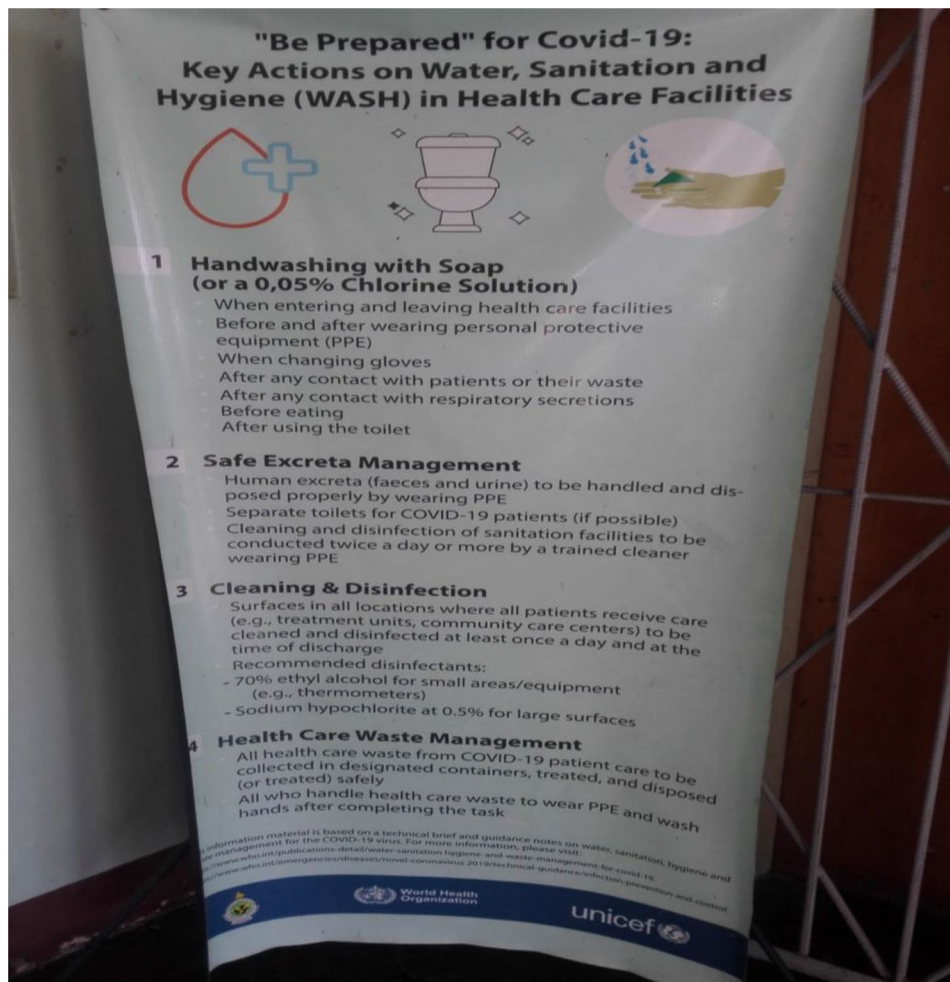


Plate 1 Informative chart shown at Driefontein Sanatorium Hospital. Source Field Survey (2023)



Plate 2 Washing hand facility (bucket) observed at driefontein sanatorium hospital. Source Field Survey (2023)

observed at Driefontein Sanatorium hospital as shown by Plate 1 and Plate 2 respectively.

Safety policies at Muvonde and Driefontein Sanatorium hospital

The majority (47.7%) of the questionnaire respondents agree that at Muvonde hospital there are clear safety policies while (33.9%) strongly agree, (10.1%) disagree and (8.3%) strongly disagree Fig. 6. However, at Driefontein Sanatorium hospital most (54.4%) of the healthcare

workers agree and (27.9%) strongly agree about the availability of clear safety policies at Driefontein Sanatorium hospital. During the study at Driefontein Sanatorium hospital the researcher was given access to some of the hospital's documents to use them as secondary data sources. The researcher discovered a safety policy manual and went through it and it was showing clear objectives. The objectives of the policy manual include 1) To provide continued guidance to health workers and students on infection prevention control measures and policies. 2) To promote an educational strategy for healthcare workers with a broader aim in mind. 3) To promote participation in infection prevention and control by healthcare workers, patients, relatives and visitors on how to reduce hospital acquired infection. 4) To allay unnecessary anxiety by providing fundamental information on infection prevention and control measures. 5) To promote, maintain and strengthen the high standard of cleanliness in the hospital and its environment. Appendix 2 only presents the cover page, preface, table of contents and objectives of hospital rules, regulations and policies related to infection prevention and control at Driefontein Sanatorium hospital. At Driefontein Sanatorium hospital few (10.3%) disagree and very few (7.4%) strongly disagree about the availability of clear safety policies at Driefontein Sanatorium hospital Fig. 6.

Effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital

Figure 7 shows that while a small percentage of survey respondents (7.3%) said that institutional measures used

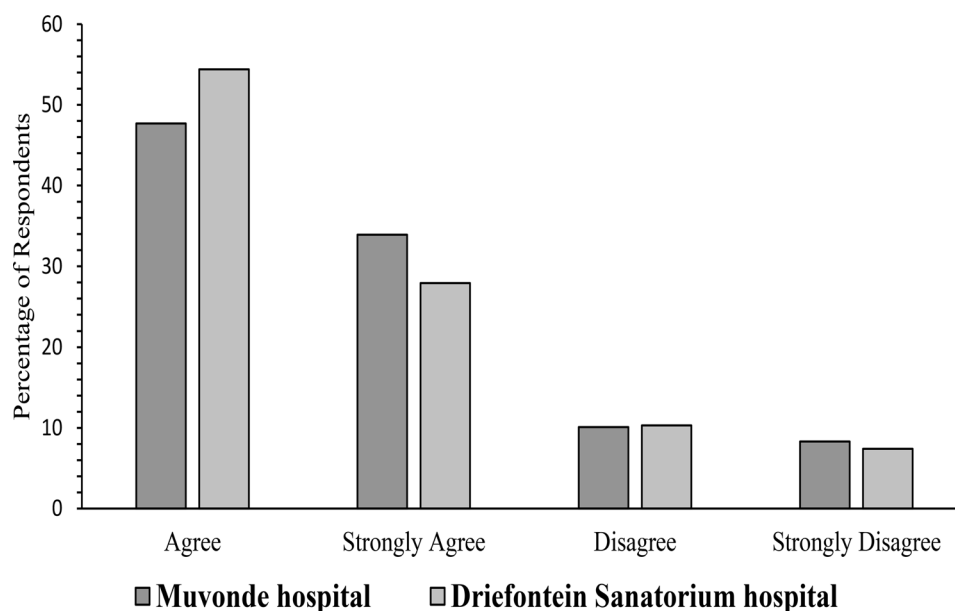


Fig. 6 Availability of clear safety policies at Muvonde and Driefontein Sanatorium hospitals. Source Field Survey (2023)

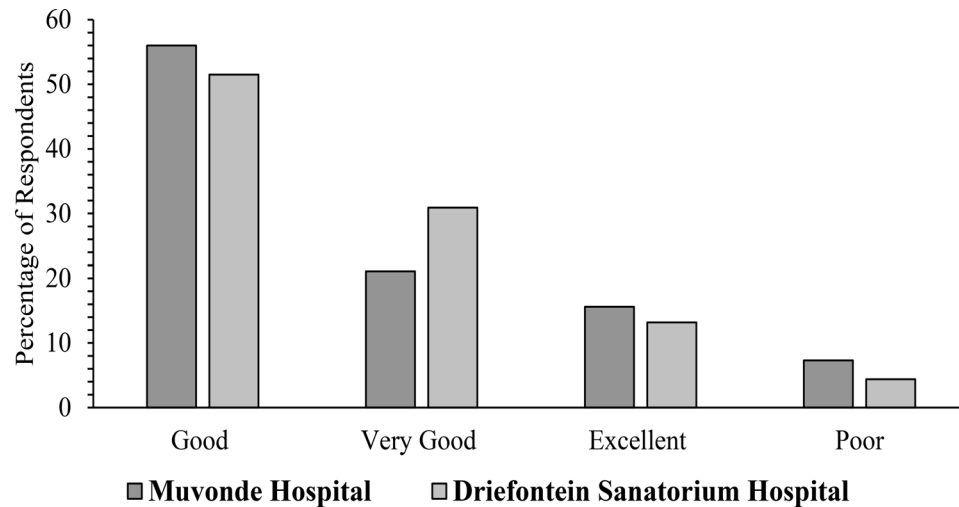


Fig. 7 Effectiveness of work safety measures used to manage risks at Muvonde and Driefontein Sanatorium hospitals. Source Field Survey (2023)

Table 4 Chi-square tests

	Value	df	Asymp. Sig. (2-sided)
Pearson chi-square	2.114E2 ^a	12	0.000
Likelihood ratio	173.584	12	0.000
Linear-by-linear association	88.739	1	0.000
N of valid cases	109		

to manage risks at Muvonde hospital are poor, more than half (56%) said the measures are good, (21.1%) indicated that the measures are very good and (15.6%) specified that the measures are excellent. As seen in Fig. 7, the majority of the study participants (51.5%) stated that the institutional measures in place at Driefontein Sanatorium hospital to manage risks are effective because they are good. This is followed by (30.9%) who said the measures are very good and (13.2%) stated that the measures are excellent. A small percentage (4.4%) of the questionnaire respondents at Driefontein Sanatorium hospital indicated that the safety measures are poor.

Association between Work Experience (years) and effectiveness of Work Safety measures used to manage risks

During data analysis Chi-Square test was employed to test the association between work experience and rating the effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital.

The following hypotheses were tested:

Null hypothesis (H_0) – There is no association between work experience and rating the effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital.

Alternative hypothesis (H_1) - There is an association between work experience and rating the effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital.

0.05 was set as the probability value.

If x^2 is above 0.05 accept H_0 and reject H_1 . There is no relationship between work experience and rating the effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital.

If x^2 is below 0.05 accept H_1 and reject H_0 . There is a relationship between work experience and rating the effectiveness of work safety measures used to manage risks at Muvonde hospital and Driefontein Sanatorium hospital.

Table 4 shows that the Chi-Square test results were 0.000, which is less than the significance level 0.05. In light of the findings, we accept H_1 and reject H_0 . Based on the analysis, the findings show that evaluating the effectiveness of work safety measures at Muvonde and Driefontein Sanatorium hospital is associated with work experience.

Discussion

Females made up the majority of the healthcare workers who took part during the study conducted at Driefontein Sanatorium hospital and Muvonde hospital. The findings of the research conducted at Muvonde and Driefontein Sanatorium hospitals align with the findings concur with [39] that females constitute the majority of healthcare workers in the United States. A study carried by [40] also indicated that females constitute 70% of the healthcare workers working in healthcare facilities of Pakistan.

This implies that healthcare workers who are men are less than women. The explanations for the gender gap in hospital employment are varied. For example, women are typically drawn to caregiving-related fields due to their nurturing disposition and empathy for others. The purpose of asking the gender of the respondents was to discover risks that are associated with gender.

Overall, data gathered for the study suggests that healthcare staff at Driefontein Sanatorium hospital and Muvonde hospital have a different age range, which offers a variety of perspectives and experiences about dangers impacting healthcare workers. Because this is the traditional age range for people to start their careers in medical institutions, the majority of healthcare workers are between the ages 26–33 and 34–41. Regarding the findings at Muvonde and Driefontein Sanatorium hospitals most of the healthcare personnel who took part during the study are in the active group. This concurs with a study conducted by [41] from healthcare facilities in Oriental Mindoro, which shows that the majority of hospital employees who took part in the study were between the ages of 26 and 33 which is the active group.

Most of the healthcare workers who participated as questionnaire respondents at Driefontein Sanatorium hospital and Muvonde hospital are married. Similar findings about married status were found at Muvonde hospital and Driefontein Sanatorium hospital. This could be due to the fact that hospital staff members prioritise marriage over pursuing their careers or because marriage is culturally valued in the communities where the hospitals are located. However, there is a connection between married status and the risk levels that impact healthcare workers. For instance, married healthcare workers have additional duties in addition to their jobs, which increases their exposure to risk. Healthcare workers' responsibilities towards their families have a significant impact on how well they function and perform at work.

The majority of healthcare personnel who participated in the study at Muvonde and Driefontein Sanatorium hospitals indicated that their highest level of education was a diploma, however, some of them held certificates. This is mainly because the majority of medical training institutions in Zimbabwe provide hospital workers with diplomas and certificates rather than degrees. The inquiry concerning the level of education for healthcare workers was raised on the grounds that it influences how they might interpret potential risks at their work environment and how to alleviate them. Higher educated medical practitioners are more aware of the risks related to their work and they can prepare more effectively for occupational risks before they occur [42]. This suggests that there is an association between the level of education of healthcare practitioners and safety attitudes and safety practices. The results obtained at Muvonde hospital and

Driefontein Sanatorium hospital demonstrated that most of the healthcare workers indicated 5–10 years range as their work experience. However, very few indicated 16 years or above as their work experience range. This proposes that turnover rates at Driefontein Sanatorium hospital and Muvonde hospital are high and this leads to the availability of less experienced and youthful workforce. Asking healthcare workers their work experience was vital because experienced hospital workers can be better equipped with better methods for managing risks when performing their tasks. According to [12] an association exists between work experience and effectiveness of safety measures used to manage work-related risks.

According to the results obtained at Driefontein Sanatorium hospital and Muvonde hospital ergonomic, chemical, psychosocial, biological and physical risks were identified. Regarding risks identified by healthcare workers at Muvonde hospital, the majority indicated ergonomic risks. Duties performed by healthcare workers involve manual tasks, pushing, transferring and lifting patients as well as repetitive tasks which expose them to ergonomic risks. Most (30.9%) of the healthcare workers at Driefontein Sanatorium hospital reported biological risks because the hospital deals mainly with contagious diseases such as tuberculosis. Some of the healthcare workers at both Muvonde and Driefontein Sanatorium hospital reported chemical risks. In hospitals healthcare employees are exposed to various types of chemicals such as disinfection chemicals used for cleaning and disinfecting equipment and facilities. According to [16] workers who perform their tasks in healthcare facilities are affected with various types of work-related risks such as psychosocial, physical, biological, ergonomic and chemical risks.

Based on the distribution of ergonomic risks at Driefontein Sanatorium hospital and Muvonde hospital, standing for a long time was reported by most of the questionnaire respondents. Duties performed by healthcare professionals require them to stand for long periods of time. Healthcare workers stand for a long time when providing services to patients. In hospitals workers usually stand in queues and move around the hospital on their feet helping patients on wheelchairs or stretchers to get their services. Results showing the distribution of physical risks at Muvonde hospital and Driefontein Sanatorium hospital indicated that sharp objects were specified by most of the healthcare workers who participated during the study. In healthcare facilities there is high use of sharp objects such as needles, razorblades, scalpels and scissors however, if safety precautions are not followed when using them they expose workers to injuries, cuts and pricks. The findings of the study coincide with the findings of [4] which indicates that healthcare workers are exposed to sharp injuries as a result of continuous

use of sharp objects in hospitals. Regarding distribution of biological risks at Driefontein Sanatorium hospital and Muvonde hospital, healthcare workers stated contact with wounds, viral infections, vomitus, urine of patients, breathing contaminated air and blood spillage. Blood spillage was reported as the major biological risk by the majority of healthcare employees. Healthcare workers are mainly exposed to blood spillages when carrying out surgeries and procedures. However, blood carries various types of contagious agents for example, hepatitis B, hepatitis C, HIV/AIDS and some blood-borne pathogens which can be transferred from one person to the other through contact with blood which is contaminated.

Regarding the distribution of chemical risks mercury, latex gloves, anaesthetic gases, sanitizers and cleaning detergents were reported by questionnaire respondents at Muvonde hospital and Driefontein Sanatorium rural hospitals. Majority of the healthcare workers who participated during the study stated sanitizers. This occurs because sanitizers are mostly used by healthcare workers after procedures to sanitize their hands in order to prevent cross infection. Sanitizer contains alcohol that kills bacteria; however, it exposes healthcare employees to skin irritation [17, 31]. Findings of the study on distribution of psychosocial risks at Driefontein Sanatorium hospital and Muvonde hospital indicated fatigue, over work, abuse and dealing with severely ill patients. Nevertheless, most of the healthcare employees specified dealing with very ill patients. Caring severely ill patients is highly demanding which increases the rate of stress affecting workers in hospitals.

Results indicated that risks identified at Muvonde hospital and Driefontein Sanatorium hospital are caused by various aspects notably, use of personal protective equipment/cloth for a long time, department the worker is allocated at the hospital, poor management, negative safety behaviour, poor training, gender, age, inadequate equipment, shortage of labour and pressure due to high workload. Regarding the mentioned causes of risks at Muvonde and Driefontein Sanatorium hospitals, the majority of the healthcare workers specified pressure due to high workload. The increasing number of patients can prompt long working hours and increase workload to healthcare workers. As a result of this, healthcare professionals may experience physical and psychosocial side effects, including exhaustion, burnout and illnesses linked to stress caused by overwork. This implies that safety in hospitals is compromised by strain brought by heavy workload, putting healthcare personnel at risk.

Based on the results obtained at Muvonde and Driefontein Sanatorium hospital pertaining to ergonomic risks, respondents indicated muscular strain, shoulder discomfort, neck pain and back injuries. However, most of the healthcare workers reported back injuries. These

findings imply that back injuries are a serious problem in both hospitals as a result medical practitioners need to pay attention to them. Because of the nature of their jobs, healthcare personnel frequently suffer from back injuries. Regular lifting, moving and transferring of patients puts a lot of strain on the backs of healthcare professionals. Furthermore, working in awkward positions is a common requirement for healthcare professionals, which can potentially lead to back injuries. Back injuries can also result from pushing large items like wheelchairs and hospital beds. Results of the study also indicate that Covid-19, HIV/AIDS and tuberculosis were indicated as effects of biological risks. At Muvonde hospital and Driefontein Sanatorium hospital influenza, cuts/pricks and needle stick injuries were specified as effects of physical risks. However, with the two rural hospitals the majority of the study participants stated needle stick injuries. The explanations behind such a high frequency of needle stick injuries at Driefontein Sanatorium hospital and Muvonde hospital could be due to poor training of healthcare workers on how to handle needle sticks with care. Additionally, in hospitals there is high use of needle sticks due to their piercing nature.

Healthcare professionals at Muvonde and Driefontein Sanatorium hospital have reported birth defects, skin irritation, allergies, asthma and pulmonary irritation as effects of chemical risks. Similar to Driefontein Sanatorium hospital, where the majority of healthcare workers (48.5%) reported skin irritation, the majority of hospital employees at Muvonde hospital (39.4%) expressed experiencing skin irritation. Healthcare personnel are susceptible to skin irritation due to their exposure to a variety of chemicals used in hospitals, including cleaning agents/products, disinfectants and sterilising solutions. When chemicals come into contact with the skin or when they are inhaled they result in allergic reactions [33]. Stress, exhaustion, anxiety, sleeplessness, chronic fatigue and blood pressure are among the psychosocial dangers that healthcare staff at Muvonde hospital and Driefontein Sanatorium hospital encounter. The study's results support those of [3, 21] that psychosocial hazards such as anxiety, stress, blood pressure and exhaustion can have an impact on healthcare professionals in Zimbabwe. The majority of healthcare professionals within the two rural hospitals specified that psychosocial risks cause them to experience stress. This could be caused by a number of factors, including stress inducing variables including workload, interpersonal issues and job uncertainty. Psychosocial risk has been linked to fatigue, which may be brought on by extended workdays and unfavourable working conditions.

Findings of the study indicated that work safety measures applied at Muvonde hospital and Driefontein Sanatorium hospital include safety inspection, safety training,

monitoring worker's safety behaviour, proper disposal of waste, provision of personal protective equipment and other measures such as screening workers for hepatitis B/C and tuberculosis. The study found that most healthcare employees at Muvonde and Driefontein Sanatorium hospitals stated use of PPE/C. This suggests that the two hospitals prioritise the use of PPE/C as a way for controlling occupational risks. In sub-Saharan Africa, hospitals prioritise the use of PPE/C and during the outbreak of Covid-19 pandemic they imported PPE/C to cover scarcity in healthcare facilities [32]. Healthcare professionals at Muvonde hospital and Driefontein Sanatorium hospital identified safety inspection as a risk management strategy. This is due to the fact that safety inspections are a useful tool for spotting possible risks and addressing them before they endanger patients, employees as well as visitors. Safety inspections assist in ensuring that appropriate infection control procedures are implemented.

Safety workshops and training have been recognised by healthcare professionals at Muvonde and Driefontein Sanatorium hospitals as crucial steps in reducing workplace risks. This is because healthcare professionals are subjected to a wide range of risks therefore, safety workshops and training give them the knowledge and abilities they need to recognise possible hazards, evaluate risks and put control measures in place. Healthcare personnel at Muvonde hospital and Driefontein Sanatorium hospital indicated that one institutional risk management strategy was the appropriate disposal of waste. Healthcare professionals may bring up waste disposal as a safety precaution because hospitals have stricter policies and procedures related to waste in place. Healthcare professionals stated appropriate waste management as a risk-reduction strategy because inappropriate hospital waste disposal can spread infectious diseases and seriously jeopardise public health. Proper waste storage of medical waste protect healthcare workers from risks associated with improper waste disposal [43].

Results of the study shows that most of the healthcare workers at Driefontein Sanatorium hospital and Muvonde hospital agree that there are safety policies within the hospitals. This indicates a high level of confidence in the hospital's safety protocols and procedures. So the hospital's commitment to ensuring the safety of everyone within its premises is commendable and should serve as an example to other healthcare facilities. The positive response from the questionnaire respondents could be due to the hospital's strict adherence to regulatory requirements. This indicates that healthcare workers recognize the significance of having well-defined policies in place to ensure their safety while performing their duties. As a result the policies can create a culture of safety within the workplace, where employees are aware of the risks associated with their job and take proactive

measures to mitigate them. According to [25] proper safety policies improves safety communication within the hospital departments and encourages hospital workers to protect patients and safeguard their own well-being.

The outcomes at Muvonde hospital and Driefontein Sanatorium hospital are consistent with each other since, when it came to work safety measures, most healthcare workers at both facilities rated them as good, very good, excellent with a minority indicating poor. Many factors may have contributed to the majority of respondents' ratings of the institutional safety measures as good, very good and excellent. For example, hospitals may have spent money on staff training programmes to make sure they are aware of and adhere to appropriate safety procedures. Furthermore, hospitals might have conducted routine audits to find possible risks and hazards at work and take appropriate measures to address them. The small percentage of respondents who gave work safety analysis a low percentage rating might be the result of other staff members' ignorance. Lastly, there might not be enough accountability or enforcement systems in place to guarantee that every employee follows the right safety procedures. This suggests that in order to guarantee that all factors are sufficiently addressed, there is space for improvement in hospital risk management procedures.

The results of the Chi-square test show a correlation between rating the effectiveness of work safety measures and work experience. This means that a health worker's work experience affects how effective the measures used to manage risks are rated. This might be a result of a number of issues, including improved procedure knowledge, increased confidence in hospital employees' abilities to recognise and reduce risks and increased awareness of the significance of workplace safety. Furthermore, workers with greater work experience might have witnessed more accidents or incidents at work, which might have improved their awareness of safety precautions that reduce risks. The results are in line with [16] who show that worker's experience has a significant impact on how effective safety measures are rated for managing losses.

Conclusion and recommendations

The study indicated healthcare workers in hospitals of Chirumanzu district are affected with work-related risks as a result of inadequate equipment, poor training, negative safety behaviour, poor management and pressure due to high workload. As a result of this, the study has pinpointed areas where these hospitals' work safety analysis performance needs to improve, highlighting the necessity of thorough risk assessments, the use of safety procedures and employee training to reduce possible dangers. Furthermore, the study has emphasised how important it is to promote a safety and accountability oriented culture in these healthcare environments. The

research's conclusions allow the formulation of the following recommendations to improve the effectiveness of work safety analysis in Chirumanzu District's rural hospitals: To identify possible risks and weaknesses in the workplace, hospital management must perform comprehensive risk assessments. Assessment should include the tools and physical infrastructure as well as human factors. Additionally, healthcare facilities should develop and implement strict safety policies and procedures to manage hazards that have been identified. This covers procedures for managing hazardous items, preventing infections and responding to emergencies. Moreover, staff training and education should be improved. Regular training on work safety methods and procedures should be provided to healthcare staff. This will enable them to identify any hazards and take appropriate action. Hospital administration should place a high priority on fostering a culture of safety among employees by fostering open dialogue about safety issues and encouraging responsibility at all levels. In hospitals work safety efforts should receive sufficient funding, which should go towards purchasing safety gear, improving infrastructure and continuing training courses.

Supplementary Information

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Supplementary Material 1

Supplementary Material 2

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Author contributions

Tapiwa Shabani wrote the main manuscript. Takunda Shabani help during data collection and preparation of figures. Steven Jerie helped proofread the document as the supervisor. All authors reviewed the document and agreed to send the paper for review.

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Data availability

The data generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical approval

Ethics Approval was granted by the Department of Geography, Environmental Sustainability and Resilience Building at Midlands State University ethics committee to carry out the research as well as to publish under its name. All sources were properly cited to avoid plagiarism.

Consent to participate for authors

All authors participated and agreed to participate up to final revision of the manuscript.

Consent to participate from study participants

All participants agreed to participate voluntarily. Informed consent to participate was obtained from all of the participants.

Consent for publication

Authors agreed to let the paper published when considered for publication.

Consent to publish from the Patients

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Competing interests

The authors declare no competing interests.

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