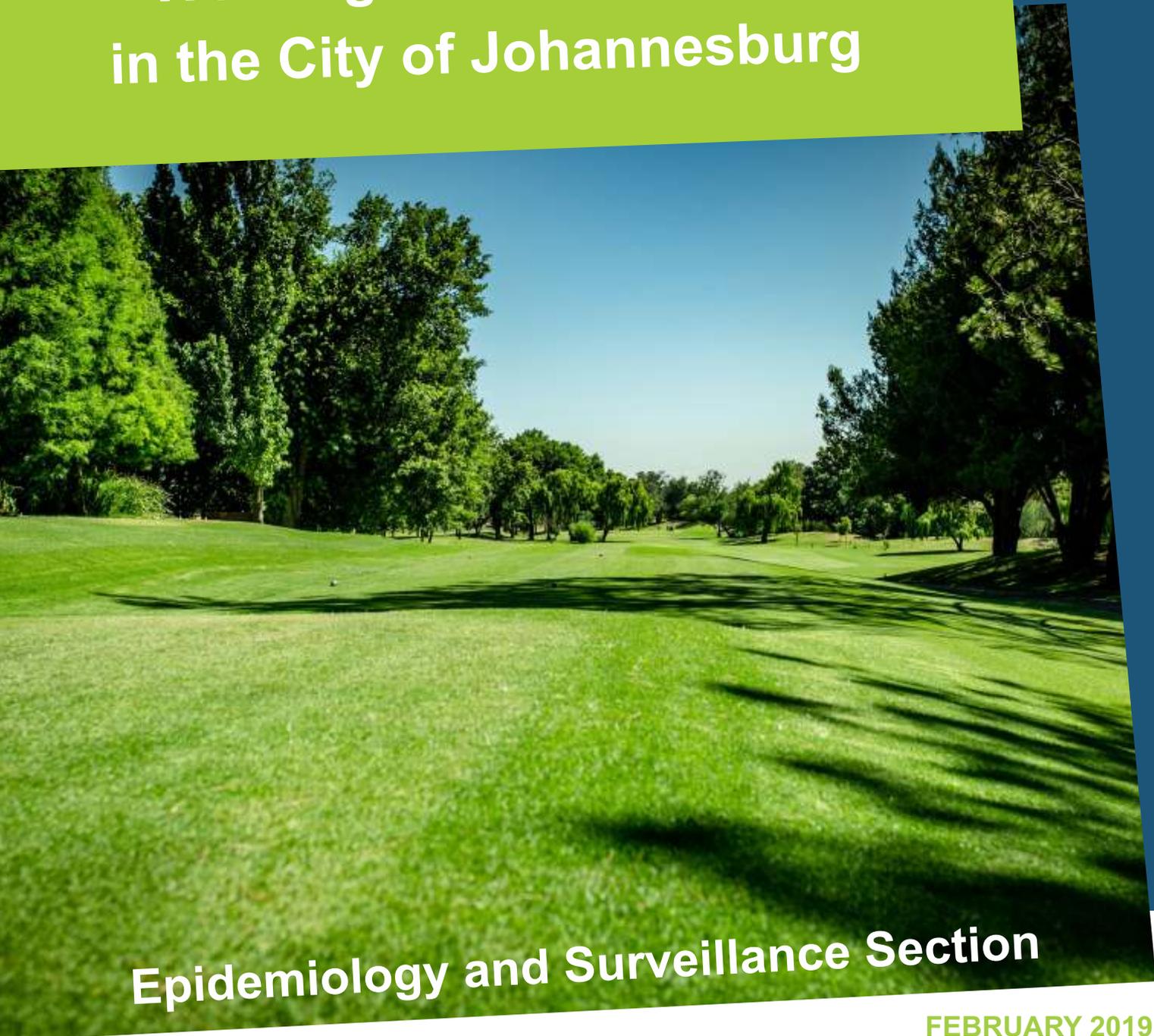


Working Conditions and Health Outcomes of Caddies Working in Golf Courses in the City of Johannesburg



Epidemiology and Surveillance Section

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ABBREVIATIONS AND ACRONYMS

BMI	Body mass index
CMD	Common Mental Disorders
GIT	Gastrointestinal Tract
Hb	Haemoglobin
HIV	Human Immunodeficiency syndrome
MSD	Musculoskeletal disorders
NHL	Non-Hodgkin's Lymphoma
NGO	Non-Governmental Organisation
NIOH	National Institute for Occupational Health
PPE	Personal Protective Equipment
PGA	Professional Golfers Association
RTI	Respiratory Tract Infections
TCPy	3,5,6-trichloro-2-pyridinol

EXECUTIVE SUMMARY

Caddies form an essential part of the golf industry. They have multiple responsibilities besides carrying the golf players bag, however, are often seen as unskilled workers, and working conditions are generally poor. Caddies, like other workers in the informal economy, have virtually no training in Occupational Health and Safety resulting in a higher health risk profile. The working environment is usually unregulated, and there is little or no protection available from laws pertaining to Occupational Health and Safety. However, in South Africa, the extent of the health risks and health outcomes, as well as the working conditions, are not known. There is a dearth of research conducted on the health hazards and outcomes affecting caddies in Africa and internationally.

This project aimed to assess the working conditions and associated health outcomes of caddies working on golf courses in Johannesburg, South Africa.

A cross-sectional study was conducted in November 2018 in six (6) golf courses in Johannesburg. A total of 323 participants were conveniently sampled: 249 caddies and 74 non-caddies (waiters, cleaners, security guards and groundsman). Trained fieldworkers conducted structured interviews using the electronic RedCap data processing software after informed consent was obtained. The questionnaire included questions on the socio-demographic profile, behavioural and hygiene characteristics, exposures and risks at the golf courses and health outcomes (acute, chronic) and mental health. Also, research nurses conducted a basic health screening assessment: body mass index (BMI), blood pressure, haemoglobin, random glucose, and cholesterol levels. Data were analysed using STATA SE version 15. Continuous data are presented as means, medians and range. Categorical data are presented as percentages.

The participants' age ranged between 22 – 67 years with a mean of 46 years. In both caddies and non-caddies, the majority (68%) had secondary school education. About a third of caddies and non-caddies



(28%) resided near to the golf courses. The majority of caddies, (70%) lived in formal dwellings with a third living in informal dwellings (30%). However, the pattern was different in non-caddies, with 50% living in formal and 47% in informal dwellings. Fifty percent (50%) of caddies had a monthly income of less or equal to R2800 per month, and only 7% earned more than R5000 per month, with a median income of R2400 per month. The non-caddies earned on average double that of the caddies with a median of R4500. In keeping with the very low socio-economic status of caddies, there was a high level of food insecurity amongst caddies. Other potential expenses for caddies were contributions to a funeral policy. However, some golf courses contributed to the policy on behalf of the caddies. A few golf courses had a development fund for the caddies. However, caddies were not certain about what the fund was used for.

Caddies working days were spread out from one day per week to seven, with a median of 3 days per week

for 4 hours although 48% worked for 4-7 days per week. This corresponds with most caddies carrying on average of three bags per week. The non-caddies generally worked 5-7 days per week, with a median of 5 days and 8 hours per day. The caddies work experience ranged from 9 months to 46 years.

Approximately 60% of all caddies reported that being hit by a golf ball was a moderate or major concern, with the largest proportion of caddies from golf club 5 (77%). Caddies from golf club 5 also reported that pesticide smells were a moderate or major concern followed by golf club 1. There were no differences in reported dust exposure by caddies across golf courses. Pesticide exposure was measured using a urinary biomarker of chlorpyrifos, 3,5,6-trichloro-2-pyridinol (TCPy). TCPy was detected in 100% of the study sample (caddies and non-caddies).

The median levels of TCPy were 3.7 µg/gCr, ranging from 0.36 to 94.3 µg/gCr. Overall, there were no differences in levels of TCPy across caddies, groundsmen and non-groundsmen. Caddies from golf club 6 had the highest average pesticide levels, followed by golf club 4. Groundsmen from golf club 3 had the highest average pesticide exposure levels, followed by golf club 6. Participants from golf club 1 had the lowest chlorpyrifos exposure. There were marked differences in the provision and use of personal protective clothing across the six golf clubs with only golf club 1, 5 and 6 providing up to 98% of the required protective clothing.

In the last six months, 7% of caddies and 18% of non-caddies reported an injury. The commonest injury for caddies was being hit by a golf ball (3.2%), followed by sprains and muscle strains (1.6%), falls (1.2%) and inhaling toxic fumes (1.2%). In the non-caddie group, 8% reported lacerations and 3% were injured by a golf cart.

The caddies reported a higher prevalence of musculoskeletal aches, pains, discomfort or numbness. The area's most commonly affected was the lower back (37%), shoulders (35%) and feet and ankles (32%). In the control group, shoulder disorders (24%) was followed by neck (23%) and upper and lower back (18.9%) disorders. Over 40% of caddies who reported pain in the lower back and ankles and feet were unable to work during the episodes of pain. In the past two weeks before the

survey, upper respiratory tract symptoms (cough, runny nose, sneezing, headaches) accounted for the majority of symptoms in both caddies and non-caddies. Teary / watery eyes were reported in 28% of caddies, higher than in non-caddies. This might be an indication of allergies or upper respiratory tract infections. Muscles aches were approximately 15% higher in caddies. Sunburn prevalence was similar in both groups possibly because many of the non-caddies were groundsmen. Among caddies, vision abnormalities followed by hypertension were the commonest chronic condition reported. Among non-caddies, hearing abnormalities and vision abnormalities were most commonly reported.

Approximately 35% of caddies and 24% of non-caddies screened positively for Common Mental Disorders (CMD). CMD is a combination of anxiety and depression symptoms. It should be noted that there was a significant difference between the prevalence found using the tool for CMD screening compared to the self-reported mental ill health which was very low, indicating a lack of awareness of mental health symptoms. Approximately 50% of caddies reported being intimidated or bullied by golf players. Only 46% reported these incidents and of these only 51% had the issue resolved. Caddies stated that they did not want to report incidents for fear of losing their jobs or they did not believe that management would do anything about the golfers behaviour.

At least 58% of the participants attended a health care facility in the past year. The main barriers to health care access were long waiting times, poor quality of service and transport issues.

There are several limitations to this study. The cross-sectional design and a convenient sample may have resulted in bias. The majority of the data collected is self-reported, and thus there could be an issue of recall bias as well as interviewer bias. This may have led to underreporting of exposures and health outcomes by participants.

Based on the results of the study, the following recommendations have been suggested:

Challenges	Recommendations
1. Exposure to pesticides	<ul style="list-style-type: none"> Further investigation and control of pesticide exposure in staff (caddies and non caddies) as well as golfers.
2. Income instability	<ul style="list-style-type: none"> To facilitate stability for the caddies by supporting the development of other (pay-for service) skills performed by caddies.
3. Prevalence of injuries	<ul style="list-style-type: none"> Support provision of adequate personal protective equipment (PPE).
4. High prevalence of psychological distress	<ul style="list-style-type: none"> Collaborating with organisations such as the South African Federation of Mental Health (SAFMH) could provide support and offer services for all staff, not only caddies. In addition improving working conditions, including income stability, may improve mental and physical health.
5. Limited access to extended health care services	<ul style="list-style-type: none"> Health screening at golf clubs (where provided) should include vision and hearing screens. Screening for allergies is recommended as many caddies reported upper respiratory tract and ocular symptoms.
6. Absence of health promotion and education programs for caddies.	<ul style="list-style-type: none"> Partnerships between golf clubs, local health facilities or NGO's could assist in the provision of health and lifestyle awareness programs.
7. Inadequate caddie houses	<ul style="list-style-type: none"> Access to adequate shelters when not carrying a bag, as well as access to clean and well-maintained ablution facilities is essential.
8. Caddies feel that their concerns are not heard by management.	<ul style="list-style-type: none"> Regular meetings between caddy masters and management may improve communication and transparency between golf club management and caddies with regards to contributions made by or on behalf of caddies, e.g. funeral policy and development fund. In addition, there should be an open line of communication to report incidents such as injury or bullying.

Chapter 1

Introduction

The golf industry is a large and expanding industry in South Africa. A survey conducted on behalf of the Professional Golfers Association of SA (PGA) estimated that golf contributed R58.4 billion to the South African economy (Sports Trader, 2009). Caddies form an essential part of the golf industry. These workers are responsible for carrying the golf player's bag and often walk ahead of the four-ball to locate the golfer's ball and calculate the distance to the pin and warn of hazards such as sand traps. A caddie can read greens, clean golf balls, fix ball marks in the turf, and attend to the flag. A caddie also provides the service of raking sand traps on the course if the golfer hits his ball into them. Caddies can advise on club selection, weather variables, and marking balls on the green. However, it is generally seen as a low skilled job, and often it is accompanied by poor working conditions.

Caddies form part of the informal economy in South Africa and internationally. Workers in the informal economy have little control over their work environment and virtually no training in occupational health and safety resulting in a higher health risk profile (Alfers and Rogan, 2015). The working environment is usually unregulated and often not safe, and there is little or no protection available. Caddies are usually paid at the end of the game in cash, or in some clubs, they may receive a ticket for which they exchange for cash at the clubhouse. The amount of money earned per day ranges from R0 to R500 depending on the golf club and if the caddie is selected to carry a bag (Personal communication at a meeting with caddies, 11 May 2018).

The caddies work long hours often greater than 12 hours per day (Heo et al., 2004; Jung et al., 2011).

Other job-related hazards include low income, informal employment and direct exposures at the golf club such as musculoskeletal injury, pesticides exposure, sun exposure and injuries from golf balls and golf carts (Heo et al., 2004). Pesticides including insecticides, herbicides, fungicides and plant growth regulators are used to protect the health of turf, trees and other living things on the golf course. However, these chemicals may pose significant risks to human health and the environment. The use of golf course maintenance chemicals is increasing. In the United States, golf courses apply four to seven times the average amount of pesticides used in agriculture. The most commonly used conventional pesticides used are 2,4-D, glyphosate, dicamba, diazinon, chlorpyrifos, carbaryl and malathion, bensulide, chlorothalonil, maneb, mecoprop, thiram, trichlorfon, ziram. Lawn care chemicals are potentially carcinogenic and may affect reproductive health. Early epidemiological studies have reported associations between non-Hodgkin's lymphoma (NHL) and the use of 2,4-D (McDuffie et al., 2001, Zahm and Blair, 1992), glyphosate (Portier et al., 2016), MCPP, dicamba, and diazinon (Reviewed by Shinasi and Leon, 2014) on turf treatments.

Limited research has been conducted on the health effects of pesticides used on golf courses. Two studies have concluded that players on golf courses are exposed to more pesticides than non-golfers, but at levels that are probably not harmful in the long run

(Murphy & Haith, 2007; Putnam et al., 2008). A recent PhD study in the USA found exposure to the pesticides studied was well below any level of concern (Doherty, 2017). Research in workers found correlations between pesticide contact and cancer levels in chronically exposed workers (Kross et al., 1996).

Musculoskeletal problems occur from standing for prolonged periods, walking or running on uneven or inclined fields and carrying a golf bag (Jung et al., 2013). Heo et al. (2004) in a study including 316 caddies showed that problems were mainly encountered in the leg, knee, ankle, foot (41%), lower back (35.8%) and shoulder regions (35.8%). Risk factors related to the injuries were long daily working hours, winding and inclined courses, important factors affecting musculoskeletal symptoms were daily carrying heavy loads, and instability of employment.

Due to prolonged hours in the sun, caddies are also at risk of sunburn and heat exhaustion, heat stroke and skin cancer.

This sector of the informal economy has not been studied in South Africa, and minimal research is available internationally. This study was conducted to assess the working conditions, health and health care access of golf caddies at golf courses in South Africa.

AIM

This study aims to generate knowledge on the working conditions and health outcomes associated with caddies working on golf courses in Johannesburg in 2018.

OBJECTIVES

1. To describe the socio-demographic profile of Caddies and formally employed workers (waiters, groundsman, security staff, cleaners: non-caddies) at the golf course.
2. To describe the working environment and potential hazards/ exposures.
3. To describe the health status using a baseline health screening assessment and a questionnaire (self-reported health status).
4. To describe the health care access of caddies and the formally employed workers (non-caddies).
5. To determine the differences in health outcomes between the caddies and formally employed workers (non-caddies).

Chapter 2

Methodology

2.1 STUDY DESIGN AND STUDY SETTING

A cross-sectional study was conducted among caddies and non-caddies working at golf courses in Johannesburg, South Africa.

There were 44 Golf Courses identified in the greater City of Johannesburg. The Johannesburg municipality is divided into seven regions, and the five central regions were chosen for this study (regions B-F). A total of 17 golf courses within the regions selected were identified and grouped based on average green fees.

Three groups were created: expensive, mid-level and affordable, two to three courses each were randomly selected from these groups using random number generator from random.org. This study only included adult male caddies and waiters, security, cleaning staff and groundsmen as non-caddies.

2.2 STUDY POPULATION AND SAMPLE

Seven golf courses were selected and approached. However, only six (6) finally participated in the study. Convenience sampling was used to sample the caddies and non-caddies. A sample size of 360 participants was calculated- 300 caddies and 60 non-caddies. Thus those who were available during the study days were invited to participate in the study.

Participants aged 18 years and older and males were included in the study. The participants (caddies and non-caddies) were matched for socio-demographic criteria.

2.3 DATA COLLECTION

2.3.1 Interviews

Trained fieldworkers visited the sites during working hours (8 am to 3 pm). The caddies and non-caddie employees were provided with an information sheet explaining the study, especially focusing on the questionnaire and health assessment process. Following informed consent, a structured questionnaire was administered to the participant to obtain information on socio-demographic status, working conditions, health status and access to health care and health and safety measures. The questionnaires were administered in a language that the participant was comfortable with. Tokens of appreciation (R50) were given to the participants.



Interviews being conducted at one golf club where caddies were provided with room to store bags and clubs donated to them.

2.3.2 Health Screening Assessments

Health screening assessments were performed by trained medical professionals and included an anthropometric assessment, measurement of blood pressure, glucose, haemoglobin and cholesterol levels. Anthropometric assessments included the measurement of body weight (kg) and height (cm) of each participant (caddies and non-caddies). Thereafter, the body mass index ($BMI = \text{weight (kg)} / \text{height (cm}^2\text{)}$) was calculated.

Three blood pressure measurements were taken using an automated blood pressure monitor with an appropriate adult sized cuff, 5 minutes apart. A finger prick blood sample was taken for the screening of blood glucose, cholesterol and haemoglobin (Hb).

Blood glucose and cholesterol were measured using the Accutrend Plus. Haemoglobin was measured using the Hemocue haemoglobinometer. Both machines were calibrated using the manufacturer's calibration strips at the start of the fieldwork day.



2.3.3 Samples: Urine for Pesticide Analyses

Pesticide exposure was measured in urine samples. Common lawn care pesticides include organophosphate pesticides such as chlorpyrifos, diazinon, trichlorfon and bensulide, herbicides such as glyphosate, 2,4-D and dicamba (Wessels et al., 2003).

The measurement of pesticide metabolites in urine (general and specific) allows for the prediction of dose-response relationships for many of the pesticides currently applied on the lawn among golf

courses. Biomarkers of pesticide exposure can be a valuable tool in assessing occupational pesticide exposure and can improve exposure assessment and reduce misclassification, thereby strengthening the exposure-outcome relationships.

In this study, chlorpyrifos was measured in the urine. Urine samples were collected in a 50 ml urine sample container. Urine samples were kept on ice and transported to an accredited laboratory.

2.4 DATA MANAGEMENT AND ANALYSES

All study data were entered by fieldworkers directly into REDCap, an electronic database capture and management tool. All data cleaning and analysis was conducted using Stata 15 SE version 4.2.

Summary measures consisting of means, medians and interquartile ranges for all continuous or discrete study variables were documented. Description of socio-demographic, clinical, and biological characteristics of the participants was conducted; these are presented in number percentages.

2.5 ETHICS APPROVAL

The study commenced with introductory meetings with golf club management and caddie representatives at each site, to introduce the study, explain what will be done broadly, and to discuss any concerns that anyone may have regarding the study. These meetings also served to obtain more information on potential hazards, the best language for communication and health literacy.

All participants were informed of their health screening results. Participants with abnormal clinical findings, i.e. blood pressure more than

140/90 mmHg, random blood glucose more than 7 mg/dL, Hb less than 8 g/dL, and a cholesterol level of more than 6 mg/dL were referred to their nearest primary health care facility for further treatment. Participants with abnormal urine results will be referred to their nearest hospital for diagnostic assessment and appropriate treatment and care.

Approval from ethics was obtained from the University of the Witwatersrand, Human Research Ethics Committee (Medical). Ethics approval number: M180661. (Appendix).

2.6 LIMITATIONS

The cross-sectional study design does not enable one to determine causality. Also, the timing of the snapshot may have added to the bias resulting in the data not being generalizable. The convenient sampling of the caddies and non-caddies that participated may have limited the generalisability of the results. The researchers were unable to assess the characteristics of caddies and non-caddies that

chose not to participate in the study, which could have differed from those who participated. The data collected were self-reported, and thus there is an issue of recall and interviewer bias. Underreporting of exposures and health outcomes may have affected the results. However, this was minimised by intensive training of fieldworkers.

Chapter 3



Results

3.1 SOCIO-DEMOGRAPHIC PROFILE

A total of 323 men participated in the study, a response rate of 90%. The participants' age ranged between 22 – 67 years with a mean of 46 years. The majority of the participants, 311 (96%), were from South Africa followed by those from Zimbabwe, Swaziland and Malawi (2%), (0.06%) (0.03%), respectively. Of those who were born in South Africa, the majority of caddies (61%) were from Gauteng followed by Limpopo (27%) with the opposite in non-caddies 58% from Limpopo, and 32% from Gauteng and others were distributed across the remaining

provinces. The level of education was mainly secondary school with the majority of both caddies and non-caddies (68%), having secondary education. About a third of caddies and non-caddies (28%) resided near the golf courses. The majority of caddies, (70%) were found to be living in formal dwellings, with a third who live in an informal dwelling (30%). The pattern was different in non-caddies with 50% living in formal and 47% in informal dwellings and 3% were homeless at the time of the study.

Fifty percent (50%) of caddies had a monthly income of less or equal to R2800 per month, and only 7% earned more than R5000 per month, with a median income of R2400 per month. The non-caddies earned on average double that of the caddies with a median of R4500. There were significant differences in the socio-demographic profiles between caddies and non-caddies, specifically for age, income, but not for education and housing type. (Figure 1).

On average, caddies spent less money on purchasing food in a month (R1190) compared to groundsman (R1831) and non-groundsman (R1953). In figure 2, more caddies overall reported running out of money for food in the last 30 days, having to eat less and having to decrease the size of their meals because of not enough money compared to groundsman and non-groundsman. This indicates a high level of food insecurity amongst all groups but more so for caddies.

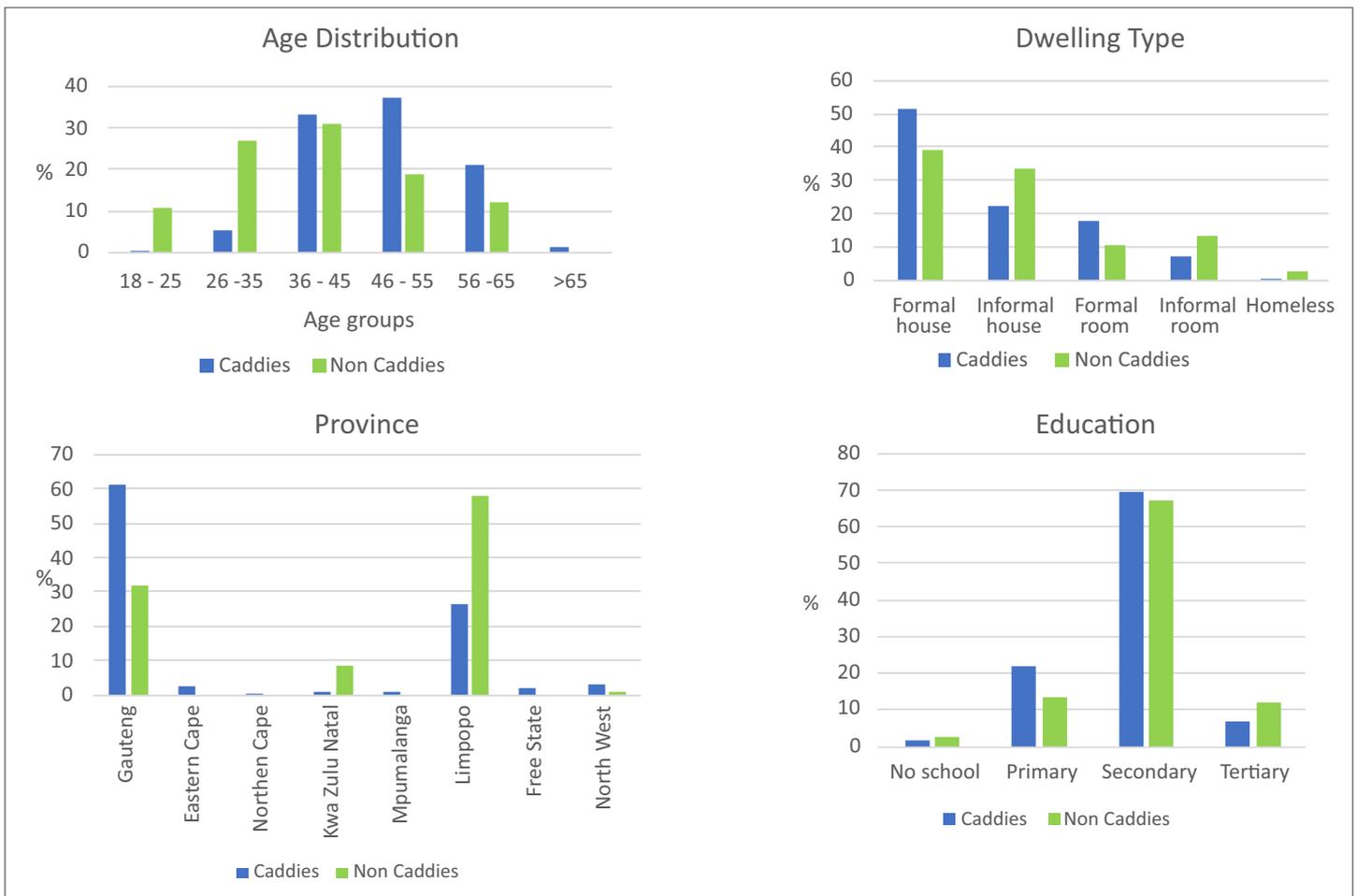


Figure 1 Demographics of caddies and non-caddies.



Figure 2 Food insecurity prevalence

Concerns of caddies regarding the Funeral Policy and Development Funds

Other potential expenses for caddies were contributions to a funeral policy or some golf courses contributed to the policy on behalf of the caddies. Some golf courses had a development fund for the caddies; however, caddies were not certain about what the fund was used for. This may indicate poor communication between golf course management, caddie associations and the caddies themselves.

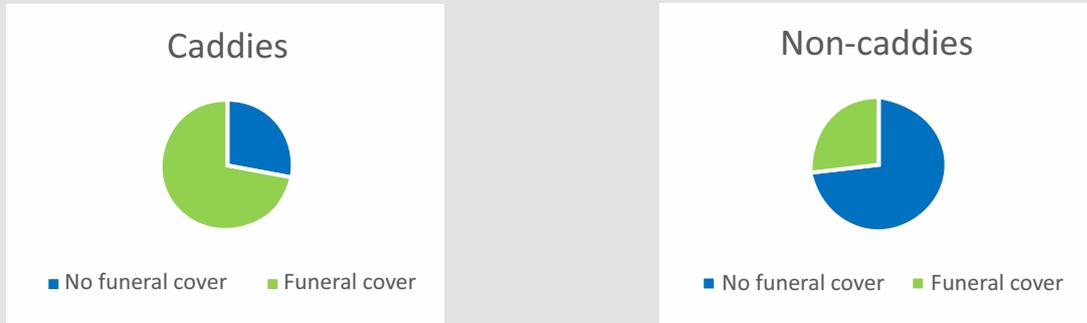


Figure 3 Funeral Policies distribution

3.2 OCCUPATIONAL HISTORY

A small proportion (22%) of caddies reported another source of income, while only 3% of non-caddies had a secondary income. Most of the extra paid work the caddies conducted was activities on the golf course. Few caddies or non-caddies (20%) did odd jobs at home. A large proportion of caddies (71%) had held other jobs before becoming caddies in as many

different jobs as there were caddies. They worked in security, construction and driving. Half of those (53%) who reported previous jobs had more than one previous job. The reported reasons for leaving their jobs were working conditions such as dust, hot sun, long hours or poor pay.

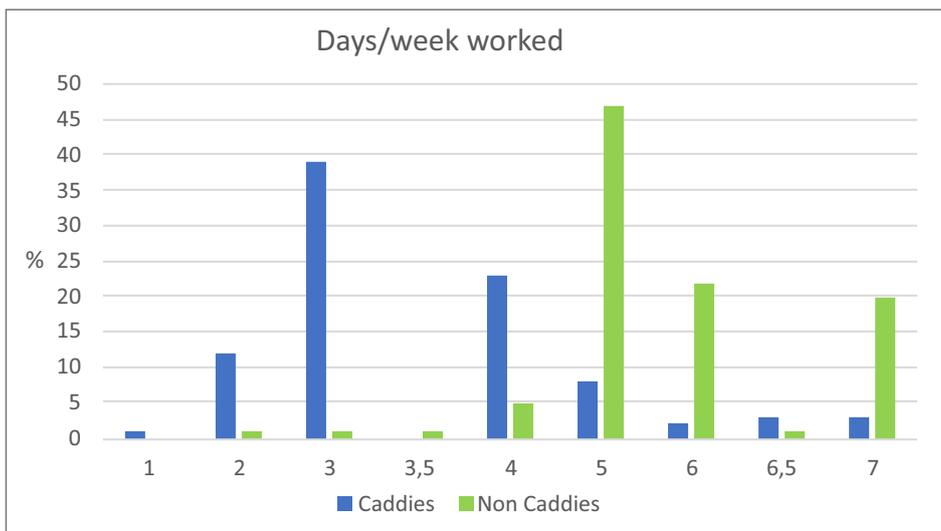


Figure 4 Number of days worked per week for caddies and non-caddies

Caddies working days were spread out from one day per week to seven, with a median of 3 days per week for 4 hours although 48% work 4-7 days per week. This corresponds with most caddies carrying on average three bags per week.

The non-caddies as employees were more likely to work 5-7 days per week, with a median of 5 days and 8 hours per day. The caddies experience ranged from 9 months to 46 years.

3.3 OCCUPATIONAL EXPOSURES

3.3.1 Personal Protective Clothing

There were marked differences in the provision and use of personal protective clothing across the six golf clubs (Figure 5). Three golf clubs (1, 5, and 6) supplied nearly all (94% to 98%) caddies with uniforms. Uniforms mainly consisted of trousers and a shirt or overalls. However, golf club 1 provided the majority of caddies with hats (86%) and shoes (93%) that they used while working. Golf club 4 provided

less than a third of caddies with a uniform. Only 3% of caddies were supplied with gloves. Very few caddies reported using sunscreen while working. Caddies were aware of the risk of dehydration. Thus 96% of caddies reported drinking water during the day. The average weight of a golf bag carried by a caddie was approximately 15 kg and caddies walked on average approximately 6 km per game.

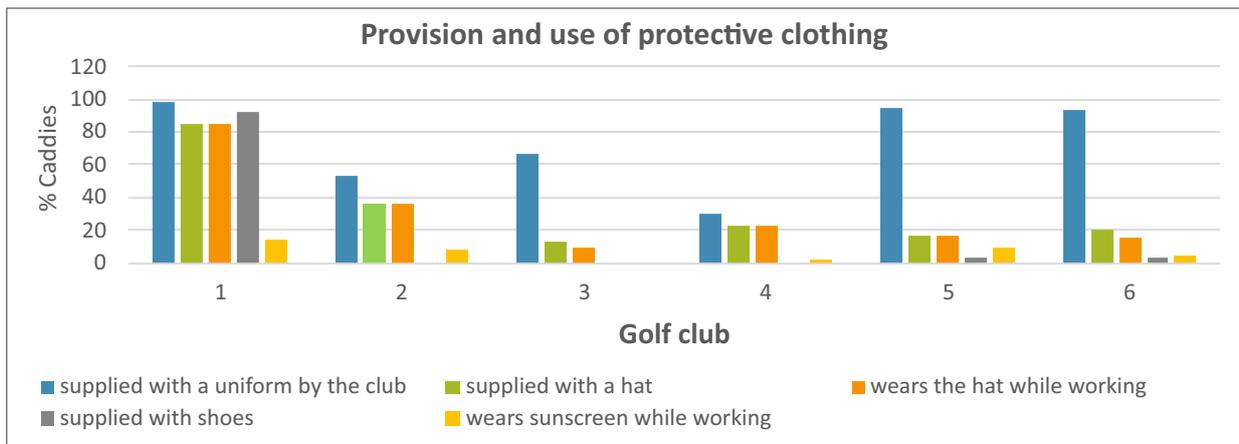


Figure 5 Provision and use of personal protective clothing



Badly damaged Caddie footwear



Damaged shoe that was self-repaired



Caddie in adequate golf shoes

Access to facilities

Golf clubs had a varying range of facilities available to caddies, from no facilities to small wooden sheds and brick, formally built, clubhouses with toilet facilities. Caddie shelters should be safe, provide lightning protection and caddies should be able to access water, sanitation and facilities with good hygiene in order to promote wellbeing.



Caddies cooking to save money with limited facilities



Inadequate heating/cooking facilities



Caddies sink and toilet in disrepair.



Inadequate washing facilities



Unsafe electrical outlet



Unplastered walls and insufficient seating for Caddies



Adequate seating in the open provided for caddies



Seating provided but still exposed to weather elements



Adequate seating in the open provided for caddies



Caddies seated on the patio outside the caddy building that included an entertainment room and a computer centre.

3.3.2 Self-reported Occupational Exposures

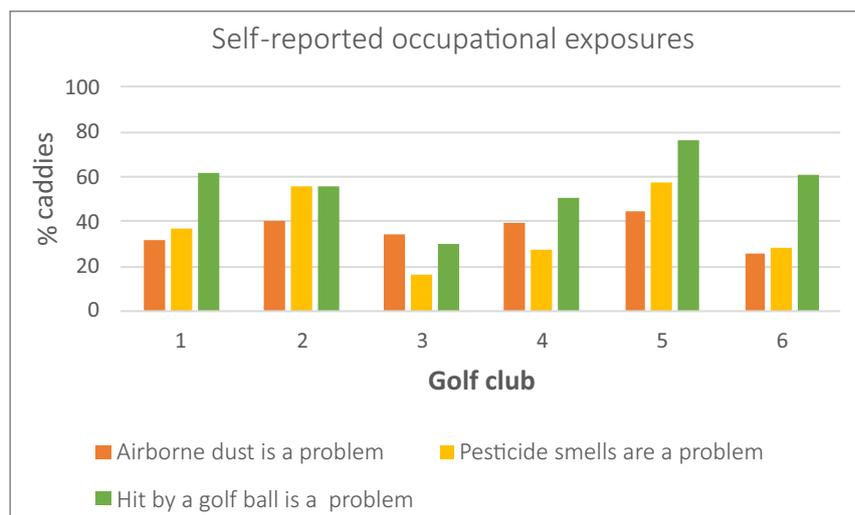


Figure 6 Self-reported occupational exposures

Approximately 60% of all caddies reported that being hit by a golf ball was a moderate or major concern, with the largest proportion of caddies from golf club 5 (77%). Caddies from golf club 5 also reported that

pesticide smells were a moderate or major concern followed by golf club 1. There were no differences in reported dust exposure by caddies across golf courses. (Figure 6).

3.3.3 Pesticide Exposure

We measured the urinary biomarker of chlorpyrifos, 3,5,6-trichloro-2-pyridinol (TCPy). TCPy was detected in 100% of the study sample (caddies and non-caddies). The median levels of TCPy were 3.7 $\mu\text{g/gCr}$, ranging from 0.36 to 94.3 $\mu\text{g/gCr}$. Overall, there were no differences in levels of TCPy across caddies, groundsmen and non-groundsmen. The distribution of average chlorpyrifos levels across the 6 golf courses by caddies, groundsmen

(maintenance and general workers) and non-groundsmen (waiters and cleaners) are shown in Figure 7. Caddies from golf club 6 reported the highest average pesticide levels, followed by golf club 4. Groundsmen from golf club 3 reported highest average pesticide exposure levels, followed by golf club 6. Participants from golf club 1 had the lowest chlorpyrifos exposure. (Figure 7)

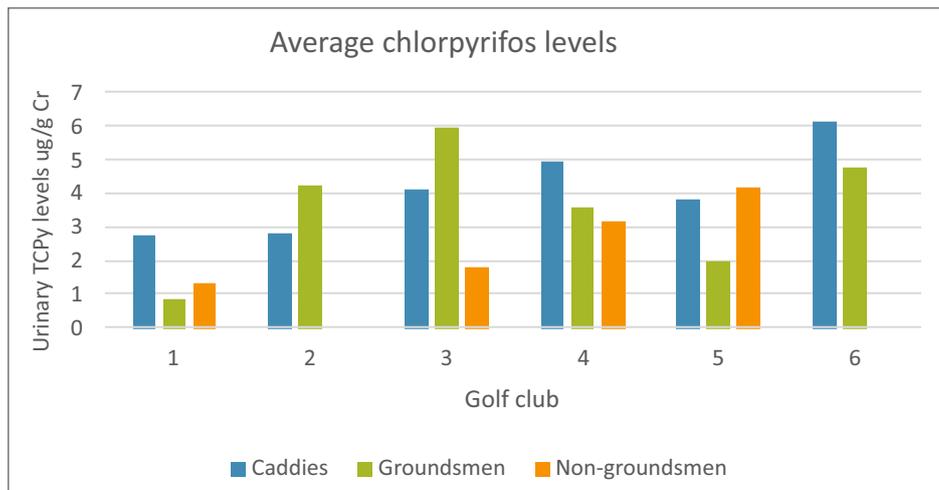


Figure 7 Average chlorpyrifos levels by golf club

Textbox 3 Chlorpyrifos exposure in context

What does this mean for golf clubs?

The average chlorpyrifos levels among caddies, groundsmen and non-groundsmen varied across clubs. Overall levels appeared similar to the reported ranges of studies measuring chlorpyrifos in the general population in the United States (NHANES). However, our results show that non-groundsmen workers such as waiters who do not have obvious direct exposure to the pesticides and the greens on average are lower, suggesting possible exposure to pesticides at the golf course. Diet and home use of pesticides can influence levels. Despite this, urine levels of participants at golf club 1 were lower suggesting that it is possible to reduce exposure.

3.3.4 Intimidation Experienced By Caddies

Caddies were asked if they ever felt or currently feel intimidated/ bullied by the golf players. Fifty percent (50%) of caddies reported some sort of intimidation compared to 23% of non-caddie staff. Of the caddies that did experience intimidation only 46% reported this to the golf club management and 51% of these

caddies had the matter resolved by management. The main reasons stated for not reporting any type of intimidation was that the caddies did not believe that management will do anything and they did not want to lose their main source of income.

3.4 SMOKING AND ALCOHOL HISTORY

More caddies (62%) reported smoking than non-caddies (40%). These proportions were higher than the South African average for men of 29.2% (Reddy P, 2015). Alcohol use was equally prevalent among caddies and non-caddies although slightly higher in non-caddies. However, caddies had reported a

higher proportion of hazardous drinking behaviour (i.e. The Alcohol Use Disorder Identification Score test: % with a total score ≥ 8) (Figure 8). The cause or risk factors for the difference will have to be explored further, but possibly it may be related to the differences in work and mental state of the caddies.

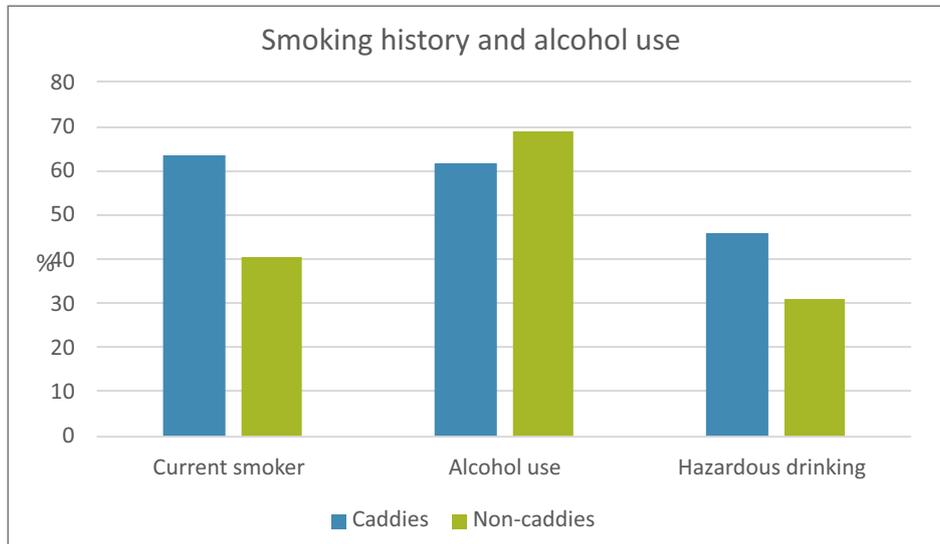


Figure 8 Smoking and alcohol history

3.5 HEALTH OUTCOMES

3.5.1 Injuries and Musculoskeletal Disorders

In the last six months, 7% of caddies and 18% of the non-caddies reported an injury. The commonest injury for caddies was being hit by a ball (3.2%), followed by sprains and muscle strains (1.6%), falls (1.2%) and inhaling toxic fumes (1.2%). In the non-caddie group, 8% reported lacerations and 3% were injured by a golf cart.

The caddies reported a higher prevalence of musculoskeletal aches, pains, discomfort or numbness. The areas most commonly affected was the lower back (37%), shoulders (35%) and feet and ankles (32%). In the non-caddie group shoulder disorders (24%) was followed by neck (23%) and upper and lower back (18.9%) disorders. (Figure 9).

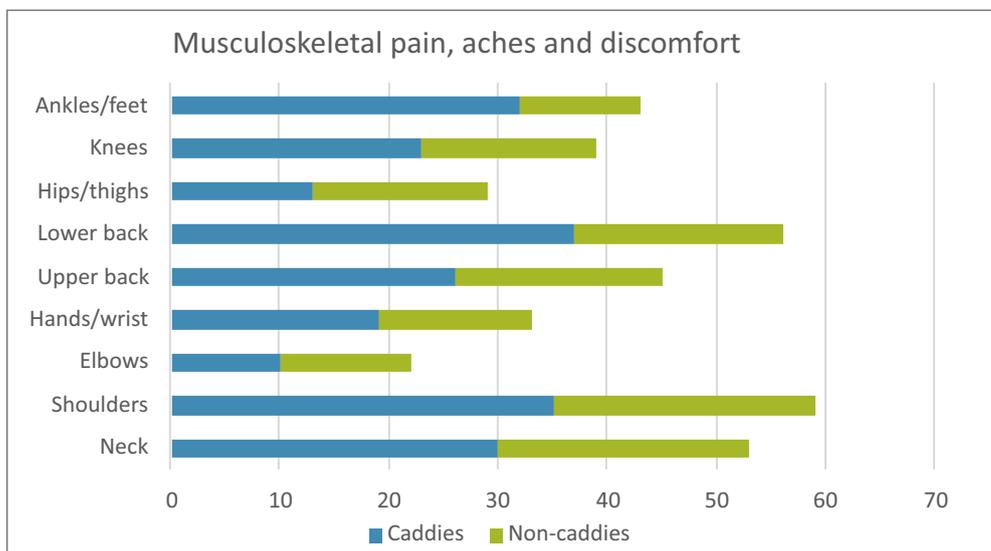


Figure 9 Musculoskeletal pain, aches and discomfort amongst caddies and non-caddies

Figure 10 illustrates the proportion of participants that were not able to work over the past 12 months due to the pain experienced in the particular region of the body.

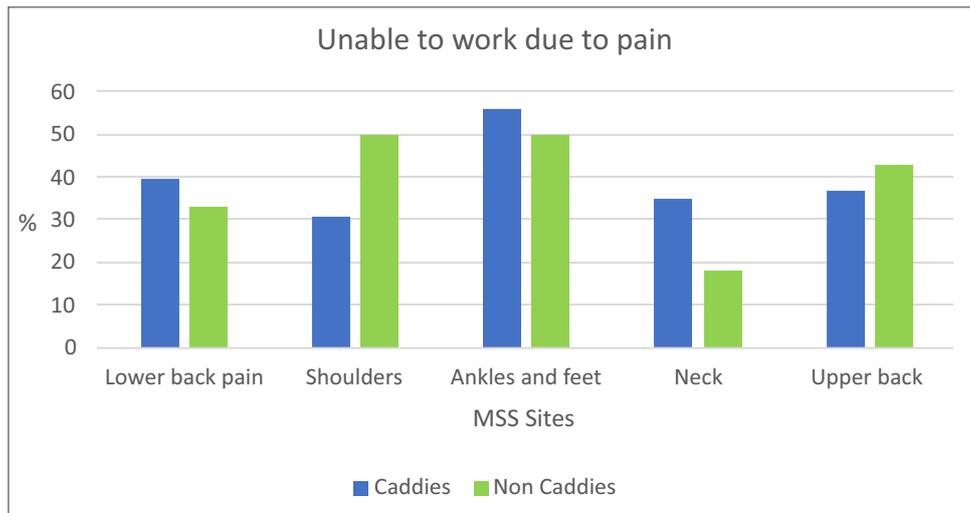


Figure 10 Proportion of caddies and non-caddies that were not able to work due to pain



Golf bags being carried and a golf bag trolley that could decrease the risk of Musculoskeletal Injury.

Text box 4 Musculoskeletal injuries and possible solutions

What does this mean for golf caddies and players?

The caddies reported that older bags were much heavier than new ones and caused more strain on the shoulders, newer designs are better for carrying. Some players also carried more extra items in their bags adding to the weight such as too many extra golf balls. A few caddies reported that semi-professional and professional players had the most extra items and weight. Communication with players about the weight of their bags may help the caddies without suggesting the players all buy new bags. Also in the long run, a few bag trolleys for the caddies to use would make a big difference in preventing muscular skeletal injuries. Caddies could also be trained on how to correctly carry the bag in order to prevent or minimise injuries.

3.5.2 Acute Ill Health

Participants were asked if they experienced acute symptoms, i.e. symptoms experienced for less than two weeks. Upper respiratory tract symptoms (cough, runny nose, sneezing, headaches) accounted for the majority of symptoms in both caddies and non-caddies. These symptoms may

reflect the high prevalence of respiratory infections or as a response to allergens in the work environment. However, muscles aches were approximately 15% higher in caddies. Sunburn prevalence was similar in both groups possibly because many of the non-caddies were groundsmen. (Figure 11).

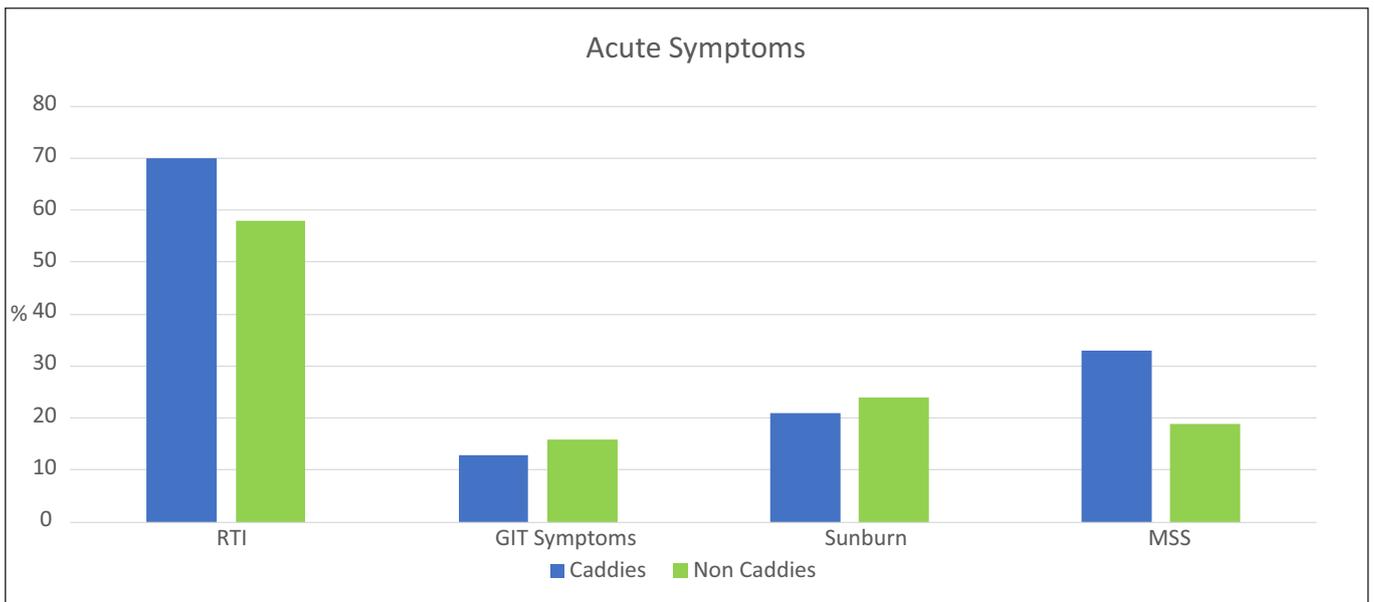


Figure 11 Acute Symptoms

Of the caddies, 19% stated that they had TB previously and of these, 96% completed the full course of treatment. Ten percent of non-caddies reported previous TB and 100% completed their

treatment. Twenty-three (23%) of caddies reported having HIV compared to 14% of non-caddies. (Figure 12).

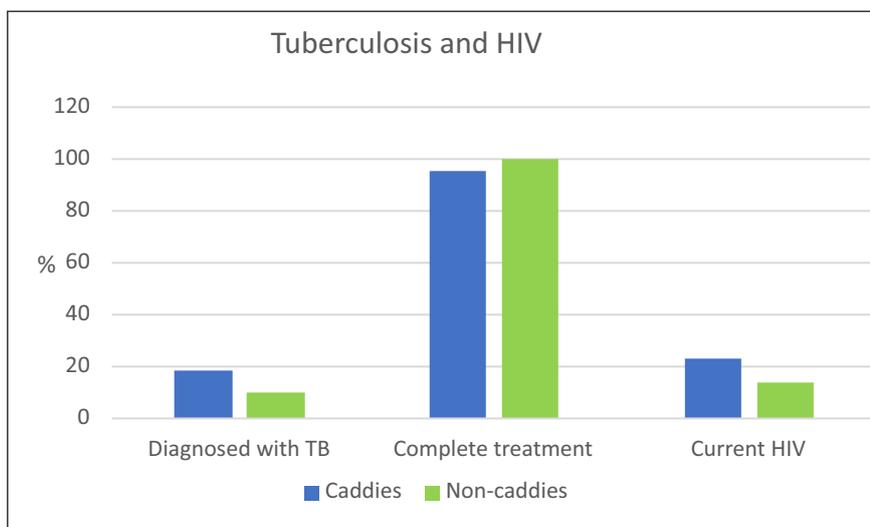


Figure 12 TB and HIV rates.

3.5.3 Chronic Ill Health

Among caddies, vision abnormalities followed by hypertension were the commonest chronic condition reported. In non-caddies, hearing abnormalities and

vision abnormalities were most commonly reported. Self-reported hypertension was much higher in caddies compared to non-caddies. (Figure 13).

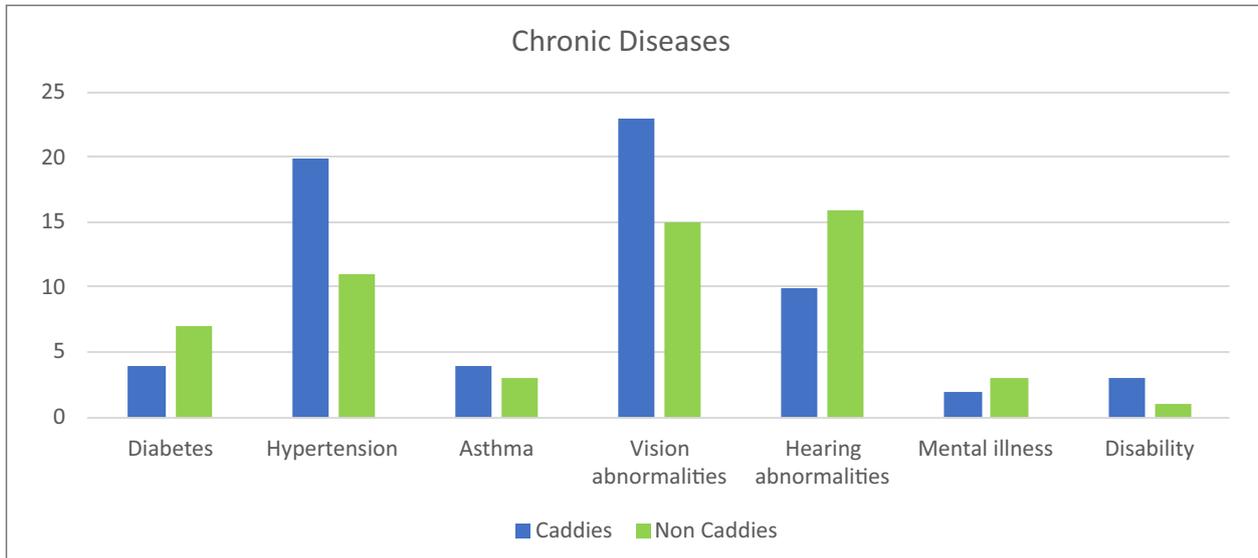


Figure 13 Self-reported chronic diseases

3.5.4 Mental Health

Mental health was assessed by the participant self-reporting on his mental state and with the WHO tool –Self Reporting Questionnaire (SRQ) for common mental disorders (CMD). Approximately 35% of caddies and 24% of non-caddies screened positively for CMD. CMD is a combination of anxiety and

depression symptoms. All groups scored very highly in this screening test. It should be noted that there was a significant difference between the prevalence found using the SRQ compared to the self-reported mental ill health. Indicating a lack of awareness of mental health symptoms (Figure 14).



Figure 14 Mental health prevalence

3.5.5 Health Screening Test Results

Approximately 38% of caddies were hypertensive on screening blood pressures. However, only 20% had a history of hypertension (Figure 15). Caddies (28%) and non-caddies (23%) were anaemic i.e. had a low haemoglobin level. There is a possibility that this may be related to diet especially since 15% of caddies

were underweight with a BMI < 18 and this ultimately relates to the poor socioeconomic status of these workers. However, 30% on non-caddies and 23% of caddies had a BMI in the overweight range (BMI > 25). None of the participants had a BMI ≥30 which would indicate obesity.

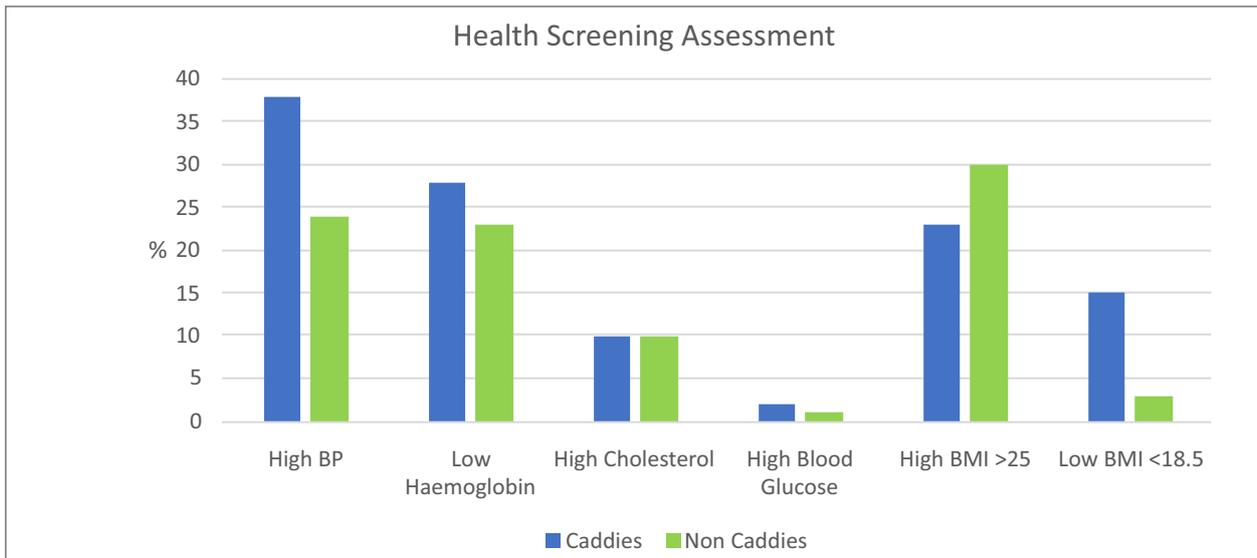


Figure 15 Health Screening Test Results



Health Screening Measurements



3.6 HEALTH CARE ACCESS

At least 187 (58%) of the participants reported they visited a clinic or doctor in the past 12 months. Comparison in percentage distribution in the clinic visit in the past 12 months showed no statistically significant difference between caddies and non-caddies. During the clinic visit, participants were also asked about how they perceived the treatment they received by clinic staff. There were 3 (4%) non-caddies out of the 74, who reported having faced at

least one of the barriers in access to healthcare, while a higher number 122 (49%) of caddies responded to facing some barriers or challenges when accessing healthcare. Transport and long waiting times were the major problems faced by the caddies in accessing healthcare, which is consistent to a similar study conducted in the informal economy by Kistan et al. 2019 (unpublished).

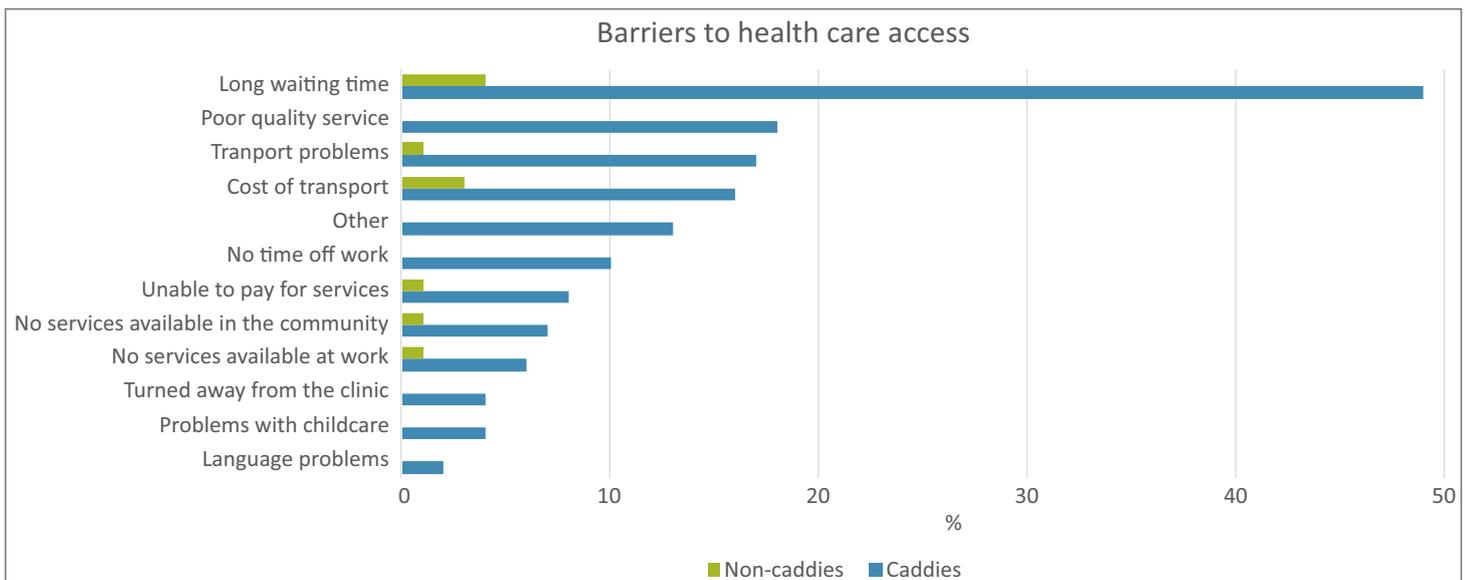


Figure 16 Distribution of barriers to healthcare access among caddies and non-caddies.

Table 1 Clinical visit, treatment, and barriers to healthcare access among caddies and non-caddies.

Clinic visit and treatment	Non-caddies (n=74)	Caddies (n=249)
Clinic visit in the past 12 months	43 (58.11%)	144 (60.25%)
Not treated well	15 (20.55%)	52 (21.67%)
Treated well	58 (79.45%)	188 (78.33%)

Figure 17 graphically demonstrates clinic visits over the past 12 months among the caddies and non-caddies. A higher number of caddies reported having visited the clinic or doctor than non-caddies.

Nearly all participants responded to the question about whether they were treated well at the clinic during visits (Table 1). A total of 15 (20%) non-caddies reported receiving poor treatment, and

52(21%) of the caddies also reported the same fate. However, there was no statistically significant difference between the groups in reporting poor treatment. Overall, a high number of the participants reported receiving good treatment at the clinic when compared to those who reported poor treatment which was similar to a study conducted among waste recyclers in Johannesburg (Kistan et al. 2019-unpublished).

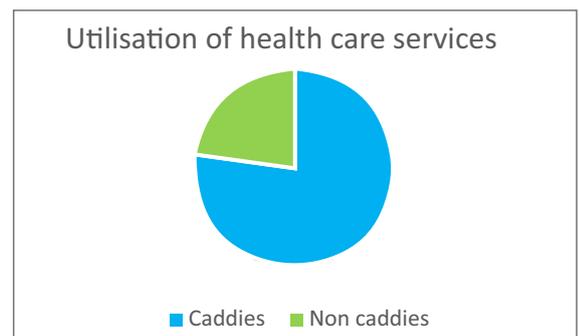


Figure 17 Comparison of caddies and non-caddies' clinic visit in the past 12 months.

3.8 HEALTH COMPARISON

We conducted a similar study to this one looking at the health of waste pickers. These informal workers work on landfill sites collecting and recycling waste items. They earned slightly less than caddies but lived in similar areas under similar environmental and social conditions. In this section, we compared the reported health between these groups to look for

similarities and differences. Caddies and waste pickers do not do the same type of work, but are both precarious workers of low socioeconomic status. All conditions compared are self-reported and subject to bias. Thus, this is an ecological comparison to provide some direction for future research and recommendations in both groups.

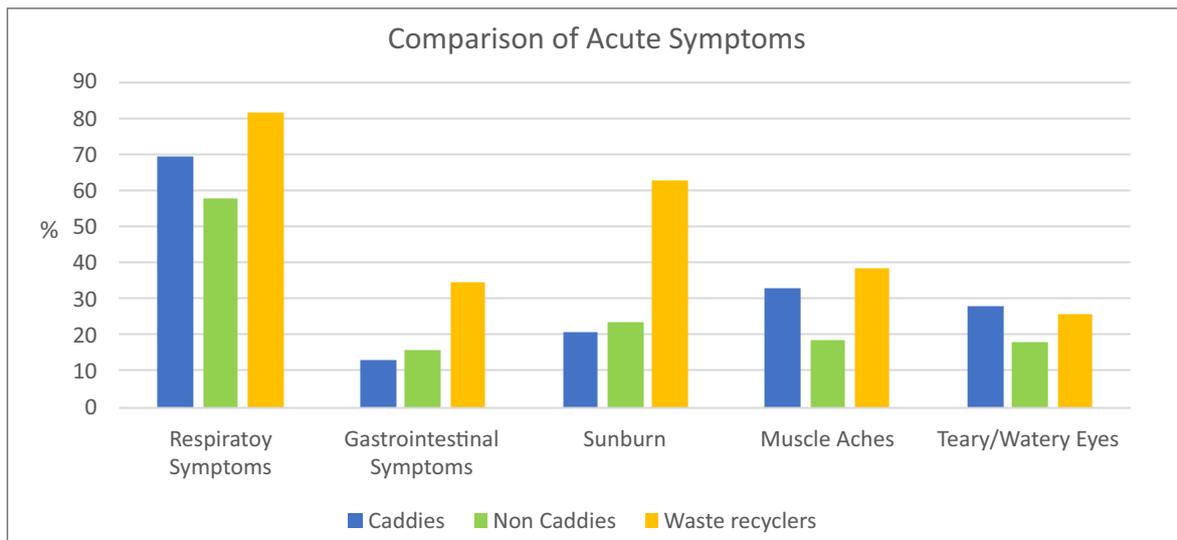


Figure 18 Quality of Life- Satisfaction results

The graph above shows that caddies are less sun exposed than waste pickers, this is likely due to fewer hours spent in the sun. However, caddies need to remain aware of the risks of sun exposure. Waste pickers, as expected reported more diarrhoea and other gastrointestinal symptoms due to working with waste. Caddies reported similar amounts of muscle aches as waste pickers due to the manual nature of their work despite waste pickers working longer and

more hours. Caddies and Waste pickers reported similar prevalence of respiratory infections indicating these are likely due to the dry dusty climate in Johannesburg and their low socioeconomic status. Caddies reported slightly more teary/watery eyes than waste pickers, despite the higher level of dust exposure in waste pickers; this needs further investigation in caddies.

3.7 QUALITY OF LIFE

Respondents were asked to rate how they feel about their quality of life, health and work (Figure 18 & 19). In general, all respondents were satisfied with their quality of life, their health and access to health care services and their capacity to work. There were no differences between caddies and non-caddies.

Although most respondents were satisfied with their health, approximately 43% worried about their health. About 61% of respondents felt safe in their daily lives and nearly half (48%) of respondents perceived their physical environment at work to be healthy.



Figure 18 Quality of Life- Satisfaction results

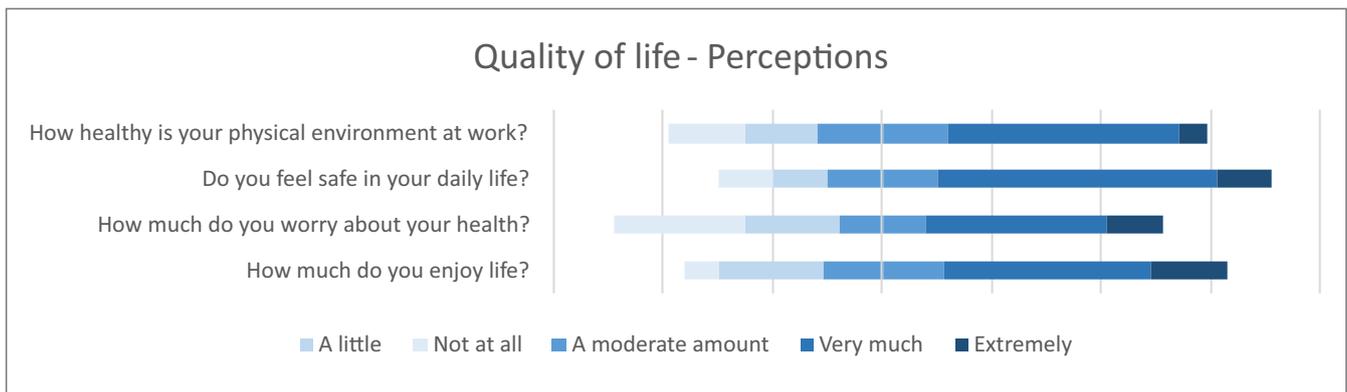


Figure 19 Quality of life – Perceptions of work, life and safety



Caddies waiting for players, carrying soil bags to repair the greens.

Chapter 4



Recommendations

According to the Occupational Health and Safety Act 85 of 1993, self-employed persons must ensure that they obtain the necessary information and training to enable them to perform their work tasks without risk to their health and safety.

It is therefore recommended that information and training on all aspects related to the identified risks must be obtained as a control strategy. Secondly, Golf Courses may retain some liability for accidents on site and thus support for caddies is recommended.

Based on the results of the health survey, questionnaire and observations the following recommendations are suggested.

1. Pesticide exposure control: Pesticide exposure may be due to working on specific golf courses. One of the clubs that participated in the study, had on average much lower urinary exposure levels in all their tested staff than the other golf clubs. As one golf club demonstrates lower exposure it is possible that other courses should be able to do the same. Pesticide exposure is concerning as it is linked to a number of health effects but also it is unlikely to be limited to just the staff but players may be at risk as well. Pesticides may be absorbed in three ways; inhalation, dermal absorption and ingestion. To determine which is the most important on golf courses, and what needs to be changed will require further study, also as we used only one pesticide as a proxy for total pesticide exposure, other pesticides will need to be measured as well to provide a complete picture. The NIOH is interested in working with the golf clubs and golfing associations to conduct this further investigation to help identify the most cost effective control measures to protect not only golf club staff but also the club patrons.

2. Provision of closed shoes or boots is recommended for both caddies and groundsmen. As pesticides are mostly applied on the ground, dermal absorption through incorrect footwear is a possible exposure route. Those caddies without decent footwear reported that their feet were a problem. A few caddies linked their problems to pesticide exposure but this is unlikely. It seems more reasonable that as the grass is often wet in the mornings and their feet get wet, they are more likely to develop dermatitis. Shoes with a good grip will reduce the risk of falls and allow caddies to walk easier on wet grass while carrying the weight of a golf bag.

3. Income Stability: Caddies earn a median income of R2400 (172.80 US \$) per month and this can vary depending on their workload over the period. Work is also affected by rain

and holidays. Most caddies would benefit from improvements in their income, which would give them food security and perhaps improve their mental health.

- Other business opportunities, which the caddies skills and experience lend themselves towards, such as affordable coaching services for new players, or children; one on one golf swing assessments; perhaps using the player's phone to record their game for later assessment by the player or an expert. New means of earning extra income on the course using technology and caddies skills should be considered that add benefits to the players and the caddies, without reducing the number of caddies.
- Ways of increasing the number of bags to be carried should be investigated cautiously. In addition clubs could advise players that for every four ball a caddie must accompany players.
- It is advisable that clubs charge a reasonable minimum fee per bag and this should ideally be standardised across golf clubs.
- Also perhaps short information sessions on the golf course for players who take carts and do not need caddies, could be developed and provide small amounts of income or a meal for the day. Support for advertising these services to players would help the caddies earn a living wage and provide for their families.
- Training in basic financial literacy is advised. Certain organisations such as the Financial Sector Conduct Authority (FCSA) do this for free.



An example of an onsite extra income opportunity for caddies.

4. Provision of personal protective clothing or equipment (PPE): For both caddies and grounds keepers, uniforms, hats, shoes and eye protection are recommended and should either be supplied or support provided to procure such items. Some golf bag trolleys should be available for caddies when bags are heavy. In addition, caddies should be trained on how to carry the bag safely. Although being struck by a ball is not frequent, most caddies (60%) reported it as a concern hence the recommended eye protection as this is a highly sensitive area. UV resistant and safety eye wear is affordably available from industrial suppliers. Secondly, hats are required for sun protection and could be a source of corporate sponsorship from the club or other companies.



Vision screening

5. Health screening inclusion of vision testing. Access to healthcare is a state responsibility. Some clubs provide access to a basic health screens which could result in increased awareness of health amongst caddies. Although most caddies reported easy access to government clinics, the long waiting times reduced their ability to attend. It is recommended to include a vision screen in the health tests provided, as this was the most commonly reported health issue and would play a role in working as a caddie.

6. Work place allergy assessment: Allergies to grasses and pollen are very common and can present in a variety of ways, such as sneezing, runny nose, itchy watery eyes to severe symptoms such as difficulty breathing. Approximately 28% of caddies

reported teary/ watery eyes. Caddies with severe symptoms should be assessed for allergens and managed accordingly i.e. with education regarding triggers of allergens and adequate medication.

7. High prevalence of psychological distress: Thirty three percent of caddies reported higher levels of psychological distress. Collaboration and partnership with NGOs and organisations such as South African Federation of Mental Health (SAFMH) could provide support and offer services for all staff, not only caddies.

8. Health and lifestyle awareness information: A large proportion of caddies reported using tobacco and consuming alcohol, which could be to the detriment of their health in the long run. The caddies smoked more than the non-caddies and at a higher proportion than the general South African public. In absence of health screening, health awareness is important especially concerning chronic lifestyle diseases and the importance of adequate nutrition.

9. Intimidation of caddies on the golf course: This is an important factor in the wellbeing of caddies. It can affect work productivity and mental health. Majority of caddies that experienced this were unable to discuss the matter with the club management due to fear of loss income or the belief that nothing will be done. It is advisable to improve communication between caddies and management. In addition there should be a zero tolerance of this type of behaviour from golfers.

10. Facilities: Facilities for caddies differed across the different golf courses and some require improvements. Major issues were the lack of access to clean and well maintained ablution facilities and adequate cover during inclement weather.

11. Caddie funeral plans: These policies should be clearly explained to caddies by the companies providing the service. There remains confusion around this causing dissatisfaction. Currently the money contributed by caddies or the clubs is not accessible after the caddie turns 65 and there is no post retirement support. Thus the funeral policy benefits needs to be extended to beyond the age of 65 years. Measures should be put in place to assist with payments if the caddie is unable to work due to illness or injury for a period of time. The possibility of contributing to a pension should be investigated and discussed with the caddies.

12. Development fund: Dissatisfaction was expressed over these funds and their use. More communication is needed. Also more consultation and deliberation around the best use of the funds is warranted. Perhaps these funds could be used to help the caddies start more income generating activities in addition to caddying.

13. Fee charged for washing caddie uniforms: The caddies expressed dissatisfaction over the fee charged for washing their uniforms. A solution may be providing caddies with access to a washing machine onsite to allow them to wash their own uniforms.



A washing machine made available for caddies.

Chapter 5



Future Research

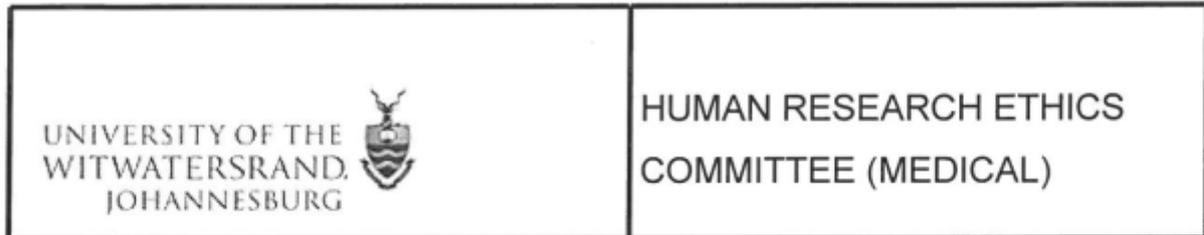
Based on the study findings we propose the following areas that require additional research:

1. Pesticide exposure in golfers.
2. Long-term follow-up of health outcomes in staff (caddies and non-caddies) as well as golfers after investigations and interventions to reduce pesticide exposure are completed.
3. Follow-up post ergonomic interventions to reduce musculoskeletal disorders.

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APPENDIX: ETHICS APPROVAL



Office of the Deputy Vice-Chancellor (Research & Post Graduate Affairs)

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DATE: 20/09/2018

REF: R14/49

PROTOCOL NO: **M180661** (*This is your ethics application study reference number. Please quote this reference number in all correspondence relating to this study*)

PROJECT TITLE: *Working conditions and health outcomes of caddies in Johannesburg, South Africa*

Please find attached the Clearance Certificate for the above project. I hope it goes well and that an article in a recognized publication comes out of it. This will reflect well on your professional standing and contribute to the Government funding of the University.



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