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SCHOOL OF PUBLIC HEALTH,

UNIVERSITY OF THE WITSWATERSRAND

THE PREVALENCE OF SELF-REPORTED AND WORK-RELATED RISK FACTORS ASSOCIATED WITH OCCUPATIONAL SKIN DISORDERS AMONG CLEANERS OF AN AGRICULTURAL RESEARCH FACILITY

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A Research Report submitted to the School of Public Health, Health Sciences Faculty, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree of Masters in Public Health – Occupational Hygiene.

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Declaration

I, Paulus Mann Mokoatle, declare that this research report is my own work. It is submitted in partial fulfilment for the degree of Masters in Public Health – Occupational Hygiene in the University of the Witwatersrand, Johannesburg. The study has not been submitted for any degree or examination at this or any other university or institute of higher learning.

This study received ethical clearance from the Committee for Research on Human Subjects (Medical) of the University of the Witwatersrand. The Clearance Certificate number: **M 180207**

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Date: January 2020

Abstract

Occupational skin disorders (OSDs) are the most commonly reported category of occupational illnesses in many countries. They have a negative impact on people's quality of life and can affect people's occupational lives by causing them to miss work or be less productive. Yet, little is known about the prevalence of occupational skin disorders in South Africa. Without data, skin disorder risks to the cleaners, a high-risk group for the development of occupational skin disorders, cannot be fully quantified. A survey to determine the prevalence of self-reported and work-related risk factors associated with of occupational skin diseases (OSDs) was undertaken at the Onderstepoort Veterinary Institute (OVI), by means of a validated self-reporting questionnaire.

Design

A descriptive cross-sectional study

Setting

All cleaners employed and based at the Onderstepoort Veterinary Institute facility of the Agricultural Research Council, in Onderstepoort, Pretoria North.

Participants

All fifty-six (56) cleaners employed and based at the Onderstepoort Veterinary Institute facility of the Agricultural Research Council.

Method

An information sheet and consent letter explaining the aim and objectives of the study was sent to 50 cleaners in June and July 2018. The principal investigator then collected information regarding the worker's workplace characteristics, occupation and skin disorder history for the period 2015-2017 including prevention/mitigation measures, through a questionnaire administered by the principal investigator. A

validated structured self-diagnosis Nordic Occupational Skin Questionnaire (NOSQ-2002) developed to survey work-related skin disorders and exposure to environmental factors was used to collected information regarding the cleaner's workplace characteristics, occupation, and skin disorder history.

Statistical analysis

EPI INFO Version 7.2.3.1 and STATA 13 were used for data analysis. Descriptive statistics on cleaning materials and chemical agents used by cleaners are provided. Binary variables (skin pigmentation, dermatitis and contact urticaria) are described using percentages and frequencies, and presented using Bar graphs. Data on the prevalence of self-reported skin disorders (skin pigmentation, dermatitis and contact urticaria) among cleaners is provided using proportions and percentages. Fishers' exact test was used to investigate the association between self-reported skin disorders of the hands and forearms and work-related risk factors.

Results

The response rate was 50 (89%). Of the 50 responding cleaners, 50% were over the age of 45 and the majority were women. Thirty four percent (34%) of respondents had more than 60 months' (5 years) work experience doing cleaning work at the OVI. Contact urticaria, dermatitis, and skin pigmentation were confined to the hands and forearms among cleaners. Between 2015 and 2017, the dermatitis was the prevalent (26%) self-reported skin disorder of the hands or forearms, affecting 13 cleaners. The most affected anatomical site was the hands (n=22) compared to the forearms (n=4).

Discussion

The study only focused on dermatitis, contact urticaria, and skin pigmentation over a three-year period (2015 - 2017) in order to increase the likelihood that skin symptoms were work-related. This study found that cleaning chemicals used and cleaning duties undertaken by cleaners at OVI are not different from other cleaning occupations

involving wet-work. From a sample of 50, over 80% of cleaners reported the use and subsequent exposure to harmful cleaning chemicals.

The study had a higher proportion of women cleaners 86% (n=43) compared to men. Duration of cleaning service and sex did not play any significant ($p > 0.05$) role in cleaners developing any of the three skin disorders.

Conclusion and Recommendations

This study showed that work-related skin disorders were prevalent between 2015 and 2017 at OVI. Dermatitis was the most common skin disorder compared to contact urticaria and skin pigmentation. Cleaning procedures followed by some cleaners, together with chemical containers used predisposes cleaners to work-related skin disorders.

Though the sample was small, this study highlights the importance of work-related skin disorders from wet-work and cleaning chemicals, and the subsequent adverse health effects among cleaners.

This highlights the need for OVI to review current chemical handling procedures among cleaners, and possibly, the development of a cleaner-focused chemical safety induction and training programme cantered on cleaning tasks and procedures. It is recommended that the OVI occupational health clinic develop and incorporate a skincare programme on periodic medical examinations for screening of suspected skin condition in order to assess dermal absorption.

Dedication

This report is dedicated to both my late parents, Philemon Tennyson Mokoatle and Dorcas Bathini Mokoatle, "*Thank you for giving life to me*"; and, wife, son, and sisters for their support and words of encouragement.

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- Co-supervisor: Ms Anna Fourie Department of Immunology and Microbiology, National Institute for Occupational Hygiene

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Abbreviations

ARC:	Agricultural Research Council
AHP:	Animal Health and Protection
COIDA:	Compensation for Occupational Injuries and Diseases Act
CSD:	Centralized Supplier Database
EADV:	European Academy for Dermatology and Venereology
HREC:	Human Research Ethics Committee
SDS:	Safety Data Sheets
NIOH:	National Institute for Occupational Health
NIOSH:	National Institute of Occupational Safety and Health
NOSQ:	Nordic Occupational Skin Questionnaire
NHLS:	National Health Laboratory Service
OVI:	Onderstepoort Veterinary Institute
OSD:	Occupational Skin Disorder/Diseases
PPE:	Personal Protective Equipment
WHO:	World Health Organization

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The prevalence of self-reported and work-related risk factors associated with occupational skin disorders among cleaners of an agricultural research facility

CHAPTER ONE

INTRODUCTION

Professional cleaners perform a variety of cleaning duties aimed at maintaining a tidy and clean working environment. Many of these cleaning duties required the use of variable cleaning products of which many contain potential skin irritants (1). As one of the major users of chemicals, the cleaning service industry is estimated to use approximately 110 tons of chemicals annually across Europe, exposing cleaners to a number of potential skin irritants (2).

In many occupational settings, a lack of, or non-compliance with skin protective measures and a lack of knowledge of cleaning chemicals used may result in dermatological health effects among cleaning personnel (3). A lack of systematic occupational hygiene analysis, workplace exposure data, and baseline data related to work-related skin disorders among cleaning workers may also be associated with increased incidences of work-related skin disorders (4). Even in occupations that have established skin protection programmes aimed at safeguarding the health of their workers, it is still not clear how effective such programmes are (5). Further attempts were made by a number of countries to develop and include formal educational training programmes as part of occupational health and safety management systems for wet-work employees in the cleaning industry (6). However, there were doubts on their implementation and effectiveness.

Though there's no standard case definition (7), collectively they are referred to as occupational skin disorders, occupational skin diseases, or work-related skin disorders as a result of exposure to occupational hazards that carry a risk of skin damage (8). Wet-work is one of the most significant risk factors associated with work-related skin disorders (9). They are caused or worsened by factors in the working environment such as direct contact with water, cleaning products, organic solvents, etc. that adversely affect a person's skin health (10, 11). Consequently, this may result in direct irritant skin effects, immune-mediated skin effects, and systemic effects such as

urticaria and skin cancer (12). The most common type of work-related skin disorder include dermatitis, the inflammation of the upper layers of the skin characterised by dryness, redness, itching, flaking, scaling, cracking, blistering, and pain caused by irritant or allergic reactions to the agents with which the skin comes into contact with at work (13). Contact urticaria, acne, chemical burns, and skin damage resulting in decrease or increase of pigmentation in the affected area (post-inflammatory hyperpigmentation) are some of the most commonly reported non-trauma related occupational illnesses (14).

It should be noted that the terms occupational skin disorders, occupational skin diseases, and work-related skin disorders are used interchangeably throughout the literature (15). For the purposes of this report, the terms work-related skin disorders and occupational skin disorders are used.

1. Background

As the outermost organ of the body, the human skin is exposed and subjected to a variety of man-made and naturally occurring stressors in the environment, such as ultraviolet radiation, drugs, chemicals, and air pollutants (16). Because of its location, the skin is supposed to serve as a biological barrier between the body and a number of these stressors (17). However, due the need to earn a living, humans are exposed to environmental and work-related pollutants that have a potential to exert negative effects on human skin (18).

As the human body's largest organ responsible for protecting our bodies from potential harm by foreign organisms or toxic substances (19), the skin is highly dependent on a balance of (**i**) anatomic location (differences in skin thickness and thinness on the body), (**ii**) endogenous host factors (factors specific to the host, such as age, location and sex) and (**iii**) exogenous environmental factors (factors specific to the individual, such as occupation, choice of clothing, use of cosmetics, soaps, hygienic products, etc.) (20). Any disruption on the balance of the skin's ecosystem can lead to skin disorders or infections (21).

The human skin consists of three layers of tissue, the epidermis (the outer most layer of the skin), the dermis (a fibrous layer that supports and strengthens the epidermis),

and a subcutaneous layer of fat beneath the dermis (figure 1). Combined, they function to prevent infection and the entry of harmful substances into the body while controlling the loss of water and nutrients (22).

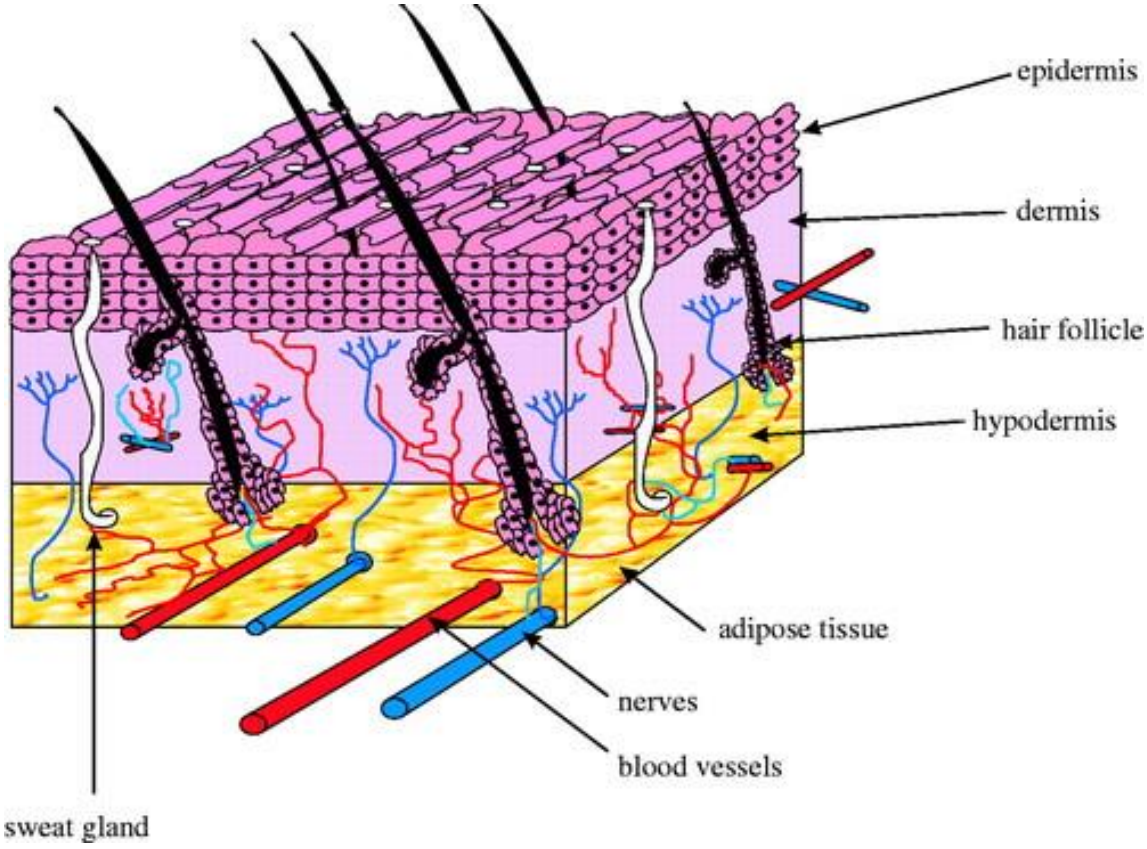


Figure 1: Structure of the anatomy of human skin (23)

However, is human skin exposure to stressors, especially in work-related environments, adequately or reasonably managed and regulated? In many countries, there is occupational health and safety related legislation aimed at protecting workers from exposure to work-related health and safety hazards.

Similar to many industrialised countries, employers in South Africa have a legal obligation in terms of the Occupational Health and Safety Act (Act 85 of 1993) to ensure the health and safety of employees while at work. It is through this Act (Act 85 of 1993) and its regulations that the human skin's exposure to pollutants is addressed and regulated.

Though not prescriptively detailed, the Hazardous Biological Agents and the Hazardous Chemical Substances Regulations of the Occupational Health and Safety

Act do require that pollutant skin absorption be controlled and managed through engineering and administrative control measure including provision of impermeable personal protective clothing.

Thus, such occupational health and safety legislation entrusts employers with workplace exposure monitoring by undertaking detailed risk assessments with the ultimate aim of ensuring the health of the human skin. In spite of this, work-related skin disorders remain the most common and frequently reported disorders for which compensation is paid in many countries (9). Despite the development of skin protection programmes in many occupations, work-related skin disorders are still high with a reported annual incidence of 12.9 per 100000 workers in the Scandinavian Peninsula (24).

Very limited epidemiological data is available relating to the work-related skin disorders in the cleaning industry in South Africa yet cleaning personnel are one of the high-risk groups for the development of work-related skin disorders (25). As a result, the research reported here was undertaken with the aim of determining the prevalence of self-reported occupational skin disorders and investigate work-related risk factors associated with skin disorders of the hands and forearms among cleaners of an agricultural research facility. It is anticipated that the findings will assist in formulating possible occupational skin disorder prevention and mitigation measures by: (**i**) determining the prevalence work-related skin disorders among cleaners at OVI, (**ii**) identify work-related risk factors associated with skin disorders, and (**iii**) recommend mitigation measures and programmes for work-related skin disorders among cleaning personnel. Though this is not a hypothesis testing study, the researcher theorizes that wet-work and exposure to cleaning chemicals is associated with development of occupational skin disorders in research laboratory cleaning workers. However, there is countless baseline data missing related to the occurrence and risk factors associated with work-related disorders. There still exist a need for more population-based studies where work-related disorders, risk factors, and preventative measure are studied (26).

In order to provide a broad overview of the magnitude of work-related skin disorders, non-exhaustive national and international summaries of policies and reports are explored and discussed in the following sections.

2. Literature Review

2.1 Work-related Skin Disorders

Skin disorders, including those that are occupation-related, account for 27% of all diseases worldwide according to a World Health Organization (WHO) survey undertaken in 120 countries (27). They are one of the leading causes of global disease burden (28). The WHO survey included India where statistics regarding the magnitude of occupational skin diseases are not available (29); the South African gold mine industry with a 0.5 to 1.8 per 10,000 workers incidence of work-related skin disorders; China, where work-related skin disorders accounts for 1.69 % of all occupational diseases; and Colombia, where 3% of the total diagnosed occupational diseases in 2002 were attributed to contact dermatitis.

It was clear from the survey that challenges related to skin diseases, including work-related skin disorders, are similar in many countries. Challenges ranged between lack of comprehensive data sources for quantifying the extent of the problem; lack or no classification systems to differentiate them from other work-related diseases, to the absence of efficient risk assessment tools and comprehensive work-related skin disorder surveillance programmes. As a result, work-related skin disorders remain the most frequent work-related disease in both industrialised and developing countries (30). Not only do skin disorders result in suffering and hardship for the workers and their families, but they also add to the overall cost to society through loss of productivity due to absenteeism from work and increased use of medical and welfare services because of prolonged sick-leave (31).

In 2011, the WHO and the European Academy for Dermatology and Venereology (EADV) held a workshop where strategies for the prevention and early detection of work-related skin disorders were discussed as one of the categories of occupational injuries. Concerns noted during the workshop were the knowledge gaps in many countries on work-related skin disorders, including a lack of research and comprehensive data due to lack of notification methods and underreporting of work-related skin disorders (32) . Further concerns among researchers and epidemiologists are that work-related skin disorders affects workers of all ages in different occupations that carry a risk of skin damage, such as occupations involving frequent immersion of hands in water, and skin contact with chemical substances (e.g. healthcare workers,

hairdressers, catering, cleaning, agriculture, laboratory workers etc.) (33). Collectively referred to as wet-work occupations because of their repetitive exposure to water, personnel working in such occupations have increased predisposition to work-related skin disorders (34). During wet-work, workers immerse their hands in liquids for >2 hours per shift, wear waterproof (occlusive) gloves for corresponding amount of time or wash their hands more than or ± 20 times per shift (35). This high burden of wet-work during a worker's work shift poses an increased risk to the skin, which may lead to the onset of different skin disorders (36).

Workers employed in wet-work occupations often wear water-resistant gloves made of rubber or plastic for hand protection (13). Consequently, the surface of the skin is almost completely covered and is unable to breathe (limiting perspiration and respiration) and there is an accumulation of heat and moisture inside the gloves, a process known as occlusion. The wearing of protective hand gloves for prolonged periods prevents the evaporation of sweat resulting in the softening and cracking of the skin (maceration), increasing the possibility of penetration of toxic material and pathogens through the skin (25). Though long and repeated exposure to water and the wearing waterproof gloves can gradually lead to the development of work-related skin disorders, dermal absorption is dependent on factors such as "skin integrity and hydration, density of hair follicles and sebaceous glands, skin thickness at the site of exposure, physiochemical properties of the substance, chemical exposure concentration, and duration of exposure" (11). Differences in skin structure based on age, race/ethnicity, and sex also influence chemical absorption through the skin based on pharmacokinetic differences (37). As the skin ages, it loses its moisture content which reduces blood flow to the skin, in turn slowing the clearance of absorbed chemicals (38). Racial differences among black and white skins related to anatomical and physiological functions of the skin also influence the skin's penetration and response to chemicals (39).

2.2 Work-related Skin Disorders in Cleaners

In many countries, including South Africa, it is difficult to obtain accurate epidemiological data on work-related skin disorders (40). The scant available literature in South Africa is based on medical record reviews conducted for the gold and coal

mining industry, and dermatological disease surveys on outpatients from academic hospitals (41). To provide insight on the magnitude of work-related skin disorders among cleaners, national and international research literature is reviewed. A PubMed search using the terms ‘work-related skin disorders’, ‘cleaning workers’, ‘wet-work’, and ‘occupational skin diseases’ found no publication related specifically to work-related skin disorders among cleaners. Further searches on Annals of Work Exposures and Health using keywords such as ‘occupational skin disorders’ revealed a variety of published material based on a number of industries such as the fishing, healthcare workers, food services, metal workers, etc. However, none of the literature is related to work-related skin disorders for the South African cleaning workforces.

Work-related skin disorders are the second largest group of occupational diseases after musculoskeletal disorders (13). Although they differ among countries and difficult to obtain accurate epidemiological data in many countries, work-related skin disorders are reported to account for more than 45% of occupational illnesses (42). According to the National Institute for Occupational Safety and Health (NIOSH) estimates, more than 13 million United States of American (U.S.A) workers are exposed to chemicals that are absorbed through the skin (43). In many countries, including South Africa, it is difficult to obtain accurate epidemiological data on work-related skin disorders due to limitations associated with a lack of accurate and standardised data collection techniques capable of confirming skin disorders with workplace exposure (7). Holness *et al* (2017) further found that work-related skin disorders received low priority in both industrialised and developing countries despite the existence of skin complaints (44). In the absence of accurate and standardised data collection techniques, work-related skin disorders remain an important public health concern in terms of quantifying incident and prevalent cases, their socio-economic impact, and the development of possible mitigation measures.

Occupations with high exposure to water, such as cleaning, are at higher risk for the development of skin disorders (45). Cleaning industry workers frequently exposed to water and a variety of cleaning chemicals have shown an elevated risk of skin disorders. The repeated exposure to water and surface-active chemicals results in impaired skin barrier function leading to irritation and inflammation of the skin (46). Recently, Denmark reported 13.2 cases per 1000 cleaners per year with work-related

skin disorders attributed to wet-work (47). Evidently, cleaning industry personnel remain susceptible to work-related skin disorders across different occupations.

Through their cleaning activities, men and women in wet-work occupations often come into contact with a variety of biological and chemical hazards potentially responsible for causing work-related skin disorders (48). Within the cleaning industry, wet-work comprise more than 50% of cleaning work and many hours of wet hands (9). Exposure to cleaning agents that are toxic to the skin, usually mixtures of chemicals that often contain sensitizers (e.g. quaternary ammonia compounds, chlorine compounds, etc.) is another risk factor for developing work-related skin disorder within the cleaning industry (49). Elements contained in some of the cleaning and disinfecting products, mostly regulated through Safety Data Sheets (used in workplaces to communicate to workers the use, storage, handling and emergency procedures for a specific chemical substance) are known to have a wide range of health effects such as acute and chronic allergic reactions of the skin and respiratory effects (50). Of most occupational concern are the three main types of chemical-skin interactions, namely, direct skin effects where exposure to a chemical produces a locals effect; immune-mediated skin effects where direct exposure to a chemical occurs through complex immune processes such as sensitization; and, systematic affects which occurs when skin exposure to a chemical leads to the overall body suffering (51).

Cleaning activities such as floor and window cleaning, restroom cleaning, office and laboratory cleaning, furniture and dustbin cleaning undertaken on a daily basis carry a risk of exposure to substances that can be irritants or allergenic to the skin. Thus, in sectors such as healthcare and research laboratories, for example, the risk to the cleaner's skin cannot be fully eliminated as such cleaning activities are a requirement for infection control and prevention programmes, and good biosafety practices (50). As a result, the prevalence of work-related skin disorders of the hands in the cleaning industry are reported to be high. Regular exposure to water, soaps, disinfectants, and drain cleaners predisposes cleaner's hands to hand dermatitis (47). Hand dermatitis alone is reported to constitute between 90–95% of all work-related skin disorders in industrialised countries (52). In Europe, the incident rate of work-related skin disorders of the hands is reported to be between 0.5–1.9 per 1,000 full-time employees (53), while Australia reported a 2.15 per 10,000 full-time workers per year incident rate of work-related skin disorders in 2005 (54).

However, the burden to the cleaner's skin from wet-work related cleaning activities can be influenced through the modification of work practices, using less irritating cleaning products, and through development of workplace skin protection programmes (24).

2.3 Work-related Skin Disorders in South Africa

Little information is available on the extent of work-related skin disorders in South Africa among cleaners. Available literature related to skin disorders is mostly based on studies conducted for the mining industry and compensation claim registers. To the researcher's knowledge, work-related skin disorders in the South African cleaning industry have not been studied.

Data on work-related skin disorders should be obtainable from compensation claim registers, the main source for occupational diseases data in South Africa, of the Department of Labour's Compensation Commissioner under the Compensation for Occupational Injuries and Diseases Act (COIDA) (No. 130 of 1993) (41). Due to under-reporting of occupational diseases by employers and medical practitioners, delays in processing reported claims, and inadequate assessment of disability there are systematic deficiencies in the administration of the Compensation for Occupational Injuries and Diseases Act (No. 130 of 1993) resulting in a poor reflection of the real number of occupational diseases, including work-related skin disorders (55). In addition, annual reports of compensable disease have not been published for many years.

Between 2001 and 2005 compensation claims registers from South African mining industry indicated that the prevalence of work-related skin disorders was between 5-6% (56). Other few sources of data include, but not limited to, hospital and insurance registers on occupational injuries and illnesses (57).

As stated by Diepgen (2003) "most of our knowledge about occupational skin disorders is derived from clinical case reports, clinical studies of in-patients and out-patients, statistical compilations of patch-test reports, official occupational-disease reports based on workers' compensation agencies, or from studies of small outbreaks of skin diseases at the work place" (58).Thus, using compensation claim registers and clinical reports is not unique to South Africa.

Currently there is a paucity of published data on work-related skin disorders among cleaners in South Africa. As an important predictor for long term unemployment in the cleaning industry, without data, the risk to the cleaner's hands cannot be fully quantified (6).The scant research and data on cleaners, a group at risk of work-related skin disorders, prompted the study reported in this report.

3. Skin Disorder Measuring Tools

During the past 40 years, numerous measurement tools and strategies that measure skin exposure directly have been developed to assess occupational dermal exposure (59). They include direct skin testing (patch or scratch), radio-allergosorbent testing methods, surrogate skin methods, florescent tracer techniques, moist-wipe measurement techniques, hydration index and trans epidermal water loss index (TEWL), medical screening methods, and compensation claim registers used to gather data on certain specific work-related skin disorders (60). These methods, such as TEWL), commonly assess the barrier function of the skin by measuring the rate of water fluctuation of the skin through the stratum corneum (61).

However, estimating work-related skin disorder causes and prevalence is often difficult due to complexities associated with a lack of standardized dermal exposure measurement techniques and methods (15). It is also less clear how measured levels should be interpreted and compared against dermal occupational exposure limits had they been available (62). Though peer-reviewed literature from studies using some or a combination of these methods and techniques does exist, unfortunately, it is difficult to present a complete overview of the methods. There are, however, a number of limitations associated with gaining reliable dermal exposure data from such sources (58), including uncertainties regarding documentation and validation of sampling methods and strategies for measurement (62).

Lately, questionnaires have been used to obtain and report about the presence of work-related outcome from exposed subjects (63). Questionnaire studies investigating work-related skin disorders use two evaluation methods to diagnose skin disorders, namely, self-diagnosis (self-report) and symptom-based diagnosis (diagnosis based on a list of symptoms) evaluation methods (64). Using self-reporting questionnaire not only aids in obtaining information on the demographic characteristics of respondents

but also as a diagnostic test for the existence of a work-related disorder (65). One of the limitations of questionnaire studies is their vulnerability to distortion and validity of causal conclusions, and statistical treatment of questionnaire data at the analysis stage (66). Dependent on (**i**) the accuracy of the evaluation method(s) and (**ii**) the sensitivity (the ability to detect the sick) and specificity (the ability to detect the healthy) of the questionnaire used (67), questionnaire studies produce more epidemiologically plausible results as compared to studies using work-related skin disorder registers or direct skin testing methods (30).

To reduce the impact of these limitations, researchers developed cost-effective occupational skin disorder epidemiological surveillance instruments such as the Dermatology Life Quality Index (DLQI) and the Nordic Occupational Skin Questionnaire (NOSQ-2002/Short and NOSQ-2002/Long) (68). Recent studies investigating work-related skin disorders using some of these validated questionnaires reported a high prevalence of skin disorders (69).

In two self-reporting studies from the Nordic countries on hand eczema using questionnaires, a sensitivity of 87% and specificity of 79% was reported from the Swedish study of “opinions on having hand eczema”; and a sensitivity of 80% and specificity of 97% reported by a Danish study which aimed at estimating the prevalence of atopic dermatitis in a population of school children (68).

Therefore, based on the two evaluation methods used or adopted by the above-mentioned studies, the prevalence of work-related skin diseases was reasonably well estimated on the basis of a self-diagnosis questionnaire (70) without the use of skin disorder registers or clinical tests.

Due to an increase in the demand for standardized survey methods, and both clinical and questionnaire criteria for epidemiological studies investigating population and occupational based skin diseases, a group of Nordic (north-western European countries, including Scandinavia and parts of northern Leningrad Oblast in Russia) researchers from the Nordic Occupational Skin Questionnaire Group (NOSQG) together with the Nordic Council of Ministers developed a new questionnaire tool called the Nordic Occupational Skin Questionnaire (NOSQ-2002) used for surveillance of work-related skin diseases and exposure to environmental factors (30). NOSQ-2002 has two sets of questionnaires, NOSQ-2002/SHORT a ready-to-use questionnaire for

screening and monitoring occupational skin diseases and NOSQ-2002/LONG, a pool of questions chosen according to research needs for occupational skin diseases or hand eczema. Included in NOSQ-2002/LONG are all questions contained in NOSQ-2002/SHORT.

The data and study findings presented in this report were collected using questions compiled from both the long and short validated Nordic Occupational Skin Questionnaire (NOSQ-2002) for the investigation of the prevalence of self-reported and work-related risk factors associated with occupational skin disorders among cleaners.

4. Aims and Objectives

4.1 Aim

To investigate the prevalence of self-reported work-related skin disorders amongst cleaning workers at an agricultural research facility between 2015 and 2017, and to identify work-related risk factors associated with skin disorders among cleaners.

4.2 Objectives

- To describe the cleaning materials and other chemical agents used by cleaners at an agricultural research facility.

- To determine the prevalence of self-reported skin disorders of the hands and forearms among cleaners at an agricultural research facility between 2015 and 2017.

- To investigate the association between self-reported skin disorders of the hands and forearms and work-related risk factors among cleaners at an agricultural research facility.

CHAPTER TWO

MATERIALS AND METHODS

This cross-sectional study was undertaken to investigate the prevalence of work-related skin disorders amongst cleaning workers at an agricultural research facility between 2015 and 2017, and to identify work-related risk factors associated with skin disorders among cleaners. Although fifty-five subjects were recruited with informed consent, only fifty responded. All cleaning respondents were employed by OVI as cleaners. Demographic information, job tasks, work experience, and work-related information was collected using a validated questionnaire.

2.1 Exposure classification

For chemical exposure, if the respondent noted their occupation as a cleaner, the main job activity as cleaning, and indicated the use of any one of the cleaning chemicals listed on the questionnaire they were considered 'Exposed'. Job practices that were considered to have the potential to be risk factors associated with skin disorders included: cleaning chemical storage area; handling of cleaning chemical containers, cleaning chemical decanting practices for possible spillages; and the use of hand protection gloves. Chemical product lists and safety data sheets (SDS) were collected from the chemical storage area.

When cleaners collected cleaning chemicals from the chemical storage area, a few that were observed had their protective hand gloves on, while others were not wearing any. When decanting cleaning chemicals into smaller containers for taking to their workstations (laboratories and offices), cleaners used empty plastic containers not suitable as chemical containers. The chemical storage area doubled as an office for the cleaning supervisor, limiting the space of moving in-between 25 litres bulk chemical storage containers (Figure 2).

2.2 Study design

A descriptive cross-sectional study was undertaken in 2018 to investigate the prevalence of occupational skin disorders amongst cleaning workers and identify work-related risk factors associated with skin disorders.

2.3 Study setting

The study was conducted at one of the ARC‘s animal health and protection research facilities, Onderstepoort Veterinary Institute (OVI), based in Onderstepoort, North of Pretoria.

The Onderstepoort Veterinary Institute, one of the seven research facilities within ARC, focuses on animal health protection, research and development. OVI undertakes veterinary research aimed at promoting animal health and welfare by providing diagnostic services and producing vaccines against Foot and Mouth and tick-borne diseases through: the development of new generation of veterinary vaccines (Vaccines and Diagnostics Development Programme); diagnostic services (diagnostic tests of specimens); public health and zoonosis (investigations of zoonotic disease); vaccine production (responsible for generating and producing veterinary products that will be available in the marketplace), and; epidemiology, parasites and vectors programme.

OVI is where the principal investigator was based on a permanent basis as an occupational health and safety officer during the study. OVI was selected as a study site for its ease of access to cleaning personnel and due to OVI’s multitude of research programmes being undertaken which include working with hazardous biological agents that require cleaning and disinfection procedures using different cleaning chemicals.

2.4 Study population and study sample

The study population was 56 cleaners employed and based within all programmes of the animal sciences division of the OVI. They included cleaning personnel based at all

the laboratories, the human resources building, facility management building, security block, canteen, library, workshop, motor fleet, and at stores.

Within OVI, there are different laboratory programmes namely: new generation vaccine; helminthology; rabies programme; insectary and entomology; molecular biology; heart water (tick-borne rickettsia disease of domestic and wild ruminants) laboratory; biotechnology platform; transboundary animal diseases programme; toxicology; virology; bacteriology; and diagnostic registration. Each of these programmes has a veterinarian, a scientist, a laboratory technician/assistance, administrator, and a cleaner(s).

Each cleaner, works Monday to Friday on an eight-hour shift per day, which amounts to a forty-hour workweek. The cleaners are tasked with general cleaning duties (cleaning of floors, staircases, wooden, glass and metal surface cleaning, , toilet, and dressing room cleaning, wiping and dusting of wall, and waste disposal) and cleaning of laboratory equipment, such as glassware, metal instruments, sinks, tables, and test panels using specified laboratory cleaning chemicals (solvents or acids). When preparing cleaning solution, using colour-coded containers, cleaning chemicals are mixed with water in accordance with laboratory and departmental cleaning specifications. Cleaning equipment used include dry and wet mops, water buckets, and three sets of clothes.

2.5 Measuring tool

The measurement tool used was a validated structured self-diagnosis Nordic Occupational Skin Questionnaire (NOSQ-2002), developed by the Nordic Occupational Skin Questionnaire Group (NOSQG) together with the Nordic Council of Ministers. The questionnaire (NOSQ-2002) was developed to survey work-related skin disorders and exposure to environmental factors (30). NOSQ-2002 consists of questionnaires, namely, NOSQ-2002/SHORT, a ready-to-use questionnaire for screening and monitoring occupational skin diseases, and NOSQ-2002/LONG, a pool of questions to be chosen according to research needs for occupational skin diseases or hand eczema.

A brief information sharing session was held with the manager to whom the cleaners reported to in order to highlight the aims and objectives of the study as highlighted on the consent letter (**Annexure A)** and study information sheet (**Annexure B**)**.** Each cleaner was interviewed and data collected over a period from June to July 2018. The questionnaire (**Annexure C**) included questions probing: (**i**) personal details; (**ii**) occupational details; (**iii**) skin disorder history; (**iv**) details of self-reported hand and forearm skin disorders; and, (**v**) personal protective clothing. The questionnaire included both open and close-ended questions.

2.6 Data Collection

The Centralized Supplier Database (CSD) system for the sourcing and procurement of goods and services was used to identify cleaning materials and Safety Data Sheets (SDS) used at OVI in order to identify the chemical constituents of the cleaning materials.

Work-related skin disorder and work-related risk factor data were collected between June and July 2018 from 12:30 to 15:00pm, Monday to Friday. The cleaners were visited at the workstations, where there was adequate privacy and a comfortable environment, and they were asked questions contained on the occupational skin disorder questionnaire. Before the questionnaire was administered, cleaners were made aware of their right to participate or not to participate in the study.

An English version of a validated self-reporting occupational skin disorder questionnaire adopted from both the long and short Nordic Occupational Skin Questionnaire (NOSQ-2002/Short) was administered by the principal researcher thorough face-to-face interviews with all cleaners who participated. Key words were translated into Setswana and Pedi languages commonly spoken by the cleaners.

Work-related risk factors of interest the study focused on included wet-work (skin contact with chemicals and detergents), laboratory cleaning protocols and guidelines (laboratory hygiene requirements), personal protective equipment of the hands or forearms, type of chemicals used, detergents and cleansing agents, and hand cleaners.

2.7 Data Management and Analysis

Respondent data were populated on Microsoft Excel 2016 to sort, filter, and check for data errors. EPI INFO 7.2.3.1, a statistical analysis software program developed by the Centres for Disease Control and Prevention used for data entry and analysis in epidemiology (71). EPI INFO was used for statistical analysis (chi-square test, fisher's exact test, odds rations, and probability values). Further data analysis was done using STATA 13.

Descriptive statistics are provided for cleaning materials and chemical agents used by cleaners. Binary variables (skin pigmentation, dermatitis and contact urticaria) are described using percentages and frequencies, and presented using Bar graphs.

Data on the prevalence of self-reported skin disorders (skin pigmentation, dermatitis and contact urticaria) among cleaners is provided using proportions and percentages. Fisher's Exact Test for small sample sizes is used to test the association between self-reported skin disorders and work-related risk factors. Variables of interest included cleaning, detergents and cleansing agents, duration of exposure, wet-work, use of personal protective equipment, laboratory hygiene requirements, hand cleaners, type of chemical and body part affected.

2.8 Ethics

The Human Research Ethics Committee (Medical) for Clearance of Research Involving Human Subjects of the University of the Witwatersrand and the Agricultural Research Council – Onderstepoort Veterinary Institute Animal Ethics Committee, approved the study. A letter explaining the aim and objectives of the study approved by both the Human Research Ethics Committee (Medical) for Clearance of Research Involving Human Subjects of the University of the Witwatersrand together and the Agricultural Research Council – Onderstepoort Veterinary Institute Animal Ethics Committee was sent to all 50 OVI cleaners in June and July 2018. In the letter, cleaners were assured of the confidentially of the information they provided and that no participant's name or identification will be recorded on the questionnaire or when analysing data on the computer. Each participant was allocated a unique survey number that was recorded on the questionnaire.

They were also advised that they were under no obligation to participate in the study; that they could withdraw at any stage; and, that copies of the research findings, the completed questionnaires and consent forms, will be kept safe and confidential by the principal investigator. Copies of the consent letter (**Annexure A**), information sheet (**Annexure B**), questionnaire (**Annexure C**), Human Research Ethics Committee (Medical) for Clearance of Research Involving Human Subjects of the University of the Witwatersrand (**Annexure D**), Onderstepoort Veterinary Institute Animal Ethics Committee clearance letter (**Annexure E**), and the Senior Manager Research: Animal Health and Production approval letter (**Annexure F**) are appended.

During the study, confidentiality of respondents was respected and adhered to. Several of the cleaners who participated in the study indicated that they benefited in participating and will be looking forward to improvements that will be conveyed by the recommendations of the study.

CHAPTER THREE

RESULTS

3.1 Respondents

The study population was expected to be 56 cleaners but one post was vacant. Of the 55 filled posts, 50 responded, a response rate of 89%. Five cleaners that were not interviewed included 2 on maternity leave, 1 deployed to the laundry, 1 on sick leave, 1 on suspension.

3.2 Cleaning chemical storage room

Daily, cleaners report to their allocated workstations where they change their civilian clothing to company-issued personal protective clothing (navy-blue overall, safety shoes, protective hand gloves, and hair cover). After which, they fetch cleaning chemicals from the chemical storage that serves as the supervisor's office. The dual use of the room limited movement when cleaners collected and decanted cleaning chemicals.

All different types of cleaning chemicals; expect for furniture polish, window cleaner, and toilet fragrances; are stored on the floor inside transparent 25 litre containers. All water-diluted cleaning chemicals were stored in one storeroom in close proximity to each other. Safety data sheets (SDS) for the chemicals are pasted on the wall inside the chemical storage room. When cleaners decant and collect chemicals from the chemical storeroom, some of the cleaners were observed with their hand protective gloves on, while others were without. When decanting cleaning chemicals into smaller containers, cleaners use empty plastic containers not appropriate for chemical storage before use, Figure 2.



Figure 2: Cleaning chemical storage room and hazardous infectious waste containers used to decant cleaning chemicals

3.3 The cleaning process

After collection of chemicals, some of the cleaners were observed carrying more than one type of cleaning chemical. As observed, most of the containers had no lids leading to some of the chemicals spilling out. On arrival at their working stations, the cleaners mixed the chemicals with water according to the desired quantities.

The cleaning process started at 07:30am with the cleaning of common areas within offices and laboratories, followed by the application of floor stripper directly on the floor without mixing it with water for hard dirt removal. Thereafter, pine gel, a concentrated deodorized cleaner for scum removal from all floors and tiles is mixed with water and applied using a scrubbing machine, followed by floor polish. While cleaning offices, the cleaners used a soft-bristled house broom for swiping. The same broom was used for swiping laboratory floors. Before application of the floor stripper, ceramic and wooden floors are washed using the same mop. The stripper is applied for bathing and stripping the floors.

While some cleaners wait for the stripped floor to dry before applying floor polish, they remove their protective hand gloves and proceed to clean toilets with water-diluted toilet de-scaler and degreaser. On completing wet-work cleaning, dry work ensues with dust removal using a damp cloth and the application of furniture polish (fragranced aerosol sprays) for surface and bench cleaning inside laboratories, without hand protection gloves. For dusting office furniture; basin cleaning; and surface wiping of laboratory areas, cleaners interchanged red, blue, and yellow clothes. To end, kitchen

areas are cleaned using the same cleaning equipment, and refuse receptacles are emptied, washed and dried. At 10:00am, cleaners will break for tea. Further cleaning, which varied depending on departmental and laboratory operations, will continue from 10:30am until 15:30pm.

3.3.1 Demographics of participants

All participants in the study were black/African race and employed at OVI as cleaners. The participants work an eight-hour daily shift from Monday to Friday (40-hour workweek). Although age and sex were not variables of interest, 50% of the cleaners were over the age of 45 years and the majority of the cleaners were woman. Age of the participants as well as their duration of service varied considerably. Thirty-four percent of respondents had more than 60 months duration of cleaning service at OVI, while 8% hand less than 12 months. These respondents (n=8) were already employed by the ARC as cleaners in 2017. In the period 2015 and 2016, the eight respondents were based at other compasses of the ARC. Cleaning duties and cleaning chemicals they used were similar to cleaning duties and cleaning chemicals used by cleaners at the study area (Onderstepoort Veterinary Institute).

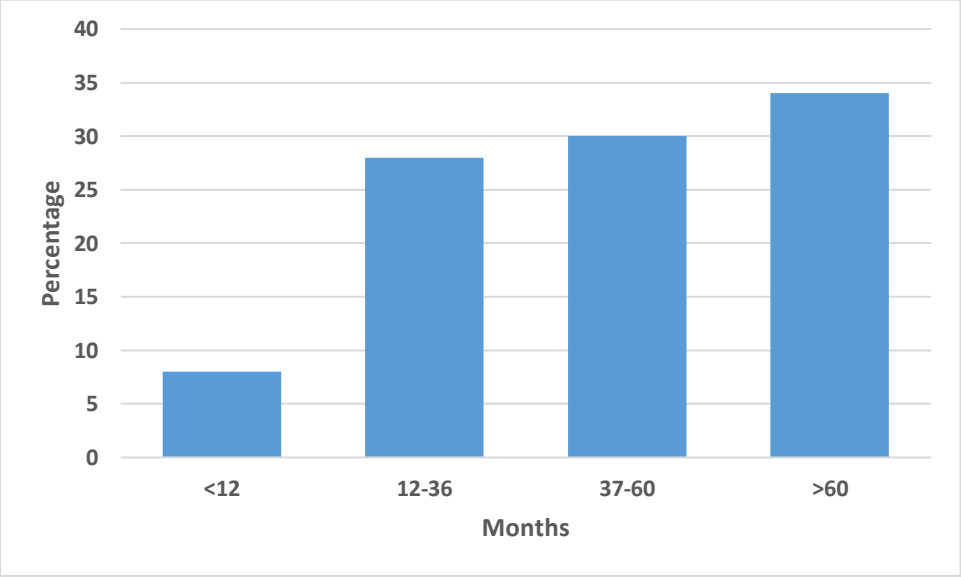


Figure 3: Duration of cleaning service in months at OVI

As shown in Table 1, more than eighty percent of the respondents specified that their major cleaning activities include cleaning floors, windows, furniture, bathrooms, kitchen, and toilets while fifty-six percent cleaned laboratory equipment. This could be attributed to the fact that OVI had more administration buildings compared to laboratories. Of the twelve laboratory programmes undertaken at OVI, only four laboratories cleaners clean microbiological specimen-manipulation areas and wash laboratory-cleaning equipment. The remaining programmes required that laboratory technicians clean all laboratory equipment.

Table 1: Cleaning activities by percentage of cleaners per work

Cleaning activities	**Yes**	**No**
Floors	98%	2%
Windows	90%	10%
Furniture	98%	2%
Bathrooms	84%	16%
Kitchen	84%	16%
Toilets	88%	12%
Laboratory equipment	56%	44%

3.4 Study findings by study objectives

3.4.1 To describe the cleaning materials and other chemicals used by cleaners at an agricultural research facility

"Cleaning chemicals" listed in Table 2 are all store items as purchased through the OVI supply chain procurement processes for laboratory and office cleaning purposes.

Where a cleaning chemical was not listed, each respondent was offered an opportunity to name that particular cleaning chemical under 'Other'. No cleaning chemical brand names were mentioned during the study. In addition, 70 % ethanol and bleach was used in all laboratory programmes, particularly, at the Transboundary Animal Disease laboratory where highly contagious microorganisms were handled, and at the diagnostic registration where specimens were received, registered, and dispatched to their designated laboratories.

Table 2: Characterization of cleaning chemicals used in laboratories and offices

Cleaning chemical	**Respondents**	
	n (yes)	**%**
Dish washing liquid	42	84
Washing powder	46	92
Hand soaps	48	96
Floor stripper	44	88
Floor shine	44	88
Furniture polish	49	98
Window cleaner	42	84
Ammoniated cleaners	41	82
Drain cleaner	43	86
Equipment cleaning soaps	44	88
Other chemicals		
Refrigerator cleaner	1	2
70 % Ethanol	1	2
Bleach	2	4
Oven cleaner	2	4
Pine gel	2	4
Surf blue	1	2
Action 3	3	6

The majority of cleaners used the same cleaning agents as show in Table 2. Furniture polish and hand soaps, mostly containing limonene, a fragrance commonly used in furniture polish and hand cleansers, and associated with dermal sensitization, were the most commonly used cleaning agent, (98%, n=49) and (96%, n=48) respectively.

‘Other chemicals’ used by a few cleaners include refrigerator cleaner, 70 % ethanol, bleach, oven cleaner, pine gel, Surf blue, and Action 3.

3.4.2 To determine the prevalence of self-reported skin disorders of the hands or forearms among cleaners at an agricultural research facility between 2015 and 2017

Figure 4, 5, and 6 represents each skin disorder and the cleaning chemicals that respondents indicated were associated with their self-reported skin disorder. The ‘yes’ and ‘no’ represents the percentages of respondents who were exposed to a particular cleaning chemical and either did or did not develop a skin disorder.

Contact urticaria, dermatitis, and skin pigmentation were confined to the hands and forearms among cleaners. Between 2015 and 2017, the dermatitis was the prevalent (26%) self-reported skin disorder of the hands or forearms, affecting 13 cleaners, Table 3. The most affected anatomical site was the hands (n=22) compared to the forearms (n=4).

Table 3: Prevalence of self-reported skin disorders of the hands or forearms between 2015 and 2017 among cleaners attributed to dermatitis, contact urticaria, and skin pigmentation

			Anatomical site	
Skin disorder	**Yes**	**No**	**Hands**	**Forearm**
Skin pigmentation	5 (10%)	45 (90%)	4 (80%)	1 (20%)
Contact urticaria	8 (16%)	42 (84%)	7 (87.5%)	1 (12.5%)
Dermatitis	13(26%)	37 (74%)	11 (84.6%)	2 (15.4%)

While dermatitis, affecting 26% of respondents, was the most prevalent self-reported skin disorder as shown on Table 3, the prevalent exposures (26%) associated with dermatitis of the hands or forearms were hand soaps, floor shine, floor stripper and, furniture polish as shown on Figure 4.

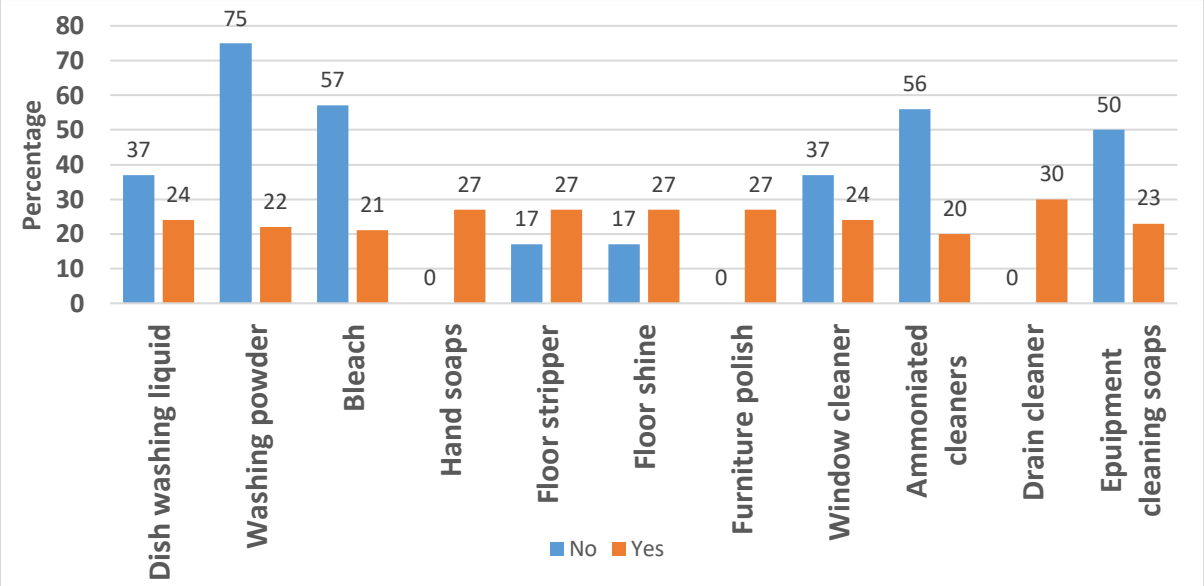


Figure 4: Percentage of dermatitis of the hands or forearms from cleaning chemicals as reported by respondents

Figure 5 provides details of cleaners who used cleaning chemicals and had or contracted contact urticaria between 2015 and 2017. More than 15% of cleaners indicated that dish washing liquid, washing powder, bleach, hand soaps, furniture polish, ammoniated cleaners and equipment cleaning soaps were the cause of the urticaria. Between 14% and 33% of respondents who indicated using floor stripper, floor shine, window cleaners, and drain cleaner had contact urticaria.

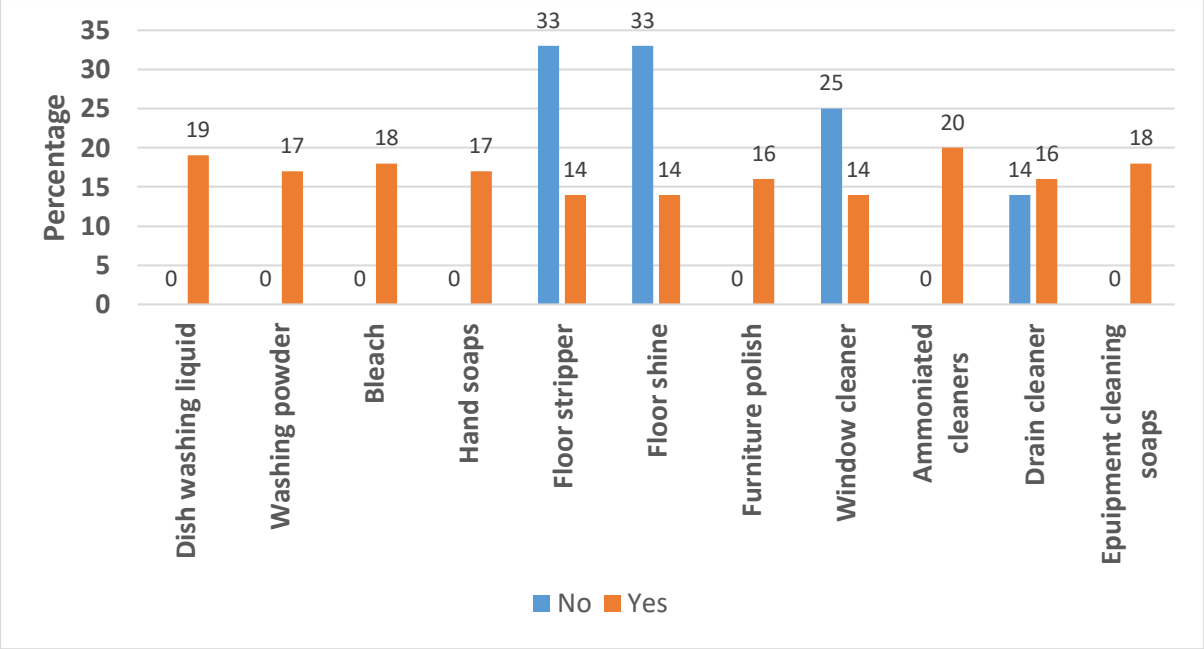


Figure 5: Percentage of contact urticaria of the hands or forearms from cleaning chemicals as reported by respondents

Less than 11% of cleaners reported that one of the chemical products used for cleaning purposes at the OVI was associated to skin pigmentation disorders of the hands or forearms.

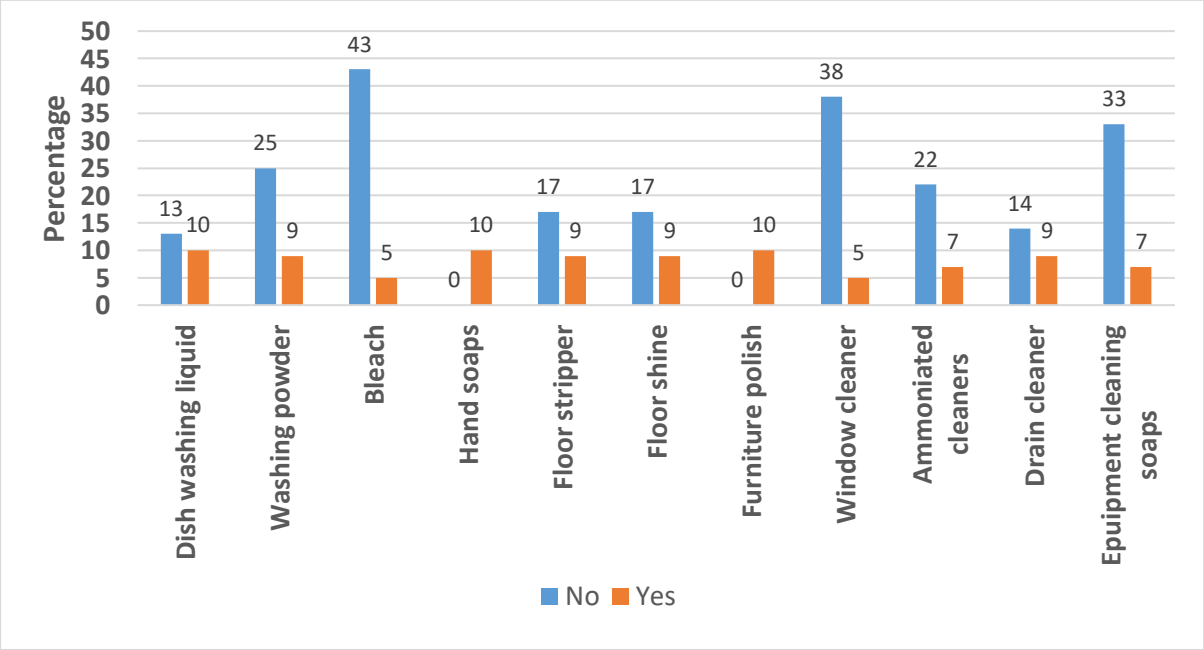


Figure 6: Percentage of skin pigmentation of the hands or forearms from cleaning chemicals as reported by respondents

As shown in Table 4, the majority of the respondents were women 86% (n=43). Between 2015 and 2017, out of forty-three female respondents, three (7%) either had or contracted skin pigmentation disorders due to cleaning chemicals as compared to two (29%) out of seven men respondents.

During the same period, seven (16%) out of forty-three female respondents either had or contracted contact urticaria as a result of cleaning chemicals as compared to only one (14%) out of seven men respondents.

Twelve (28%) out of forty-three female cleaners had or contracted dermatitis due to cleaning chemicals as compared to one (14%) out of seven men between 2015 and 2017.

Table 4: Comparison of skin pigmentation, contact urticaria , and dermatitis between women and men

Skin disorder		Women	Men
Skin pigmentation	No	40(93%)	5(71%)
	Yes	3(7%)	2(29%)
Contact urticaria	No	36(84%)	6(86%)
	Yes	7(16%)	1(14%)
Dermatitis	No	3(172%)	6(86%)
	Yes	12(28%)	1(14%)

3.4.3 To investigate the association between self-reported skin disorders of the hands or forearms and work-related risk factors among cleaners at an agricultural research facility

Less than 26 respondents were affected by any of the three-skin disorders on the hands or forearms. The highest prevalence of self-reported work-related skin disorders was observed in cleaners with a work experience of 37 to 60 months, Table 5. Seven (47%) of the respondents with between 37 and 60 months duration of service either had or contracted dermatitis.

All skin disorders are not associated with duration of cleaning work, as their probability values are more than 0.05 ($p>0.05$). However, the results indicate that the seven

(47%) respondents who had between 37 and 60 months work experience at OVI had dermatitis, which is high as compared to respondents of the other duration of service categories for dermatitis, Table 5.

Table 5: Association between duration of cleaning service at OVI and skin disorders

Skin disorder		<12 Months	12-36 Months	37-60 Months	>60 Months	X^2 value	Probability value
Dermatitis	Yes	25% (1)	14% (2)	47% (7)	17% (3)	4.9469	0.1757
	No	75% (3)	86% (12)	53% (8)	83% (14)		
Contact urticaria	Yes	0% (0)	21% (3)	7% (1)	24% (4)	2.7582	0.4304
	No	100% (4)	79% (11)	93% (14)	73% (13)		
Skin pigmentation	Yes	25% (1)	0% (0)	13% (2)	12% (2)	2.7996	0.4236
	No	75% (3)	100%(14)	87% (13)	88% (15)		

CHAPTER FOUR

DISCUSSION

4.1 Summary of main study outcomes

The aim of this project was to investigate the prevalence of self-reported and work-related risk factors associated with occupational skin disorders among cleaners at Onderstepoort Veterinary Institute (OVI) between 2015 and 2017. The study had a small sample size and there were no follow-ups and no participant drop-outs. A good response rate of 89% was obtained, with the percentage of non-respondents being less than 15% of the sample (50 cleaners). This study found that cleaners self-reported work-related skin disorders resulting from contact with cleaning chemicals. The hands, as the predominant body part directly encountering cleaning chemicals, were more affected by either dermatitis, contact urticaria, or skin pigmentation compared to the forearms.

The study only focused on dermatitis, contact urticaria, and skin pigmentation over a three-year period (2015 - 2017) to increase the likelihood that the skin symptoms were work-related. The study considered duration of service over a three-year time-period in consideration of the interval between exposure to cleaning chemicals and development of skin disorder symptoms. The three skin disorders were defined based on self-reported symptoms that were not clinically tested and confirmed. To reduce this limitation and any possibilities of recall bias, the study adopted a NOSQ questionnaire validated for investigations of work-related skin disorders. As a cross-sectional study, the design provided an opportunity to collect existing dermal exposure data and possible risk factors that were used to estimate the prevalence self-reported work-related skin disorders among cleaners (72).

A few terms were translated on the questionnaire, and colour-printed pictures were used for explaining the three types of skin disorders.

Of the three skin disorders, dermatitis was the most prevalent affecting 26% (n=13) of the respondents, mostly women, followed by 16% (n=8) of contact urticaria and 10 % (n=5) of skin pigmentation disorder.

There appears to be awareness of work-related health and safety issues from OVI management and cleaners themselves through the provision of PPE, and health education and training. This study has shown that cleaners at OVI either had or contracted dermatitis, contact urticaria or skin pigmentation disorders of the hands or forearms between 2015 and 2017.

4.2 Limitations of the study

Lack of previous literature on work-related skin disorders among cleaners. No occupational skin disorders were confirmed by other methods or techniques except a self-reporting questionnaire. Attempts were made to reduce the impact of this limitation by using a validated questionnaire. Not every member of the 55 cleaners employed and based at OVI participated in the study. The six cleaners (11%), less than 15% of the total population, who did not participate, did not negatively affect representability of the true characteristics of the total population. Therefore, any effect of non-responder bias is likely to be small.

A number of scheduled presentations had to be undertaken prior to securing interview times for data collection. Because of the unavailability of some cleaners during prior agreed upon presentation dates, more presentations had to be conducted to explain the aim and direction of the study in order to avoid any possible misunderstandings that could have introduced further bias.

Limitation associated with cross-sectional studies to establish a cause (work-related risk factors) and effect (work-related skin disorders) relationship between variables.

4.3 Major findings of the study in relation to study objectives

Limited literature is available related to agricultural research facility cleaners and work-related skin disorders. However, this study found that cleaning chemicals used and cleaning duties undertaken by cleaners at OVI are not different from other cleaning occupations involving wet-work. These cleaning activities include wet cleaning, dusting, sweeping, polishing, waxing, window and toilet cleaning, etc. using variable cleaning products such as bleach, washing powder, polishes, waxes, strippers, and

ammonia, which are similar to other wet-work occupations (47). As reported in international studies, wet-work and repeated exposure to cleaning products without personnel protective equipment is associated with irritation and inflammation of the skin of the hands (73).

In this study, over 80% of cleaners reported the use and subsequent exposure to harmful cleaning chemicals listed on Table 2. Ninety-eight percent (n=49) reported using furniture polish possibly containing limonene, a commonly used fragrance additive in products and perfumes reported to be associated with dermal sensitization (74) . On SDS's formulation information; dish washing liquid, washing powder, hand soaps, floor stripper, floor shine, floor polish, cherry-red, pine gel, and safblue are described as 'general maintenance deodorising cleaners with pleasant fragrances'. Deodorizing or fragrance ingredients used in most cleaning products are complex mixtures of different synthetic and volatile organic compounds (75). Previous research indicates that fragranced cleaning agents trigger adverse cutaneous effects among those directly exposed and without skin protection (76). Asserting the finding is a clinical review on fragrance contact allergy which found that between 1.7 to 4.1% of the general population become sensitised to chemical products containing deodorizing ingredients (77). A study investigating the incidence of work-related cases of cutaneous fragrance allergy reported to EPIDERM, also found that 5.2% of allergic dermatitis was attributed to fragrances (78).

Safblue, pine gel, floor stripper, and floor shine are highly concentrated cleaners with a potential of being skin irritants that may corrode, crack, flake, and defat the skin. Drain cleaner, degreaser, and toilet de-scaler are described as 'powerful, concentrated acrylic, non-ammoniated emulsion scrubbing cleaners that contain sequestering agents', which require wearing of gloves when handling the products. As listed on SDS's, their toxicological constituents include, but are not limited to, diethylene glycol; chlorinated phenols; petroleum solvents; perchloroethylene; naphthalene; petroleum distillates; and, sulphuric acid, which have the potential to irritate and burn the skin on direct and prolonged contact (79). A study where 105 professional cleaning products were sampled, found more than 132 different chemical substances that carry a risk for adverse health effects of the skin (80). While solvents may lead to dissolution of the skin surface lipids resulting in dermatitis, dermal exposure to perchloroethylene can result in both dermatitis and hypersensitivity (81). Furthermore, the use of degreasing

agents is widely reported to be associated with hand dermatitis among cleaning workers (48).

The study defined the three skin disorders based on symptoms. Dermatitis is referred to as red-like rash on the skin resulting from irritant or allergic reactions post skin contact (82). The results indicated that over a three-year period, between 17 and 75% of respondents had or dermatitis, while 14 to 33 % had or contracted contact urticaria , defined as sudden itchy rash and swelling (83). Five to 43 % had or contacted skin pigmentation disorders (chemical-induced depigmentation) characterized by light or dark patches on the skin encouraged by repeated exposure to cleaning chemicals (84). Similar studies also found dermatitis to be high in the cleaning industry due to various cleaning chemicals used, allergens contained in disinfectants and, a high skin sensitization rate from disinfectants (85). Similarly, Liskowsky *et al* (2011) found that the most common problem in the cleaning industry was occupational dermatitis of the hands attributed to cleaning chemicals and rubber additives from gloves (86). Irrespective of the industry, many epidemiological studies on work-related skin disorders report that dermatitis of the hands is one of the most prevalent occupational diseases (87). As some cleaners were observed removing protective hand gloves in-between cleaning and using containers with no lids leading to chemicals spilling out, it is not alarming that over a three-year period there was a high number of cleaners with dermatitis at OVI. The results did not indicate whether over 17% of respondents who either had or contracted dermatitis are once off or repeat cases. However, some respondents indicated that they had suffered from the skin disorder more than once.

Over a three year period, 2015 – 2017, dermatitis affected 13 (26%) of the 50 (89%) cleaners who participated in the study attributed to the chemical cleaning products used at OVI and other cleaning associated risk factors. Eight (16%) cleaners had or contracted contact urticaria while five (10%) of the 50 cleaners suffered skin pigmentation disorders on their hands or forearms. It is important to note that without an unexposed reference group and limitation associated with the healthy-worker effect, there could have been an over- or underestimations of work-related skin disorders.

The study did not probe into any sex-related skin disorder predisposing and possible confounding determinants, as it was not a gender-comparative study. However, the present study had a higher proportion of woman cleaners 86 % (n=43) compared to men, Table 4. Many work-related skin disorder studies pronounce that women are more at risk of work-related dermal exposures because women are alleged to be more skin-reactive than men (88).

Duration of cleaning service did not play any significant ($p > 0.005$) role in cleaners developing any of the three skin disorders. Over a three-year period, less than 26% of respondents across all work experience were affected by all three skin disorders either on the hands or forearms. The highest prevalence of dermatitis was observed among 47% (n=7) cleaners with between 37 and 60 months duration of cleaning service, Table 5.

Using a self-diagnosing validated questionnaire, the study has shown that cleaners have a continued risk of work-related skin disorders at OVI. Asserting the finding is a Spanish study reporting that professional cleaning workers are not sufficiently protected from dermal hazards which prejudices cleaners at continued risk of skin disorders (48). Using a skin disorder questionnaire conceded a 73% response rate and a 1-year prevalence of hand eczema of 8% (females 10%, males 6%) during a study of self-diagnosed dermatitis in adults (89). Another Nordic Occupational Skin Questionnaire study recently reported a 19% 1-year period prevalence of self-reported skin disorders among 400 healthcare workers (90).

In the present study, contact urticaria, dermatitis, and skin pigmentation were confined to the hands and forearms. Between 2015 and 2017, dermatitis was the prevalent (26%) self-reported skin disorder, affecting 13 cleaners, Table 3. The most affected anatomical site was the hands (n=22) compared to the forearms (n=4). Over a three-year period, dermatitis was the dominant self-reported skin disorder affecting mostly the hands as compared to the forearms as shown on Table 3. There was a 31% three-year period prevalence of dermatitis. Among cleaners who had dermatitis, more than 21% cited hands soaps, floor stripper, and floor shine as the exact course of their dermatitis while 30% reported drain cleaner as the course of dermatitis, Figure 4. Similar work-related skin disorder studies found that the hands were at elevated risk of hand dermatitis followed by the fingers (48). The skin of the hands was also found

to be the most anatomical part affected during a Taiwanese study on occupational dermatitis among cement workers (91). Both studies concluded that more effective hand preventative measures are still required within wet-work occupations.

The results of the study indicate that between 2015 and 2017 cleaners were also susceptible to work-related contact urticaria and skin pigmentation, both affecting mostly the hands. Similarly, a work-related skin disorder study from New Zealand found an 11% prevalence of urticaria of the hands in 425 cleaning subjects (47). In this present study, 11% of cleaners had or contracted skin pigmentation disorders. Skin pigmentation was defined based on cleaners developing light or dark patches on the skin of the hands or forearms. This description proved difficult to infer correctly the exact cleaning chemicals that might have led to the development of skin pigmentation disorders among cleaners. From literature, aromatic hydrocarbon, like phenol commonly used in various commercial soaps, sprays, and ointments as a germicidal antiseptic give rise to dark and white pigmentation on contact with exposed skin (92).

Protective hand gloves is a widely cited preventative strategy for skin disorders among cleaners. The use of liquid-proof gloves for prolonged period is widely cited to contribute to impairment of the skin barrier resulting in the development of dermatitis (93). To mitigate the development of work-related skin disorders associated with the use of protective hand gloves, cleaners may take regular breaks from wearing gloves in order for hands to dry out and use suitable protective skin care products guided by a healthcare professional skilled in dermal exposures.

All participants either indicated the type of glove currently in use or previously used on the self-reported skin disorder questionnaire-measuring tool, Annexure C, section 5 (personal protective clothing). The personal protective clothing section of the questionnaire included: nitrile heavy duty industrial gloves, chemical nitrile gloves, blue plastic gloves, blue rubber gloves, white latex gloves, disposable long plastic gloves, and cotton gloves. Cleaners were afforded an opportunity to list any other type of gloves not listed on the questionnaire with a description of the particular gloves under ‘Other’.

In manual handling work, the skin of the hands is the utmost vulnerable anatomical part to exogenous exposures (52). It is first anatomical part for physical contact with any materials or substances required in the execution of a particular task (94). During cleaning, there is frequent hand use in the execution of cleaning tasks as was observed in this study. When OVI cleaners fetched cleaning chemicals and decanted cleaning chemicals into smaller containers, they used empty plastic containers not suitable nor designed for storing and handling of chemicals. While decanting cleaning chemicals into smaller containers, some were observed with their company-issued protective hand gloves on, while other were without. Cleaners were also observed removing protective hand gloves while waiting for the stripped corridor floors to dry. They removed protective hand gloves and proceeded to clean ablution facilities with water-diluted toilet de-scaler and degreaser.

Decanting and carrying spilling cleaning chemicals together with the removal of protective hand gloves between wet-work cleaning activities is a risk factor for the development of work-related skin disorders among cleaners at OVI. Furthermore, the results of this study indicate that the wet-work cleaning job is a risk factor among OVI cleaners developing dermatitis, contact urticaria, and skin pigmentation.

Irrespective of occupational industry, wet-work has long been reported to be the main risk factor associated with work-related skin disorders (95). Specific to the cleaning industry, wet-work together with cumulative exposure to skin irritating chemicals and wearing of occlusive gloves are the most risks associated with the development of skin disorders (96).

Though gaps still exist in epidemiological investigations of work-related dermal exposure assessment, a few methods and models do exist aimed at attacking these issues, such as clinical skin tests, direct skin testing methods, and the use of validated occupational skin disorder questionnaires. Though some of these methods and techniques are time consuming and prone to observer bias (97). Self-reporting questionnaires administered to exposed individuals have so far been the method used to estimate prevalence and association in most work-related skin disorder studies.

At Onderstepoot Veterinary Institute, self-reported work-related skin disorders of the hands or forearms does exist among cleaners. Dermatitis was more common on the hands among cleaners as compared to contact urticaria and skin pigmentation.

Although the findings of this study are limited to cleaners at OVI and lack the extent to which they can be generalized, it is anticipated that the findings would provide baseline work-related skin disorder data among cleaners, strengthen current or develop new precautionary measures for wet-work employees, and mitigation measures against cutaneous exposures. The study findings will, expectantly, encourage management to ensure that OVI cleaners are familiar with the risks of chemical hazards associated with the cleaning duties.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

The study hypothesized that wet-work and exposure to cleaning chemicals is associated with development of occupational skin disorders in research laboratory cleaning workers. The results of this study indicated that work-related skin disorders were prevalent between 2015 and 2017 at OVI. Dermatitis was the most common skin disorder affecting 13 of cleaners compared to contact urticaria (n=8) and skin pigmentation (n=5). This study had more women than men, and a small sample. Therefore, some results of the study must be interpreted with caution.

From observation of the cleaning process, risk factors for the development of work-related skin disorders could include removal of protective hand gloves between wet-work cleaning activities and exposure to cleaning products without hand protection. Cleaning methods followed by some cleaners, together with chemical containers used at OVI predisposes cleaners to work-related skin disorders. Though the sample was small, this study highlights the importance of work-related skin disorders from wet-work and cleaning chemicals, and the subsequent adverse health effects among cleaners at OVI.

The study did not have an objective to identify evidence-based recommendations and thus only general recommendations based on generally applied principles are given. There must be a review of current chemical handling procedures among cleaners, and possibly, the development of new cleaning methods at OVI. Other than self-reports, it is recommended that a healthcare professional skilled in dermal exposures first assess suspected cases of work-related skin disorders.

The OVI occupational health clinic must develop and incorporate a skincare programme with screening of suspected skin conditions on periodic medical examinations in order to assess dermal absorption. In turn, the programme will assess the efficacy of hand protective equipment offered to cleaners. Management can further explore a cleaner-focused chemical safety induction and training programme cantered on cleaning tasks and procedures, and use of protective hand gloves. Though, numerous studies have shown that success in preventing work-related skin disorders is possible with intervention measures such as training in skin protection, knowledge alone does not automatically lead to a change in attitudes, and this in turn may not

automatically lead to a change in behaviour. However, developing and implementing a skincare programme, coupled with chemical use induction and training programme is required at OVI.

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ANNEXURE A

INFORMED CONSENT FORM

Dear Mr/Ms/Mrs

You are hereby invited to participate in the study titled "*the prevalence and work-related factors associated with skin disorders among cleaners at an agricultural research facility*". Mann Mokoatle, Occupational Health and Safety Officer for Onderstepoort Veterinary Research (OVR) will undertake this interview-based study, during normal working hours/days in 2018 with the objective of:

- Describing the cleaning materials and other chemical agents used by cleaners at OVR,
- Describing the prevalence of self-reported occupational skin disorders of the hands and forearms among cleaners at OVR between 2015 and 2017,
- Investigating the association between self-reported occupational skin disorders of the hands and forearms and work-related risk factors among cleaners at OVR.

The Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg, has approved this study. If you have any concerns over the way the study is being conducted, the Chairperson of this Committee is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by email on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the email addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukasi@wits.ac.za. The supervisors for the study are Professor David Rees, at the National Institute of Occupational Hygiene (NIOH) who can be contacted by telephone at 011 712 6424 and email david.rees@nioh.nhls.ac.za; and Ms Anna Fourie, NIOH Department of Immunology and Microbiology who can be contacted by telephone on 011 712 6424 and email anna.fourie@nioh.nhls.ac.za.

Thank you for taking time to read this information, and should you be willing to partake in the study, please read and sign the attached consent form.

✂

I ……. (*Print name*) hereby confirm that I have been informed of the nature (including risks and benefits) of the study *"The prevalence and work-related factors associated with skin disorders among cleaners at an agricultural research facility"* outlined in the information sheet and agree to be part of this study.

PARTICIPANT **Survey no**……

.....	……	……..
Print Name	**Signature**	**Date and Time**

THANK YOU FOR YOUR WILLINGNESS TO PARTICIPATE

ANNEXURE B

Information Sheet

Dear Mr/Ms/Mrs

Study Title:

The prevalence and work-related factors associated with occupational skin disorders (OSD) among cleaners at an agricultural research facility**.**

Invitation

Good day. My name is Mann Mokoatle. I am the occupational health and safety officer at the Agricultural Research Council – Onderstepoort Veterinary Research (ARC-OVR). I am doing a study to find out how many cleaners working at Onderstepoort Veterinary Research (OVR) have skin problems. I also want to find out what things at work are causing these skin problems. I am inviting you to be part of the study. The study will take place during normal working hours from Monday to Friday this year (2018).

Background

The number of people suffering from work-related skin problems of the hands and forearms in the cleaning industry is high because of working with water and cleaning chemicals for long periods. Cleaners working for the ARC-OVR also use water and chemicals for cleaning offices and laboratories. This can result in OVR cleaners developing skin problems on their hands and forearms. After getting the information about the cleaning work you do at OVR and the skin problems you have, this information help the ARC-OVR and cleaners by:

- Helping reduce work-related skin disorders and compensation claims related to occupational skin disorders
- Develop an effective chemical exposure medical surveillance programme tailored for cleaning personnel within the Agricultural Research Council.
- Increase awareness of work-related skin disorders and encourage proper skin care among Onderstepoort Veterinary Research cleaning staff.

Participating in the study would involve:

With the knowledge and approval by OVR management to conduct the study with cleaners as participants:

- No clinical skin examination will be conducted on any of the participants,

- The Principal Investigator will visit you at your workstation between 09:00am – 13:00pm (Monday - Friday), asked questions based on your job functions which should take about t 30 minutes to an hour. This will include questions on your job, detergents and cleaning agents you use, duration of exposure (time spent doing your cleaning duties), wet-work practices, use of personal protective clothing of the hands/arms, working hours, your skin condition currently and over the last 36 months, and your hand washing routine
- No participant's name or identification will be recorded on the questionnaire,
- No costs or payments incurred in participating in the study
- If you do not participate or if you withdraw (which you can do at any time), there will be no negative consequences for you or your job.

Are there any risks involved in participating in the study?

There are no risks for you participating in the study. However, as a cleaner the day-to-day exposure to wet-work with cleaning chemicals does pose a risk of developing skin disorders.

Confidentiality.

The protocol will be submitted to the Human Research Ethics Committee (HREC) of the University of the Witwatersrand, Johannesburg for ethics approval. For permission to conduct the study at the Agricultural Research Council and for access to employees, an application will be submitted to the Onderstepoort Veterinary Institute Animal Ethics Committee for approval.

Participation of the participants in the study will be voluntary. Participants will be issued consent forms and they will be free to refuse to participate without facing any consequences for their non-participation. Identifying information will be collected separately from the questionnaire and a survey number known only to the principal researcher will be used to link identifiers and questionnaires. All completed consent forms will be kept privately and confidentially by the principal investigator. Any employee who voluntarily discloses any skin disease will be referred to the institute's occupational health clinic.

The research finding will be presented, without mentioning any participant (cleaners) by name, surname, department or any identifying characteristic, to the Agricultural Research Council management including the logistics and support services department manager to whom the cleaners are reporting; the Onderstepoort Veterinary Research Institute Animal Ethics Committee; the OVR Occupational Health and Safety Committee; and, the National Institute of Occupational Hygiene (NIOH).

The Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg, has approved this study. If you have any concerns over the way the study is being conducted, the Chairperson of this Committee is Professor Clement Penny, who may be contacted on telephone number 011 717 2301, or by email on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the email addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukasi@wits.ac.za. The supervisors for the study are Professor David Rees, at the National Institute of Occupational Hygiene (NIOH) who can be contacted by telephone at 011 712 6424 and email david.rees@nioh.nhls.ac.za; and Ms Anna Fourie, NIOH Department of Immunology and Microbiology who can be contacted by telephone on 011 712 6424 and email anna.fourie@nioh.nhls.ac.za.

Thank you for taking time to read this information sheet, and your willingness to partake in the study.

ANNEXURE C

Questionnaire:

The prevalence and work-related factors associated with skin disorders among cleaners at an agricultural research facility

Respondent No.:_____

1. Personal details

1.1 **Age**: _____

1.2 **Sex** **male** ☐ **female** ☐

1.3 **Name of Institute/Organisation:_____**

1.4 **Date of interview**: **Day**_____ **Month**_____ **Year**_____

2. Occupation

2.1 **Name of employer/organisation/institute**:_____

2.2 **What is your present occupation:**_____

2.3 **What is your major activity at work:**_____

2.4 **Since when have you been in your present occupation? years** ☐ **months** ☐

2.4 **How many hours do you work per day?** ☐ **or per week?** ☐

2.5 **What are your main cleaning activities in your current job?**

Floor	
Window	
Furniture	
Bathroom	
Kitchen	
Toilet	
Laboratory equipment	

2.6 **During your work activities, do you use any of the below listed chemicals?**

Dish washing liquid & washing powder	
Bleach	
Hand soaps	
Floor stripper and floor shine	
Furniture polish	
Window cleaner	
Ammoniated cleaners e.g. Handy Andy	
Drain cleaner, de-greaser & toilet descaler	
Equipment cleaning soaps	
Other, please specify:	

2.7 **Do you regularly perform any other cleaning work other than your current job?**

Yes ☐ **if yes, what kind of work?** _____

No ☐

3. Skin disorder history

3.1 **Have you ever had any of the conditions listed below?**

	Yes	No
Contact dermatitis/eczema: **A rash on your skin resulting from coming into contact with cleaning chemicals (Itchy, Dry, flaky, red, little 'blisters', cracks with bleeding)**		
Contact urticaria: **Itchy rash and wheal (swelling) that lasts for a few minutes to an hour after contact with cleaning chemicals**		
Skin pigmentation disorders: **Have you developed light or dark patches on your skin since working with cleaning chemicals?**		

3.1.1 **If so, where?** **Hands** ☐ **Somewhere on the body** ☐

Specify part of body_____

3.1.2 **When did this start: Month**_____

3.1.3 **Do you still have the condition? Yes** ☐ **No** ☐

4. Self-reported hand or forearm skin disorder (rough, itchy rash)

4.1 **Have you ever in the past had a rough, itchy/burning rash on your hands?**

Yes ☐ **No** ☐

If YES, how did it happen? _____

_____

4.2 **Have you ever in the past had a rough, itchy/burning rash on your forearms?**

Yes ☐ **No** ☐

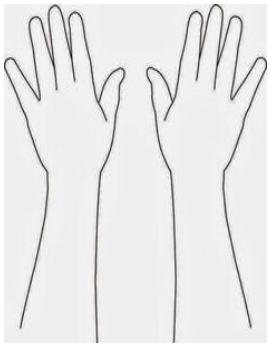
If YES, how did it happen? _____

_____

4.3 **What did you do to prevent 4.1 and 4.2 from happening again?**

Use gloves	
Use skin barrier creams	
No protection	

Please shade areas on the hands and forearms where you commonly have rough itchy rash







4.4 **How many times have you had a rough itchy rash on your hands or forearms in the last 36 months?**

Once	
2 times	
3 times	
More than 3 times	

4.5 **When did you last have rough itchy rash on your hand or forearms?**

	Yes	**No**
I have it now		
In the past 3 months		

Between 3-12 months ago		
More than 12 months ago		

4.6 **Does your rough itchy rash get worse when coming into contact with certain materials, chemicals or any other thing during your work?** **Hands: Yes** ☐ **No** ☐

Forearms: Yes ☐ **No** ☐

4.7 **Does your rough itchy rash get better or worse when you are away from your normal work (e.g. during weekends or leave/longer periods)?**

No	
Yes, sometimes	
Yes, usually	
Don't know	

4.8 **Have you had any of the following symptoms or signs on your hands or forearms during the last 36 months?**

	Hands	**Forearms**
Redness		
Flaking dry skin		
Crack on the skin		
Weeping or crusts		
Tiny water blisters		
Small bumps		
Rapidly appearing itchy wheals/welts		
Itching		
Burning or stinging		
Tenderness		
Other, please specify:		

5. Personal Protective Clothing (PPE)

5.1 **Do you use protective gloves in your work?** **Sometimes** ☐

Yes ☐

No ☐

5.2 **How many hours per day do you use protective gloves? _____Hours**

5.3 **What type of gloves do you or did you use in your work?**

	Currently using	Previously using
Nitrile heavy duty industrial gloves	☐	☐
Chemical nitrile gloves	☐	☐
Blue plastic gloves	☐	☐
Blue rubber gloves	☐	☐
White latex gloves	☐	☐
Disposable long plastic gloves	☐	☐
Cotton gloves	☐	☐
Don't know	☐	☐
Other (describe the type and make of gloves) ……		

5.4 **Have you had skin disorder symptoms as a result of wearing protective gloves?** **Yes** ☐

No ☐

5.5 **From what type of gloves? (**mark any that are applicable**)**

	Currently using	Previously using
Nitrile heavy duty industrial gloves	☐	☐
Chemical nitrile gloves	☐	☐
Blue plastic gloves	☐	☐
Blue rubber gloves	☐	☐
White latex gloves	☐	☐
Disposable long plastic gloves	☐	☐
Cotton gloves	☐	☐
Don't know	☐	☐
Other (describe the type and make of gloves) ……		

End,

Thank You

ANNEXURE D

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Paulus Mann et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180207

NAME: (Principal Investigator)	Paulus Mann et al
DEPARTMENT:	School of Public Health Agricultural Research Council Onderstepoort Veterinary Research Pretoria
PROJECT TITLE:	The Prevalence of self-reported and work-related risk factors associated with occupational skin disorders among cleaners at an agricultural research facility
DATE CONSIDERED:	23/02/2018
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof David Rees
APPROVED BY:	CB Penny Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	01/06/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **February** and will therefore be due in the month of **February** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date 01/06/2018

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

ANNEXURE E

ARC • LNR
Excellence in Research and Development

ARC-ONDERSTEPOORT VETERINARY INSTITUTE
LNR-ONDERSTEPOORT VEEARTSENYKUNDE-INSTITUUT
Private Bag / Privaatsak X05, Onderstepoort 0110, South Africa / Suid-Afrika
Tel: (012) 529-9111 • Fax: (012) 565-6573 (Int: + 27 12)
E-Mail: ovi-info@arc.agric.za • Web site: www.arc.agric.za

Enquiries / Navrae
Dr P Mutowembwa
012 5299593

Ref. no. / Verw. nr.
18/10/3/1/1/4-
AEC-OVI

Mr Mann Mokoatle
ARC–OVR
100 Old Soutpan Road
Onderstepoort
0110

31 October 2017

RE: Application for ARC–OVR Animal Ethics Committee approval to do research: The prevalence and work-related risk factors associated with skin disorders among cleaners at an agricultural research facility.

Dear Mr Mann Mokoatle,

Your enquiry dated 2017-10-31, requesting clearance from the ARC–OVR animal ethics committee to perform a research project or study, refers.

I do hereby to inform you that the ARC–OVR Animal Ethics Committee has noted that the application does not involve use of animals or tissues derived therefrom. Approval is therefore granted to perform the above-mentioned research/study, with the following conditions:

Conditions:

1. Approval for the study to be conducted at ARC–OVR must be obtained from the Senior Manager: Animal Health and Protection before the study may start;
2. Ethical approval for the study must be obtained from the University of the Witwatersrand before the study may start;
3. This approval does not relieve the researcher of any responsibility which may be placed on him by any act of the Republic of South Africa;

Kind regards,

Dr Paidamwoyo Mutowembwa (Research Veterinarian)
Chairman: ARC–OVR Animal Ethics Committee

ANNEXURE F

ARC • LNR
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AGRICULTURAL RESEARCH COUNCIL
LANDBOUNAVORSINGSRAAD
Private Bag X05
Onderstepoort, 0110 R S A

Tel: (012) 529-9106 (Int: +27 12)
Fax: (012) 565-4667 (Int: +27 12)
e-mail: bofelof@arc.agric.za
Web site: www.arc.agric.za

Memorandum

Office of the Senior Manager Research: AH&P

To	:	Wits University HREC (Medical)
CC	:	Mr. PM Mokoatle
From	:	Dr M Mulumba
Ref No	:	18/10/1/1/4-AEC-OVI
Date	:	02 May 2018
Subject	:	Approval to Conduct the Postgraduate study at ARC-OVR

Dear Wits University HREC (Medical)

I, Senior Manager Research: Animal Health and Protection at the Agricultural Research Council – Onderstepoort Veterinary Research, do hereby inform you that:

- Mr. PM Mokoatle student no. 844288 is employed at ARC-OVR and has been cleared by both the OVR Animals Ethics Committee and the Senior Manager Research: Animal Health and Protection to conduct a research project at ARC-OVR.
- This Master's research project (Public Health – Occupational Hygiene) is purely for academic purposes only, all research findings will not be harm the ARC and OVR in any way.

Kind regards

_____

Dr Misheck Mulumba

Senior Manager Research: Animal Health and Protection
Comment/s:

_____

_____

_____

Signed: _____ **Date:** _____

APPROVED		AMENDED		NOT APPROVED	