Research article

Barriers and facilitators of translating doctoral research findings into policy: The case of a selected health sciences school in a South African university

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ABSTRACT

Background: Although the barriers and facilitators of translating health research into policy are generally well documented, not much has been reported for universities in low-and middle-income countries. We identified and analyzed barriers and facilitators of translating doctoral research findings into policy in a selected health sciences school in a South African university.
Methods: The study adopted a quantitative descriptive research design. We conveniently collected data through an online questionnaire administered to 47 PhD graduates, 11 PhD final year students and 21 PhD supervisors of the School of Nursing and Public Health. Descriptive statistics was performed, and data were summarized using percentages.
Results: More than half (72.4 %) of the students reported not involving Department of Health during formulation of research questions for their projects and 62.1 % reported not directly sharing research findings with the Department of Health. 53.4 % of the students indicated that they attended Department of Health research days and only 39.7 % said they presented research findings at the meetings. Only 39.7 % of the students who shared their research results to the Department of Health received feedback. About 52.4 % of the academic supervisors believed the introduction of the quartile system as a measure of impact of publications may reduce policy impact. An individual PhD supervisor supervises an average of 6 PhD students at any given time. 85.7 % of PhD supervisors reported that they consider stakeholders needs/interests when assisting students to identify research topics.
Conclusion: The study revealed the need for universities to make policymakers aware of available evidence, conduct research that is informed by the Department of Health's research agenda, involve the Department of Health in identifying research projects, and disseminate findings using platforms accessible to policymakers. Other key considerations are political will to utilize evidence, packaging evidence in a user-friendly manner and building the capacity of policymakers to use evidence.

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1. Introduction

Health research is conducted with the expectation that it advances knowledge and eventually translates into improved health systems and population health. This is increasingly being recognized by policymakers and researchers worldwide [1]. However, research findings are often caught in the know-do gap; they are not acted upon in a timely way or not applied at all [2]. The failure to translate research findings into action is therefore a major societal issue and contributes to an estimated $200 Billion (USD) of wasted research funding because the full potential of research was not realized [3].

In the last decade, there was an unprecedented global interest in the promotion of the use of research evidence to inform policymaking in the health sector [4]. This interest was triggered by the 2005 Fifty-eighth World Health Assembly Resolution (WHA58.34 Ministerial Summit on Health Research) where it was acknowledged that high quality research and the generation and application of knowledge are critical for achieving the internationally agreed health related goals contained in the United Nations Millennium Development Goals (MDGs) and especially in low- and middle-income countries (LMICs) [4]. It is therefore necessary for institutions of higher learning to produce research that bridges the information gaps to advance social services in society, including better-informed healthcare [5].

Despite a plethora of public health research generated by doctoral students, the process of translating doctoral research into health policy remains slow, haphazard, and unpredictable [6]. Translation of doctoral research results into health policy can be influenced by barriers and facilitators. Barriers to translation or utilization are the constraints or negative influencers that hinder translation of research findings into policy [7]. Facilitators of translation are the enablers or positive influencers that promote the translation of research into policy [7]. The gap between research and policy is still very wide and could be related to a wide range of challenges that can be grouped into organizations and resources, contact and collaboration, research and researcher, policy and policymaker, and government barriers [8]. The facilitators can also be grouped under the same categories as the barriers. Organizations and resources barriers and facilitators are factors associated with key characteristics of an organization and its management and the organizational resources. They are also referred to as systemic or institutional barriers and facilitators. Organizations and resources barriers include inadequate capacity of organizations to conduct policy-relevant research [4], inability to produce and disseminate highly relevant products [9], and poor planning for policy change [10]. Organizations and resources facilitators include increased capacity for evidence use [11] and appropriate packaging of research findings [12]. Contact and collaboration barriers and facilitators are concerned with exchanges between researchers and policymakers. Contact and collaboration barriers include lack of collaboration and networking between researchers and policymakers [13], lack of interaction fora between researchers and policymakers [4], and the disintegration between researchers and policymakers [14]. Diverse stakeholder engagement [15] and collaboration between researchers and policymakers [13,16] are examples of contact and collaboration facilitators. Research and researcher barriers and facilitators are factors related to research itself and the researchers, for example, lack of high-quality useable evidence [17], poor packaging of research findings [18], and lack of skills to conduct knowledge translation (KT) [15].

Improved data quality [17] and a research issue that generates interest in both the researchers and policymakers [19] are facilitators at the research and researcher level. Policy and policymaker barriers and facilitators are the factors affecting policy itself and the policymakers. Policy and policymaker barriers include policymakers' lack of time to find and read research articles [13,18], and poor demand and support for research evidence [20]. Policy and policymaker facilitators include willingness to enhance skills in evidence-informed decision-making [16] and an interested and informed group of policymakers [19]. Government barriers and facilitators are factors affecting the government. Limited funding for research [11] and political interference [20] are examples of government barriers. Political will [13] and improved funding for research [16] are the government facilitators.

In designing this study, Carol Weiss' ideas about what it means for policymakers to use research were considered [21]. Carol Weiss's 7 models on the importance of research use show some of the barriers and facilitators to the use of research by policymakers. The first model, called the knowledge-based model, suggests that knowledge is available for use [21]; how it reaches the user depends on improving how the research is communicated. The second model is called the problem-solving model. It focuses on understanding the problem and doing research to find a solution. The goal is to gather missing information and make smart choices. The third model, according to Wiess, is the "interactive model" [21]. In this model, researchers work together with different people involved in a problem to understand and solve it. In the fourth model, called the political model, politicians use research to support their claims and sometimes change the results to suit their own views. The fifth model, called the tactical model, allows agencies to use research to avoid criticism [21]. They partner with well-known researchers and academics to make the agency seem more important, so they can justify their findings. Weiss' sixth model, the enlightenment model suggests that social research informs policy through education and influencing public thinking about social issues [21]. In the final model, called "Research as part of the intellectual enterprise of society", the use of research is considered as a dependent variable that is intertwined with politics, philosophy, journalism, history, law and criticism and affects the intellectual activity of society [21].

Looking at the 7 models of Weiss, we recognise how policymakers influence the way in which research is used. All models seem to impact the extent to which research will be used, presenting various forms of barriers and facilitators along the way. The political model, the problem-solving model, and the tactical model indicate how policymakers can commission research to suit their needs. Whether it is a known problem that needs to be solved, or it's a policy that needs to be backed by science, all situations involve policymakers taking the initiative. Other models suggest that researchers should make the initiative to push research findings, directly or indirectly. Model 1 suggests that research needs to be done with the goal of informing, while model 6 and 7 both suggest that research needs to be done to provide a source or pool of resources that can be referred to when the need arises. Our study views these models as starting points in articulating the problem of translating research into policy and we explore the barriers and facilitators of research utilization by policymakers.

Numerous studies have explored the barriers and facilitators of translating health research into policy [22]. Malama et al. explored the perspectives of policymakers and researchers towards the process of health research KT into policy and identified limited resources, limited space for dialogue, continued policy-researcher divide, and lack of coordinated knowledge hubs as key obstacles to the process of health research KT into policy in Zambia [23]. Kalbarczyk et al. described needs and barriers in KT specific to academic institutions in LMICs and noted a lack of knowledge about what KT is and how to do it, limited resources (e.g. time and funding), and institutional resources (e.g. staffing and infrastructure) for KT, and the need for buy-in from members of the leadership as the barriers to conducting KT activities [15].

Despite these important findings, no studies have addressed the barriers and facilitators of translating doctoral research findings into health policy. Therefore, the current study aimed to comprehensively provide an overview of the barriers and facilitators of translating doctoral research findings into health policy. The rest of the paper is organized as follows: In section 2 the research methodology is provided. Section 3 reports on the results of the barriers and facilitators of translating doctoral research into policy. Finally, section 4 contains a detailed discussion, followed by the study strengths and limitations and the conclusion.

2. Methods

2.1. Study area

The study was conducted in KwaZulu-Natal province and data was collected at a selected health sciences school in a South African university. The school is comprised of 9 disciplines: Behavioral Medicine, Biostatistics & Bioethics and Medical Law, Family Medicine, Nursing, Public Health Medicine, Rural Health, Telemedicine, Traditional Medicine, and Occupational and Environmental Health. The school has an average enrolment of 44 PhD students per year and graduates on average 32 PhD students per year. The school has an average of 54 PhD supervisors at any time. The school works closely with the KwaZulu-Natal Department of Health (KZN-DOH) to provide skilled staff and carry out relevant research. The study area was purposively selected as it is the largest university with a College of Health Sciences in KZN. The study focused on translation of health doctoral research findings into health-related policies. The largest pool of health doctoral students was at the selected university.

3. Study design

The study adopted a descriptive study design using quantitative methods. A questionnaire was administered online to PhD graduates, PhD final year students and PhD supervisors.

3.1. Study population and sampling

The researchers conveniently invited PhD graduates, PhD final year students and PhD supervisors through email to participate in the study. Participation was voluntary. The total number of respondents was 79 consisting of 47 PhD graduates, 11 PhD final year students and 21 PhD supervisors yielding an overall response rate of 42 %. Due to Covid-19 it was very difficult to contact PhD final year students as it was not clear whether they had continued with their studies or not.

4. Data collection methods

Before commencement of data collection, ethical clearance, gatekeeper permission from relevant authorities and informed consent were obtained. Data was collected from October 2020 to July 2021. Quantitative data was collected through a questionnaire using KoboCollect software (Cambridge, MA, USA). Prior to administering the questionnaires, a pilot study involving PhD graduates, final year students and supervisors was conducted to ensure validity of the tool. The pilot was conducted to improve precision, reliability, validity of data, identify problems/omissions and assess time spent to complete the survey. All participants of the pilot study were excluded from the actual study. One questionnaire which took 40 min to complete was administered to PhD graduates and PhD final year students. The other one was administered to PhD supervisors, and it took an hour to complete.

4.1. Analysis of quantitative data

Data from questionnaires were cleaned and exported to Microsoft Excel Computer Package. Quantitative data were analyzed using IBM- SPSS version 27. Descriptive analysis, mainly frequencies were performed on all the data and a summary of the data by percentages was generated. Data were presented in tables. The study sought to identify barriers and facilitators of research translation. The barriers and facilitators emerged from responses to questions that directly solicited for the information. However, others were indicated in responses to questions that did not directly ask respondents to provide that information.

4.2. Ethical considerations

The study was approved by the Biomedical Research Ethics Committee (reference number BREC/00001384/2020) and the Kwa-Zulu-Natal Provincial Department of Health (reference number KZ_202008_030). All research was performed in accordance with the ethical standards of the institutional research committee applicable when human participants are involved. Written informed consent

was obtained from all participants in the study.

5. Results

5.1. Sociodemographic characteristics of participants

The mean age of respondents was 35–44 years. Most of the respondents (75.9 %; n = 44) were full time students, while (24.1 %; n = 14) were part-time students. The minimum duration of PhD studies was 2 years, while the maximum was 9 years, with a mean of 3.6 years. The largest proportion of the respondents were PhD graduates (81 %; n = 44), with PhD final year students representing only 19 % (n = 11). More than half of the respondents 58.6 % (n = 34) were in Public Health Medicine, while 32.8 % (n = 19) were in Nursing discipline, 5.2 % (n = 3) were in Traditional Medicine and 1.7 % (n = 1) were in Rural Health and Occupational and Environmental Health respectively. The sociodemographic characteristics of the PhD graduates and PhD final year students are given in Table 1.

The job title of less than half of the sample 33.3 % were Professors and lecturers respectively, while 14.3 % were Heads of Discipline, 9.5 % was Postgraduate Programme Coordinators and 4.8 %; n = 1 were family physician and academic leader respectively. 28.6 % were in the Public Health Medicine discipline while 23.8 % were in the nursing discipline, 14.3 % were in the family and traditional medicine disciplines respectively, 9.5 % were in the occupational and environmental health disciplines and 4.8 % were in the behavioral health and rural health disciplines respectively. 100 % of the respondents had PhD. More than half the sample (52.4 %; n = 11) have been PhD supervisors for 2–8 years, while (28.6 %; n = 6) have supervised PhDs for 12–15 years, and (19.0 %; n = 4) have supervised PhD students for 20–27 years. Most of the respondents (71.4 %; n = 15) have supervised 1–8 students PhD students to graduation in the period 2014–2021, while (28.6 %; n = 6) have 10–20 PhD students to graduation in the period 2014–2021. More than half of the respondents 12 (57.1 %) were supervising between 3 and 5 students at the time of the study, 6 (28.6 %) were supervising between 6 and 9 students, while 3 (14.3 %) had between 10 and 14 students under their supervision. The mean number of students supervised to graduation in the period 2014 to 2021 by 21 supervisors was 6.15 (5.3 standard deviation). The mean number of students supervised by 21 supervisors at the time of the study was 5.86 (3.1 standard deviation). Table 2 shows the sociodemographic characteristics of PhD supervisors who participated in the study.

5.2. Barriers to translation of doctoral research findings into policy

Responding to the question regarding what academic supervisors thought contributes to students' selection of research topics that are not aligned to Department of Health (DOH) needs 17(81 %) academic supervisors said students who are registered to PhD programmes are not sure of what they want to do; 8 (38.1 %) indicated that it is because of poor educational background; 8 (38.1 %) said it is because of poor guidance from academic supervisors; 7 (33.3 %) academic supervisors said it is due to limited funding; 1 (4.8 %)

Table 1
Sociodemographic characteristics of PhD graduates & Final year students.

Sociodemographic variables	Attributes	n (%)
Age	25–34	10 (17.2)
	35–44	25 (43.1)
	45–54	11 (19.0)
	55+	12 (20.7)
Mode of attendance	Part-time	14 (24.1)
	Full- time	44 (75.9)
Status of student	PhD graduate	47 (81.0)
	PhD Final Year student	11 (19.0)
Duration of PhD studies	2 years	8 (13.8)
	3 years	24 (41.4)
	4 years	14 (24.1)
	5 years	9 (15.5)
	6 years	2 (3.4)
	9 years	1 (1,7)
Discipline	Nursing	19 (32.8)
	Public Health Medicine	34 (58.6)
	Rural Health	1 (1.7)
	Traditional Medicine	3 (5.2)
	Occupational & Environmental Health	1 (1.7)
Country of Origin	Botswana	2 (3.4)
	Kenya	2 (3.4)
	Ghana	2 (3.4)
	Malawi	1 (1.7)
	Nigeria	8 (13.8)
	Rwanda	3 (5.2)
	South Africa	23 (39.7)
	Zambia	1 (1.7)
	Zimbabwe	16 (27.6)

Table 2
Sociodemographic characteristics of PhD supervisors.

Sociodemographic variables	Attributes	N (%)
Job title	Lecturer	7 (33.3)
	Professor	7 (33.3)
	Family Physician	1 (4.8)
	Postgraduate Programme Coordinator	2 (9.5)
	Head of Discipline	3 (14.3)
	Academic Leader	1 (4.8)
Discipline	Nursing	5 (23.8)
	Public Health Medicine	6 (28.6)
	Family Medicine	3 (14.3)
	Traditional Medicine	3 (14.3)
	Behavioural Medicine	1 (4.8)
	Occupational & Environmental Health	2 (9.5)
	Rural Health	1 (4.8)
Highest level of education	PhD	21 (100)
No of years as PhD supervisor	2–8 years	11 (52.4)
	12–15 years	6 (28.6)
	20–27 years	4 (19.0)
No of PhD students supervised to graduation in the period 2014–2021	1-8 students	15 (71.4)
	10- 20 students	6 (28.6)
No of PhD students currently being supervised	3–5	12 (57.1)
	6–9	6 (28.6)
	10–14	3 (14.3)

academic supervisor said it was because students were allocated to academic supervisors without considering the academic supervisors' areas of specialization, 1 (4.8 %) academic supervisor said students do not read adequately around a topic; and 1 (4.8 %) said students consider career prospects and that creates challenges in finalizing a research topic. Regarding students' formulation of research questions, most of the respondents 42 (72.4 %) said they did not involve DOH during formulation of research questions for their projects while 16 (27.6 %) said they consulted DOH. More than half of the respondents 36 (62.1 %) reported that they did not directly share their research findings DOH while 22 (37.9 %) said they shared. Of the 36 respondents who did not disseminate their research findings directly to DOH, 34 stated that they used the following methods: 13 (38.2 %) conference presentations; 10 (29.4 %) copies of theses; 9 (26.4 %) research reports; 6 (16.6 %) journal articles; 4 (11.7 %) presentation at DOH Research days; 2 (0.5 %) stakeholder feedback meetings; 2 (0.5 %) policy briefs; 1 (0.2 %) National Health Research Database; 1 (0.2 %) use of media such as the radio, social media platforms such as X, Facebook and WhatsApp, and storytelling; and 3 (0.8 %) students responded that their study was on-going.

PhD supervisors were asked about the methods their students used to communicate their research findings to policymakers and 17 (81 %) academic supervisors said their students communicated through peer-reviewed journal articles while 16 (76.2 %) academic supervisors said their students used stakeholder feedback meetings to communicate their research results. 5 (23.8 %) academic supervisors said their students shared their findings using policy briefs, 2 (9.5 %) academic supervisors said their students disseminated their research findings through the media such as the radio and peer reviewed journals articles, and 1 (4.8 %) academic supervisor said students used X to share research findings. PhD and final year students' questionnaire data revealed that use of media such as the radio, social media platforms such as X, Facebook and WhatsApp, and storytelling were the least used methods of dissemination with 1 (2 %) participant having used each method. DOH holds annual research days as a platform to disseminate research findings but the platform is not fully utilized.

When students were asked about attendance at DOH research days, 31 (53.4 %) indicated that they had attended DOH research days while 27 (46.6 %) had not. Only 23 (39.7 %) presented while 35 (60.3 %) attended the meeting to listen to others presenting. Of the 36 (62.1) students who shared their research findings with DOH, 23 (39.7 %) did not receive feedback while 13 (22.4 %) received feedback. 26 (44.8 %) of student respondents said they had published in South African journals whilst 32 (55.2 %) said they had published in journals outside of South Africa. 9 (42.9 %) supervisors agree that the recently introduced quartile system encouraging students to publish in Q1 journals may reduce policy impact by resulting in policy related research being published in high impact journals that may not be readily accessible to policymakers due to high costs. 8 (38.1 %) supervisors disagreed, 2 (9.5 %) supervisors strongly agreed, and 1 (4.8 %) supervisor strongly disagreed. 1 (4.8 %) supervisor did not provide a response.

Supervisors were asked about when they had last had a meeting with stakeholders and twenty supervisors responded. 7 (33.4 %) supervisors responded that they had last had a meeting with stakeholders to discuss their research or that of their students a year to five years ago. 8 (38.1 %) supervisors had only had stakeholder feedback meetings once in the past month to six months while 3 (14.3 %) supervisors had last met with stakeholders two weeks back. 2 (9.5 %) supervisors had not interacted with stakeholders to discuss their research findings. 1 (4.8 %) supervisor did not respond to the question. When supervisors were asked about the grants they had received in the past or those they currently held 13 (61.9 %) supervisors indicated that they had received grants from National Research Foundation (NRF); 2 (9.5 %) from Department of Science and Technology, 1 (4.8 %) from DOH. 5 (23.8 %) mentioned other grants such as those from Medical Research Council (MRC), Discovery and College of Health Sciences.

Supervisors were requested to select the reasons for underutilization of research findings to inform policy by policymakers and to

rank their responses. Table 1 shows ranking of reasons by the participants. Selection of research topics that do not align with DOH needs and lack of DOH influence on doctoral research done in universities were ranked highest on the list at 66.7 %. Lack of collaboration with stakeholders at conception, implementation, and execution stages of research and lack of funding were ranked second at 57.1 % and 52.3 % respectively. Ranked third were policymakers' lack of capacity to use evidence (47.6 %), selection of research topics that address externally driven agendas (42.9 %), policymakers not being aware of the availability of research evidence (33.3 %), and inadequate acknowledgement of PhD qualification by DOH (33.3 %). Different political parties having different agendas (14.3 %), limited impact of research on the political processes that drive policy (9.5 %), and lack of political will to implement research findings (4.8 %) were the lowest ranked by the participants. Table 3 shows the barriers to utilization of PhD research findings to inform policy by DOH and the order of their ranking.

To determine the research supervision load we analyzed the number of students an individual supervisor was supervising at a time. 3 (14.3 %) were supervising between 10 and 14 students at the time of the study, 6 (25.6 %) were supervising between 6 and 9 students while 12 (57.2 %) supervisors had between 2 and 5 students under their supervision. The mean number of students supervised to graduation in the period 2014 to 2021 by 20 supervisors was 6.15 (5.3 standard deviation). The mean number of students supervised by 21 supervisors at the time of the study was 5.86 (3.1 standard deviation). Table 2 shows the mean number of students supervised by an individual supervisor at any given time.

5.3. Facilitators of translation of doctoral research findings into policy

The findings highlighted four facilitators to translating doctoral research findings to policy. They included: considering stakeholder needs/interests in identification of research topics, academic supervisors' insistence on students having research questions that address the real need of society, collaboration of academic supervisors with government departments and frequent feedback of results to stakeholders. 18 (85.7 %) PhD supervisors indicated that they consider stakeholders needs/interests when identifying research topics with students while 3 (14.3 %) academic supervisors said that they did not.

More than half of the respondents strongly agreed (57.1 %; n = 12) that they insisted on students having research questions that address a real need of society, 8(38.1 %) agreed and 1 (4.8 %) supervisor strongly disagreed. 19 (90.5 %) academic supervisors in the SNPH said they frequently work with DOH; 9 (42.9 %) Department of Education; 4 (19 %) Department of Science and Technology; 2 (9.5 %) Department of Social Development; 1 (4.8 %) Department of Water and Sanitation. 4 (19 %) supervisors reported that they work closely with government departments such as KZN Department of Development, Tourism and Environmental Affairs, Council for Scientific and Industrial Research, Department of Transport, Department of Environment, Forestry and Fisheries (DEFF). 8 (38.1 %) academic supervisors indicated that they sometimes share research results with stakeholders; 4 (19 %) said they always; 4 (19 %) said they often; 3 (14.3 %) never give feedback; and 2 (9.5 %) indicated that they rarely send results to stakeholders.

6. Discussion

The study aimed to establish the barriers and facilitators to the use of doctoral research findings to inform policy. We analyzed several systematic review papers to place our findings in the context of existing evidence. One of the systematic reviews we considered analyzed interview studies with health policy decision-makers to understand their use of research evidence in policy decisions [24]. The review focused on identifying facilitators and barriers to evidence use, aiming to develop strategies for improving research utilization. They found that, the most commonly reported facilitators were personal contact, timely relevance, and the inclusion of summaries with policy recommendations [24]. The most commonly reported barriers were absence of personal contact, lack of timeliness or relevance of research, mutual mistrust and power and budget struggles [24]. Another review considered the development and testing formats for systematic reviews to optimize their use by healthcare managers and policymakers [25]. They suggested that researchers should provide tailored summaries, consider partnerships, and rigorously evaluate these strategies to enhance review relevance and uptake, ultimately enhancing the impact of systematic reviews [25].

Another study analyzed the use of evidence in WHO recommendations and found that the WHO's guidelines for developing recommendations for member states were not always followed closely, with systematic reviews and concise summaries of findings rarely

Table 3
Barriers to utilization of PhD research findings to inform policy by DOH and the order of their ranking.

Barrier	Percentage of participants	Ranking of barriers
Lack of DOH influence on doctoral research conducted in universities	66.7 %	1
Selection of topics that do not align with DOH needs	66.7 %	1
Researchers' lack of collaboration with DOH at conception, implementation, and execution stages of research	57.1 %	2
Lack of funding	52.3 %	2
Policymakers' inadequate capacity to use students' research and evidence	47.6 %	3
Selection of topics that address externally driven agendas	42.9 %	3
Policymakers not aware of research findings	33.3 %	3
Inadequate acknowledgement of PhD qualification by DOH	33.3 %	3
Different political parties having different agendas	14.3 %	4
Limited impact of research on the political processes that drive policy	9.5 %	4
Lack of political will to implement research findings	4.8 %	4

used [26]. The recommendations relied heavily on experts in specific content areas, rather than representatives of the affected population [26]. Another study that examined the facilitators to the uptake of systematic reviews and meta-analyses by health professionals [27] found that interventions can improve clinical practice by focusing on five common facilitators of uptake: systematic reviews' multiple uses for improving knowledge, research, clinical protocols and evidence-based skills; content that is current and includes benefits, harms, costs, transparent and timely content; its format with staged access and executive summary; training in use; and peer-group support [27]. We also refer to a framework that has been developed to assess country-level efforts to link research to action [28]. The framework suggests rigorous evaluation of innovative initiatives targeting specific user groups [28].

The barriers identified in this study were unique compared to those cited in other studies. However, there were similarities in the facilitators. Relevance of research questions to the knowledge users is one of the facilitators of knowledge translation [29]. The findings revealed a disconnect between the Department of Health and doctoral students in identifying and formulating research questions. More than half of the respondents (72.4 %) indicated that they did not involve DOH during formulation of research questions for their projects. This is a missed opportunity because according to the Canadian Institutes of Health Research (CIHR) knowledge translation framework, the planning phase presents the initial opportunity for knowledge translation, with researchers and consumers interacting in identifying and formulating research questions [29,30].

It is therefore imperative that stakeholders are involved in the formulation of research questions and in shaping the research project. Stakeholders are "individuals, organizations or communities who are responsible for, or affected by, the processes or outcome of a project, research or policy endeavours" [31]. These may include individuals such as representatives from the DOH, public health specialists, traditional health practitioners, nurses and midwives, patients, community health workers, community members, and health facility managers and administration staff. Involving stakeholders in identification of research questions enables researchers to frame research questions that align with stakeholder needs [32–34]. In a study conducted in Ghana and Tanzania, the specific research questions addressed by the project emerged from the interactions with main stakeholders [35]. Co-designing and coproducing research creates a sense of trust and empowerment amongst potential users, thus increasing the likelihood of research utilization [36,37].

Most of the academic supervisors (85.7 %) indicated that they consider stakeholder needs/interests in the identification of research topics with students. This is consistent with findings from other developed and developing countries [31,38,39]. This ensures that research is relevant to their knowledge needs and interests. Involving policymakers and critical stakeholders as knowledge consumers may be an added advantage in terms of funding, considering that resources for research are limited [30,40].

Users having a clearly defined research agenda, and researchers conducting research that is aligned to the users' research priorities is one of the factors influencing knowledge translation and utilization [29,30]. This study revealed that most of the research questions by doctoral students were not aligned to DOH research priorities despite the KwaZulu-Natal Provincial Health Research and Ethics Committee (KZN-PHREC) having a website with clearly defined research priorities for the province [41]. The participants indicated that the list of DOH priority research questions was not considered in the formulation of research questions. Ensuring that the research conducted responds to priority questions raised is important because it ensures that research responds to locally important issues and to the concerns of local actors [40]. The likelihood of research results to be utilized in policy is high if research responds to priority questions [29,30].

Factors that contributed to students' selection of topics that were not aligned to DOH needs included career prospects of the candidate, funding opportunities, availability of academic supervisors whose areas of specialization or research niche areas are not aligned to DOH research priorities. This study finding highlighted that research academic supervisors play a significant role in influencing a student's topic selection. This was not unique to this study as Olalere, De lulio, Aldarbag and Erdener (2014) also reported that participants were influenced by faculty members' research projects, advisor's preference, new trends in the field, core courses offered by the department and their own professional and personal experiences [42]. The present study reveals that students selected topics mainly based on the guidance they received from academic supervisors, identification of an area of need through consultation with stakeholders, work experience and alignment of their topic to an objective of an already existing bigger project.

Having a commonly shared knowledge transfer strategy and communication plan in place is one of the factors that facilitate knowledge translation [29]. There should also be commitment from knowledge producers to communicate their findings in line with ethics guidelines. The study findings revealed a lack of commitment to the dissemination and utilization of research results by both the students and DOH. Approval letters from the KwaZulu-Natal Department of Health (KZN-DOH) encourage researchers to give feedback on their research findings. For example, the KZN-DOH gatekeeper permission letter states that "The researcher will be expected to provide feedback on findings to the district/facility" while the Health Research and Knowledge Management approval letter states that "the researcher must provide an interim progress report and final report (electronic and hard copies) to the Health Research and Knowledge Management unit when the research is complete".

Thus, researchers have the responsibility to actively disseminate their research findings while on the other hand stakeholders have the responsibility to engage with the findings. Researchers and stakeholders should have shared responsibility in the dissemination and utilization of research results by policymakers. DOH should accommodate feedback meetings with researchers for the discussion of research findings and implications. Researchers on the other hand must be cognisant of making policymakers aware of the availability of research results. Researchers should not only use conventional dissemination methods such as conferences, peer reviewed journal articles, copies of theses and policy briefs but should also include the use of different methods such as radio, X, and storytelling to reach a wider audience [43]. The use of social media seems to be gaining momentum as a communication tool among young researchers. PhD graduates and PhD final year students highlighted that they disseminated research findings via social media platforms such as X, Facebook, and WhatsApp. These platforms have allowed for easy and rapid dissemination and sharing of information to much wider audiences than traditional methods of communication [44]. A recent social media technique for information dissemination and knowledge translation has been the use of abstracts [45] or infographics [46,47].

Similarly, social media acts as a hub for researchers from all over the world to interact, fostering a unique opportunity for collaboration that spans beyond country borders and continents [48]. Some websites such as the Brave African discussions in emergency medicine can act as hubs for collaboration, peer editing and information dissemination [48]. Social media platforms such as Research Gate offer researchers platforms for information sharing and networking. It serves such purposes as searching and sharing information, discussing current topics, and connecting with other professionals in the field of research [49]. Social media has been used successfully as a recruitment methodology for study participants in numerous contexts [50–53]. Research has established that not only is social media cost effective, but it can reach target populations that had traditionally been hard to recruit for studies [54] such as low-income patients [55]. It is, however, likely that participants recruited via social media may not be representative of the entire population of interest. For this reason, most studies that have used it for recruitment purposes have not used it entirely but used it to support some modalities [50]. It can also be used to collect data.

Social media is also a great way for building a researcher's academic brand by generating useful and consistent stream of content [48]. Building a successful online brand can be a career accelerator, for example, papers that have been shared on social media have been reported to have more citations [56,57]. However, researchers must use social media in their work with caution because their findings may be read out of context and hence have negative impact. Content posted on social media is also not tested for quality hence cannot be considered scientifically substantive knowledge output [58].

The existence of a feedback loop between knowledge producers and users to promote engagement and dialogue is one of the factors influencing research translation [29,30]. We noted that the DOH provided knowledge sharing platform in the form of research days. Students also used other platforms such as national and international conferences national and international conferences, copies of theses or research reports shared with DOH, research sites and funders, peer reviewed journal articles, stakeholder feedback meetings, policy briefs and media to disseminate research findings and obtain feedback. Conferences are a key place for dissemination of research findings and can be in local, national and international settings [59]. Presenting research findings at conferences allow research findings to be disseminated earlier compared to research findings published in a journal whose timeline is much longer due to the rigorous process that it is subjected to Ref. [33]. Specifically, 39.7 % of the participants presented their research results at DOH annual research days. Annual research days provide a platform for policymakers to be aware of health research being conducted in the province which can contribute to the policy process [39,60]. The number of participants who presented their research findings at DOH was low compared to the number of participants who presented their research findings at national (75.9 %) and international (72.4 %) conferences. Presenting research findings at both DOH annual research day and national conferences increases the likelihood of research uptake especially when the research addresses local priority health problems. An annual research day was successfully held in Nigeria to promote policy dialogue between researchers and policymakers to improve maternal, new-born and child health [61]. DOH have limited spaces for presentations at annual research day resulting in a few PhD students presenting their research findings. Since research projects are approved by DOH there may be need for them to consider a special day for students' presentations to allow them to listen to all the research projects conducted in the province and decide which ones are of interest to them.

Presenting at international conferences also increases the likelihood of research uptake if the research has global influence. The research findings may be taken up by organizations such as the United Nations and the World Health organisation. This is in line with a study conducted in Lesotho where the International Aids Society (IAS) and World Health organisation (WHO) utilized research findings to update international policies and guidelines on rapid same day anti-retroviral therapy (ART) [62]. According to Edwards (2015) conferences can be a key driver of disseminating research findings if policymakers and relevant stakeholders who are likely to be the early adopters of research into practice are invited not just to officiate but to attend the conference in its entirety and listen to presentations [63]. It is important to note that the findings revealed a gap in the feedback loop despite participants sharing their findings with DOH only a few (22.4 %) receiving feedback from DOH.

Accessibility of final research products to users or policymakers which was partly done in this study is one of the key factors to knowledge translation. The university where the study was conducted has a mission of becoming a leading hub of African scholarship by conducting research that is relevant and disseminating findings in reputable platforms, locally and internationally, that will enhance utilization of the produced knowledge [64]. Our study revealed that just below 50 % of the study participants published in South African (SA) while the rest published in journals outside of South Africa (international). The reasons cited for not publishing in SA journals were that there were high article publishing charges, low impact factor, rejection rates, delayed feedback, and limited options for relevant journals. This was associated with the Department of Higher Education and Training (DHET) Research Outputs policy which "encourages research productivity by rewarding quality research outputs at public higher education institutions" [65].

Incentives differ according to the impact factor of the journal, with researchers aiming for high impact journals that however are associated with high article publishing charges, rejection rates, delayed feedback, and language which in most cases is not easily understood by policymakers and other users. The university where this study was conducted offers financial incentives to authors based on the Scimago Journal Rank (SJR) indicator quartile system with higher financial incentives offered for publication in Q1 and Q2 journals [66,67]. Previously, researchers published their work to receive recognition of their peers as a reward [68]. However, the reward system has changed since the introduction of the monetary reward incentive. This is money received from Department of Higher Education and Training (DHET) which is allocated to the universities for their research outputs. Universities have different ways of cascading that benefit down to researchers. In the case of UKZN, researchers are collectively awarded 60 productivity units for each publication which translates to R18 000 per paper. This money can be used by researchers only for activities that are research related. This includes conference attendance, procurement of research related equipment like laptops, conferences attendance for students, capacity development workshops and so forth. Wang noted that the purpose of publishing is no longer to advance knowledge and gain recognition but for monetary gain [69]. Researchers may be driven to publish for monetary gains rather than to disseminate knowledge and receive recognition for academic excellence. This negatively impacts on policy since some researchers may not be

interested in conducting long-term research projects that will translate into policy[70]. This may result in policy related research published in low impact journals to be ignored and excluded by policymakers.

Universities around the world are being challenged to increase their numbers of postgraduate students [71]. This is driven by the global shift towards knowledge societies. Postgraduates are a vehicle for advancing knowledge through research. Incidentally, one of the criteria for ranking universities is through publications which are generally produced through postgraduate research. The South African government aspires to increase the number of PhD graduates fivefold by 2030 [72]. As the pressure to produce more post-graduate students has increased, the number of postgraduate students has risen but the number of academic supervisors has not increased to match the high numbers [73]. In their survey Mouton et al. found that a significant number of supervisors at South African universities supervise more than six doctoral students at any given time [74].

According to the UKZN teaching workload policy, 2 h per week for a 45-week year is allocated to a sole supervisor for the 3 years in which the student is registered. A supervisor may be allocated a further 90 h, at most, for one additional year. The total supervision time per year spent by the research supervisor is 720 h according to the UKZN workload framework in addition to classroom teaching. Each academic at senior level and above is expected to supervise at least six postgraduate students as per the approved University research norms [75]. Our study revealed that supervisors supervise an average of six doctoral students with others carrying a load of up to 14 students. Those supervising more students with additional teaching load are likely to compromise the quality of supervision. Academic supervisors may be too absorbed in their supervisory duties and forget to ensure that their students prepare their research results for translation.

Academic supervisors were asked about when they last had a meeting with stakeholders to discuss their research and that of their students. The findings revealed that frequency of academic supervisors' engagement with stakeholders was very poor. Once the research has begun, researchers and stakeholders may need to frequently interact whilst the research is being conducted. Importantly, researchers and stakeholders may also interact at the stage of dissemination and utilization of research results. Some of the academic supervisors reported that they had not interacted with stakeholders while others reported that they last met with stakeholders one to five years back. Thus, stakeholders may not even be aware of the studies resulting in underutilization or non-utilization of research findings to inform policy. Stakeholder engagement can legitimize research findings [76].

Stakeholder engagement is increasingly being promoted across the board by health research funding organizations, and indeed by many researchers themselves, as an important pathway to achieving impact [77]. There is need for researchers and stakeholders to have meetings regularly to discuss ongoing research projects. In a survey by Knoepke et al., face-to-face meetings with stakeholders were most impactful on practice or policy [78]. Stakeholder feedback meetings may also increase researchers' access to policymakers. Such meetings may also increase the relevancy and credibility of the research produced and the chances of its uptake in policy and practice [31,79].

Our study found that there is little to no production of policy briefs by doctoral students. 1 (4.8 %) academic supervisor indicated that their students produced policy briefs while 20 (95.2 %) academic supervisors reported that none of their students produced policy briefs. This may be because doctoral students are not trained to write policy briefs. It is noteworthy that there is need to train post-graduates who are doing policy related work on how to write policy briefs so that they can disseminate their findings efficiently. Universities could include policy brief writing in the curriculum and run workshops on translation of research findings targeting final year PhD students.

In addition to training postgraduates in policy briefs writing, it may also be important for researchers who are not trained in policy briefs writing or development to work with colleagues who have the skill. This would facilitate the translation of research findings into actionable interventions or measures. In other schools or departments within the university, there might be people who are specialized in policy briefs writing who may be able to assist them to write for policymakers. Arnautu and Dagenais (2021) stated that policy-makers are more likely to use policy briefs if they are associated with a specialist [80]. In this regard, students can either partner with their academic supervisors or policymakers in the production of the policy briefs to improve the legitimacy of the message communicated [81].

Lack of funding for research from DOH was identified as a barrier to translation of research findings into policy. Our study revealed that health research conducted in the SNPH is mainly funded by NRF with DOH funding very little research. 61.9 % academic supervisors received grants from NRF while 1(4.8 %) received grants from DOH. DOH could make funding available to encourage studies that focus on priority research questions.

7. Study strengths and limitations

This is the first study that has attempted to detail the barriers and facilitators of translating doctoral research findings from a selected health sciences school in a South African university. Although the study was conducted under severe lockdown restrictions, we managed to survey a substantial number of participants. However, we believe that if the study was conducted under less restrictive conditions, it could have revealed greater detail from a more comprehensive sampling group. The findings may not reflect a comprehensive view of PhD graduates, PhD final year students and PhD supervisors. Our sample was collected from a single school in a university and the results may not be generalizable in other settings. Due to the lockdown restrictions, the online questionnaire was the only option to collect data. Although online surveys offer perfect opportunities for collecting data the response rate was very low. The findings should therefore be viewed in this context. During identification of research topic and development of the study proposal, students address the issue of policy relevance of their proposed study. We however acknowledge that this is something that might need to be studied and have suggested that as possible future research. There is therefore the need to bridge the gap between research and policy implementation.

8. Conclusion

Our study has highlighted barriers to the translation of doctoral research findings into policy as well as potential solutions that can facilitate the utilization of research into policy. We noted that researchers did not involve DOH during formulation of research questions for their projects. Involvement of DOH in formulation of research questions results in the creation of knowledge that is more readily translatable to policy. We also noted that there is generally a lack of commitment to the dissemination and utilization of research results by both the students and DOH. Dissemination of research findings to DOH is emphasized during postgraduate training and mentorship. During ethics approval, DOH emphasises the obligation for reporting the findings at closure of study but this is not enforced. We recommend that this condition be enforced. Researchers and DOH have a shared responsibility in the dissemination and utilization of research findings which is crucial for the uptake of research findings for policy formulation.

DOH holds annual research days as a platform to disseminate findings but the platform is not fully utilized. Sharing research reports with DOH and DOH providing feedback is important. There is a need to use other creative ways of disseminating findings. Other platforms we identified include disseminating research findings via the radio, social media platforms such as X, Facebook, and WhatsApp groups for specific communities of practice, and storytelling to ensure that they reach a wider audience. Publishing in local journals is also important for evidence to be easily accessible to policymakers. Publishing scholarly work in high impact journals is important to academics but makes their work not always accessible to policymakers. Hence the need for researchers and DOH to engage on the matters of research to inform policy for improved service delivery and health outcomes.

Ethical approval

The study was approved by the Biomedical Research Ethics Committee (reference number BREC/00001384/2020) and the KwaZulu-Natal Provincial Department of Health (reference number KZ_202008_030). All research was performed in accordance with the ethical standards of institutional research committee applicable when human participants are involved.

Informed consent

Written informed consent was obtained from all participants in the study. The ethical principle of protection of the participants from harm were observed through obtaining written informed and signed consent from all participants before they proceeded to participate.

This study does not contain any studies with human participants performed by any of the authors.

Data availability statement

The data involved in this study are from questionnaire surveys, and because the original data involves personal information, it cannot be fully disclosed due to identifiability issues in line with the South Africa Protection of Personal Information Act (POPIA). De-identifiable datasets generated and analyzed during the study will be made available from the corresponding author on reasonable request.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

CRediT authorship contribution statement

Florence Upenyu Damba: Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Conceptualization. **Ntombifikile Gloria Mtshali:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Investigation, Conceptualization. **Moses John Chimbari:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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