

## Occurrence of occupational slips, trips and falls amongst health workers in Limpopo Province of South Africa

*Ntlogeleng Mabina Mogale*<sup>1</sup>, *Ntambwe Malangu*<sup>2</sup>, *Mmampedi*

*Huma*<sup>3</sup>

### Abstract

*Injuries related to slips, trips and falls (STFs) are the second largest proportion of occupational injuries. Age, gender, and type of occupation, inter alia, are common risk factors to STFs. In South Africa, falls account to 10% of all deaths and the 20<sup>th</sup> leading cause of mortality. The aim of this study was to describe the patterns of STFs among health care workers (HCWs) from Limpopo Province of South Africa. Data submitted for occupational health compensation purposes were reviewed for the period from January 2007 to December 2009. Data on age, gender, type of injury, and profession amongst others were collected. Data were analysed using Stata 13 software. The mean age of victims was 48±10.2 years. The majority of STFs were reported in those aged >40 years (77%), females (76%), non-clinical staff (54%) and those working in district hospitals (54%). The most affected body parts were ankles, legs, arms and soft tissues. In conclusion, the prevalence of STF-related injuries among HCWS was 20%. STFs are more common among nursing staff and non-clinical support staffs, who are females and over the age of 40 years old. Interventions to reduce these STFs are required to create a safe and conducive work environment for all HCWs. The understanding of the important factors contributing to the occurrences of STFs should assist in the design of interventions aimed at curbing these incidents.*

**Keywords:** Slips, trips and falls, occupational injuries, health workers, South Africa.

---

<sup>1</sup> School of Public Health, Sefako Makgatho Health Sciences University, Pretoria, South Africa. Email: mogalenm@gmail.com; Co-author: gustavmalangu@smu.ac.za

<sup>2</sup> School of Public Health, Sefako Makgatho Health Sciences University, Pretoria, South Africa. Email: [gustavmalangu@smu.ac.za](mailto:gustavmalangu@smu.ac.za)

<sup>3</sup> School of Public Health, Sefako Makgatho Health Sciences University, Pretoria, South Africa. Email: mmampedi.huma@smu.ac.za.

## Introduction

Work-related or occupational slips, trips and falls (STFs) especially in the health sector can result in serious injuries, which can impact negatively on the health care personnel, resulting in pain, lost days of work, diminished productivity, and inability to care for patients (Bell et al., 2010; Bell et al., 2013; Miller et al., 2013; Yeoh, Lockhart, & Wu, 2013). Outside South Africa, STF-related injuries have been reported to be the second largest proportion of lost-workday non-fatal injuries amongst health workers (Bell et al., 2013). In a 10-yearlong study by Bell and co-workers (2008) in which injury data was analysed, it was found that of the 2,263 injury claims filed, about 21% of them were caused by STFs. In the US, the injury rates from STFs were estimated at 38.2 per 100 000 population (Bell et al., 2010). STFs can lead to injuries affecting various parts of the body. Lower extremities accounted for about 45% of all injured body parts after an STF event, followed by upper extremities (Bell et al., 2008). Lower extremities such as knees, ankles and feet are the most cited injured body parts after an STF event (Andersen et al., 2012). Several hazards have been identified as contributing to risk of STFs in the health sector and these include amongst others, contamination of floor surface by water, chemicals, and grease (Reubenstein & Josephson, 2002). Liquid contamination on the floor surfaces account for 36% of all falls with slipping as an initiation event (Bell et al., 2013). And this supports evidence that about 25-45% of falls are attributed to environmental hazards (Reubenstein, 2002).

Age, gender, personal lifestyle habits, state of mental health, and workload are some of the risk factors identified and associated with the risk of STF. Increase in age has been linked with increased risk of STFs due to age-related impaired motor skills (Troy et al., 2009; Miller, 2013). Hence, the rates of these injuries are said to steadily increase after middle age (Reubenstein & Josephson, 2002). In the health care sector, females have been found to be more at risk of slip-related falls than male workers (Alamgir et al., 2011; Bell et al., 2013). According to Miller (2013) lifestyle habits such as lack of exercise, smoking, and overeating as a coping mechanism for stress can also contribute to risk of falls. Workloads placed on nurses as a result of shortages of staff, tend to increase the nurse-patient ratio and this too often contributes to risk of injuries (Yeoh, Lockhart, & Wu, 2013).

South Africa has made great stride since the advent of democracy to put in place legislative tools aimed at ensuring that occupational health and safety is a priority not only in the health sector but also across various industries. Some of these legislations include the Occupational Health and Safety Act (Act 85 of 1993), Compensation of Injury and Disease Act, Act no. 130 of 1993 (COIDA), and Mine Health and Safety Act of 1996, amongst others. Despite these legislative instruments, especially the former, there seem to still exist work-related injuries of various forms and slips, trip and falls (STFs) are no exceptions.

According to Seedart (2009), falls from non-intentional injuries in the year 2000 accounted for about 10% and were the 20<sup>th</sup> leading cause of mortality in South Africa. A breakdown of deaths due to other external causes of accidental injuries in South Africa

points out that there were 123 reported cases of fall-related deaths out of 29786 reported deaths (Statistics South Africa, 2013). Kielkowski and co-authors (2004) highlighted that there are challenges in estimation of the burden of occupational disease and injuries. These include inherent design issues, lack of accurate data, and the fact that most occupational diseases and injuries do not always culminate deaths. To date, there is a paucity of data on slip, trip, and falls among workers in the South African public healthcare sector. This study aimed to describe the patterns STFs among health care workers from Limpopo Province of South Africa.

## **Methods**

### *Study design*

This was a cross-sectional study involving a review of health workers' records on occupational injuries, submitted to the Compensation Commissioner from 2007 to 2009 in Limpopo Province, South Africa. Health workers are defined as any person engaged in actions whose primary intent is to enhance health (WHO, 2006). This definition includes health service providers and health management and support workers. Health service providers include doctors, nurses and allied health workers such as dietitians, physiotherapists etc. Health management and support staff include amongst others managers, accountants and administration staff, cleaners, laundry workers, clerical workers, porters, artisans and drivers.

Records of occupational injuries reported to the Compensation Commissioner under the study period were included in the study. Data were extracted using a standardized data collection tool. Cases were regarded as reports about any event related to slip, trips and falls amongst health care workers (HCWs) during the study period. The following data were extracted and these include age, gender, year of reporting, year of employment, job title, anatomical body parts affected, health district where the incident occurred. A total of 686 records were captured for analysis after discarding 17 records due to incomplete or missing data.

### *Ethical considerations*

Ethical clearance was obtained from Medunsa Research Ethics Committee (MREC); while permission to conduct the study was granted by the Limpopo Department of Health's Provincial Research Committee.

### *Data analysis*

Statistical analyses were performed using STATA version 13.0 (StataCorp, Texas, USA). Descriptive statistics was used to summarise both categorical and continuous data. Cross-tabulation was performed to assess the association between the dependant and independent variables such as age, gender, occupation, years of experience associated with STFs. The results are expressed as odds ratios (ORs) with 95% confidence intervals (CIs) and p-values. A *p*-value of less than or equal to 0.05 considered was considered statistically significant.

## Results

### *Prevalence of STFs and characteristics of affected health workers*

Of the 686 cases of occupational injuries reported to the Compensation Commissioner for the years reviewed, there were 139 cases related to STFs, resulting in a prevalence of 20.3%. The majority (73%) of workers affected by STFs were females who were significantly affected by STFs than their male counterparts (OR=1.5; p=0.003). Although, overall non-clinical staff members experienced STFs just slightly more than clinical staff members (53% versus 47%); there was a significant difference among non-clinical male workers who were more affected by STFs than male clinical staff members (p=0.012). The age of victims ranged from 24 to 65 years with the mean age of 48.1±10.2 years and a median age of 49 years. Individuals over 40 years were twice more likely to be affected by STFs than younger ones (OR=2.08 p=0.001). Most individuals in the age group 50 - 60 years (36.2%) had the highest incidents of STFs, followed by those between 40 and 50 years (26.8%).

**Table 1: Characteristics of health workers by gender**

Variables	Females (N)	Males (N)	Total N (%)	OR (95%CI)	p-value
<b>Gender</b>					
Females	102	---	102 (73.4%)	1.5 (0.98-2.35)	0.03
Males	---	37	37 (26.6%)	1	---
<b>Age Category</b>					
>30	4	2	6 (4.3%)	1	---
30-39	14	8	22 (15.8%)	2.76(1.07-7.14)	0.035
40-49	29	4	33 (23.7%)	3.03 (1.21-7.55)	0.017
50-59	31	13	44 (31.7%)	4.73(1.92-11.61)	0.001
60+	24	10	34 (24.5%)	4.92 (1.96-12.34)	0.001
<b>Age above 40 years</b>					
<40 years	22	10	32 (23.7%)	1	---
>40 years	76	27	103 (76.3%)	2.08 (1.35-3.18)	0.001
<b>Staff category</b>					
Clinical	57	7	64 (47%)	1	
Non-clinical	41	30	71 (53%)	1.6 (1.09-2.41)	0.012

In the following Table 2, STF-related injuries are presented in relation to professional or staff categories and health facility types. Professional nurses reported the highest number of STFs (17.2%), followed by cleaning staff (14.2%), nurse assistants (12.7%), enrolled nurses, laundry staff (9%), admin staff (6.7%), and artisans (6%). Most STF-related injuries took place in district hospitals (55.4%, n=77) as compared to regional hospitals 16.5% (n=23), tertiary hospitals 19.8% (n=15) and clinics 5.8% (n=8). Most STF-related injuries were reported from Vhembe (30%), Mopani (27%) and Capricorn (23%) districts as compare to Waterberg (11%) and Sekhukhune (9.6%).

**Table 2: Staff categories and facility types**

Variables	Females N (%)	Males N (%)	Total N (%)
<b>Staff categories</b>			
Professional Nurses	23 (96%)	1 (4%)	24 (17.9%)
Cleaning staff	15 (79%)	4 (21%)	19 (14.2%)
Nurse Assistants	16 (94%)	1 (6%)	17 (12.7%)
Enrolled Nurses	11 (92%)	1 (8%)	12 (9.0%)
Laundry staff	7 (58%)	5 (42%)	12 (9.0%)
Admin staff	7 (78%)	2 (22%)	9 (6.7%)
Artisan	0	8 (100%)	8 (6.0%)
<b>Facility Types</b>			
District Hospital	57 (74%)	20 (26%)	77 (55.4%)
Regional Hospital	14 (60%)	9 (40%)	23 (16.5%)
Tertiary Hospital	13 (87%)	2 (13%)	15 (10.8%)
Clinics	8 (100%)	0 (0%)	8 (5.76%)

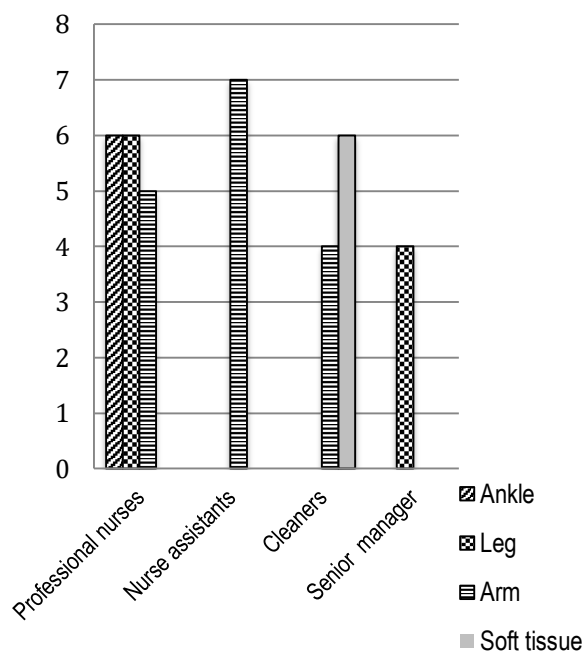
### ***Injured anatomical body parts and health workers profession***

Table 3 shows the affected body parts resulting from an STF event. Ankles (18%), legs (17.4%), arms (15.9%), soft tissue injuries (11.6%), and back (7.2%) were the most frequently reported injured body parts after an STF event. Of these, female health workers reported most injuries compared to males in the age groups 50-60 years followed by 40-50 years.

Figure 1, below shows the most reported injured body part by selected group of health workers. Most body injuries sustained after an STF reported by professional nurses are ankles (n=5), legs (n=6) and arms (n=5), while most nurse assistants (n=7) reported being injured on the arms. Majority of cleaning staff reported to have sustained mostly leg (n=4) and soft tissue injuries (n=6). The last group with high proportion of reported injured body parts was senior managers who reported leg injuries (n=6). These injuries led to soft tissue injuries resulting in swelling and bruises.

Injured body parts	Frequency	Percent
Ankle	25	18.10%
Leg	24	17.40%
Arm	22	15.90%
Soft tissue	16	11.60%
Back	10	7.20%
Foot	7	5.10%
Hip	7	5.10%
Shoulder	5	3.60%
Finger	4	2.90%
Hand	4	2.90%
Knee	4	2.90%
Head	3	2.20%
Abdomen	2	1.40%
Nose	1	0.70%
Mouth	1	0.70%
Buttocks	1	0.70%
Ear	1	0.70%
Chest	1	0.70%
<b>Total</b>	<b>138</b>	<b>100.00%</b>

**Figure 1. Most reported body injuries after STF, amongst staff categories**



**Discussion**

The study found that the prevalence of STF-related injuries among health workers was 20%. Similar results were found in other settings; for instance, in a study by Yeoh and co-authors (2013), the proportion or injury rate amongst health workers was 22.1%. Other investigators have reported proportions ranging from 18% to 26% (Bell et al., 2013; Bureau of Labour Statistics, 2011).

The findings from this study show that majority of reported cases (76.3%) of STFs were amongst health workers who were 40 years and above. According to Courtney (2001), 50% of all fall-related injuries arise from slipping and once this process is initiated, it becomes difficult to avoid a fall (Troy et al., 2009). The inability to avoid a fall is associated with age and is as a result of diminished neuromuscular performance (Reubenstein, 2002; Troy et al., 2009). This explains why older workers are most likely to experience STF-related injuries than younger workers (Kemmlert and Lundhorn, 2001; Troy et al., 2009; Bell et al., 2013; Yeoh et al., 2013).

Moreover, the majority of STF victims in our study were females as compared to males (73% vs 27%). This trend is similar to findings from other settings where 80% of victims of STFs were females (Yeoh et al., 2013; Alamgir et al., 2011; Bell et al, 2013). This trend is not unusual considering that majority of individuals in the health sector are mostly females (Miller, 2013; Yeoh et al., 2013).

Amongst the categories of staff, nurses constituted at least a third of those affected by STFs. This finding concurs with reports by Bell and co-authors (2013) as well as Yeoh and colleagues (2013) who reported that cases of STF events were more common amongst nursing assistants. This finding is in contrast to what Alamgir and co-workers

(2011) found as they reported that the majority of STFs occurred among facility support staff members. Indeed, in this study, non-clinical staff members reported the highest numbers of STFs as compared to clinical staff. This is also in contrast with Collins et al., (2004) who found that clinical staff reported most cases of STFs than non-clinical staff.

In this study, the most commonly affected body parts by STFs were ankles (18%), legs (17.4%), arms (15.9%) and the resulting soft tissue injuries lead to swelling and bruises. Professional nurses reported most cases of ankle, leg and arm injuries while among cleaning staff members, arms and soft tissue injuries were more prevalent. This finding concurs with reports by Yeah and co-workers (2013) as well as Bell and colleagues (2008) in which lower extremities including knees, ankles, feet and toes were commonly affected in case of an STF event. Bentley (2009) pointed out that the occurrence of STFs is a function of distal and proximal factors. Distal factors create conditions that elicit substandard or unsafe behaviour without eminent threat and proximal factors on the other hand, relates to time and place of the injury. It should be noted that the perception of potential threat is affected by individual factors i.e. age, risk taking behavior, visual impairment or being engaged in concurrent activities while walking. In order to reduce the rate of injury or occupational STFs in health care facilities, these factors should be taken into consideration when planning interventions (Bell et al., 2013).

The findings of this study should be interpreted with some caution especially when taking into account some of the study limitations. As a cross-sectional study, no temporal relationships could be established. This study was a retrospective study in which existing records - routinely collected for non-research purposes - were reviewed. Hence, narratives describing details related to the circumstances of accidents were not available. This information could have been useful to guide specific prevention strategies about STFs. For instance, details such as the state of the floor at the time of the incident; whether it was wet, slippery, or uneven; the activities that were performed when specific injuries occurred.

In the light of the above findings, it is clear that more research studies and innovative STF prevention strategies are required to reduce the rate of STF-related injuries. Firstly, awareness campaigns can be conducted across health facilities particularly district hospitals that reported more cases in this study. In these campaigns, health workers can be sensitized to the potential and eminent dangers they face while carrying out their duties and how to recognize these dangers. Secondly, floor surfaces (especially those that are constantly wet) can be textured to provide adequate surface grip and friction. Thirdly, the most vulnerable population of health workers should be provided with slip-resistant footwear for enhanced traction and stability. Fourthly, safety measures and policies should be upheld especially by those responsible for housekeeping to ensure that adequate signage such as “wet floor” signs are visible every time the floor surfaces are cleaned. Accident hotspots within the facilities should be identified and warning signs should be appropriately displayed to warn health workers and other users of health care facilities of the potential dangers.

## Conclusion

This study has shed some light on the occurrence of STF-related injuries amongst health workers in health care facilities in Limpopo Province of South Africa. The study found that the prevalence of STF-related injuries among health workers was 20%. STFs are more common among nursing staff and non-clinical support members, who are females and over the age of 40 years old. Interventions to reduce these STFs are required to create a safe and conducive work environment for all health care workers. The understanding of the important factors contributing to the occurrences of STFs should assist in the design of interventions aimed at curbing these incidents.

## References

- Andersen L. L., Clausen T., Burr H., & Holtermann A. (2012) Threshold of Musculoskeletal Pain Intensity for Increased Risk of Long-Term Sickness Absence among Female Healthcare Workers in Eldercare. *PLoS ONE* 7(7): e41287.
- Bentley, T. (2009). The role of latent and active failures in workplace slips, trips and falls: An information processing approach. *Applied Ergonomics*, 40, 175-180.
- Bell, J. L., Collins, J. W., Wolf, L., Grönqvist, R., Chiou, S., Chang, W., Sorock, G. S., Courtney, T. K., Lombardi, D. A. & Evanoff, B. (2008). Evaluation of a comprehensive slip, trip and fall prevention programme for hospital employees\*\*. *Ergonomics*, 51(12), 1906-1925.
- Bell, J. L., Collins, J. W., Dalsey, E., & Sublet, V. (2010). Slip, trip and fall prevention for healthcare workers. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Publication no.2011-123.
- Bell, J. L., Collins, J. W., Tiesman, H. M., Ridenour, M., Konda, S., Wolf, L., et al. (2013). Slip, Trip, and Fall Injuries Among Nursing Care Facility Workers. *Workplace Health and Safety*, 61 (4), 1-6.
- Bureau of Labor Statistics. Case and demographic characteristics for work-related injuries and illnesses involving days away from work 2011-2013. 2014 available from [http://www.bls.gov/news.release/archives/osh2\\_12162014.pdf](http://www.bls.gov/news.release/archives/osh2_12162014.pdf) [Accessed 15 May 2014]
- Collins, J. W., Wolf, L., Bell, J., & Evanoff, B. (2004). An evaluation of a “best practices” musculoskeletal injury prevention program in nursing homes. *Injury Prevention*, 10, 206–211.
- Courtney TK, Sorock GS, Manning DP, Collins JW, Holbein-Jenny MA. (2001). Occupational slip, trip, and fall-related injuries--can the contribution of slipperiness be isolated? *Ergonomics*; 44:1118–1137
- Kemmlert K, Lundholm L. (2001). Slips, trips and falls in different work groups with reference to age and from a preventive perspective. *Applied Ergonomics*; 32:149–153.
- Kielkowski, D., Rees, D., & Bradshaw, D. (2004). Burden of occupational morbidity in South Africa: two large field surveys of self-reported work-related and work-



- aggravated disease. *South African Journal of Science*, 100, 339-402.
- Miller, K. (2013). Risk factors and impacts of occupational injury in healthcare workers: A critical review. *Musculoskeletal Medicine*, 1(1), 1-6.
- Reubenstein, L. Z., & Josephson, K. R. (2002). The epidemiology of falls and syncope. *Clinics in geriatric medicine*, 18(2), 141-158.
- Seedat, M., Van Niekerk, A., Jewkes, R., Suffla, S., & Ratele, K. (2009). Violence and injuries in South Africa: prioritising an agenda for prevention. *The Lancet*, 374(9694), 1011-1022.
- Statistics South Africa (2013). Mortality and causes of death in South Africa, 2010: Findings from death notification. Statistical release P0309.3
- Troy, K. L., Donovan, S. J., Grabiner, M. S., & Graniber, M. D. (2009). Theoretical contribution of the upper extremities to reducing trunk extension following a laboratory-induced slip. *Journal of biomechanics*, 42(9), 1339-1344.
- World Health Organization. (2006). The world health report: 2006: working together for health. World Health Organization, Geneva, Switzerland.  
[http://www.who.int/whr/2006/06\\_chap1\\_en.pdf](http://www.who.int/whr/2006/06_chap1_en.pdf) [accessed 15 May 2015]
- Yeoh, H. T., Lockhart, T. E., & Wu, X. (2013). Nonfatal Occupational Falls Among US Health Care Workers, 2008–2010. *Workplace health & safety*, 61(1), 3.