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RESEARCH ARTICLE **OPEN ACCESS**

Assessment of Occupational Health and Safety Standards of Employees Working for Water Programme in Tzaneen, Limpopo Province

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Abstract:

Background: Occupational health and safety have become a worldwide concern, particularly for those who operate in outdoor settings, and despite global attempts to address workplace safety and health issues, millions of work-related deaths occur yearly.

Objective: The study assessed the occupational health and safety standards of the Working for Water employees in Tzaneen, Limpopo Province, South Africa.

Methodology: The study was conducted in the Greater Tzaneen Local Municipality. A quantitative, descriptive research design was adopted. A total population sample size was used since there are only a few workers in the Working for Water (WfW) programme in Tzaneen. Data were collected using a self-administered questionnaire with open and close-ended questions, and ethical concerns were considered. Data were analysed using the Statistical Package for Social Sciences version 27.0.

Results: The results showed that most respondents (63.6%) were male workers, indicating that females are underrepresented in the WfW programme; the age group with the highest rate of respondents was the 31-35 years age group, at 50%. The findings revealed that employees were not taken for medical examination before and during their working period and that minimum or no training was being provided so that they could be fully equipped for the work. The chi-square test was statistically significant, as it indicated that the education level obtained influenced respondents' awareness of the potential hazards associated with radiation (P=0.003, df =2).

Conclusions: Data showed that the WfW project gave little attention to Occupational Health and Safety practices. The researcher, therefore, recommends that the WfW project should prioritize occupational safety management practices. In addition, employees should understand that safety and health practices are the responsibility of both management and staff, as this is the only way to increase safety in the work environment.

Keywords: Knowledge, Occupational accidents, Occupational health and safety, Work for water employees, Workplace safety, Potential hazards associated with radiation.

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1. INTRODUCTION

Occupational Health and Safety is a broad discipline concerned with desired health practices and working conditions in organisations, and it focuses on the social, mental, and psychological well-being of the workers. It is regarded as a dual concept that necessitates two actions, namely collaboration and participation on the part of both employers and employees [1].

The Working for Water programme in South Africa has been described by Rivas (2018) as a success; however, there are still challenges that must be addressed, particularly in connection with the health and safety of the employees. Rivas (2018), for instance, discovered that the Personal Protective Equipment (PPE) used by workers are not always appropriate, comfortable, or worn correctly [2].

Occupational safety and health have become a global concern, particularly for people working in outdoor environments [3], and despite international efforts to address these concerns, it is estimated that 2 million work-related fatalities occur each year. In addition, over 330 million accidents and 160 million work-related diseases occur yearly [4], resulting in more than $1.25 trillion, or 4% of the world's Growth Development Product, being lost [3]. Statistics show that injuries at work account for a large proportion of all deaths and morbidities in African countries, such as Ghana, Kenya, South Africa, and Zimbabwe [5]. This picture, which demonstrates a violation of employees' right to safe and healthy working conditions, has sparked widespread concern at the global, regional, and national levels [4].

According to the World Health Organization's statistics (2016), the accident rates experienced by low to middle-income countries in African regions, across the industrial, agricultural, and service sectors were the highest globally [6], although Paul, Ghebreyesus, and Sharif (2019) assert that most fatalities occur in the agricultural sector, worldwide [7]. Milios, Beqiri, Whalen, and Jelonek (2019) attribute this state of affairs to low skill levels, the pressure to produce goods and supply a thriving economy, the use of antiquated machinery, and a lack of concern from management for employees' health and safety [8].

The South African Department of Labour's 2016/2017 annual report notes that the Compensation Fund paid over R2.7 billion during the fiscal year due to workplace injuries and diseases, and most payments were made because of health and safety law violations [9]. Charfeddine, Alma, and Kori (2018) argue that an expenditure of such a huge amount on paying injured workers negatively impacts the economy of the country [10].

The Occupational Health and Safety Act of South Africa No. 85 of 1993, which went into effect in 1994, governs workplace health and safety. This Act provides for the health and safety of the South African workforce by setting boundaries for what constitutes acceptable working conditions [1]. Similarly, South Australia's Department of Labour (2013), in the country's Health and Safety Act, provides clear explanations of both health and safety concepts to enable employers and employees to understand their respective responsibilities [11]. The amendment to the Occupational Health and Safety Act of South Africa No. 85 of 1993 clarifies that the protection provided by the Act applies to all public and private employees in all sectors of the economy. The Act protects all individuals who encounter or are exposed to hazards, regardless of whether they are employed on the premises or not, at the time the incident occurred [12]. Accidents and injuries continue to occur, particularly in the agricultural sector, despite the Act's implementation [13].

The Working for Water programme was established in 1995 by the South African Department of Water Affairs and Forestry to control alien vegetation and alleviate poverty by providing jobs and training to members of low-income communities [14]. This government-funded program's primary goal is to clear alien vegetation from water catchments and riparian areas to protect and restore biodiversity and hydrological functions. Hansen and Donohoe (2017) argue that the program, implemented in all nine South African provinces, is one of the world's very significant, and recognised environmental conservation initiatives on the continent for removing invasive alien vegetation [15]. The Working for Water (WfW) programme has been described as a success. However, Federico and Hanna (2015) maintain that persistent worker-safety challenges must be addressed, and many workers are regularly exposed to occupational hazards, such as harmful herbicides while mixing and spraying, and may suffer injuries and other occupational accidents [16].

The methods of WfW for removing alien vegetation expose workers and contractors to various health risks; for example, WfW employees in Tzaneen are exposed to harmful herbicides meant to kill invasive exotic plants. Rani, Thapa, Kanojia, Sharma, Grewal, and Kaushal (2021) point out that herbicides have acute adverse effects on humans, including respiratory, eye, and skin illnesses. Studies have also confirmed that long-term exposure to herbicides is linked to the development of chronic diseases [17]. Rani *et al*. (2021) add that the exposure of workers to herbicides increases the risk of soft-tissue sarcoma, non-lymphoma Hodgkin's disease, prostate cancer, neurological impairment, congenital disabilities, and endocrine disrup-tion [17].

Rother, John, Wright, Irlam, Oosthuizen, and Garland, in their research of 2019, contend that the negative health effects of occupational injuries in the Working for Water (WfW) project in South Africa pose a significant public health problem as the impact is felt by both the workers and their families. Workers are also vulnerable to daily hazards, such as sunburn, cuts from the use of sharp objects, and exposure to snakes and poisonous insects [18]. Rani *et al*. (2024) recommend that these occupational health hazards can be reduced by implementing safety strategies, such as the use of Personal Protective Equipment (PPE); however, there are concerns about the effectiveness of these tools in practice [17].

Other African countries with similar programmes in

biodiversity conservation include Mozambique, Tanzania, Kenya, Cameroon, Guinea, Ethiopia, Madagascar, and Namibia. Although these countries have financial problems, they are still striving for successful biodiversity conser-vation. The Africa Wildlife Foundation (2017) states that occupational health and safety is still a concern in all African biodiversity programmes because most employees are uneducated, and there is corruption in allocating funds [19].

2. METHODS AND MATERIALS

2.1. Design and Settings

A quantitative, descriptive research design was adopted in this study, and the study was conducted in the Ramphera Project in Tzaneen, which covers the Greater Tzaneen Local Municipality under the Mopani District in the Limpopo Province of South Africa. Data were collected from all the 84 workers on the WfW program, from the seven villages of Tzaneen.

2.2. Sampling

A non-probability/purposive sampling method was used to recruit study respondents. The researcher chose respondents with experience of more than 1 year of working on the project on the assumption that these were individuals who knew the working environment and challenges and were experienced in the field. Respondents who refused to sign the consent form on the day of data collection and workers who were on annual or sick leave on the week of data collection were excluded from the study.

2.3. Data Collection and Measurements

2.3.1. Data Collection Instrument

A self-administered questionnaire, based on the research objectives, was used to collect data; the questionnaire comprised both close-ended and open-ended questions. This data-collection instrument was divided into four sections: Section A requested demographic information of the respondents; Section B sought the level of awareness about the occupational health and safety standards among the sampled employees and contractors in the WfW project; Section C ascertained the role of contractors in the training process of workers in OHS; and Section D detailed the role of contractors in promoting health safety practices among the employees to improve the OHS standards. The instrument was written in English, and an expert translated it into Sepedi and Xitsonga and re-translated the completed questionnaires back to English so that the answers would retain their original meaning.

2.3.2. Data Collection Process

Data were collected from seven villages in Tzaneen, and all the workers were part of the study. The researcher obtained permission from the Department of Forestry, Fisheries and Environment and the management of the WFW project in Tzaneen. Before the commencing of data collection, the researcher read out to the potential respondents the information sheet and informed consent form, giving comprehensive details of the whole project, its potential benefits, and the procedures to be followed; finally, the researcher gave them an opportunity to ask questions before agreeing to participate in the study. In the case of respondents who could not read or write, the researcher read out the questions to them and wrote the answers as they responded. For this process, the researcher established a conducive environment - free of disruptions that did not disturb or hinder the respondents from accurately answering the questions. Data were collected at respondents' workplaces, during their break times, or after work. The researcher handed out the questionnaires to respondents who were willing to take part in the study and these were filled out anonymously and with the assistance of the researcher, if required. Questionnaires that were incomplete or had errors were discarded.

2.3.3. Data Analysis

Data were coded using Microsoft Excel 2016 and then exported to the Sta SPSS for analysis using the latest SPSS version 27.0. Statistical tables, bar graphs, and charts were utilised to present the analysed data. Descriptive statistics (percentage), cross-tabulation, and a Chi-square test were employed to obtain association and strengthen the relationship between the independent and dependent variables. The Chi-square test was also used to determine whether there were any relationships between two or more categorical variables, such as the association between respondents' age and use of PPE, with a statistical level of significance of (i.e., $p<0.05$).

2.4. Ethics Statement

The research proposal was presented to the Health Sciences Faculty Higher Degrees Committee and the University Higher Degrees Committee for approval and quality control. After the approval, an ethical clearance number was given by the University of Venda, Health, Safety, and Research Ethics Committee - FHS/22/PH/15/1511. As indicated earlier, a formal written letter of informed consent was read out, then issued and signed by the willing respondents before the commencement of the study to ensure voluntary participation. During this briefing session, the researcher ensured that the respondents were aware of the type of information needed, why the information was being sought, for what purpose, how they were expected to participate in the study, and how the study directly or indirectly would affect them.

3. RESULTS

Demographic characteristics of the respondents are shown in Table **1**.

At 63.6% (n=28), most of the study respondents were males, and 36.4% (n=16) were female workers. The study was conducted in a rural area; hence, it can be assumed that communities still believe that men must provide for the family and women must stay at home taking care of the household chores. The age group with the highest rate

of respondents was the 30-39 years age group with 59% (n=26). Most respondents, 56.8% (n=25), had secondary education, 29.5% (n=13) had primary education, and only a few 13.6% (n=6) participants had attained tertiary education. Similarly, Kristina J. Elias A, Maria J, *et al*. (2019) established that forestry is an industry with a highly gendered division of labour in which men dominate across a range of key activities, including harvesting, production, and management [31].

3.1. Job Title of the Respondent

Most respondents (63.6%/ n=28) were general workers; only 4.5% (n=2) were first-aid workers assisting employees in case of any emergencies; 9.1% (n=4) of the respondents were peer educators; 9.1% (n=4) operated saw chains; and 13.7% (n=6) were health and safety officers (Table **2**).

The next section focuses on the level of awareness regarding occupational health and safety among employees and contractors in the WfW project in Tzaneen (Table **3**).

Workers were asked if the officials of the company conduct compliance monitoring and respondents (86.4% (n=38) reported that they did not; 13.6%(n=6) answered "yes". About 50% (n=22) responded "yes" when asked if the PPE at work is stored as per the manufacturer's recommendation. Most workers (70.5% (n=31) responded "yes" that there is a system in place to monitor the contracted employers or the self-employed persons. When workers were asked if they were provided with a First Aid kit, most (86.4%/n=38) answered in the negative. The study findings highlighted that most workers (84.45%) were not aware of the potential hazards associated with radiation exposure, and only 13.6% (n=6) were aware. Most respondents (86.3%/n=38) said they are not taken for induction or training when there is new machinery, while only 13.7% (n=6) responded that they had been taken for orientation. These results concur with those of Federico and Hanna (2015) that there are still diverse challenges that must be addressed in conservation programs (Table **4**).

Section C: Role of contractors in the training process of workers.

More than half, 54.5% (n=24) of the workers indicated that they needed training regarding safety and health responsibilities. Most respondents (79.5%/n=35) answered "no" when asked if there was an established schedule for any training required, and only 20.5% (n=9) agreed with the statement. Most respondents (72.7% (n=32) responded "no" when they were asked if workers were evaluated to ensure competency with the training provided, and only 27% (n=12) replied in the affirmative. Most respondents (65.9% (n=29) stated that there was no evaluation of the training provided to ensure its effectiveness, and 56.8% (n=25) respondents maintained that they did not receive any training before starting with the work. Mohamad and Valliappan (2020) concluded that evaluation could help assess the effectiveness of current training, help to improve the quality of future training programmes, identify areas where training is needed, and determine if training has the desired impacts (Table **5**).

Table 1. Demographic characteristics of the respondents (n=44).

Variable	-	Frequency	Percentage
Sex	Male	28	63.6%
	Female	16	36.4%
Age	20-29	6	13.6%
	30-39	26	59%
	40-49	3	6.8%
	50 and above	9	20.4%
	Total	44	100%
Education	Primary education	13	66%
	Secondary education	25	54%
	Tertiary	6	20%
	Total	44	100%

Table 2. Job titles of the respondents.

Job title		
-	N	%
General worker	28	63.6%
First aider	2	4.5%
Peer educator	4	9.1%
Saw Chain operator	4	9.1%
Health and safety officers	6	13.7%
Total	44	100%

Table 3. Awareness regarding occupational health and safety among WfW employees (n=44).

Statement	No		Yes	
	N	%	N	%
Does management conduct compliance monitoring?	38	86.4%	6	13.6%
Are the PPE stored as per the manufacturer's recommendations?	22	50%	22	50%
Is there a system in place to monitor the contracted employers or the self-employed persons?	13	29.5%	31	70.5%
Is there a process to monitor compliance with OHS?	13	29.5%	31	70.5%
Do you have an appropriate First Aid kit?	38	86.4%	6	13.6%
Are workers aware of the potential hazards associated with radiation exposure?	37	84.45%	6	13.6%
Is the machinery used taken for service regularly?	23	52.3%	21	47.7%
If there is new machinery, are workers taken for induction to be trained on how to use it?	38	86,3%	6	13.7%

Table 4. Role of contractors in the training process of workers (n=44).

Statement	Yes		No	
	N	%	N	%
Has everyone been trained in safety and health responsibilities?	20	45.5%	24	54.5%
Have you established a schedule for any training you identify as being required?	9	20.5%	35	79.5%
Has the training been conducted as per the training schedule, *i.e.*, the record of training?	17	38.6%	27	61.4%
Are workers evaluated to ensure competency in the training provided?	12	27.3%	32	72.7%
Is there an evaluation of the training to ensure the program's effectiveness?	15	34.1%	29	65.9%
Are contract employees provided with training before starting work?	19	43.2%	25	56.8%

On the issue of whether there are avenues to assist employees with personal issues and to offer counselling, the majority of the employees (70% (n=31) responded that they had no idea of any existing policies; 23% (n=10) said there were peer educators, while only 7% (n=3) mentioned that there are social workers for that purpose (Table **6**).

Table **6** shows the results on whether the workers receive regular medical examinations. Half of the respondents, 50% (n=22), indicated that they had never received any medical examination; 29.5 (n=13) had received an examination once; and 20.5% always receive such examinations.

Section D: Role of Contractors in Promoting Practices to Improve OHS (Table **7**).

This section covered the role of contractors in promoting practices to improve OHS. Employees were asked if they knew how to raise safety and health concerns; more than half (59.1%/n=26) responded in the negative, and 40.9% (n=18) responded in the affirmative. Most employees (86.3%/n=38) agreed that there is an evaluation schedule and that there are procedures to investigate health incidents at the workplace.

Table **8** shows a cross-tabulation of the level of education and employee awareness of the potential hazards associated with radiation exposure. From the details, (34,09%) of the employees who were not aware of the potential hazards related to radiation had only primary education, and 36.4% of the employees who were aware had attained tertiary education. The chi-square test was statistically significant as it showed that the level of education influences the level of awareness of the potential hazards associated with radiation (P=0.003, df =2).

Table 5. Policies for assisting employees on personal issues (n=44).

-	No Polices Available		Peer Educators		Social Workers	
-	%	N	%	N	%	N
-	70	31	23	10	7	3

Table 6. Receiving regular medical examinations.

Never Received any Medical Examination		Received Medical Examination Once		Always Receive a Medical Examination	
%	N	%	N	%	N
50	22	29.5	13	20.5	9

Table 7. Role of contractors in promoting practices to improve OHS.

Statement	Yes		No	
	N	%	N	%
Do workers know how to raise safety and health concerns?	18	40.9%	26	59.1%
Is there an evaluation schedule that includes who will be conducting the evaluation?	38	86.3%	6	13.6%
Do you have procedures to investigate health incidents at the work place?	34	77.3%	10	22.7
Have you verified that hazards and recommendations identified from workers' concerns are controlled or addressed appropriately?	25	56.8%	19	43.2%

Table 8. Cross-tabulation of the level of education and employee awareness of the potential hazards associated with radiation exposure (n=44).

-		The awareness of employees of the potential hazards associated with radiation.		Total
		Yes	No	-
Level of education	Primary education	3	15	18
	Grade 8-12	6	3	9
	Tertiary Education	16	1	17
Total		25	19	44

4. DISCUSSION

This section discusses the findings of the study with the support of existing literature. An interpretation of the descriptive data generated by this research, conducted among employees of WfW projects in Tzaneen, leads one to conclude that these employees are relatively young and uneducated since most had completed only some level of secondary education. Against the backdrop of the increasing casualisation of workers on the WfW programs, there is a need for stable and regular employment opportunities that would transfer skills to this working population. This explains why the WfW programme is often welcomed as an alternative employment opportunity by residents in a region. However, the findings raise concerns about the extent to which the regulations of Expanded Public Works Programmes (EPWPs) are conscientiously implemented by the projects' management; for instance, the gender representation target for women was clearly not attained. The reasons for this should be clarified and researched more extensively.

The study also found that, generally, people with low levels of education find employment opportunities in such community programs; however, frequent workplace changes and casualisation of the workforce mean that their lack of knowledge and experience makes occupational health and safety issues more challenging for them. Some participating contractors acknowledged that lack of funding for PPEs necessitates neglecting occupational health and safety training and exercises.

4.1. Effects of Exposure to Health Hazards and Work Environment at the WfW Project

The WfW employees in Tzaneen, Limpopo Province, are exposed to dangerous chemicals affecting their internal and external parts of the body; thus, these workers must monitor their health regularly. As indicated in the findings, 79.5% of respondents claimed that the company does not provide regular health status examinations of employees. These findings are in violation of the regulations of the International Organisation for Standardization (1996), which stipulate that to reduce health risks due to exposure to chemical and physical agents, both collective and individual preventative measures should be adopted, together with the implementation of medical and physical reports [20]. Some respondents mentioned that manage-ment usually sends an employee for a medical check-up after he/she has experienced a problem. Regarding medical services, respondents indicated that first aid services had been outsourced to capable service-giving centres. The disadvantage of outsourcing this service is that it negatively affects company productivity as employees

have to take time off to access such services. According to Chemscape (2020), exposure to harmful chemicals can interfere with or cause damage to the body's organs or vital systems; these may include the skin, heart, liver, kidneys, lungs, and even reproductive system [21]. The University of Illinois-Urbana-Champaign, 2021, recommended that the primary means to prevent employees from suffering negative health effects of chemicals is to minimize their risk of exposure to these hazards [22].

4.2. Role of Contractors in Terms of Promoting Health and Safety Practices to Improve OHS Standards

Regarding the commitment of management to upholding OHS practices, 71.6% of the respondents indicated that the company management is not committed to proper and timely response to the OHS. Similarly, Reichard AA, Marsh SM, Tonozzi TR, *et al*. (2017) reported that any OHS efforts without the full support of the company's top management will meet with limited success. Most employees in the Tzaneen WfW project said that they were not given induction on health and safety regulations before they started working [23]. Silvia and Freitas (2017) obtained different results, which revealed that training is an integral part of risk management and for risk identification and communication between all stakeholders, including management [24]. Naidoo *et al*. (2010) agrees that lack of knowledge training is a major cause of occupational accidents [25]. Jonckie (2018) also suggests that manage-ment commitment is required to enforce regulations, for instance, the wearing of safety equipment; however, the provision of safety equipment alone does not improve worksite safety, but rather there should be a corporate culture that encourages its use and adherence to safety procedures [26].

Most respondents (86.3%) asserted that they were not inducted on how to operate new machinery, while 13.7% replied in the affirmative. Carter (2016) believes that most occupational accidents happen due to a lack of induction when there is new machinery [27]; Wang (2024) *et al*. also contends that training and induction help employees to see and avoid hazards [28]. The findings also indicated that the WfW project has failed to provide adequate training for their employees; as a result, they have insufficient awareness, which leads to misunderstandings about how to operate equipment and protect their safety. When asked about the provision of PPE as required by law, only a few respondents agreed that the company is doing enough to provide them. At the same time, most respondents indicated that there is no proper inspection of OHS practices by the company.

According to Wang (2024) *et al*., providing occupational health and safety services means carrying out activities in the workplace to protect and promote workers' safety, health, and well-being, as well as improving their working conditions and the working environment [28]. Employers should provide appropriate personal protective equipment in line with the type of work and risks, and these should be maintained by the employer at no cost to the workers. Personal protective equipment should also comply with the standards established by national authorities in line with international standards [29].

4.3. Level of Awareness on Occupational Health and Safety among Employees in WfW Project Tzaneen

The WfW employees were asked if the company conducts compliance monitoring, and most (86.4%) reported that it did not. Carter (2016) states that a lack of monitoring of compliance to occupational health and safety standards contributes to occupational accidents [27]; similarly, Naidoo *et al*. (2010) concludes that monitoring compliance at the workplace helps employees to be aware of and avoid hazards [25]. Half of the respondents (50%) gave positive responses when they were asked if the PPE at work is stored according to the manufacturer's recommendation. Furthermore, findings highlighted that most workers (84.45%) were not aware of the potential hazards associated with radiation exposure, and only 13.6% said they were aware of the potential hazards. These findings are consistent with those by Hoyos *et al*. (2016), who discovered that most occupational accidents occur due to a lack of awareness of the potential hazards of materials used and certain workplace practices [30]. Naidoo *et al*. (2010) attested that most fatal injuries in the workplace were in supervisory positions, indicating possible inadequate safety awareness [25].

CONCLUSION

In any workplace, occupational safety and health management procedures should be strictly adhered to, and this requires managerial commitment. If employers and employees neglect their respective duties, occupational health and safety standards will be compromised and unable to function effectively. An employer is responsible for compiling accident reports, keeping track of health and safety issues, posting safety alerts and legislative information, and offering health and safety instruction and training. The employer, hence, must establish a safety committee to handle all matters relating to health and safety.

AUTHORS' CONTRIBUTION

The authors confirm their contribution to the paper as follows: Study conception and design were contributed by NE, and the supervision was provided by TS and ML. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

DWAF	=	Department of Water Affairs and Forestry
GDP	=	Gross Domestic Product
OHS	=	Occupational Health and Safety
PPE	=	Personal Protective Equipment
WfW	=	Work for Water Programme
WHO	=	World Health Organisation

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The research proposal was presented to the Health Sciences Faculty Higher Degrees Committee and the University Higher Degrees Committee for approval and quality control. After the approval, an ethical clearance number was given by the University of Venda, Health, Safety, and Research Ethics Committee, South Africa, FHS/22/PH/15/1511.

HUMAN RIGHTS AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent has been obtained from the participants involved.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data sets used and/or analysed during this study are available from the corresponding author [N.M.E] upon request.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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None.

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