Health care providers' experience of research activities in public sector health facilities in the Western Cape Province of South Africa

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Abstract

There is a significant amount of public health research conducted within provincial health facilities in South Africa, whose findings have a positive impact on the delivery of health services. This includes clinical, epidemiological, health systems and health services research, often initiated by post-graduate students, independent academics researchers, as well as research institutions. Although researchers commonly commit to providing feedback to the provincial department and facilities, there is little evidence to confirm that research feedback is subsequently provided. Little contextualized empirical evidence is available to guide action, particularly for frontline health care providers, who often have the responsibility to host these research activities. The aim of this study was to explore the experiences of healthcare providers with research activities hosted in health facilities in the Western Cape province of South Africa. A mixed-method, cross-sectional study was conducted utilising an online survey (n= 19), and semi-structured interviews (n=3) with frontline health care providers (research gatekeepers). Descriptive analyses characterized respondents and their experience of research. Qualitative thematic analysis took on an inductive approach by identifying themes as they emerged from the data and cross comparing these with findings from the scoping literature review. Findings provided insight into how research conduct is experienced by those on the frontline in public health facilities on the provincial district platform. This is particular to the Western Cape province, which has a specific health department administration system. The following themes emerged: perception of research burden on services, understanding of the research approval process, autonomy to deny researchers access to the health facility due to overburden of research, the frequency or occurrence of research feedback after completion of a project, and interpersonal dynamics between researchers and gatekeepers as it relates to research conduct in facilities. This research reports on empirical evidence of perspectives from frontline health care providers on their experience with health research in a particular provincial context. The findings could form the basis of a study with a much larger sample size to inform how research feedback can be translated in a way that directly impacts on the uptake in the frontline.

Acronyms and abbreviations

AIDS	Acquired Immunodeficiency Syndrome
CDC	Community day centre
CHC	Community health centre
CIHR	Canadian Institute of Health Research
DST	Department of Science and Technology
DOH	Department of Health
DHET	Department of Higher Education and Training
EBP	Evidence-based practice
ENHR	Essential National Health Research
HIV	Human Immunodeficiency Virus
HPSR	heath policy and systems research
HREC	Human research ethics committee
HSR	Health systems research
HST	Health Systems Trust
ICFs	Informed consent forms
IP	Internet Protocol
KT	Knowledge translation
LMICs	Lower-middle income countries
MDGs	Millennium Development Goals
MDR	Multi-drug resistant
MOH	Ministry of Health
NDoH	National Department of Health
NGOs	Non-governmental organisations
NHI	National Health Insurance
NHRC	National Health Research Committee
NHRD	National Health Research Database
NHRS	National Health Research System
PAR	Participatory Action Research
PDoH	Provincial Department of Health
PHC	Primary health care
PHRC	Provincial Health Research Committee

R4H	Research for health
SA	South Africa
SADOH	South African Department of Health
SAMRC	South African Medical Research Council
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
TB	Tuberculosis
UCT	University of Cape Town
UHC	Universal Health Coverage
WC	Western Cape
WCDoH	Western Cape Department of Health
WHO	WHO African Region

Glossary of Key Terms

For the purpose of this Thesis, the key terms used are operationalised and understood as follows:

Gatekeepers	Department of Health (DoH) employees who provide permission for researchers to access these health facilities in order to conduct their research [1]. For this Thesis, most of the gatekeepers encountered were senior doctors, professional nurses, facility managers, service managers.
Health care providers	Different cadres of frontline health facility staff, i.e., Nurses (enrolled, professional, auxiliary), Doctors (medical officer, family physician, senior doctor, community service doctor) and Facility Managers
Public health research	While the aim of public health practice is to control disease and improve health and wellbeing, and related health services, "*The primary intent of public health research is to yield generalizable knowledge. Key characteristics of public health research include (1) benefits beyond the needs of the study participants, (2) collection of data exceeding what is needed to care for study participants and (3) generation of knowledge with relevance outside the population from which data were collected*" [2]. Therefore, Public health research of consequence should draw emphasis on critical issues around public health threats that are the biggest contributors of morbidity, mortality, and health care costs [3].
Health facilities	Clinics, Community health centre (CHC); Community day centre (CDC), district hospitals
Knowledge Translation	Defined by the Canadian Institutes of Health Research (CIHR) "*as a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products, and strengthen the health care system*" [4].

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PART A: THESIS PROTOCOL

Health care providers' experiences of research activities in public sector health facilities in the Western Cape Province of South Africa

Introduction

Evidence and findings from localised health research should have a major impact on the functioning of a country's health system. One of the main objectives for conducting health research is to produce high quality, scientific evidence that informs practice and provides a basis for the delivery of quality health services- that addresses population needs [5,6]. In settings where different sectors of the economy compete for resources, research can be used to set health priorities and justify the choice of fund allocation [6]. Trends in the epidemiology of diseases, the rise in quadruple burden of disease and increasing health inequities across the world require informed, targeted and timely responses [7]. Addressing these health challenges requires evidence-informed decision making, now, more than ever [8]. Findings from health research form a large part of the evidence that can be used to inform health policy and planning, and the management of health programmes [9]. Investing in health research, particularly public could result in a healthier population, improved quality of life, job creation, and subsequently impact on economic growth [7].

Despite evidence showing the benefits of research focused on health issues locally, many countries in sub-Saharan Africa (SSA) are yet to experience this. The health research systems of these countries are characterised by limited resources, lack of inclusion of all relevant stakeholders in the research process, poor communication of research findings and mechanisms for translation of findings into policy and practice [10]. This may indicate inadequate acceptability or value given to research on the side of health care providers, facility management or senior managers of services [1]. The complex nature of translating information gathered from health research into practice, not only requires an understanding of how the health research system operates, from its funding, approval processes for research but also the translation of the research findings into usable information with effective feedback mechanisms [8].

Every year, billions of dollars are spent on health research worldwide. From its inception in 1998, the Global Forum for Health Research was set up to help address issues on the disparities around resource allocation in health research [7]. The 1990s saw the start of a revolution in the prioritisation of health research [7]. In the 1990 report, the Commission on Health Research development made significant recommendations to correct the gap between an inadequate investment in research (10%) and the magnitude of disease burdens (90%) – the' 10/90' gap [7]. It is described as situation where the smaller portion of resources (10%) invested in research accounts for the largest (90%) of the burden of disease, globally [7]. They argued that to move beyond the 10/90 gap, a focus on the following factors is required: priority setting, building capacity of health research systems, increasing funding for health in "*developing countries to create international research networks and* *public-private partnerships*", and encouraging strong linkages and efficient delivery of products and services [7].

Furthermore, in 1991, the Global Research Forum came up with the idea of the Essential National Health Research (ENHR) approach [7]. The ENHR was developed specifically to help developing countries in redressing the 10/90 gap and building capacity for research. The recommendations were more specific [7]:

- *"To invest in individuals and institutions, particularly in epidemiology, social sciences, and management research".*
- "*To set national priorities for research*."
- "*To build career paths to attract able researchers*".
- *"To develop reliable links between researchers and users*."

Developed countries have benefitted immensely from the technology and the knowledge generated through health research as they have the means to conduct and implement programmes [11]. However, the experience with low-income countries is often the contrary because of limited resources being invested in areas where they are required the most. The production of better-quality information that informs priority setting could aid in bridging these gaps. A global observatory as a monitoring mechanism for health research and development has since been suggested as a possible solution [11]. This repository would also function as a means of regulating, facilitating research to make efficient use of funds, and avoid wastage through duplication of research efforts [11].

In South Africa, governance of the health research stretches across three sectors [5]. The National Department of Health (NDoH) is the custodian of the health system, while the research and information system is under the Department of Higher Education and Training (DHET), and the Department of Science and Technology (DST) [12]. Historically, in South Africa, a challenge to research dissemination and knowledge translation has been the lack of coordinated research bodies in the country [5]. The National Health Research Committee (NHRC) was formed to address this problem [12]. Provincial Health Research Committees (PHRC) were subsequently formed to operationalise the national directorate mandate to suit the different provinces' unique settings [13]. The terms of reference for the PHRC in the Western Cape include facilitation of research activities and to provide advice on health research translation of findings into policy and the building research capacity [9]. The PHRC's are separate entities from ethics committees, and all research conducted in health facilities require prior approval from human ethics committees registered by the National Health Research Ethics Council.

A report on proceedings and recommendations of the 2011 National Health Research Summit appealed to the South African government to increase the funding for local, researcher-clinician driven research to at least 2%

of the national health budget. Research on the national expenditure on health research in South Africa noted that there was no direct stream of public funding for research going to the provinces [14]. Although there are competing resources in the budget, there is recognition of the need to increase research that is locally driven, and that responds to the health priorities and population needs [9].

The NDoH and the Health Systems Trust developed a National Health Research database (NHRD), an online tool to monitor research being done in the country. The NHRD functions as a health research repository and is the application portal for researchers applying for permission to conduct research in facilities managed by provincial institutions [9]. This enables the tracking of research activities in the different provinces [9]. The intention is to reduce duplicated efforts, help identify priority areas for resource allocation and ensure that facilities are not overburdened with research. In the Western Cape, approval process for research in provincial facilities is strictly through the NHRD and applications made on other platforms are not considered [9]. Access is required when the researcher enrols patients from a public facility, conducts research that impacts on the workflow or referral systems in the public sector, or requires the involvement of provincially employed staff [9]. Turnaround time for feedback on applications are expected to be between six and eight weeks. If approved, a letter is sent to the researcher with the facility managers' contact details, to arrange access [9]. Researchers are required to give a feedback report of research findings within six months of data collection. Ideally feedback will reveal evidence that is relevant for the services and enable the revision of policy [15].

The Western Cape health research system

An audit of research activities within the Western Cape province found that between January 2011 and August 2012, 615 projects were approved by the provincial authority, and about 85% of all research was carried out in the Cape Town Metro district [6]. Substantial resources were directed to research within the province, mostly for HIV, TB and non-communicable diseases research. Despite contributing substantially to the burden of disease, Mental Health, Nutrition, Violence and substance abuse did not receive as much attention [6]. The largest source of funding for most of these projects was from the US government and international agencies such as PEPFAR, USAID, NIH, Bill & Melinda Gates Foundation [6]. The South African government accounted for only 8% of the sources of funding within the districts.

The Western Cape province public health sector has five independent administrative authorities, led by research coordinators, who are responsible for research approval [9]. Applications for access to health facilities administered by the WCDoH must be done through the National Health Research Database (NHRD). In this study, the focus was on provincial health facilities at primary care level, such as district hospitals, Community Day Centers (CDCs), Community Health Centers (CHCs) and clinics. Although the primary contact for research permission is through the NHRD, the research coordinators are "*responsible for processing the research in their various settings*" [16]. It is highly recommended for researchers to engage with the relevant service managers from as early as the research proposal development stage. Service managers are usually facility managers, senior doctors or family physicians stationed at the health facility and assume the role of a gatekeepers, who are, the first point of contact when accessing health facilities for research purposes.

However, "*agreement or approval by service managers at this preliminary stage does not constitute approval…Such approval must still be sought following the standard procedures outlined* "[7].

There are three main important questions outlined in the policy guideline document for Approval of Health Research in the Western Cape. These are:

1. "*Is the research feasible in facilities within the limitation of space, staff, patients, timing and funds?*
2. *"Does the research duplicate or clash with other research in the relevant facilities?"*
3. *"Does the research have the potential to answer questions of interest to the province, and provide outputs that could be implemented by the province*?" [7]

In the Western Cape, despite researchers undertaking to give research feedback to the province on completion of studies, few written feedback reports are received. The reasons for this are unknown and may be researcher or service related, including that feedback is given and translated locally but fails to reach the provincial office.

Research question

Therefore, the question this research would be asking is: *What is the experience of healthcare providers with hosting research in health facilities within the Western Cape provincial health system?*

Sub-questions

i. How much value do frontline health providers place on research activities, feedback of research findings, and translation systems operating in the province?

ii. What dynamics exist in their relationship with researchers?

Purpose and aim

The aim of the current study is to explore the knowledge, attitudes and practices of facility staff regarding their experience of health research activities. Ultimately, the purpose of this research is to inform better systems for health research and research translation in the Western Cape Province.

Objectives

The objectives of the study are:

1. To describe the systems used to obtain entry to health facilities for research as experienced by facility managers and key clinical staff.

2. To determine the experience *(perceptions, knowledge and practices)* of hosting research in facilities.
3. To ascertain the frequency and type of feedback received from researchers.
4. To document recommendations for research translation and feedback mechanisms from the perspectives of frontline health providers**.**

This research is a sub-study of a bigger project commissioned by the Western Cape Government: Health's health research sub-directorate. There is a sister-study running in parallel with the current research, which is a mapping exercises focused to map the feedback systems in place for research conducted in the Western Cape. The mapping exercise will make use of a mixed methods approach, reviewing existing data and interviews among researchers and senior provincial officials.

Method

This study is a mixed method design. The first phase will be a cross-sectional study, through a self-administered survey. The second phase of data collection will be qualitative, using an exploratory research design. This will consist of 10-20 interviews[1], to explore how public-sector health facilities experience and accommodate research activities, and the relationship that exist between health care providers and researchers. The mixed methods strategy will be sequential in its approach, with the fixed quantitative preceding the flexible qualitative, exploratory aspect of the research. Results from the survey will also inform the sample for the qualitative phase.

The mixed method approach offers an option to broaden and strengthen the analytic scope of the study, as it reflects characteristics of both fixed and flexible approaches [17]. The flexible design is appropriate for this study as it does not follow a stringent pattern of pre-specified steps, instead, it makes allowance for adapting and readjusting as the study progresses [17]. This is important, given that the research seeks to explore more intangible and unquantifiable issues like attitudes, perceptions, and relationships. The fixed design is also necessary to elicit responses for more specific and targeted responses.

This research addresses an important aspect of health policy and systems research (HPSR) and emphasises a people-centred approach at both the micro and meso levels in the health system. At the micro-level the focus is on how the individuals operate within the system, including how they interact with each other and how those relationships among them affect the functioning of the system [18]. The meso-level focuses on the health systems at the organizational level of operation. This includes the functioning of the health facilities and the organisation at the district health systems [18]. In this study, relationships that healthcare providers

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[1] As a result of the competing priorities, and unavailability of target participants, the number of interviews subsequently completed was less (n=3) than the number initially planned. As a result of low response rate, the NHRD was subsequently used as an additional data source to complement findings from the surveys and interviews.

have with researchers will be explored. Actors, agents, or individuals are recognised as the main drivers of change in the system [19]. Hence strengthening the practice of HPSR means giving due attention to the relationships among the people within, and how they relate with the system. The subject matter also deals with a relevant topic: the health research coordination systems put in place at the provincial health government level. The organisational functioning of health facilities and the management of health activities (research) and health workers within the various health district/sub-district structures are all the modes of operation on a meso level [18].

Rigour

To ensure rigour, the validity of the study design will be enhanced through member-checking. This means using the results from the quantitative survey questionnaire to inform the sampling and questions asked in follow-up semi structured interviews. This will be done sequentially and hence present an opportunity for triangulation to ensure rigour [20]. The triangulation across data collection methods will be used to further verify or confirm the findings and gain clarity. Using diverse methods and results from quantitative surveys to probe issues allows for a deeper insight into the preliminary results, particularly in this instance where there is there is limited evidence on the subject matter [18].

The nature of interviews positions the researcher as a data collection tool. Hence the researcher acknowledges that their own preconceived notions, perceptions and knowledge on the subject matter may influence how they interpret responses. Because of the differences in the way individuals respond to the same information may yield different results, depending on their broader social, political, and economic contextual [20]. This will be limited by the neutrality of the pre-set questions to be asked. Questions will also be asked in such a way that they are not leading. The researcher will draw on her prior experience in conducting qualitative interviews.

The researcher is aware that some of the questions asked may appear to be a subjective evaluation of the participants' responses. It is important that these questions are asked in a way that does not imply a performance appraisal, or the researcher assuming a position of superiority. This will be addressed by emphasising that this is a subjective value judgement and perceptions. The researcher will also take note to reiterate their position as an equal, not superior because of their position as the one facilitating the interview process.

Sampling strategy

We reviewed a list of proposals on the NHRD that had been submitted and approved for research in public health facilities on the district platform in the Western Cape between the year 2015 and 2016. This report records the number of studies being conducted in each facility, and consequently in each district. We decided to target primary care public sector clinics managed by the provincial department: Community Health Centres (CHCs), and district hospitals. For the survey, 20 facilities will be purposefully sampled, and five participants from each will be recruited to participate. To achieve a power of 80% with the confidence interval of 95% the recommended sample size was calculated to be 91, however the total sample size of 100[2] will be enrolled.

The cadre of health care providers we will be recruiting are facility managers, who are the first point of call for researchers in health facilities, doctors and nurses who are involved with research activities, or incorporate research operations into their routine service delivery. In Phase 2, the healthcare providers to participate in the interviews will be purposively sampled based on the results of the questionnaire survey. Appendix I shows a table of sampled health facilities and their research saturation level.

Characteristics of sampled facilities

Two district hospitals will be included to reflect the experience at a different level of care. The primary care facilities will be purposively sampled to reflect the different experiences of both rural town and metropolitan/urban health facilities, then facilities from each geographical area will be stratified according to their relative research load. Facilities will be classified as saturated, medium saturation and low saturation, as per the number of proposals submitted for research in a particular facility between 2015 and 2016. For the urban facilities, saturated is defined as facilities that hosted an average of 11 or more research projects between the two years. Facilities that hosted 10 or less research projects are defined as medium saturation, and lastly, the low saturation hosted somewhere between seven and five research projects on average. These categories were intentionally lower (*see* Appendix I), for research carried out in the rural part of the province, because approximately two-thirds of the research done in the province is concentrated in the Cape Town area [9]. To account for the heterogeneity that exists in the urban part of the province, the 20 facilities were sampled to reflect the different demographic profiles of the populations and the catchment areas they are nested. Table 1 provides a summary of health facility research volume categories as per average number of proposals submitted through the NHRD between 2015 and 2016.

Exclusion criteria

For the rural facilities, we opted for health facilities that are closer in distance, for ease of logistics. The Western Cape province comprises of six health districts namely: Cape Winelands, Central Karoo, West Coast, Overberg municipality, Eden and City of Cape Town. The Central Karoo and Eden districts will be excluded from the onset because of geographical distance (Central Karoo), and as Eden is a National Health Insurance (NHI) pilot, to avoid research overload. Academic, Tertiary and Regional hospitals will be excluded, as most of the research in those settings may be practitioner-initiated. In that case those dynamics are outside the scope

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[2] Sample size achieved for the survey data collection at the end of the study was 19

of this research. Facilities under governance by the City of Cape Town will not be considered for this study as these are not under provincial government and require a separate process of approval.

Table 1 Sampled health facility [3]research volume categories as per average number of proposals submitted: 2015 and 2016[4]

URBAN			RURAL		
Facility Name	Number of proposals submitted		***Facility Name***	Number of proposals submitted	
	2015	2016		2015	2016
Hospitals			***Hospitals***		
Karl Bremer	17	23	Swartland	2	5
DP Marais (TB)	5	7	Hermanus	9	8
Saturated			***Saturated***		
Mitchells Plain CHC	19	21	De Doorns Clinic	6	11
Delft CHC	17	21	Worcester CDC	7	15
Kraaifontein CHC	13	19			
Retreat CHC	12	13			
Medium Saturation			***Medium Saturation***		
Greenpoint CDC	9	7	Ceres CDC	5	9
Woodstock CDC	11	8	Breerivier Clinic	3	8
Belville South CDC	6	9			
Mfuleni CDC	9	8			
Low Saturation			***Low Saturation***		
Hout Bay harbour CDC	6	8	Wellington CDC	3	5
Kensington CDC	3	5			
Du noon CDC	6	7			

Study setting

The Western Cape province is home to three of the universities with impressive track records of research within the field of Health Sciences namely, the University of Cape Town (UCT), Stellenbosch University and University of the Western Cape (UWC). Research is encouraged and valued in the province, with active researchers and projects, compared to the relatively less-resourced Eastern Cape, Mpumalanga and Limpopo provinces [6]. There are six health districts within the province, namely Cape Winelands, Central Karoo, West

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[3] These reflect health facilities sampled at the submission of this proposal for ethics review. Subsequently, access approval was not granted for some of the facilities listed here. See Appendix I for final list of Approved health facilities.

[4] In the original protocol, we planned to look at NHRD data from 2014-2016 as this was the available data at the time. However, as the time progressed, we subsequently had access to more recent data (up to 2018) available and added it to the analysis.

Coast, Overberg, Eden and the City of Cape Town. There is still a dual governance of some facilities across the City of Cape Town district, with most clinics managed by the City of Cape Town Municipality while the Community Health Centres (CHCs), Community Day Centres (CDCs) and hospitals in Cape Town metro are managed by the Provincial Department of Health [9].

Data collection

The initial phase of data collection will consist of an online self-administered questionnaire hosted on SurveyMonkey^{TM}. Prior to participation in the study, an email invitation to participate in the study will be sent to potential participants. The email will contain a link to the survey questionnaires, and a copy of the informed consent for the online survey, attached (*see* Appendix II). Because it is not possible to get oral consent through SurveyMonkey, the front page of the survey will also follow the pattern of this informed consent form. This will include the description of the research study, ethical considerations and contact information for the researchers and health research ethics committee representatives.

After ethical approval, facility managers for each of the sampled facilities will be contacted through telephone to make the necessary arrangements. Printed copies of invitation letters (*see* Appendix II), together with the ethics letter of approval from the Health Research Ethics Committee (HREC) and the access approval letter from the Western Cape Department of Health, will be sent to healthcare providers who are confronted with the responsibility of accommodating research activities in their facilities. Those who agree participate will be asked to provide their email addresses. Further consent will still be sought at the time of administering the survey.

The first page of the survey will provide a description of the study and by clicking the ‘next’ icon, the participant essentially confirms participation. A total of 100 participants sampled from the 20 different facilities, will be sent a link to the survey via email. The questionnaires will consist of questions on access experience, feedback and recommendations. Participants’ scores on the survey will be examined for deviant cases or extreme scores.

The second phase of data collection will consist of follow-up semi-structured interviews. These will be conducted with facility managers from facilities where there is a variety of responses or from institutions that have long standing projects or relationships with researchers, in institutions where there are differences in responses, or complex relationships. Facility managers will be invited to take part in the interview through an invitation letter. The letter will contain the information sheet and informed consent (*see* Appendix IV). The information sheet will be read out to them and clarity provided, where questions may arise. Participants will be given a copy of their signed consent form, also co-signed by the researcher. As part of the consent process, participant will also be asked if they consent for the interview to be voice recorded. For those who choose not to be recorded, the researcher will take hand-written notes.

Data analysis

The quantitative data from the cross-sectional survey questionnaire will be analysed using STATA 14 [21].[5] Descriptive analyses will be performed to characterise respondents and their experience of research. Responses about research experience by urban and rural facilities will be compared using appropriate t-tests and chi-sq tests for numerical and categorical data respectively. This is based on the hypothesis that differences exist in the way rural, public sector health facilities staff experience research, in comparison to more urban facilities. The recordings from semi-structured interviews will be transcribed and uploaded on NVivo 11 for windows – a software package used for qualitative data analysis. Data will be analysed by grouping text into themes [22]. These thematic codes will be generated based on the data reflecting participants' experiences, attitudes and practices on how they accommodate research. Text under each theme will be examined for patterns, concepts, and associations.

Ethical considerations

This study is embedded in a broader project commissioned by the Provincial Health Research Committee (PHRC) of the Western Cape Provincial department of Health (PDOH). In addition to receiving permission from the DOH, ethical approval for this study will also be sought from the University of Cape Town (UCT) Human Research Ethics Committee (HREC) in the Faculty of Health Sciences. The four basic principles of ethics, namely, beneficence, non-maleficence, autonomy, and justice will be upheld, at every point of the study:

Beneficence and non-maleficence: No harm intended will be inflicted on the participants. All the necessary information and protection that they are entitled to will be made available.

Autonomy: Respondents will be treated with respect and dignity, allowing them to make their own decision to participate in the study, or otherwise. Do not have to answer all questions and can withdraw.

Justice: Selecting participants will be done in a fair manner, with a consideration of research experience in the various facilities.

Benefits for participation

There are no immediate personal benefits for the participants, however the information gathered may be used to strengthen guidelines for improvement of the systems for research access, conduct of research and feedback. This should benefit the effectiveness of the research, building health care providers' capacity in research, and encourage health managers to engage with researchers about the conduct of research and how the research could benefit the services. The study results may be used to inform future research and possibly contribute to efforts in the use of health research in the province, and ultimately in the whole country. We

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[5] A newer version of STATA (STATA 15) was used for data analysis of the questionnaire results.

acknowledge that the research to policy process is a complex one and hence these benefits may not be immediately recognisable and could take a while before coming into effect.

Potential risks

Health Policy and Systems Research (HPSR) is heavily influenced by the Social Sciences and as such there is a need for ethical consideration that are unique to a more relativist paradigm [20]. The risks may not be as overt as that of Biomedicine, for example, someone could react negatively to the side effects of a novel drug. Risk in HPSR could also be issues like trust and power relations are critical in HPSR because of its people-centeredness [20]. Ethics in HPSR takes into consideration such interpersonal relationships and power dynamics that exist in the relationships among individuals within the health system. To avert risk to the overall health system, the researcher's actions will be guided by principles of ethics previously outlined.

We do not anticipate any physical harm to the participants. However, because of the approval from the DOH to conduct this research, participants may feel compelled against their will to be involved in the study for fear of being considered uncooperative. The compulsion may also come from the misconception that study participation is a requirement from the provincial health authorities. This will be addressed by reiterating the voluntary nature the research study and making sure that participants are fully aware of their right to withdraw at any point of the study, which is stated in the consent process. Respondents may be tempted to phrase their responses for socially desirability, which leads to a response bias. The questions in the interview guide will be repeated and rephrased in more than one way.

To reduce the possibility of psychological harm, the online survey will have an option for the participants to skip an item, that they feel uncomfortable giving a response to. Participants will also be told of the right to withdraw their responses and pull out at any point in the survey.

Anonymity and confidentiality

For the online survey[6] anonymity will not be divulged. The results reported will be aggregated from responses received from all the information received. To ensure that responses are anonymous, the option to collect Internet Protocol (IP) addresses will be turned off. Online data collected in the survey shared account that is password-protected. The nature of in-depth interviews does not guarantee the same anonymity that self-administered surveys do. However, to ensure the confidentiality, the names of the participants will not be included in the transcribed material or mentioned in the report of findings. Numbers will be assigned to each participant's name. Interviews will be conducted in a private room and the voice recording will only start after initial introductions. The recordings will be stored in the researcher's password encrypted computer, with only

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[6] Paper-based version was later made available for the health providers who had challenges accessing the online survey or preferred a soft copy of the questionnaire survey.

the supervisors and researcher having access to the results. This information will be backed up onto an external memory disk encrypted with a password to avoid data loss. All the audio recordings will be erased after being downloaded onto a computer.

Study duration

This study will run for approximately six months[7]. The data collection is most likely to take the longest time, because of participants' differing schedules. Below is a timeline of planned events for the duration of the research study period.

Table 2: Research Activities timeline

PERIOD → **PHASE ↓**	**SEPT 2017**	**OCT**	**NOV**	**DEC**	**JAN 2018**	**FEB**	**MAR/ APR**
Protocol submission to ethics		🟩					
Literature review		🟩					
Ethics approval		🟩					
Participant recruitment			🟩				
Data collection (online survey)			🟩				
Preliminary survey data analysis				🟩			
Data collection (interviews)				🟩			
Data analysis					🟩		
Write-up					🟩	🟩	
Submission						🟩	
Results feedback							🟩

Dissemination of Information

Upon completion of the study, a meeting with the Western Cape Provincial Health Research Committee (PHRC) will be scheduled for an oral presentation to feedback the findings and recommendations to inform the broader project. Further recommendations that address the questions asked will be included as part of the presentation, and a policy brief prepared for policymakers. A manuscript will be prepared for a peer reviewed journal that focuses on health system issues in LMICs such as South Africa. This journal is appropriate for the subject matter given the contextual factors to be explored in this study.

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[7] The study ran longer than expected due to few setbacks along the line with receiving access approval to health facilities and taking on demanding full-time employment- and having to navigate the two. In the end, the study took one year longer than anticipated. Full dissertation submission is scheduled for February 2020 (See revised timeline in Appendix VII.

A report back to the facilities where the research will take place will be in the form of a research brief. The research brief will be prepared and circulated to the service providers and managers. For participants who provide their email addresses as a medium for further communication during the survey questionnaire, the research brief will be emailed to them.

Budget

Table 3 shows the estimated budget for this research study. The transport fares are based on one of two possible options for public transport.

Table 3: Estimated Cost of Research Project

ITEM	COST per Unit	No. of Units	Total Cost
Printing			
-ICFs	R1.00	40 pages	R40
Transport & Logistics			
-Mitchells Plain	R203	2 trips	R406
-Green Point	R72	2 trips	R144
-Kraaifontein	R125	2 trips	R250
-Mfuleni	R193	2 trips	R386
-Swartland	R499	2 trips	R998
-Malmesbury	R498	2 trips	R996
-Karl Bremer	R155	2 trips	R310
-Wellington	R543	2 trips	R1086
Stationery			
-Envelopes	R109	2 packs of 50	R218
TOTAL	**R 2 288**		**R4 834**

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PART B: LITERATURE REVIEW

Factors influencing health care providers' involvement in research and related activities within health facilities in low-to-middle income countries (LMICs): a scoping review

Background

While evidence in literature has shown that effectively engaging health care providers in research could be beneficial for health outcomes and knowledge translation (KT), frontline healthcare providers in most developing countries are still relatively marginalised when it comes to research production [1-6]. Unfortunately, health research systems in these countries are characterised by poor feedback of research findings, inadequate mechanisms by which information is disseminated and applied in practice, and a lack of inclusion of all relevant stakeholders in the research process [2,4,5,7]. Primary care facilities in low-to-middle income countries (LMICs) lack the capacity to provide adequate health-care services due to poor staffing, inadequate medical equipment, unequal distribution of financial investment in health care, which impacts on the effective functioning of the overall health system. Incidentally, these challenges have been cited in a number of studies as deterrents for involvement of frontline health care providers' in research [2,6,8–10]. Particularly, both institutional and individual capacity for health policy and systems research (HPSR) remain a huge challenge for most health care providers in low resource settings yet, their involvement is key to making research a success and incorporating research results into health service functioning [2,6,11].

Given the challenges in most LMICs with limited financial resources and staff shortage in public health facilities, it is not clear from the literature how frontline health care providers can be meaningfully engaged in the research process and policy development, whilst meeting the daily demands of routine service delivery in these busy settings [5,12–14]. In recent years, there has been a steady increase in research on knowledge translation and efforts to address barriers to research utilisation and uptake. However, gaps in literature focusing on exploring the experiences of health providers with conducting research, and related research activities in the health facilities persist [11,15–17]. Particularly important to understand are the dynamics involved in hosting these research activities in constrained health facilities. As such, the aim of this scoping review is to broadly highlight factors that influence health providers' motivation to engage in research and research activities and the importance of the health systems in enabling or deterring this motivation. Gaps identified will be flagged for further research around this topic.

Method

A Boolean search strategy was used to search for keywords on the online databases EbscoHost and PubMed Central, complemented by a Google Scholar search, for a much wider pool of literature. In addition, the Google search engine was used to search for the less conventional or non-academic literature like conference proceedings, research day programmes and webpages for government reports that could contain relevant information. Key search words were a combination of phrases and individual words used in sequence. These included: 'barriers and facilitator of health providers involvement in health research ', 'health research and healthcare providers', 'dissemination', 'research feedback'. Alternative synonyms for health providers like 'nurses', 'health professionals', 'health care provider', 'health care workers' and 'clinical staff' were used interchangeably in instances where there were insufficient search results. The inclusion criteria were wide, considering the exploratory nature of this piece of work.

Most of the literature was retrieved by means of cross-referencing and snowballing. Physical copies of material used were obtained through the University of Cape Town (UCT) World-Cat library portal. A collection of research papers, conference reports and grey literature that had been compiled by the researcher and supervisors on Dropbox, also served as a resource for obtaining the literature. All literature added from Google were found in the first 5 pages, after which no search results were relevant to the study. The phrase 'research burden in public health facilities' was run on a Google search. The first 10 pages did not produce results relevant to subject matter.

Literature written in English and those that had been translated from a foreign language into English, were included. Articles from low-income settings were considered, primarily. Although these countries may have different demographics, socio-cultural and political structures, most LMICs, also referred to as developing countries in some papers, would probably have similar challenges in terms of their health systems. Literature from high income/ developed countries was also included. These countries may differ significantly from LMICs, albeit in the performance of their health systems. However, for this literature review, they were included minimally. This was done to highlight findings from some of the similarities in health providers' interactions with public health research.

Articles that were published more than 30 years were excluded. The term 'frontline healthcare provider' will be used in this literature review, inclusive of nurses. It is meant to be inclusive of the different cadres of health professionals, whose day-to-day clinical activities are based in (public) health facilities. The terms health care providers and healthcare workers will be used interchangeably to refer to the broader group of frontline nurses, midwives, family physician, doctors. For the purposes of this review we use the terms 'involvement', 'engagement' or 'participation' in research, interchangeably to refer to the participation of health workers in research and related activities, both as users of research and as those who carry out research activities. However, for the purposes of this scoping review, these will be analysed together as engagement in any form. Research engagement or involvement exists along a continuum - from being involved in research activities as data collectors, as consultants for research priorities, and less commonly, as principal investigators. There is a dearth of literature on frontline health care provider engagement with research activities, particularly in an LMIC and this study contributes to closing that gap.

The Importance of health system and health services research

One of the key functions of public health research is the production of high-quality scientific evidence that informs clinical practice and provides a basis for the delivery of quality health services that meet population health need [18–21]. This evidence also comes in the form of research results that can be used to set health priorities and justify resource allocation. This is especially beneficial in settings where there are competing demands and limited financial resources for providing cost-effective public health interventions [22]. Findings from research contributes a large part of the evidence that can be used to inform interventions in the prevention and management of ill-health burdens through health programmes [19]. Particularly, health policy and systems research (HPSR), as an emerging area of public health focuses on the broader settings in which such programmes are implemented. Its value-add is that it places due emphasis on what can be done to improve policy implementation and the functioning of health systems in a specific context [23,24]. The focus is strengthening the health financing, human resource for health (HRH), medicines and technology, information systems and governance elements health system that underpin the delivery of health services in facilities [24,25]. HPSR can be effective to address gaps in health service delivery, particularly in settings where evidence is required for policy and clinical guidelines as research that is not relevant to specific health systems can be easily dismissed by policymaker [23,26] .

HPSR could also provide a platform to address socio-economic determinants of health in achieving the sustainable development goals (SDGs). One of the shortcomings the preceding millennium development goals (MDGs) were criticised for, was giving little consideration for different country contexts and their capacity to implement targets set for them [27,28]. MDGs were essentially a set of common goals presented by the United Nation, for participating countries to have achieved by 2015 [28]. On the contrary, the successive SDG framework places health in its socio-economic context and promotes and a multisectoral approach to addressing health challenges [28]. This requires a robust public health workforce and one of the targets under SDG 3 aims to "*increase substantially... recruitment, development, training and retention of the health workforce*" [21,29]. Health policy and systems research places emphasis on a people-centred approach-individuals are recognised as the main drivers of change in the system [23,24,30]. Giving due attention to the relationships between the people within the health system is critically important.

Knowledge translation

Notwithstanding the contributions of HPSR to support health system strengthening and policy change in LMICs had remained quite weak [39]. Developed countries have benefitted immensely from the technology and the knowledge generated through health research as a result of the availability of resources to conduct research and implement programmes [40]. On the contrary, the experience with low-income countries has often been characterised by limited resources for global research agenda setting and a disproportionately high focus on clinical research [6,26,33]. Due to the concern about research evidence informing clinical practice, and conversely practice informing research, much of the focus and a substantial amount of resources on research recently has been on Knowledge translation (KT) [3,34,35,41].

KT was introduced in the early 19th century and has since gained popularity, now with almost 100 synonyms used [42,43]. However, added to this complexity of multiple words for the same idea, is the variation in the usage of these terms, across geographical regions to mean the same thing [42,44,45]. For the purpose of this review, we will make reference to the definition of KT from the Canadian Institute of Health Research (CIHR), which is " *a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and strengthen the health care system*" [46]. The elusive nature of the concept causes issues with clarity of definition, when retrieving information and gathering evidence of what has been done in this field. Establishing a common understanding of what KT entails, is essential not only in theory but also to define what the process looks like, in practice. In theory, the intended outcome of KT should demonstrate an improvement in health services. However, researchers have generally considered the end-product of their work as published and/or presented [21]. This passive, one-directional approach to promoting uptake of research findings is often less effective [3,41,45,47]. More active efforts to increase the exchange of knowledge between researcher and clinician, where knowledge from the frontline influences research priorities [41]. This can also be enhanced by involving health workers not only in consultation on dissemination strategies at the end of a research project, but also in the conceptualising, design and conduct of research.

Table 1 A sample of top articles on different concepts included in the scoping review

Author/s & Year	Methodology & Study Country	Objectives	Findings
Lutge et al. 2017	Qualitative research *South Africa*	To explore perceptions of research conducted in provincial health facilities in KwaZulu-Natal, South Africa.	Researchers tended to emphasize the contribution of research to the generation of knowledge and to the health of future patients while gatekeepers of health facilities tended to emphasize its contribution to the healthcare system and to current patients. relations between research stakeholders were perceived to be somewhat fragile, making it difficult for stakeholders to achieve consensus about the social value of research, as well as on ways to maximize value.
Asuquo et al. 2013	Descriptive research *Nigeria*	To assess the extent of nurses' involvement in research and policy development.	Majority of 61.7% utilized research findings and perceived research as a tool to enhance development of nursing. 77.5% respondents were not aware of any financial support for research and only 3.3% had ever received research grant to support research activities. The results also revealed minimal 6.7% involvement of nurses in health care policy development.
Oluwatosin 2014	Cross-sectional survey *Nigeria*	To assess how nurse conduct and utilize research.	**Barriers**: time-related, knowledge-lack of interest, lack of utilization **Facilitators**: continuing education, study leave for degree, increased staffing. Conduct and utilization of research was very poor within the study population. Only few of the research conducted were also published in peer reviewed journals.
Koen et al. 2017	Participatory approach *South Africa*	To investigate the relevance and meaning of the term "over-researched community" (ORC) as an ethical construct. At	The usefulness of the term 'over-research is limited and a vague term for complex issues of ethical concern. However, it should not be dismissed as it suggests potential concerns about the relationship between communities and researchers.
Straus et al. 2011	Narrative review	To provide an overview of the science and practice of knowledge translation	Knowledge translation is defined as the use of knowledge in practice and decision making by the public, patients, health care professionals, managers, and policy makers. Failures to use research evidence to inform decision making are apparent across all these key decision maker groups.
Edward et al., 2019	Evidence Mapping Review *LMICs*	To provide a systematic overview of the literature on knowledge translation (KT) strategies employed by health system researchers and policymakers in African countries.	Significant disparities exist between reports on KT in different countries, and there are many settings without published evidence of local KT characteristics. Commonly reported KT strategies include policy briefs, capacity-building workshops, and policy dialogues. Barriers affecting researchers and policymakers include insufficient skills and capacity to conduct KT activities, time constraints and a lack of resources.

Martinez 2012	Narrative review of intervention *Cuba*	To assess the results of a strategy implemented between 2008 and 2011 to develop nursing capacity for health systems and services research in 14 national research institutes based in Havana.	A systematic strategy to build nursing capacity for health systems and services research can be effective in involving nurses in such research and in developing institutional support for it, fostering compliance with professional development priorities for nursing, as well as contributing to quality of patient services.
Edwards et al., 2009	Literature review *LMICs*	To discuss factors that have influenced the development of research capacity among nurses in lower and middle-income countries (LMICs).	Programmes specifically targeting nurses did attract and prepare a significant number of nurses. Factors limiting nurses' involvement in research include hierarchies of power among disciplines, scarce resources, a lack of graduate and post-graduate education opportunities, few senior mentors, and prolonged underfunding of nursing research.
London et al., 2014	Database review *South Africa*	To review the profile of research on the health service platform in the Western Cape province of South Africa which was approved by the health authorities over the period January 2011 to December 2012.	Of the health research approved in the province, 56% of projects were located on the District Health Services platform and 70% were based in the Cape Metropolitan area. The primary focus of research was on HIV and tuberculosis (TB), whilst relatively few studies addressed nutrition, mental health or injury and there was little health systems research The South African government sources comprised less than 8% of all health research funding. Conclusion:
Shroff et al., 2017	Literature Review and Surveys *LMICs*	To analyse institutional capacity for the generation of HPSR and the use of evidence (including HPSR) more broadly in LMICs.	Findings from the survey of research institutions identified the absence of core funding, the lack of definitional clarity and academic incentive structures for HPSR as significant constraints. The survey of Ministries of Health identified a lack of locally relevant evidence, poor presentation of research findings and low institutional prioritisation of evidence use as significant constraints to evidence uptake. In contrast, improved communication between researchers and decision-makers and increased availability of relevant evidence were identified as facilitators of evidence uptake
Van Rensburg et al., 2017	Case study, exploratory design *South Africa*	To gain insight into the contributions that a novice researcher programme makes towards research capacity development in nursing education on health research.	The Cooke integrated framework for research capacity building in healthcare was used to evaluate the development that took place. This novice programme fulfilled all the dimensions of the framework. The success of the programme lies in the skills and confidence gained by the participants Continuity and sustainability of the programme remain a challenge and was partially promoted by using the premises of the professional organisation or university participating in the project, devolving the programme to organisational chapter or regional level and partnership with universities. Such partnerships should be extended.

Despite the growing interest for KT in Africa, there has been limited high-quality research evidence that is tailored to local contexts [35]. A recent review, '*exploring the types of institutional support required to enhance the generation and use of evidence*' from HPSR in LMICs in Africa and Asia was conducted. The study reported a lack of locally relevant research as a constraint for the use of evidence [37]. In addition, they were unable to find published literature that could particularly "*shed light on processes established at the level of MoHs (Ministries of Health) to facilitate the uptake and use of research evidence for decision-making at a cross-national level*" [37]. These findings were echoed in a recent mapping review of factors that facilitate and hinder implementation of KT strategies on the lack of high-quality evidence relevant to local health systems contexts [35]. In this study, Edwards and colleagues did a mapping exercise of KT African settings, particularly looking at engagements between researchers and policymakers [35]. Recommendations from the results of the review, included exploring more context-sensitive embedded research approaches and participatory research methodologies, which would allow for inclusion of all relevant stakeholders in the research, and ultimately decision-making process [35].

There is still a gap in the literature on what effective mechanisms for engaging all stakeholders in the process should look like, particularly those in the fore of providing service [15,16,48]. Ideally, operational research within an embedded approach presents opportunities for frontline health provider to lead or be actively involved in research that is translatable and has a direct effect on the services they provide [42,44]. "*In this model, policy-makers and implementers at different levels in the health system are engaged as co-investigators and are involved in all phases of a research project*" [44]. A study analysing 30 different case studies in Ghana, aimed to map the contribution of health research-to action. They examined which features of research and translation processes encouraged the use of the results, and found that most of the evidence for research uptake/utilisation failure, points to the crucial fact that research users are not involved in the design, conduct and interpretation of research [41].

Research conduct versus research uptake

In embedded research, the contribution of research becomes contextualised and based on empirical questions and research findings that can be translated into evidence and subsequently integrated in service delivery [42–44]. However, little is known about whether the conduct of research is enabled by the health system in the first place. Most capacity building efforts for research use and uptake are geared towards developing strategies and strengthening institutional relationships between researchers and policymakers [31,38,39,48]. These strategies have been heavily focused on the output part of the research process [4,38,47,48]. However, not much is known about the more upstream factors associated with the actual conduct of research, that is, the data collection activities that are often hosted in health facilities. Equally important is understanding how LMICs are receptive to and enable the conduct research, such as health systems and health services research.

This is relevant particularly given their contexts characterised by shortages of staff and clinically overburdened health facilities. Understanding the barriers for research conduct could indicate the reason for this lack high-quality, contextual health policy and systems research (HPSR) evidence cited in literature above and in a few KT studies [3,14,15,49,50].

Factors influencing frontline health care providers' involvement in research

Studies set in LMICs across time have highlighted the central factors influencing the decision of frontline health care providers and gatekeepers to engage in research and research activities [4,5,7,10,32,49]. The focus of this review is health care providers' experience of research. It not only addresses issues that may inhibit them from being involved in research activities, but also issues that motivates their engagement. These factors are not only influenced by the health care providers' own individual perceptions about research, but also systemic and organisational factors that reflect the broader health system. These include the health lack of designated time for research and related activities, and research supervision, limited research capacity, the provider's own attitudes towards research and lack of interest [2,9,10,50]. Despite these challenges, studies conducted within the last five years in a few LMICs found that including health care providers from the initial phases of the research process encourages more involvement and continued use of research findings in clinical practice [32,51]. This involvement largely included consultation, and less of the actual conduct of the research. In a recent paper, Ghaffar and colleagues argued that the embedded research model give policymakers and implementers the ownership of health systems and policy research, because they are the initiators of the research [52]. However, this may not always be feasible for nurses in most LMICs, as limited health research training and access to international funding, grants and training programs result in fewer opportunities for collaboration. Therefore, fostering partnerships without building capacity could be detrimental as frontline clinical staff may feel more undermined by the power dynamics between the different partners [4,15,16,53].

Apart from research capacity, limited knowledge about the different kinds of research methodology still persist among frontline health providers [3]. This was reflected in an intervention done by a team of international researchers and policy makers in five LMICs, namely, Barbados, Jamaica, Uganda, Kenya, and South Africa. The aim was to set to promote nurses' involvement in HIV policy development by designing a research study led by multi-disciplinary team, where most of the members were nurses [8]. The study made use of a participatory action research to increase the qualitative research capacity of nurse mentorship, role-modelling, and the enhancement of institutional support [8]. The results revealed that some nurses were more sceptical about qualitative research being 'real' research because their academic training groomed them to value quantitative research methodologies and epidemiological studies and their research experience was often of a biomedical nature [8]. Team members cited many examples of quantitative findings being disseminated to decision- makers- these were viewed as "*credible evidence while qualitative results or the* *experiences gained in the leadership hubs were considered more anecdotal*" [8]. This reflects perceptions about the hierarchy of research methodologies, and their contribution to knowledge. The study showed that such misconceptions could be addressed by strengthening research capacity among health care providers, an opportunity to bridge the research-practice gap [2]. Clinicians who are well versed and experienced in research could become instrumental, acting as mentors to frontline healthcare providers for the conduct of research, translation and implementation of research findings [10,53,54].

Researcher-health provider relations

This section highlights the factors (relationship) that influence HP's involvement in research. This sub section argues that professional relations and perceived power dynamics may further undermine or facilitate the willingness of frontline health providers to accommodate research. Although evidence on clinician-researcher professional relationships is not documented in the literature, it may be implied in certain instances [57,58]. For example, the structure of primary health teams, which typically places the physician as the team leader, are sometimes reflected in research settings where physicians, by virtue of their postgraduate training take on the role of researcher and lead projects with nurses as 'research assistants' [2,5,10]. Studies investigating reasons for these roles are still in their infancy, with most describing anecdotal evidence. It may be that those healthcare providers who identify problems do not want to or have training to go through the process of writing a proposal, data analysis, and proceed to publish findings in journal articles. However, in cases where there is expressed interest from the healthcare provider to be involved in research, it is not always clear how institutional relationships and professional hierarchies are managed, particularly in environments where perceived power imbalances exist between nurses and physicians.

Obtaining permission to access health facilities/institutions for research purposes, which may seem like a single administrative event is a complex process [44]. So, although formal permission may be granted to the researchers, gatekeepers have the autonomy to permit or deny access to their information, space, personnel, clients/ patients, subliminally or otherwise [44]. A gatekeeper is "*someone who controls access to an institution or an organisation*". In this instance, it would be the health facility. Findings from a qualitative research study in a research- active province in South Africa, highlighted differences in how research is valued by facility managers [31]. They found that facility/health managers were motivated to supporting research in the hope that the research would primarily benefit their clients and the conditions under which health services are delivered to patients [31]. These gatekeepers positioned themselves as advocates for their clients, and their value of research was determined by how much of the collateral benefits would directly benefit participants. Benefits included receiving free care and access to better clinical diagnostic tests provided by research projects [31]. On the other hand, this research highlighted more aspirational benefits, that accrue into the future for the benefit of society, such as research findings' contribution to scientific knowledge. There were poor relationships between gatekeepers and researchers were perceived as wanting to benefit through publishing and acquiring more funding as opposed to benefitting communities hosting research. Facility managers described their relationship with researchers as characterised by mistrust [31]. This mistrust was exacerbated by differences in stakeholders' perceptions of the social value of research [31]. Reconciling these values as complementary rather than competing, could be the first step to getting an appreciation for the contributions brought by each stakeholder into the research process.

The findings above were echoed by a study done in Kenya, whose aim was to highlight opinions of health stakeholders on what constitutes the social value of research [7]. The consensus was that the social value of research was that health is a social construct and health research should therefore aim to understand the settings in which the research is being hosted [7,31,33,57]. They concluded that research should move beyond adding to scientific knowledge or testing the efficacy of drugs, to also engage with broader systemic issues that surround health challenges being researched. Such expectations from gatekeepers in LMICs are valid given the very limited resources in these countries' public health systems. Additionally, "*there is the potential that multiple ongoing studies in a single community* could *compromise existing healthcare services*" [33], thereby placing further demands on limited resources, including the health care providers. Gatekeepers increasingly cite 'over-research 'as a reason for denying researchers access to carry out research in institutions [57]. However, where the idea of 'over-research' and 'over-researched communities' has been used, it has been anecdotal and elusive with different stakeholders holding various opinions of what the term means. The evidence on 'over-research' in public health as a subject of enquiry is still limited [33,57,58]. A related study found that most researchers did not fully understand the term 'over-research' while gatekeepers who expressed allegations of over-research, did so where there were imbalanced power relations between different stakeholders in the research process, and concerns that the research would fail to benefit communities and participants [33]. Interestingly, this research was conducted in sites that host multiple HIV prevention trials and projects. Such a response is expected, given the recent increase in investments of HIV services and research in certain countries in sub-Saharan Africa, particularly South Africa [59].

The South African research system

South Africa (SA) is one of the LMICs that have made relatively large investments and major scientific advances through the work of their research institutions and councils [18,56,60]. This steady progress has been a result prioritising national resources for health research, developing national health plans and leveraging political will [61]. In the decade leading up to the 21st century, South Africa saw "*an increase in research inputs and outputs in areas such as clinical trials and epidemiological and other health-related studies*" [62,63]. There was a recognition that generally "*research activities lack coordination and prioritisation to maximally benefit health sector development and achieve the desired impact on the quality of life of the greater population*" [64]. In response, the National Department of Health developed and adopted a research policy framework. The South African Health Research policy of 2001 provided a framework to enable research to enrich the lives of all South Africans [65]. Part of the objectives outlined by the policy were "*to encourage the uptake and utilisation of research findings in the coordination of the nation's health system and to build research capacity within the community, health services, research institutions and decision makers, including training facility managers on the management of research and utilisation of finding*s" [65]. Also outlined was a need to "*develop of a communications strategy that establishes mechanisms for the dissemination of information and ensures that benefits of research are systematically and effectively translated into practice*" [65].

Historically the challenge to research dissemination and knowledge translation in South Africa has been due to the lack of coordinated research bodies in the country [64]. The health system is the responsibility of the Department of Health whereas the research system is under the stewardship of the Departments of Science and Technology (DST), and Higher Education and Training [64]. The National Health Research Committee (NHRC) was formed to address this problem [62,63]. Provincial Health Research Committees (PHRC) were subsequently formed to operationalise the national directorate mandate to suit the different provinces' settings [67].

Although there are competing resources in SA's health budget, there is recognition of the need to increase research that is locally driven and that responds to the health priorities and population needs. International donor-funded research often reflects the donors' interests, which may not necessarily mirror local research needs [22,68]. A report on proceedings and recommendations of the 2011 National Health Research Summit appealed to the South African government to increase the funding for local, researcher-clinician driven research to at least 2% of the national health budget. In 2018 update of the status of the national health research system, the ≥ 2% was still the recommended allocation [61]. Research on the national expenditure on health research in South Africa noted that there was no direct stream of public funding for research going to provinces [69]. The funds that were historically allocated for Research and Development (R&D), had been channelled to training and development of health professionals, which might not have included any research training. One such ways is to incorporate research capacity building into continued professional development programs for health workers [24]. Other efforts include improving research literacy in the undergraduate nursing and medical student [9,50,70].

In the wake of global efforts to improve health, for example, the introduction of Universal Health Coverage (UHC) and the sustainable development goals (SDGs), there is need to strengthen the national research system to be able to achieve to achieve optimal health outcomes [71]. In measuring progress, there is an index used, that is, the research barometer that was developed by WHO African Region (WHO AFR) [61]. Unfortunately, only two published studies in Africa have had an attempt at developing such a measure of progress, to date

[61,72]. In 2018, the overall NHRS barometer score for South Africa was 83.7% [72]. See Table 2 showing the different functions and sub-functions on which the total score is based. As indicated, the shortfall is largely on NHRS human and physical resources, and financing [61]. Although this score exceeds those of many other African countries, these deficits are quite substantial in the specific country context. The National Department of Health (NDoH) and Provincial Departments of Health (PDoH) works closely with medical schools to provide training for the health workforce and human resources for health research. However, there is still a low emphasis on research training, particularly HPSR, in both medical schools and nursing schools [9,73]. Exposing health care providers to public research at the onset of their career, could help address the deficiency in research capacity and encourage more operational and health services research in primary care.

Table 2 South African NHRS barometer scores, 2018 [72].

Functions and sub-functions	**NHRS index (D)=(A-C)/(B-C)**
A. Leadership and governance	
1. National Health Research Policy 2001	1 (or 100%)
2.Health Research Legislation/Law – Chapter 7 of the National Health Act, Act 61 of 2003	1 (or 100%)
3.Health research strategic plan: National Health Research Summit Report 2011	1 (or 100%)
4.Functional National Ethics Review Committee	1 (or 100%)
5.National Health Research Focal Point/Unit	1 (or 100%)
6. National health research agenda 2011	1 (or 100%)
B. Developing and sustaining resources	0.737
7. Health Research Programme/Unit	1 (or 100%)
8. Number of technical & support staff in HRP per 100 000 population	0.00018 (0.018%)
9. Whether HRP has internet connectivity	1 (or 100%)
10. Presence of SAMRC	1 (or 100%)
11. Number of universities conducting R4H per a million population	0.42 (or 42%)
12. Presence of NGOs undertaking health research 1	(1 or 100%)
C. Producing and utilising research	0.937
13. Existence of NHRC that convenes Summit	1 (or 100%)
14. Existence of knowledge-translation platform(s)	1 (or 100%)
15. Total number of R4H publications in 2017 per 100 000 population	0.81 (or 81%)
D. Financing R4H	**0.50**
16. Presence of health research budget within government budget	1 (or 100%)
17. Government allocation to health research in the 2017/18 financial year	0.00041 (or0.041%)
Overall NHRS barometer score ((sum of sub-function indices divided by 17) x 100%)	0.837 x 100 = 83.7%

The lack of funding for research has been cited in a number of studies as a barrier to conducting research in most LMICs but this has not largely been the case in South Africa- at least, not as far as research in infectious epidemics is concerned [2,5,32,74,75]. Although government funding towards research is still marginal, South Africa has benefited from relatively substantial funding for research from international donors and several relief aids over the years [22]. This is partly due to the attention on the HIV/AIDS epidemic and TB. However, although the funding may be available for this, it remains relatively inaccessible to healthcare workers because of lack of confidence in their research capacity [6,10]. Although government funding for research has not increased significantly, especially in the area of health policy and systems, and health services research there is a heightened interest in health research, and increased investment in research and developments in South Africa compared to other African countries [76]. The 2016 Global Research and Development (R&D) forecast reported that while Africa accounted for only 1.1% of global investments in R&D, 65.7% was took place in three countries- South Africa, Nigeria and Egypt [77].

One of such investments in the country has been the National Health Research database (NHRD) The South African NDoH through the Health Systems Trust developed a National, an online tool to monitor research being done in the country. The NHRD functions as a health research repository and is the application portal for researchers applying for permission to conduct research in facilities managed by provincial institutions [78]. This enables the tracking of research activities in the different provinces [78]. The intention was to reduce duplicated efforts, to help identify priority areas for resource allocation and ensure that facilities are not overburdened with research.

The Western Cape Provincial health research system

Each year, hundreds of applications for approval to conduct research in health facilities are submitted to the Western Cape Provincial Health department through the National Health Research database (NHRD) online platform. The NHRD functions as a proxy for tracking research activities in each province, across the country. It also provides valuable information on research priorities and allows for a snapshot of the geographic distribution of research to identify gaps and for equitable allocation of resources [77]. In the Western Cape, the approval process for research in provincial facilities is strictly through the NHRD and applications made on other platforms are not considered [78]. Access is required when the researcher enrols patients from a public facility, conducts research that impacts on the workflow or referral systems in the public sector, or requires the involvement of provincially employed staff [78]. Turnaround time for feedback on applications are expected to be between six and eight weeks. If approved, a letter is sent to the researcher with the facility managers' contact details, to arrange access [78]. Researchers are required to give a feedback report of research findings within six months of data collection. The Western Cape has arguably been one of the most progressive and accommodating provinces for health research [22,78]. This may be because the province hosts various research institutes, universities, and non-governmental organisations (NGOs) that conduct a range of research projects. The province is home to four universities, of whom three of them have highly active schools of Public Health with affiliated research units [74]. Researchers seeking to conduct research in central hospitals seek additional approval from hospital research administrative authorities largely through the NHRD. In the Western province there are 5 authorities granting permission for research: the three tertiary hospitals -Groote Schuur, Red Cross and Tygerberg hospitals, all other facilities managed by the Provincial government, and City Health who run municipal clinics in Cape Town [78]. Applications for facilities under the stewardship of the Cape Town City council are administered through a different process. This application process differs from the application to an ethics committee for ethics approval.

A review of proceedings from the 2017 annual research day organised by the Western Provincial Health department displayed an array of presentations on research that had been conducted in the province [79]. The various kinds of research taking place in the province are also reflected in the Western Cape Provincial Research Newsletter, and annual research reports from the different academic institution [79,80]. Many these projects are often hosted in public sector health facilities. The NHRD can provide a general overview of the kind, and number of discrete studies taking place in the province, but it does not give a sense of the burden as experienced by the health system. For the most part, evidence of research burden has been limited and often anecdotal. It is therefore important for empirical research to investigate this topic, to contribute to the wider pool of literature addressing the research. Figure 1 illustrates the step-by-step procedure of the access approval application process for provincially run public health facilities [78].

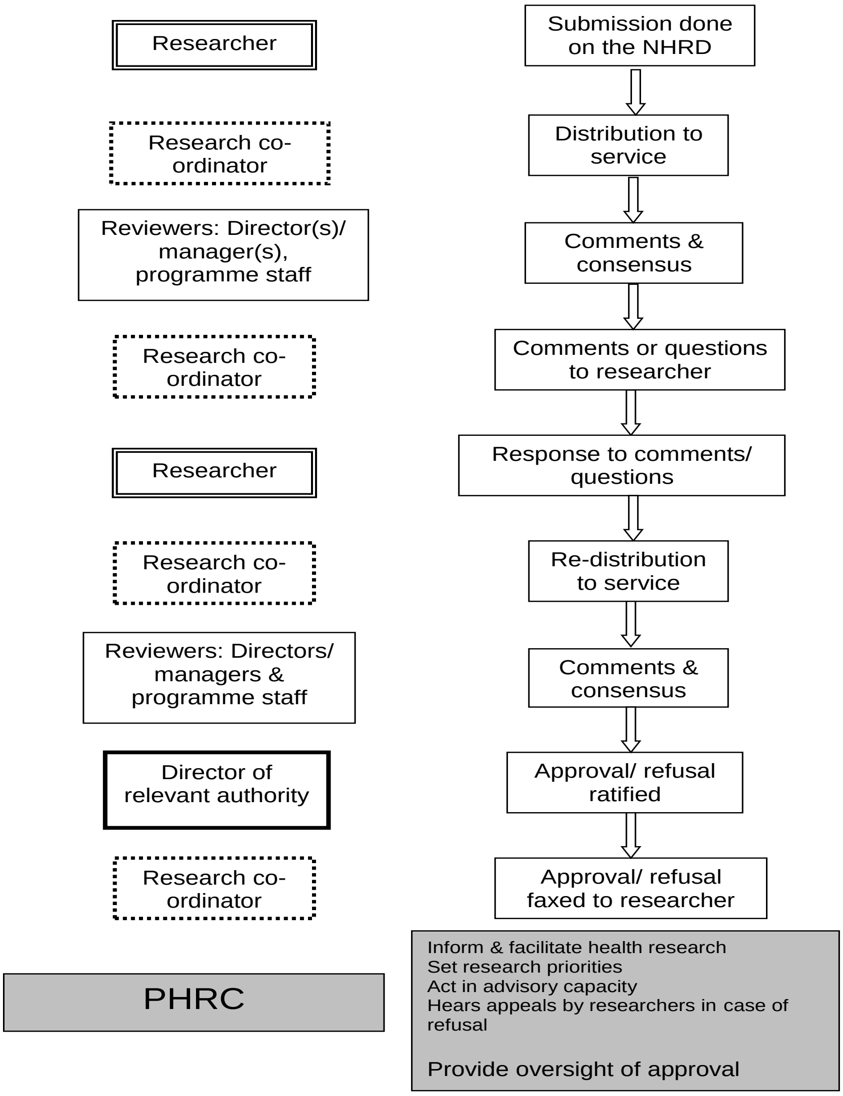

Fig 1 Flow chart of approval process, with responsibilities for the relevant personnel [78]

Conclusion

There is a need for empirical research on how health workers engage with research from conduct to utilisation, particularly in LMICs, and in Africa in general. HPSR helps to understand broader issues within their specific context. Primary empirical research is required that explores the involvement and participation of frontline health workers in the conduct of research as they experience it in health facilities, where operational research, primary data collection takes place. This is important given the already existing challenges, in terms of staff shortage, limited resources and capacity that characterise many public health sector primary settings. Health facilities often struggle to provide comprehensive services because of these challenges, let alone, host research projects. Importantly, the professional relationships and dynamics at play among the stakeholders involved merit exploration. Particularly in South Africa, large investments have been made in research and development, and giant strands have been taken to develop knowledge translation mechanisms. While the literature on research conduct, feedback and knowledge translation has focused on policymakers and researchers, very little attention has been given to exploring the potential role of frontline healthcare providers to enrich the research process. In as much as efforts are being channelled to translating research to practice, it is equally valuable to assess the capacity of health system to accommodate this research in the first palace. This is best done at a local, provincial level, as processes and relationships are difficult to track nationally, given the differences in structures and administration of the provincial health departments in South Africa

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PART C: JOURNAL MANUSCRIPT

Exploring frontline health care providers' experiences of hosting research and related activities in public health facilities in the Western Cape Province, South Africa

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Target Journal: BMC Health Research Policy and Systems[2]

Abstract

Background: There has been a rapid increase in the research being conducted in provincial health facilities within the Western Cape province of South Africa, which yields findings that have a potential to impact positively on the delivery of health services. However, there is little empirical evidence available on this topic, from the perspective of frontline health care providers, who often have the responsibility to host and accommodate such research activities in primary health settings. The aim of this study is to gain an understanding of the experiences of health care providers with research activities in facilities.

Methods: In addition to data from the National Health Research database (NHRD) on sampled facilities, a mixed method, cross-sectional methodology was used by administering questionnaires to frontline health providers (n=19), semi-structured interviews (n=3) with gatekeepers in primary health care settings. For the survey questionnaire, descriptive analyses were used to characterize respondents and their experience of research. Semi-structured interviews were analyzed by identifying themes as they emerged from the data and cross-comparing with findings from scoping review and other data sources (NHRD).

Results: Findings from this study fall under four broad thematic areas, namely: 1) Staff overall attitudes to research; 2) Approval processes; 3) Experiences of hosting research; and 4) Experiences of research feedback. Results revealed that the importance of research was generally understood by the respondents, howbeit with a few caveats. The approval processes put in place have mitigated research burden, as facilities have a say in how much research volume is allowed. It was reported that more timely feedback of research outcomes would make the staff more willing to accommodate research.

Conclusion: This research provides preliminary insights into the perspectives from frontline health care providers on their experience with health research in a specific context. Findings suggest that in instances where there are coordinated mechanisms for conducting research, the burden of research becomes less on

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[1] For the purpose of this thesis, the student is the sole and first author of this article.

[2] Article in line with BMC Health Research Policy and Systems – Manuscript Submission Guidelines (Appendix VI)

the services. The process could become an enriching experience for all stakeholders involved, and consequently, facilitate knowledge translation (KT).

Keywords: hosting research, health research in LMICs, research feedback, gatekeepers, knowledge translation, National Health Research Database (NHRD), frontline health care providers

Background

Despite the progress, innovations and increased financial investments in public health research and capacity development by the developed countries to low-to-middle income countries (LMICs), the burden of unfavorable health outcomes is still disproportionately borne by LMICs [1,2]. The health research systems of most LMICs are often characterized by inadequate mechanisms for dissemination and poor feedback of research findings, as well as, little or no involvement of all relevant stakeholders in the research process [2–7]. Those in the frontline of health services, who are better placed to identify health priorities from practice are still minimally involved when it comes to leading or initiating research [8–11], yet their placement at the coal face of service delivery gives them a unique opportunity to identify context-relevant priorities, questions, and to champion evidence-based practice (EBP) [10,12,13]. Evidence from the literature suggests that research conducted in partnership with implementers improves the uptake of research findings and increases its utility in evidence-based practice at the health facility level [22,37,41,44,92–94]. A study in a research-intense province of South Africa, investigating the value placed on research and research activities by facility managers, found that failure to involve, and effectively communicate findings to stakeholders, particularly the facility staff who deliver health services, justified the lesser value they placed on research [20]. Hence, involving the frontline health care providers from the initial stages of the research process is utile for Knowledge Translation (KT)- which has been defined by the Canadian Institutes of Health Research (CIHR) as *“a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services and products, and strengthen the health care system”* [21].

The intended outcome of KT as defined above- to provide more effective health services directly implicates the frontline health providers and suggests a reason for meaningfully engaging them in the process. Due to this growing realization of the bilateralism of research evidence informing clinical practice, and practice informing research, there has been increased attention and efforts to strengthen KT mechanisms both globally and regionally [1,12,22–26]. However, the potential for research feedback to inform practice is usually quite a lengthy process. As such, despite the progress and increasing investments in KT mechanisms, a huge ‘knowledge-to-practice’ gap still exists [12,23,24,27]. Edwards and colleagues conducted an evidence mapping of KT strategies in African health settings, as well as a review of key policy documents and nine expert interviews with high-level health system researchers and provincial health policymakers [28,29]. The findings raised vital issues for policymakers and researchers involved in KT in a particular country setting. The current study sought to corroborate these results in a similar setting, with different group of stakeholders, that is, frontline health care providers. Currently, there is limited evidence about the perspectives of frontline health provider on research and related activities conducted, in public health facility settings in developing countries [11,30-33]. Known barriers to health care providers’ involvement in public health research, including limited funding for research, scarce resources, research capacity, and unfavorable attitudes towards research, have been commonly cited in literature [8,9,11,27].

Increasingly, there has been attention on literature on the ethical concerns around the conduct of research in low-resource settings [34–38]. Particularly the use of terms like ‘over-researched’ and ‘over-researched community’ has gained popularity [34,35]. In a few recorded instances, these terms have been used by gatekeepers as a reason for denying researchers access to institutions or facilities, to carry out research [34–36,38] .Given the context in most LMICs, with limited resources for health, the burden of over-research is a valid reason for the denying access to health facilities for research. Involvement in research for health providers may take on different forms. This includes engaging them as co-investigators, co-creators of research concept, for data collection, as implementers of research findings, in policy development or simply to refer patients/clients in the health facility to a research site [8,11,32,39]. The focus of this research is on frontline health care providers accommodating and hosting research in public health facilities on the provincial district platform.

In a study done in South Africa, by Lutge and colleagues, findings revealed that there was a significant difference in stakeholders’ perspectives of what makes research in public health facilities valuable [20]. Facility managers positioned themselves as advocates of clients. As such, the way they valued research was tied to collateral benefits directly benefitting the participants, for example free care, or access to better clinical diagnostics. On the other hand, researchers highlighted more “a*spirational benefits that accrue into the future”*- for the benefit of a much broader society than the immediate one [20]. For example, contribution of the research to service delivery guidelines, health system governance and to the body of scientific knowledge [20]. Similar results were echoed by a study in Kenya highlighting the different experiences of stakeholders involved in health research as to which of the benefits are the fairer in a developing country context [38]. Their research findings revealed that the various benefits mentioned were situated at both the micro and macro level. They concluded that social value of research should go beyond “*seeking to engage with interests of those facilitating research*” , but also to engage with “*broader systemic issues*” that expose communities in poorly resourced settings to exploitation in the research production process [38].

The South African health research system

Over the past decade, South Africa has seen an increase in research investments and publication in areas such as epidemiology, social and behavioral studies, clinical, health policy and systems research [40]. This was supported by a progressive South African Health Research Policy in 2001, which was developed to provide a framework, enabling the conduct of ensure research is an enriching experience for all intended beneficiaries [10]. The policy was meant to:

> "*…build research capacity in all its facets within the community, health services, research institutions and decision makers, including training facility managers on the management of research and utilization of findings. The goals of the policy involved developing a communications strategy that establishes mechanisms for the dissemination of information and ensures that benefits of research are systematically and effectively translated into practice*" [10].

The policy highlights the need to build systems for the management of research that include building capacity among facility managers to manage research in their facilities. However, it was never clear how this would translate into practice, given that research activities tended to lack coordination and prioritisation, often resulting in multiple studies running parallel in a single health facility [41,42]. Provincial Health Research Committees (PHRCs) were proposed as an effective mechanism to coordinate research and facilitate the efficient and effective use of resources [41]. However, the different provinces have operationalized their terms of reference and objectives differently. The Western Cape PHRC was set up to:

> "*…inform and facilitate health research in the province by liaising with all research stakeholders conducting research within the province to ensure that research activities are directed towards the greatest health needs in the province. This committee serves to advise on and oversee the approval of health research by the relevant authorities*" [41].

In an attempt to centrally track and coordinate research activities in health facilities, the South African National Department of Health (SADOH), commissioned the Health Systems Trust (an independent non-governmental organisation) to develop the *National Health Research Database* (NHRD) [41]. The NHRD serves as a uniform online portal for applications from researchers to access provincial health facilities in all nine provinces in the country. It also serves as a database for information about volumes, types, subjects, and locations of research. Access approval is required when any researcher enrolls patients from a public sector facility, conducts research that impacts on the workflow or referral systems in the public sector, or requires the involvement of provincially employed staff.

The Western Cape provincial public health sector has five independent administrative authorities, led by Research Coordinators, that are responsible for research approval [41]. Applications for access to health facilities administered by the Western Cape provincial Department of Health must be done via the National Health Research Database (NHRD). Research Coordinators process the applications that apply to their zone. Researchers are encouraged to engage with the relevant service managers in the research development stage Service managers are facility managers, senior doctors or family physician stationed at a particular facility, assuming the role of gatekeeper, and point of contact for research purposes. This research provides an account of the experiences of facility managers and front-line health care providers hosting health research in public health facilities on the district platform in the Western Cape. Also highlighted from the results of this research are their interactions with researchers, the systems used to obtain entry to health facilities for research, their perceptions of the concept and reality of research burden, and to explore the frequency and type of feedback received from researchers as a factor influencing future research involvement of frontline staff.

Method

This study is a mixed method, cross-sectional study conducted on facilities on the provincial district health platform. Primary data was collected using a self-administered questionnaire survey (n=19) and semi-structured interviews (n=3). Secondary data from the NHRD, was used to complement the data from participants. The cross-sectional design was chosen as the most suitable as the study sought to explore and gain an understanding of the topic at a specific point in time [43]. Given the exploratory nature of the study design, a mixed method approach was selected to incorporate different data sources and provide a relatively more comprehensive understanding of the findings.

Targeted health facilities of interest were selected based on the research volume in the health facility between 2015-2018, as reported in the NHRD. A detailed list of sampled facilities is included in this thesis (see Appendix I). The health facilities were sampled by mean of proportional stratified sampling to reflect the different experiences of both rural town and metropolitan/urban health facilities, then facilities from each geographical area were stratified according to their relative research load. Two district hospitals were included to reflect the experience at a different level of care. **Table 1** shows how facilities were classified as 'saturated', 'medium saturation' and 'low saturation', as per the number of proposals submitted for research in a particular facility between 2015 and 2018. For the urban facilities, saturated was defined as facilities that hosted an average of 11 or more research projects across the three years. Facilities that hosted 10 or less research projects were defined as medium saturation, and lastly, the low saturation hosted somewhere between seven and five research projects on average. These categories were intentionally lower for research carried out in the rural part of the province, because approximately two-thirds of the research done in the province is concentrated in the Cape Town metropolitan area [41]. Seven facilities were eventually included – seven of 428[3] public, health facilities (clinics and community health centres) in the province, with the Cape Metro District accounting for 152 facilities [44].

Table 1 Facility research volume categories as per average number of proposals submitted between 2015 and 2018

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[3] Data as reported in the 2008 Annual report.

	Urban	**Rural**
Saturation	11+	8+
Medium Saturation	10-8	7-5
Low Saturation	7-5	4-2

The target sample for the self-administered survey was frontline health providers (nurses, doctors, facility managers) working in provincial public, health facilities (CHCs, CDCs, clinics, and district hospitals). For the recruitment of respondents, facility managers from the 20 target health facilities were initially invited by email to participate in an online survey. Subsequently, more email contacts were received via networking. Through this networking, a total number of 56 frontline providers who met the criteria for study participants were directly contacted, primarily by email, and a SurveyMonkey® link was sent to them [45]. Responses trickled in but efforts to recruit more participants were made. Automated follow-up reminders were sent via SurveyMonkey to those who had not responded. Some surveys were printed out and distributed to those who preferred paper-based versions. Eventually, the response rate was 34% (19/56). The total number of health facilities represented by the respondents was seven. Data saturation could not to be determined due to the relatively low response-rate. **Table 2** below shows the number of respondents who completed the questionnaire survey per cadre.

Table 2 Descriptive statistics

Facility manager	**Nurse**	**Medical Officer**	**Senior doctors**	**Other (not specified)**
15.8% (n=3/19)	31.6% (n= 6/19)	15.8% (n=3/19)	26.3% (n=5/19)	10.5% (n=2/19)
Period working at the facility (months) median= 14 months 25th quartile= 4 months 75th quartile =72 months min= 3months max=156months				

To better understand how public-sector health facilities experience and accommodate research activities, and the relationship between health care providers and researchers, three in-depth semi-structured interviews were conducted. There was an overlap in the process of data collection between these two phases of data collection. These were administered to three gatekeepers, selected from three high-research volume facilities. Of these three, two were family physicians, and one was a facility manager – but all fulfilling the role of gatekeeper or identified first point of contact for researchers seeking to access the facility for research purposes. Surveys were captured on a Microsoft Excel® spreadsheet and the dataset was uploaded onto STATA

15®- a statistical analysis software [46]. The qualitative thematic analysis took on an inductive approach by identifying themes as they emerged from the data and cross comparing these with findings from the scoping literature review. The transcripts from the semi-structured interviews were analyzed by categorizing responses thematically to reflect the issues that were emerging from the data.

Research context and ethical considerations

Ethical clearance was obtained from the University of Cape Town (UCT) Human Research Ethics Committee (HREC) (see Appendix V). Participation was voluntary and individual anonymity ensured. To ensure that responses from the online survey were anonymous, the option to collect Internet Protocol (IP) addresses was turned off. Interviews were conducted in a private room and the voice recording only started after initial introductions, in cases where consent to record had been granted.

Four facilities declined access - providing reasons such as recent infrastructure damage from natural causes, current staff shortages, and over-saturation of current research studies. Research activities could not be carried out outside of working hours, and during working hours, the researcher was competing with clinical care responsibilities. The limitations on findings demonstrate the real-world experiences and challenges facing both researchers and frontline staff when it comes to research implementation. However, the findings offer a unique insight into the experiences of frontline health workers with research that can form a basis for further investigation in knowledge translation. As a result of low response rate, the NHRD was subsequently used as an additional data source to complement findings from the surveys and interviews.

Results

Data from the survey and interviews were synthesized and are presented below. The numerical pointers show survey responses, and narratives added from the interviews. Together these provide perspectives of frontline health care providers on their experience with hosting research and researchers in health facilities, given that gatekeepers are the first point of contact for researchers seeking to be hosted in the public health facilities on the provincial district platform.

Staff attitudes towards research

Generally, the questions asked study sought to understand frontline health care providers’ perspectives on research. This includes exposure to conducting or participating in research studies. More than half (56%; 10/18) of the respondents reported never having conducted research themselves during their academic studies. However, most (12/18) felt that staff should be encouraged to do their own research as part of their professional development. When asked about the availability of opportunities for building staff research capacity, a clinical manager felt that it would most likely be embraced as one moves higher up in ranks. The frontline health care providers were reportedly struggling to meet the demands of their daily work. A facility manager [F3, Interview, 2018] from a high research volume CHC acknowledged that opportunities for research capacity development do exist. However, doctors would most likely take them up, and that is simply a function of the difference in the training curriculum for doctors, which places more emphasis on research, compared the nursing curriculum.

When asked about their general opinion on the substantive relevance of the research that takes place in their health facilities, to service provision and client care, half (8/16) of those who responded said that research is 'always relevant', while the others were equally split between the research being 'sometimes relevant', and 'often relevant'. One of the respondents, a facility manager from a CHC who selected 'sometimes', noted that they do not always understand the rationale behind all the research activities, and that it is only 'sometimes' that it was relevant to the services, as the intended impact of the research is normally on a small percentage of the population.

The general importance of research was appreciated by all the respondents – but they provided caveats such as the need for clarifying benefits - not only for the greater health system, but for that health facility directly.

> "*Research is important, but if not shared it is a burden as the staff feel it was a waste of time and we are not aware what impact the research had on patient treatment outcomes or staff improvements*" [Facility manager F1 survey, 2018].

In their response about the importance of research to the work delivered by the Western Cape department of health, most (10/16) of the respondents felt that research was always important. A third thought research was 'often important' because some research addresses the ever-changing global issues, population demands and the burden of disease.

It was noted that for research to contribute to the work delivered by the Department, communication on research priorities must be established between the researcher and frontline health care providers.

"*Research is important to improving health care systems. So, communication is key to what research needs, where there are decisions made to choose opportunity*" [Senior doctor P15 survey, 2018].

Approval processes

All the gatekeepers interviewed at the health facilities were aware of the structures put in place for the access approval application process at provincial level.

> *"Initially, the process was such that the researchers would approach the facility manager directly to ask for permission to conduct research in the facilities, but at least from last year, they go through the sub-structure. The process works better"* [Facility manager, F3, Interview, 2018].

Data from the survey showed mixed responses on the question of whether the facility could turn down the request to be involved in research activities. When asked to choose the option, half of the respondents (8/16) felt that their facility could not turn down a request, the rest (7/16) felt that it c ‘sometimes’ be turned down, while one felt the facility could ‘always’ decline’. It was, noted that denial of requests happens “*…from time to time but is mostly limited to research activities involving staff members*”[Facility manager, P6,survey,2018], and that it could happen in instances where space is a constraint, or if such activities require time and input from their staff.

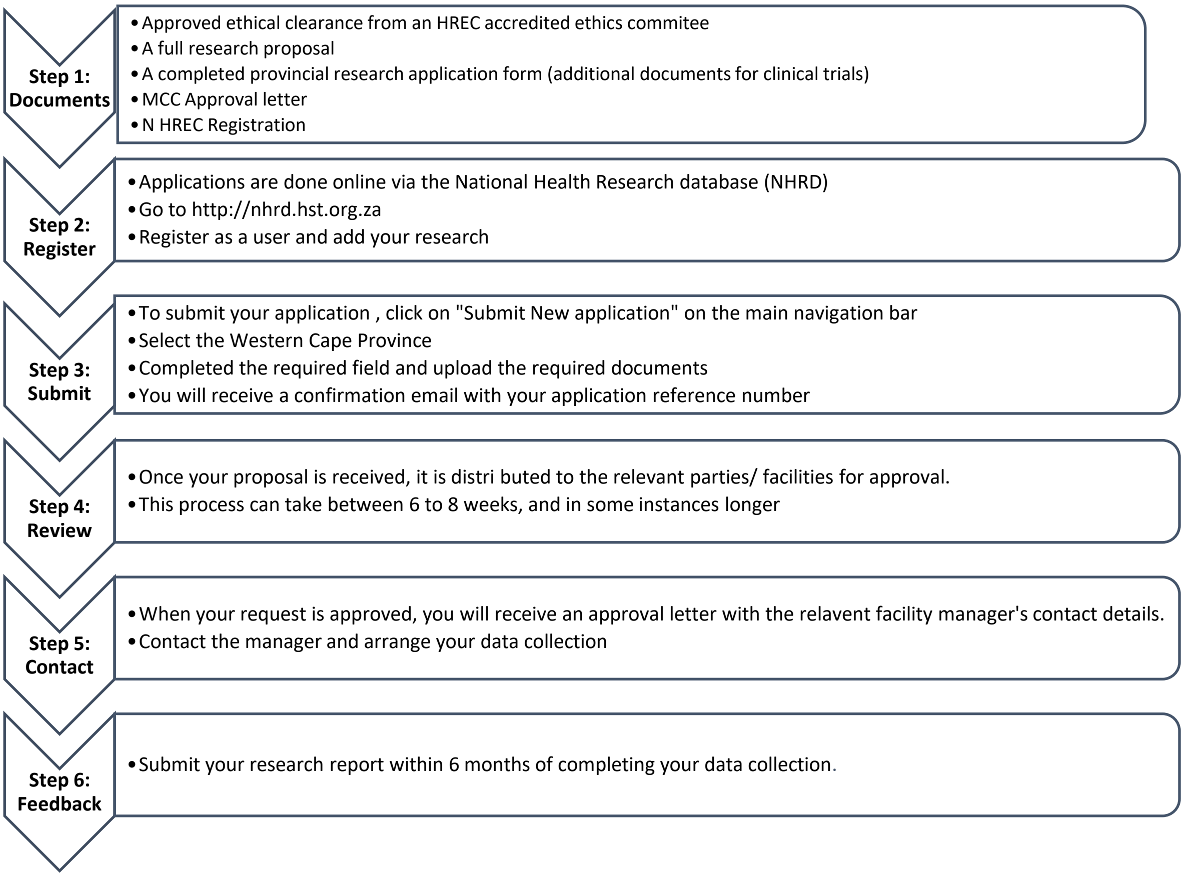
When asked if they felt that they are given an option to personally decline the request to be involved in research (as individuals, even if approval had been given for the facility), only a few respondents (3/16) felt they could or would ‘always’ decline to participate in research (as individuals). A quarter of the respondents (4/16) selected ‘often’, and they reported that this happens mostly in cases when the research involves filling in a questionnaire.

However, there was general agreement that although there is acknowledged autonomy to decline involvement in research (on a personal and facility level), most felt that research is likely to be beneficial, and so should be accommodated where possible. This is also subject to the appropriate protocol being observed.

> *“Communication with involved staff is the most important. Our health facility is understaffed. Although the importance of research is understood, any extra workload would add to the current stress on the health system at our facility. Communication prior to starting research with the ‘ground’ staff in order to hear if there is space for such research is very important”* [Medical officer, P12, survey 2018 year]

When asked if researchers should consult frontline service staff before developing research proposals, most all who responded to this question (10/15), responded in the affirmative. All the respondents (15/15) preferred the access approval process to happen primarily at the sub-structure (district) level. When asked who the researchers should consult prior to applying for access to health facilities, it was reported that the district office or sub-structure should consult the facility manager about any research proposed at the facility. These responses reflect the current process of access approval in the Western Cape province. Figure 2 below, reflects a stepwise guide for those seeking to conduct research within provincial health facilities.

As a result of streamlining the approval process, it was reported that the workload burden from research is lessened because the sub-structure would have assessed the current situation at the facility before granting permission. When there is an understanding of the contribution of research to the health outcomes, it can be prioritized even amidst challenges of limited resources.



Step 1: Documents
- Approved ethical clearance from an HREC accredited ethics commitee
- A full research proposal
- A completed provincial research application form (additional documents for clinical trials)
- MCC Approval letter
- N HREC Registration

Step 2: Register
- Applications are done online via the National Health Research database (NHRD)
- Go to http://nhrd.hst.org.za
- Register as a user and add your research

Step 3: Submit
- To submit your application , click on "Submit New application" on the main navigation bar
- Select the Western Cape Province
- Completed the required field and upload the required documents
- You will receive a confirmation email with your application reference number

Step 4: Review
- Once your proposal is received, it is distri buted to the relevant parties/ facilities for approval.
- This process can take between 6 to 8 weeks, and in some instances longer

Step 5: Contact
- When your request is approved, you will receive an approval letter with the relavent facility manager's contact details.
- Contact the manager and arrange your data collection

Step 6: Feedback
- Submit your research report within 6 months of completing your data collection.

Fig. 2 Source: A quick Guide to: Conducting research in the Western Cape [1].

Experiences of hosting research

At the time of data collection, almost half of the respondents (8/18) noted that they were currently accommodating researchers in their facility. Most people reported having been involved with research in different instances and could therefore reflect on prior experiences. In addition to the research types the respondents had to choose from, including patient surveys, qualitative with patients, staff surveys, qualitative research with staff, respondents reported specific research studies that they had accommodated. These were students asking patients questions, staff satisfaction surveys, students doing quality improvement surveys, recruiting patients for TB/HIV studies that are conducted by non-governmental organisations (NGOs) in one of the provincial hospitals, and receiving training packages for major clinical trials.

It was noted that the burden of making resources available is not always assumed by the facility. By virtue of their study design, some research projects require extra resources, for example, those recruiting patients for HIV and TB studies would clearly require more resources than the staff satisfaction survey. Researchers brought their own, and so were less of a burden. Not only is this a function of the research design, but also the fact that provincial approval process requires an upfront declaration of availability of adequate resources for the research to be conducted:

> *"Usually, the first thing I check is what is expected of us, to try and see if it's something that we can accommodate or not within our operational capacity and our time. Most of the research … the most they require is space to do whatever they want to do, access to files, or maybe they want the staff to identify patients … so it's very low maintenance in terms of what it requires but staff and space are the big issues"* [Clinical manager,F1, Interview, 2018].

For example, in all three semi-structured interviews, it was noted that because of the strict criteria for resources, researchers often bring their own staff, stationery and drugs. In some instances, researchers provide research assistants to supplement staff activities, such as blood sampling but also, the health care providers could also benefit from the

> "*…the lady who did the scans - the ultrasound for the legs - she went over and beyond with her scan. So, we would ask to use her scanner for someone who didn't fit her criteria. So that was useful*" [Family physician, F2, interview, 2018]

It was reported that other projects have set up their research sites close to the clinic and only required assistance with referring specific patients, and this has mitigated the issue of limited space for carrying out research activities:

> *"And in terms of clinical trials, it's usually only two clinical trials running simultaneously but you find that the follow-up is done off-site. Others have their own nurse, they set up a container just outside but within facility grounds and what they ask us to do is to refer certain clients…"* [Facility manager, F3, Interview, 2018]

However, for certain types of research, particularly students-led qualitative surveys with staff and patients, space remains a significant challenge across the interviewed facilities. One facility manager reported that on several occasions, they have had to give up their offices for an afternoon, for researchers to have a confidential space in which to conduct interviews.

Managing relationship dynamics with researchers

Two of the gatekeepers interviewed reported that professional relationships with researchers were generally good from the onset but varied when it came to day-to-day engagements. All interviewees reported that most researchers come into the facilities with reasonable requests in terms of how much resources and support they would require from the service. Some facility staff attempt to minimize constant interactions, but when researchers require more assistance or engagement than is meet, it then becomes a challenge to keep up with the increasing requirements. One facility manager said what works is establishing boundaries from the onset, and having a performance agreement where there are clear expectations about each other from the beginning, and keeping each other accountable.

A family physician who reported good interactions with researchers mentioned that they were strict about researchers bringing their own resources, as the absence of adequate resources for the research can become a source of conflict. The same gatekeeper reported that relationships was best when it was mutually beneficial, as researchers brought in expertise that the clinic staff could benefit from. Their patients would also benefit from using some of the state-of-the-art medical equipment that researchers bring in.

> *"…the one* [multi-drug resistant] *MDR trial recently that finished last year … he was very helpful because he was a consultant and he later moved onto research, – and we were asking for advice as well. So that was sort of his way of giving back to the hospital, by being here*" [Family physician, F2, Interview,2018].

Mutual benefit was generally held as a strong factor for success of the research relationship and it was centred maintaining reasonable expectations from each other.

Experiences of research feedback

All the gatekeepers interviewed reported that feedback of research findings has improved in recent years – but still requires improvement. It was noted that the number of people who are going back to facilities to share research findings is growing steadily because reporting back had been included as a requirement for those applying for access to health facilities. One health provider suggested that the recent initiation of sub-district annual Research Days was a possible reason for the shift in the – Department getting more people to feedback.

> *"I think that it's probably now that we're starting to get the feedback. Like the end of last year, we had the sub-district research day, where we had people, researchers giving feedback, and that went incredibly. And now I have got a researcher who is coming to give feedback. There is another researcher who is coming to do follow-up … I think for now, it is starting to come together … So, I think there is an interest from the Department for researchers to give feedback* [Clinical manager, F1, Interview, 2018].

However, there is an acknowledgement that in the past this was a major problem, and currently feedback had not been consistently given. "*…at times one forgets about research that was conducted at facility. [We] only receive some results at times*" [Facility manager, P6, survey 2018].

It was widely suggested that feedback encourages future participation from frontline health workers – and in reverse, limited (or not) feedback becomes a barrier for future research involvement.

> *"Researchers should not just do research, but share what the outcomes were, so that staff is inclusive* [included], *feel valued and know that they have contributed to health impact changes. This will make them more willing to accommodate researches"* [Facility Manager, CDC, survey, P1, 2018].

It was suggested that the feedback could be in different formats, shaped for the target audience. Suggestions included: a one-pager that is submitted at the health facility; presenting at the provincial, district or sub-district research days meetings at the health facility. For the latter, attending scheduled staff meetings and providing power-point summaries were considered more popular. *Also considered, crucial, is the direct feedback to frontline health care providers:*

"direct contact/feedback with the involved staff members of which the research results are applicable is most important" [Medical officer, P12, survey, 2018].

The gatekeepers interviewed reported that researchers were encouraged to feedback findings at routine staff meetings. Several examples were given where such feedback had been translated into change in the health service or system.

Discussion

Like the other provinces in South Africa, the Western Cape health system historically has had challenges with the generation and utilization of health research. This also includes barriers such as over-saturation and the lack of research feedback. Nevertheless, it remains one of the research-intensive and welcoming provinces, and the recent restructuring has put new mechanisms in place for improving research coordination in the province. The NHRD is one of such resources that provides a platform for monitoring the research that happens in and around the health facilities. Such mechanisms have helped ease the burden of research and resources in health care settings that are frequently under-resourced, under-staffed and consequently under significant pressure. When it comes to gaining access into health facilities, gatekeepers were aware of the current (new) processes, and they expressed contentment with the process and their participation in the consultation process that led to this reform.

When applying for permission to conduct research, researchers commit to give feedback of findings upon completion of research. However few written feedback reports are received at the Western Cape Department of Health (WCDoH) [2]. Some feedback is given and translated locally but often fails to reach the provincial office [47]. The reasons for this are not clear- and they could be a result of inappropriate, or underutilization of feedback mechanisms, either researcher-related or frontline service-related. It could also be that much of the literature has focused on improving the upstream aspect of research, that is, KT-related activities, but less on the readiness and willingness of the health system to host the research. It is equally important to ascertain if the research is accepted in health facility settings in the first place. Accessing institutions for research purposes may seem like a single administrative event, but it can be quite a complex process [34] [3]. Although formal permission may be granted to access health facilities, participation in research still requires the gatekeepers' cooperation to their information, space, personnel and clients and/or patients for research purposes [13,34]. This has implications for the effectiveness of the research process and hence important to understand the dynamics at work in the interactions between researchers and frontline health care providers, and how that plays out in the experience of health care providers.

Understandably, some survey respondents felt that they did not often have the autonomy to turn down research because the ultimate decision-making happens at the sub-structure (district) level. Although this did not mean health care providers could not 'resist' or passively deny research on an individual level – for example by not being available. Delegating the autonomy of controlling access to health facilities, to the sub-structure level, seems to have created a system that works. It was reported, so far, that coordination has made hosting research studies in health facilities more manageable. In such cases, it was noted that it is also important to negotiate the balance between granting and denying access to health facilities carefully, to not hamper the conducting of 'potentially great' research. It was also noted that it is equally important to maintain consistency in the cause for denial of access into the facilities. All of this suggests an important oversight role – for research coordination at the higher levels of the system, although it is not yet clear whether this role is currently filled.

The results of this study echo and confirm findings from the broader literature [8,9,33,48]. For example, health care providers and gatekeepers in the health facilities understand and appreciate the importance of health research, although not frequently involved personally in research in their professional capacity. From the literature, reasons reported for the lack of involvement was limited research capacity, limited time, shortage of staff, and sometimes simply because there is no interest in pursuing research as a field of work or study [8,9,11,30,49,50]. Findings from this research reflected the same sentiments with regards to the lack of designated time for research as the major barrier,-preventing health care providers from taking up opportunities to be more directly involved in research, even when the opportunities are available. However, it is also worth noting that although, for some, it is because of limited in research capacity, for others, it is a matter of choice. Particularly, those in the nursing profession may feel that research is not a necessity for career progression in their field [51].

The motivation for health providers to directly conduct, lead or initiate research was much more influenced by individual interest as opposed to the structural factors that facilitators of research, like a supportive research environment, financial incentives, or strengthening research capacity [8,33]. However, there is still a dearth of literature on frontline health providers engagement in health research within primary health care settings in LMICs [9,11,15,31]. There is growing evidence on research uptake, dissemination but little is known about whether research is allowed or enabled by the health system in the first place [1,22,23,52,53]. The focus of this research on involvement of health care providers in the form of hosting and accommodating research in the health facility, and it therefore provides insights that contributes to building a case for the latter.

Adequate resourcing of research was a key finding, as a prerequisite for researchers accessing health facilities, be it medical equipment, or forms of reimbursement for patients recruited to participate in these research studies. It was interesting that even when researchers provided resources, these resources were viewed as mostly benefitting the researcher, and not directly the health facility. This was because most resources were only available for the period of the research study. An important consideration for research planning and negotiation is to make recommendations on what happens to resources beyond the research timeframe

The type and frequency of research feedback was reported as varying from project to project. In the Western Cape, the common theme was that while this was previously a major problem there is a slow and recent improvement, as researchers have increasingly returned to the health facilities upon completion of study, to give feedback of research findings [30]. This was attributed to the requirement at the province for researchers to report back. However, it should be noted that this was a relatively small sample, so it is possible this improvement is not felt province-wide, for example, by those facilities further away from certain university settings. And while it is encouraged, this feedback is also not 'enforced' in any way – and other research has noted that while researchers are encouraged to report on this feedback, a few do [30].

It is also worth noting that because of staff turnover, it may be difficult for newly appointed facility managers or gatekeepers to reflect fully on previous (less encouraging) experiences of feedback at their health facility. There was consensus on what the mechanism of the feedback *should* be – primarily oral feedback into routine facility; meetings, and written feedback to the sub-structure – and that feedback should be packaged for different audiences. The broader KT literature generally recommends different feedback mechanisms that are utilized for dissemination of research findings to different audiences- and emphasizes on the importance of packaging the feedback appropriately to increase its utility [54–58]. In this research, it was felt that 'personalizing' feedback in an accessible form would encourage uptake of findings and recommendations. This would encourage health care providers to be more willing to accommodate research in the future feel valued and included- knowing that they have contributed to making an impact in the health system.

Relations with researchers at these facilities were characterized as 'reasonable' for the most part. Relationships were improved if expectations (of researcher and facility) were outlined from the onset – which is consistent with the broader literature on embedded research and how it can facilitate trust, joint learnings and the co-creation of knowledge between the stakeholders, howbeit with specific intent and over a longer period of time [59,60]. Part of navigating embedded research not only includes include negotiating research partnerships, but also the boundaries of the relationship [60].

It was noted that communication could be improved, and it was recommended that researchers should communicate with the frontline health care providers prior to starting research, as opposed to applying directly to the NHRD with their own research focus – to ensure the research was relevant to the health facility. It was noted that it would be beneficial for researchers to hear what the research needs were in that setting, and to ascertain if there was a need for the research focus, they were proposing to conduct. This is essentially

The mistrust between researchers and gatekeepers that was reported in other South African settings was not reported in this instance [20,61]. This may be because of the sample; or because there is a research application process that is inclusive of research gatekeepers, as this gives them the autonomy to deny projects they do not view as a good fit; or this could be an indication of the research-literacy maturity, or drive currently in the Western Cape province.

As noted earlier, the relatively low response rate to this study request is an indication of the challenges that this paper attempts to address. It also suggests that there might be some bias in the findings – as the respondents might generally have a more positive perspective towards research, and those that refused to participate might have provided a more negative (and more balanced) view. Nevertheless, it provides an interesting glimpse into an underexplored area which is usually only anecdotally referenced to – the perspective of frontline primary level health workers to health research. The Sustainable Development Goal number three consists of targets, which includes supporting research, building local research capacity and also training and development of the health workforce [62]. Reflecting on this study, the number of health care providers and gatekeepers that were *not* available to be surveyed or interviewed, is also indicative of the challenges in LMIC contexts, where there are resource, time and staff constraints; a toxic mix of no research and over-saturation of research; which results in negative attitudes and future barriers towards research engagement. A deeper understanding of the facilitators and barriers that hinder frontline health workers from being involved in research is crucial, especially because these issues are nested within the broader health systems challenges being faced in most public facilities in LMIC settings.

Reflexivity

Reflecting on the research process as the researcher, it was ironic how the reason for which this study was conducted, played out in this process. There are four health facilities that we were declined access to, for various reasons. One of the facilities had just experienced damage from flooding. For the others, reasons cited were staff shortage, and as result, could only avail fewer health care providers than requested for the study. For other health facilities, they just simply could not take any more research studies at the time because of the state of the health facility following an incident with fire. This is a true reflection of the real-life context in which the research in the province takes place.

Limitations

For this project, there are health facilities that simply could not accommodate this research, as the cadre of health care providers we had initially planned to interview, were not available as a result of staff shortage and concerns about research burden. Compounded to that difficulty is that research activities could not be carried out outside their working hours, leaving the researcher with no choice but to compete for time with a lot of other clinical care responsibilities. This resulted in the sample size for the questionnaire and consequently adding the one -on-one interviews based on experiences from few health facilities. However, the findings in here offer a unique insight into the experiences of frontline health workers with research that could form a basis for further questions. The low response rate is evidence of the problem of overstretched facilities with research requests compounding overstretched staff. Respondents may have been those who are more research experienced or who value research, so the positivity reflected in the results may overestimate the sentiment of the province as a whole. As a result of a low response rate, the review of data on sampled facilities from the National Health Research database (NHRD) was subsequently included as a source of reference

Conclusion and recommendations

The results of this research provide a preliminary insight into the perspectives from frontline health care providers on their experience with health research in a specific context. Findings suggest that where there are coordinated mechanisms for conducting research, the burden of research becomes less on the services. The process could become an enriching experience for all stakeholders involved, and consequently, facilitate knowledge translation (KT). The complex nature of conducting research and translating information gathered from health research into practice not only requires an understanding of how the health research system in the province operates: from the funding, approval of research, the feedback mechanisms used, and translation of the research findings into usable information. Additionally, the motivations, values, interests, internal and external influences of the actors driving these processes must be appreciated to understand the overall system functioning.

Frontline health providers in primary care settings can host research in their health facilities. They acknowledged that although there may be formal processes to gain access, ultimately, the gatekeepers in health facilities have the discretion to welcome researchers or not. Hence, it is important that frontline health care providers are provided opportunities to be capacitated to lead or initiate research efforts. Most respondents expressed an interest in research to be offered as part of their professional development. Literature on building frontline health care providers' capacity for research in LMICs is limited, yet evidence from research has shown that engaging them may be beneficial for operational research, evidence-based service delivery and policy guidelines [11,33,48]. This capacity is best incorporated during training nursing education and in medical school as part of the curriculum. because this is a skill that requires time- which is

The NHRD has created a comprehensive platform to coordinate research activities in the province. It is also central to how research activities are regulated, and how much research is accommodated in the health facility at each point in time. It is recommended that further resources be put towards building capacity in the NHRD, and perhaps to introduce a mechanism that tracks if feedback was successfully and timeously provided as planned.

This research supports important to involve broader recommendation being made in public health and health policy and systems research, that stakeholders should be involved in research at all stages [56,63–65]. That is, relevant stakeholders should be involved in a consultative process – how to enrich the research experience in the health facilities, rather than an instructive approach. Further research could replicate this present study on a much larger and representative sample to test this approach and conduct other less rapid research methodologies to capture the perspectives of those who usually ‘refuse’ research engagement.

Gatekeepers are stakeholders who are central to both the production and use of research knowledge, and as feedback was highlighted as an enabler of research involvement by health care providers on the frontline. There is a need to tailor feedback to the intended audience. This can be done by not being too prescriptive about the types of feedback can be used, while also encouraging the use of less conventional feedback types like audio-visuals, infographic videos Further studies should also explore the effectiveness of tailoring mechanisms for communicating research findings according to the needs and preferences of different audiences.

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Appendices

Appendix I: Sampled facility research volume as per number of proposals submitted between 2015 and 2016

URBAN			RURAL		
Facility Name	Number of proposals submitted		***Facility Name***	Number of proposals submitted	
	2015	2016		2015	2016
Hospitals			***Hospitals***		
Karl Bremer	17	23	Swartland	2	5
DP Marais (TB)	5	7	Hermanus	9	8
Saturated			***Saturated***		
Mitchells Plain CHC	19	21	De Doorns Clinic	6	11
Delft CHC	17	21	Worcester CDC	7	15
Kraaifontein CHC	13	19			
Retreat CHC	12	13			
Medium Saturation			***Medium Saturation***		
Greenpoint CDC	9	7	Ceres CDC	5	9
Woodstock CDC	11	8	Breerivier Clinic	3	8
Belville South CDC	6	9			
Mfuleni CDC	9	8			
Low Saturation			***Low Saturation***		
Hout Bay harbour CDC	6	8	Wellington CDC	3	5
Kensington CDC	3	5			
Du noon CDC	6	7			

Appendix II: Quantitative Survey Questionnaire

We appreciate you taking time to complete this survey. You have been identified to participate because of the position you hold as a healthcare provider in your health facility, who deals with and manages health research activities. By research activities, we mean duties related with research being hosted at your facility. We ask that you please take some time to read through the following questions and answer to the best of your knowledge.

Facility Name:

1. **First it would be helpful to know something about you**:

a. What is your position in the health facility: (tick as many as apply)

Facility manager	Senior doctor	Senior nurse	Administrator	Other: ID

b. What is the highest professional qualification you have obtained?

PhD	Master	Post-grad diploma	MBChB	Bachelors	Post-matric diploma	Post-matric certificate	Matric	Other

If other, please specify in the space below

c. How long have you been working in the facility?

d. Have you conducted research in your studies?

Yes	No

Please elaborate

e. Are you involved with accommodating/ hosting researchers in your facility?

Yes	No

Please elaborate

f. Have you attended a provincial research day?

Never miss these	Yes, more than 3	Yes, twice	Yes, once	never

g. Have you attended other district or sub-structure research days?

Yes, more than 3	Yes, twice	Yes, once	never

h. Have you ever seen and read a Provincial Research Newsletter?

Never heard of them	Heard of them but never seen one	Heard of them, seen one but not read it	Read one and it was interesting	Read one but it was not interesting	Read a few because they were interesting

2. We would appreciate you giving feedback about your experience of research that is conducted in your facility:

a. How frequently do you have to accommodate research activities in your facility?

Never	Sometimes	Often	Always

b. What kind of research is conducted in your facility? (tick all that apply)

Clinical research with patients	Patient surveys	Qualitative research with patients	Staff surveys	Qualitative research with staff

Give an example of each

c. Do researchers provide additional resources required to carry out their research projects in facilities?

Never	Sometimes	Often	Always
Please elaborate			

3. a. Are research objectives and aims usually communicated to you by those conducting the research?

Never	Sometimes	Often	Always
Please elaborate			

b. Do you feel that researchers take time to explain their research projects to facility staff?

Never	Sometimes	Often	Always
Please elaborate			

4. Do you receive feedback of results/findings after research has been completed?

Never	Sometimes	Often	Always

Please elaborate

5. The relationship you have with researchers benefits both of you equally.

Agree	Neutral	Disagree

6. Do you feel that your facility can turn down the request to be involved in research activities?

Never	Sometimes	Often	Always

7. Do you feel that you are given an option to turn down the request to be involved in research activities?

Never	Sometimes	Often	Always
Please elaborate (?)			

8. In your opinion, in general, how important is research to the work delivered by the department of health?

Never	Sometimes	Often	Always
Please elaborate:			

9. In your opinion, how relevant is the research that is conducted in your facility to the health issues faced by your patients?

Never	Sometimes	Often	Always
Please elaborate:			

10. In your opinion, how relevant is research to the service that is provided by your facility?

Never	Sometimes	Often	Always
Please elaborate:			

11. In your opinion what could be done to make research conducted in department of health's facilities more relevant to the health needs of the population served?

a. Researchers should be in contact regularly with managers who run the services to discuss possible research projects

Yes	No	No Opinion

b. Service staff need to have longer term relationships with researchers in order to develop research together

Yes	No	No Opinion

c. Service managers need to decide on research priorities

Yes	No	No Opinion

d. Staff should be encouraged to do their own research by going on courses that have a research project as part of the work

Yes	No	No Opinion

e. Staff could do research in their facilities that is relevant to their work if it was part of their Key Results Areas (KRAs)

Yes	No	No Opinion

f. Research priorities should be sent to academic institutions to encourage researchers and students to work on priorities

Yes	No	No Opinion

g. The department should fund research that it seems to be a priority.

Yes	No	No Opinion

12. How could the system be improved?

a. Accessing facilities to conduct research:

i. Researchers should consult service people before developing research proposals:

Yes	No	No Opinion

ii. Researchers should consult the hospital /substructure/district managers to see if research is feasible at the facility before applying for permission to do research:

Yes	No	No Opinion

iii. Researchers should consult facility staff to see if research is feasible before applying for permission to do research there:

Yes	No	No Opinion

iv. The hospital/substructure/district office should decide whether research can be conducted at my facility as they have a handle on what research is being done in the hospital /district/sub-structure:

Yes	No	No Opinion

v. The hospital /substructure/district office must consult our facility manager about any research proposed at my facility:

Yes	No	No Opinion

vi. Other: Explain below

b. The way researchers should conduct themselves in facilities

i. Researchers should contact the hospital/district/sub-structure research co-ordinator to discuss the research and when they could start in advance of their start date:

Yes	No	No Opinion

ii. Researchers should contact the facility manager to discuss the research and when they could start in advance of their start date:

Yes	No	No Opinion

iii. Researchers should present an overview of the research to a staff meeting:

Yes	No	No Opinion

iv. Researchers need to better plan to fit in with our services for space and times:

Yes	No	No Opinion

v. Researchers need to give back to the services by seeing patients or helping out according to their expertise:

Yes	No	No Opinion

vi. Other: Outline below

c. Research feedback is best given through: (*please tick the correct one***)**

i. oral presentations at hospital departmental/facility management meetings.

Yes	No	No Opinion

ii. oral presentations at facility staff meetings.

Yes	No	No Opinion

iii. oral presentations at hospital/district/sub-structure management meetings.

Yes	No	No Opinion

iv. oral presentations at regular hospital/district/sub-structure research days.

Yes	No	No Opinion

v. annual provincial research days.

Yes	No	No Opinion

vi. hospital/district/sub-structure research days.

Yes	No	No Opinion

vii. research newsletters containing articles.

Yes	No	No Opinion

viii. Researchers should send journal articles published about research conducted in our facility to the hospital/district/sub-structure

Yes	No	No Opinion

ix. Research finding flashes sent to staff in infographics.

Yes	No	No Opinion

x. Other: Outline below.

d. Further suggestions about feedback to the provincial level of the Department of Health

i.Written feedback should be given to the Research sub-directorate.

Yes	No	No Opinion

ii.Written feedback should be sent to the appropriate senior manager/directorate.

Yes	No	No Opinion

iii.Written feedback should be sent to the head of health directly.

Yes	No	No Opinion

iv.Oral feedback should be presented at an appropriate management meeting.

Yes	No	No Opinion

v.Oral feedback should be presented to the head of health directly.

Yes	No	No Opinion

vi.Researchers should send journal articles published to the research sub-directorate for distribution if appropriate.

Yes	No	No Opinion

vii.Other. Outline below

e. How would you suggest the department could incorporate research feedback and study findings into the work of the department? (*Please circle as many as you think)*

i. Researchers should identify relevant study findings and make recommendations in their written feedback

ii. Researchers should identify relevant study findings and make recommendations in oral feedback

iii. Researchers should be asked to write ‘research briefs’ focusing on for managers and policy makers to discuss

iv. We should have forums with researchers and service people where important research findings are discussed in our hospital/district/sub-structure

v. Senior management and the Head of Health are the only people who have the authority to make policy decisions, so feedback to them should be the priority.

vi. For research with clinical service implications, feedback suggesting for changes in guidelines should be to the appropriate senior clinicians

vii. For research with clinical service implications, feedback suggesting for changes in guidelines should be to senior managers

viii. For research with implications for the way the department functions, feedback should be given to senior managers

ix. For research with clinical service implications, feedback suggesting for changes in guidelines should be to national government as we depend on them for guidelines

x. You may have other ideas about how research findings could be incorporated into the work of the department. Please outline below

You may have other suggestions to improve the way research could be done in health facilities such as yours. Please outline below.

Thanks for your participation. We look forward to giving you feedback from this survey

Appendix III: Information sheet and consent form for qualitative interviews

INFORMATION SHEET

Title of Research Project: Health providers' experience of research activities in public sector health facilities in the Western Cape Province of South Africa

Student Researcher: Linda Ndlovu

What is the purpose of this study?

I am a Master of Public Health (MPH) student from the university of Cape Town, under the supervision of Dr Virginia Zweigenthal and Dr Jill Olivier. We are conducting a research study to explore the experiences of healthcare providers with hosting and accommodating research at public sector health facilities. It is important to keep track of the research happening within the province, and how it impacts on the day-to-day functioning of the health facilities and staff.

Background: There is much research being conducted within Provincial Health facilities in the Western which includes clinical, epidemiological, health systems ranging from post-graduate dissertations, clinical trials and government driven research. Despite this activity and opportunity for research feedback to inform policy, it has not been successfully implemented. Several reasons have been suggested for this mismatch, including inappropriate and underutilised mechanisms for feedback of research results. There is, however, not a lot of information or scientific evidence available to answer these questions and guide further action. The reason why you have been chosen to possibly participate in this study is because you are a vital stakeholder in the implementation process of the research for which the results are important. We would like to find out what your experience with research has been within the context of your workplace (health facility).

Aim of the Research: We will be conducting this research in partial fulfilment of the student's Masters mini dissertation. The aim of this study is to understand the experience of health workers in terms of the research being conducted in health facilities across the Western Cape province. The aim is to get an understanding from the perspective of health workers. We would also like to explore the capacity of health workers, the constraints and to utilise research in their day-to-day practice

You are being asked to take part in this study because your facility has been identified as having hosted and/or currently hosting research projects. The purpose of this consent process is to provide you with information to help you decide if you would like to take part in this study or not.

What happens if you agree to take part? You will be asked to take part in a semi-structured interview, where you will be asked a series of questions about your experience with research, perception of the impact of research, user-researcher relationship. The interviews will take approximately 30-45mins. Please note that there is no right or wrong answer- the intention is to share your knowledge and experience. Your contribution to this research study will be greatly appreciated. The information you share will be treated with confidentiality, that is, personal details will not be included in the transcripts, or any other written material to be circulated.

Should you decide you no longer want to be part of the study, you are entitled to withdraw at any point, even after giving consent. Participation in the study is not compulsory. Your decision not to engage will not affect your job, as far as this study is related. However, you are encouraged to take part in this research because from the findings will potentially contribute to building better systems of conducting research and feedback of results and findings.

For more information, you can contact the student researcher, or the accompanying alternative contact

Linda Ndlovu (Student Researcher)
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University of Cape Town
Faculty of Health Sciences
Public Health Medicine
Email: virginia.zweigenthal@uct.ac.za

Thank

Appendix III: INFORMED CONSENT FORM

I consent to taking part in this study and voluntarily agree to participate. I understand that my identity will be kept confidential and that I may withdraw from the study at any time and this will not have any negative consequences on me, as far as this study is related.

A Dictaphone will be used to record the interview to capture accurately all the information that will be given. The researcher will keep the source of the information confidential and refer to me by a pseudonym or invented name, erasing the audio file on completion of the study; and limiting access to the interview transcripts to co-researchers who will assist in the data analysis and thesis supervisors.

___ I agree to be **audiotaped** during my participation in this study.

___ I do not agree to be **audiotaped** during my participation in this study.

Name of Facility ………………………………………………………….

Participant's name ………………………………………………………….

Participant's signature ………………………………………………………….

Date …………………………………………………………..

Researcher's name …………………………………………………………..

Researcher's signature ………………………………………………………….

Date …………………………………………………………..

Witness's name ……………………………………………………..

Witness's signature ……………………………………………………..

Date ……………………………………………………..

Should you wish to express any concerns you have related to the ethics of this study, please contact the University of Cape Town, Faculty of Health Sciences Human Research Ethics Committee (HREC)- Email: www.health.uct.ac.za/research/humanethics/forms .Tel: +27 21 406 6492

Thank you for your cooperation

Appendix IV: Semi- structured Qualitative Interview Guide

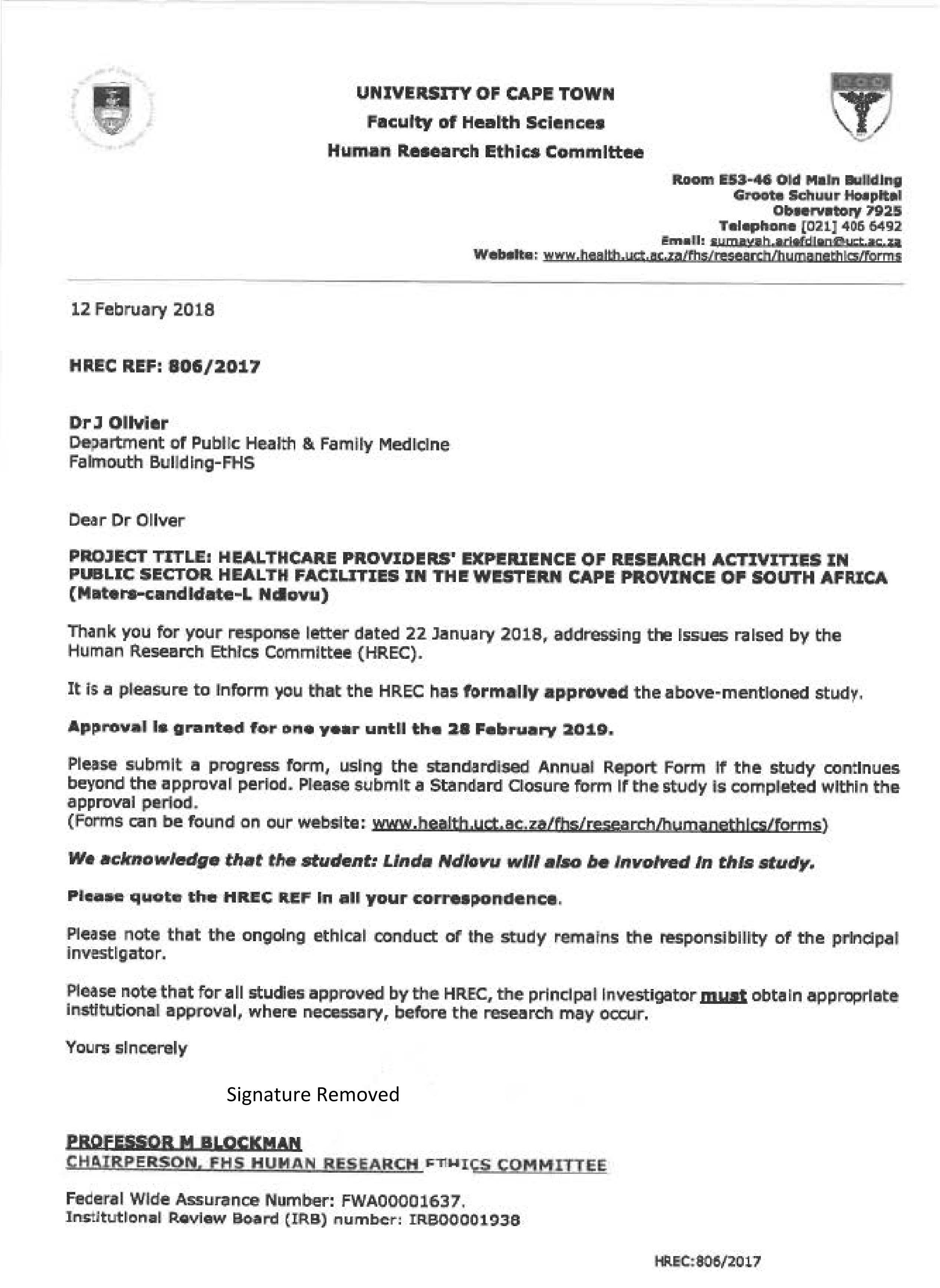
Hello, thanks for agreeing to be interviewed about research. My name is Linda.

1. First, I would like to find out a bit about you:
    a. How long have you worked at this facility?
    b. How long have you worked for the department of Health?
    c. What work do you do in the facility?
    d. Have you done research yourself before?
2. What do you think of the research that has been conducted in the facility that you have seen? (*probe*)
3. In your experience, what is the process of seeking permission for research work from the facility's perspective?
4. In your experience, what is the process of seeking permission for research work from the researchers' perspective?
5. What impact does research projects hosted in the facility have in terms of resources?
    - time,
    - workload,
    - medical supplies
6. Do you usually get feedback of research findings from researchers?
7. Does the way research findings are presented work for you?
8. In your experience, are results and recommendations from research useful?
9. In your opinion, what would enable research findings to be 'translated' into policy or the way the services run and what the service package is?
10. Do you have any recommendations on how health practitioner-researcher relationships can be improved to enrich the research process in your facility, or others in general?
11. Based on your experience, do you think there is enough support for health workers to build capacity in doing research? What opportunities exist in this regard?

Many thanks

Cover Page

Appendix V: UCT Human Research Ethics Committee (HREC) Approval Letter



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6492
Email: sumayah.ariefdien@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics/forms

12 February 2018

HREC REF: 806/2017

Dr J Olivier
Department of Public Health & Family Medicine
Falmouth Building-FHS

Dear Dr Oliver

PROJECT TITLE: HEALTHCARE PROVIDERS' EXPERIENCE OF RESEARCH ACTIVITIES IN PUBLIC SECTOR HEALTH FACILITIES IN THE WESTERN CAPE PROVINCE OF SOUTH AFRICA (Maters-candidate-L Ndlovu)

Thank you for your response letter dated 22 January 2018, addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 28 February 2019.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: Linda Ndlovu will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

Signature Removed

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

HREC:806/2017

Appendix VI: BMC Health Policy and Systems Journal Guidelines

https://bmchealthservres.biomedcentral.com/submission-guidelines/preparing-your-manuscript/research-article

Research

Criteria

Research articles are reports of data from original research. All research manuscripts should follow the relevant research reporting statement available from the EQUATOR network.

Health Research Policy and Systems strongly encourages that all datasets on which the conclusions of the paper rely should be available to readers. We encourage authors to ensure that their datasets are either deposited in publicly available repositories (where available and appropriate) or presented in the main manuscript or additional supporting files whenever possible. Please see Springer Nature's information on recommended repositories.

Preparing your manuscript

The information below details the section headings that you should include in your manuscript and what information should be within each section.

Please note that your manuscript must include a 'Declarations' section including all of the subheadings (please see below for more information).

Title page

The title page should:

present a title that includes, if appropriate, the study design, for example:

"A versus B in the treatment of C: a randomized controlled trial", "X is a risk factor for Y: a case control study", "What is the impact of factor X on subject Y: A systematic review", or for non-clinical or non-research studies a description of what the article reports

list the full names and institutional addresses for all authors

If a collaboration group should be listed as an author, please list the Group name as an author. If you would like the names of the individual members of the Group to be searchable through their individual PubMed records, please include this information in the "Acknowledgements" section in accordance with the instructions below

indicate the corresponding author

Abstract

The Abstract should not exceed 350 words. Please minimize the use of abbreviations and do not cite references in the abstract. Reports of randomized controlled trials should follow the CONSORT extension for abstracts. The abstract must include the following separate sections:

Background: the context and purpose of the study

Methods: how the study was performed, and statistical tests used

Results: the main findings

Conclusions: brief summary and potential implications

Trial registration: If your article reports the results of a health care intervention on human participants, it must be registered in an appropriate registry and the registration number and date of registration should be in stated in this section. If it was not registered prospectively (before enrollment of the first participant), you should include the words 'retrospectively registered'. See our editorial policies for more information on trial registration

Keywords

Three to ten keywords representing the main content of the article.

Background

The Background section should explain the background to the study, its aims, a summary of the existing literature and why this study was necessary or its contribution to the field.

Methods

The methods section should include:

the aim, design and setting of the study

the characteristics of participants or description of materials

a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses

the type of statistical analysis used, including a power calculation if appropriate

Results

This should include the findings of the study including, if appropriate, results of statistical analysis which must be included either in the text or as tables and figures.

Discussion

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study.

Conclusions

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported.

List of abbreviations

If abbreviations are used in the text, they should be defined in the text at first use, and a list of abbreviations should be provided.

Declarations

All manuscripts must contain the following sections under the heading 'Declarations':

Ethics approval and consent to participate

Consent for publication

Availability of data and material

Competing interests

Funding

Authors' contributions

Acknowledgements

Authors' information (optional)

Please see below for details on the information to be included in these sections.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

Ethics approval and consent to participate

Manuscripts reporting studies involving human participants, human data or human tissue must:

include a statement on ethics approval and consent (even where the need for approval was waived)

include the name of the ethics committee that approved the study and the committee's reference number if appropriate

Studies involving animals must include a statement on ethics approval.

See our editorial policies for more information.

If your manuscript does not report on or involve the use of any animal or human data or tissue, please state "Not applicable" in this section.

Consent for publication

If your manuscript contains any individual person's data in any form (including any individual details, images or videos), consent for publication must be obtained from that person, or in the case of children, their parent or legal guardian. All presentations of case reports must have consent for publication.

You can use your institutional consent form or our consent form if you prefer. You should not send the form to us on submission, but we may request to see a copy at any stage (including after publication).

See our editorial policies for more information on consent for publication.

If your manuscript does not contain data from any individual person, please state "Not applicable" in this section.

Availability of data and materials

All manuscripts must include an 'Availability of data and materials' statement. Data availability statements should include information on where data supporting the results reported in the article can be found including, where applicable, hyperlinks to publicly archived datasets analysed or generated during the study. By data we mean the minimal dataset that would be necessary to interpret, replicate and build upon the findings reported in the article. We recognise it is not always possible to share research data publicly, for instance when individual privacy could be compromised, and in such instances data availability should still be stated in the manuscript along with any conditions for access.

Data availability statements can take one of the following forms (or a combination of more than one if required for multiple datasets):

The datasets generated and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS]

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

All data generated or analysed during this study are included in this published article [and its supplementary information files].

The datasets generated and/or analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

The data that support the findings of this study are available from [third party name] but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of [third party name].

Not applicable. If your manuscript does not contain any data, please state 'Not applicable' in this section.

More examples of template data availability statements, which include examples of openly available and restricted access datasets, are available here.

BioMed Central also requires that authors cite any publicly available data on which the conclusions of the paper rely in the manuscript. Data citations should include a persistent identifier (such as a DOI) and should ideally be included in the reference list. Citations of datasets, when they appear in the reference list, should include the minimum information recommended by DataCite and follow journal style. Dataset identifiers including DOIs should be expressed as full URLs.

For example:

Hao Z, AghaKouchak A, Nakhjiri N, Farahmand A. Global integrated drought monitoring and prediction system (GIDMaPS) data sets. figshare. 2014. http://dx.doi.org/10.6084/m9.figshare.853801

With the corresponding text in the Availability of data and materials statement:

The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS]. [Reference number]

Competing interests

All financial and non-financial competing interests must be declared in this section.

See our editorial policies for a full explanation of competing interests. If you are unsure whether you or any of your co-authors have a competing interest, please contact the editorial office.

Please use the authors initials to refer to each authors' competing interests in this section.

If you do not have any competing interests, please state "The authors declare that they have no competing interests" in this section.

Funding

All sources of funding for the research reported should be declared. The role of the funding body in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript should be declared.

Authors' contributions

The individual contributions of authors to the manuscript should be specified in this section. Guidance and criteria for authorship can be found in our editorial policies.

Please use initials to refer to each author's contribution in this section, for example: "FC analyzed and interpreted the patient data regarding the hematological disease and the transplant. RH performed the histological examination of the kidney and was a major contributor in writing the manuscript. All authors read and approved the final manuscript."

Acknowledgements

Please acknowledge anyone who contributed towards the article who does not meet the criteria for authorship including anyone who provided professional writing services or materials.

Authors should obtain permission to acknowledge from all those mentioned in the Acknowledgements section.

See our editorial policies for a full explanation of acknowledgements and authorship criteria.

If you do not have anyone to acknowledge, please write "Not applicable" in this section.

Group authorship (for manuscripts involving a collaboration group): if you would like the names of the individual members of a collaboration Group to be searchable through their individual PubMed records, please ensure that the title of the collaboration Group is included on the title page and in the submission system and also include collaborating author names as the last paragraph of the “Acknowledgements” section. Please add authors in the format First Name, Middle initial(s) (optional), Last Name. You can add institution or country information for each author if you wish, but this should be consistent across all authors.

Please note that individual names may not be present in the PubMed record at the time a published article is initially included in PubMed as it takes PubMed additional time to code this information.

Authors' information

This section is optional.

You may choose to use this section to include any relevant information about the author(s) that may aid the reader's interpretation of the article and understand the standpoint of the author(s). This may include details about the authors' qualifications, current positions they hold at institutions or societies, or any other relevant background information. Please refer to authors using their initials. Note this section should not be used to describe any competing interests.

Endnotes

Endnotes should be designated within the text using a superscript lowercase letter and all notes (along with their corresponding letter) should be included in the Endnotes section. Please format this section in a paragraph rather than a list.

References

Examples of the Vancouver reference style are shown below.

See our editorial policies for author guidance on good citation practice

Web links and URLs: All web links and URLs, including links to the authors' own websites, should be given a reference number and included in the reference list rather than within the text of the manuscript. They should be provided in full, including both the title of the site and the URL, as well as the date the site was accessed, in the following format: The Mouse Tumor Biology Database. http://tumor.informatics.jax.org/mtbwi/index.do. Accessed 20 May 2013. If an author or group of authors can clearly be associated with a web link, such as for weblogs, then they should be included in the reference.

Example reference style:

Article within a journal

Smith JJ. The world of science. Am J Sci. 1999; 36:234-5.

Article within a journal (no page numbers)

Rohrmann S, Overvad K, Bueno-de-Mesquita HB, Jakobsen MU, Egeberg R, Tjønneland A, et al. Meat consumption and mortality - results from the European Perspective Investigation into Cancer and Nutrition. BMC Medicine. 2013; 11:63.

Article within a journal by DOI

Slifka MK, Whitton JL. Clinical implications of dysregulated cytokine production. Dig J Mol Med. 2000; doi:10.1007/s801090000086.

Article within a journal supplement

Frumin AM, Nussbaum J, Esposito M. Functional asplenia: demonstration of splenic activity by bone marrow scan. Blood 1979;59 Suppl 1:26-32.

Book chapter, or an article within a book

Wyllie AH, Kerr JFR, Currie AR. Cell death: the significance of apoptosis. In: Bourne GH, Danielli JF, Jeon KW, editors. International review of cytology. London: Academic; 1980. p. 251-306.

OnlineFirst chapter in a series (without a volume designation but with a DOI)

Saito Y, Hyuga H. Rate equation approaches to amplification of enantiomeric excess and chiral symmetry breaking. Top Curr Chem. 2007. doi:10.1007/128_2006_108.

Complete book, authored

Blenkinsopp A, Paxton P. Symptoms in the pharmacy: a guide to the management of common illness. 3rd ed. Oxford: Blackwell Science; 1998.

Online document

Doe J. Title of subordinate document. In: The dictionary of substances and their effects. Royal Society of Chemistry. 1999. http://www.rsc.org/dose/title of subordinate document. Accessed 15 Jan 1999.

Online database

Healthwise Knowledgebase. US Pharmacopeia, Rockville. 1998. http://www.healthwise.org. Accessed 21 Sept 1998.

Supplementary material/private homepage

Doe J. Title of supplementary material. 2000. http://www.privatehomepage.com. Accessed 22 Feb 2000.

University site

Doe, J: Title of preprint. http://www.uni-heidelberg.de/mydata.html (1999). Accessed 25 Dec 1999.

FTP site

Doe, J: Trivial HTTP, RFC2169. ftp://ftp.isi.edu/in-notes/rfc2169.txt (1999). Accessed 12 Nov 1999.

Organization site

ISSN International Centre: The ISSN register. http://www.issn.org (2006). Accessed 20 Feb 2007.

Dataset with persistent identifier

Zheng L-Y, Guo X-S, He B, Sun L-J, Peng Y, Dong S-S, et al. Genome data from sweet and grain sorghum (Sorghum bicolor). GigaScience Database. 2011. http://dx.doi.org/10.5524/100012.

Figures, tables and additional files

See General formatting guidelines for information on how to format figures, tables and additional files.

Submit manuscript

Appendix VII: Revised Study Timeline

PERIOD → **PHASE ↓**	DEC **2017**	FEB-MAR **2018**	**APR**	**MAY-JUL**	**AUG-SEP**	**OCT DEC**	**JAN 2019**	**FEB-APR**	**MAY-JUL**	**AUG-DEC**	**FEB 2020**
Protocol submission to ethics	🟩										
Ethics approval		🟩									
NHRD Application		🟩									
Access Approval process		🟩	🟩	🟩							
Literature review			🟩	🟩	🟩	🟩	🟩				
Participant recruitment				🟩	🟩	🟩	🟩				
Data collection (survey + interviews)					🟩	🟩	🟩				
Data analysis								🟩	🟩		
Write-up							🟩	🟩	🟩	🟩	
Thesis Submission											🟩
Results feedback											🟩