Understanding the Potential Barriers and Facilitators for Enrolling Postdoctoral Fellows: A Case Study of Medical Colleges in Malawi, Zambia, and Zimbabwe

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Abstract

In many countries, aspiring researchers compete for post-doctoral fellowships after PhD studies. The Southern Africa Consortium of Research Excellence (SACORE) had aimed to enrol eight post-doctoral fellows in the first phase but only appointed one. This study was conducted to explore barriers and potential facilitators for enrolment of post-doctoral fellows at three African schools of medicine. Individual interviews were conducted with 32 stakeholders from College of Medicine, Malawi; University of Zambia, School of Medicine; and University of Zimbabwe, College of Health Sciences. Interviewees included: university leaders and faculty (n = 15), Ministry leaders (n = 5), eligible fellowship candidates (n = 11), and a post-doctoral fellow (n = 1). Interview guides were developed for each stakeholder group; interviews were recorded, transcribed verbatim and coded for key themes. Post-doctoral fellowships were identified as potentially beneficial financially and for academic career development. Institutions felt they could benefit by developing relevant research, increasing the pool of mentors, and future research leaders. Lack of suitably qualified applicants and economic constraints of academia were the main challenges to recruitment. Post-doctoral fellowships benefits for individuals, institutions and countries, and the need to improve the recruitment process as well as to define research career pathways, were isolated.

Keywords: capacity strengthening, career development, post-doctoral fellowship

Background

Despite rapid growth of doctoral research training since the 1990s worldwide, only a limited number of PhD holders proceed to post-doctoral research training (Holden, 1999). Nevertheless, the interest in appointment of post-doctoral fellowships is on the increase (Holden, 1999; Miller, 2011; Paterson and Hanson, 1995). Post-doctoral fellowships are research grants awarded to people who have recently completed their PhD studies in order to facilitate their transition to become independent researchers (Akerlind, 2005; Akerlind, 2010). The main aim of post-doctoral training is to produce high quality scientists, capable of successfully pursuing academic and research careers (Holden, 1999; Miller, 2011; Nerad and Cerny, 1999). Fellows undertake additional original research, publish research findings, develop and expand personal research networks, broaden teaching experience, and are supported and prepared to competitively apply for national and international research grants (Akerlind, 2005).

Fellows are usually granted waivers to university duties (such as onerous teaching, administration, and clinical practice responsibilities), and these waivers allow them to focus on their research

and grant writing (Holden, 1999; Leonard et al, 2005). Post-doctoral fellows often have opportunities to network and collaborate with other researchers within their discipline and in related disciplines (Akerlind, 2009; Thompson et al, 2001). Essentially post-doctoral training provides a framework for an individual to fully develop as an academic researcher and to engage in or develop interdisciplinary, and often collaborative, research partnerships (Akerlind, 2009; Boice, 1992; Waters, 1996).

Undertaking post-doctoral training entails a high level of commitment (Miller, 2011); in some cases fellowships are remunerated at lower levels than those of junior faculty and the transition from closely supervised PhD student to a mentored independent researcher can be challenging (Holden, 1999; Akerlind, 2009). Nonetheless securing a competitively awarded post-doctoral fellowship is an accomplishment highly regarded by universities and grant-awarding bodies and is generally perceived to be beneficial for academic career progression (Nerad and Cerny, 1999).

Despite the many benefits of post-doctoral fellowships, the reality is that few show interest to or are actually registered annually in African institutions (Holden, 1999) and this could be due to a number of possible reasons. Firstly, some academic institutions may not value or understand the whole concept of having post-doctoral positions and as such the advantages of post-doctoral work are not made clear to the researchers especially in those countries which have few academic opportunities (Akerlind, 2005; Akerlind, 2009). Linked to this, some universities reportedly have no clearly defined role for postdoctoral fellows resulting in a sense of isolation within departments (Akerlind, 2009). In addition, potential fellows may not clearly understand how the experience they would attain as postdoc fellows would advance their careers or how they would fit into the overall institutional hierarchy during and after their postdoctoral training, with some feeling like they are still postgraduate students and not full members of faculty (Akerlind, 2009).

Such uncertainty with respect to the impact of a fellowship on career prospects may lead to negative attitudes towards applying for post-doctoral training. To make matters worse, for those African academics who have undertaken their PhD training overseas, returning to work in their own country can seem unappealing if there are limited resources for research, unclear pathways for career progression and limited opportunities for research mentoring (Miller, 2011; Nerad and Cerny, 1999). This tends to contribute towards the observed massive brain drain in African academic and research institutions as most fellows trained overseas prefer to settle there and make a living doing jobs that may not be related to their area of specialisation (Bhorat et al, 2002; Danso, 1995).

In 2009, the Wellcome Trust launched its African Institutions Initiative (AII) which sought to accelerate research capacity strengthening in Africa. A consortium of universities from Southern Africa and the UK, the Southern Africa Consortium for Research Excellence (SACORE) was established (www.sacore.org) and successfully competed for funding. SACORE's overarching goal was to develop a vibrant, sustainable research culture in participating southern African institutions by building a critical mass of research-active postgraduates in these institutions, by developing leadership in research, setting out attractive career pathways, and by strengthening comprehensive research management and support systems (Mandala et al, 2014).

In addition to MSc, MPhil and PhD fellowships, SACORE had aimed to recruit eight postdoctoral fellows across three partner institutions: College of Medicine (CoM) in Malawi, University of Zambia (UNZA), and University of Zimbabwe College of Health Sciences (UZCHS) who would benefit from research funding, a monthly stipend and triangular mentoring from both local and internationally recognised researchers. Although SACORE managed to recruit eighteen PhD fellows, four MSc and five MPhil fellows by March 2013, four years into the programme, only one post-doctoral position had been filled.

This study was therefore initiated to explore reasons why SACORE had difficulties recruiting researchers to these funded fellowships. The Evaluation Center, University of Colorado Denver was contracted as independent evaluators to undertake the study. The evaluation study was guided by three questions: 1. What are stakeholders' perceptions of the advantages of post-doctoral fellow positions? 2. What are the perceived disadvantages/barriers/challenges to filling the post-doctoral positions? 3. What are recommendations to increase the likelihood of filling post-doctoral positions in the three partner universities?

Methods

Study Population

Individual interviews were conducted with 32 key stakeholders concerning the post-doctoral fellowship positions at CoM, UNZA, and UZCHS. The sample population was identified by SACORE leaders and included the following groups: university leaders and faculty members (n = 15, 10 male and 5 female), ministry leaders (n = 5, four male and one female), eligible candidates for the post-doctoral fellowships (recent graduates or those who would complete their PhD within three years) (n = 11, 6 male and 5 female), and a current post-doctoral fellow (n = 1, male). Different study participants were selected using different inclusion criteria; representatives from the government ministries were chosen based on their involvement in tertiary education, with some understanding of postdoctoral programmes and human resource development. Faculty members were included in the study if they had worked for the respective institutions for more than three years, had supervised one or more either undergraduate or postgraduate student before, had an understanding of the promotion criteria for faculty members in their respective universities. University leaders that participated in the study were either Vice-chancellors, Principals, Vice-Principals, Faculty Deans or Heads of Departments who had an understanding of the institutional guidelines for career development and promotion criteria. Potential postdoctoral candidates were faculty members who had just completed their PhD programmes a year or two prior to 2013 who still had an interest to do research given the chance and seed funding. Evaluators, in collaboration with SACORE leaders, developed semi-structured interview guides tailored to each stakeholder group, to address the evaluation questions. (Appendix A.)

Study Procedures

This qualitative research work employed a case study design to understand the reasons behind the low uptake of postdoctoral positions in the three institutions. Data was collected by the use of a questionnaire (Appendix A) which was administered using in-depth interviews as the data collection tool by the researchers. This design was chosen since the aim of the study was to understand the current problem being encountered in the recruitment of postdoctoral fellows so that we can provide a basis for actions aimed at improving this scenario.

Interviews were conducted in March 2013 at all three institutions. Prior to conducting the actual interviews, the validity and ease of use of the questionnaires were tested by conducting some pilot interviews. These pilot interviews were conducted by the researchers and also by independent experienced social scientists with the aim of reducing potential response bias associated with self-reporting method of administering the questionnaires, to check on consistency of the results obtained and also to test the dependability of the results. Undergraduate students and faculty members participated in the pilot interviews as interviewees.

During 23 interviews, both interviewers were present, while nine interviewees met with only one interviewer. Nineteen interviews were conducted face to face and four via Skype. To encourage interviewees to recall the specifics of this fellowship opportunity, evaluators shared an advertisement previously used by SACORE to recruit applicants (Appendix B). The researchers were involved both in conducting the interviews and in data collection and analysis.

Ethics considerations

Although Institutional Review Board approval was not obtained, the interview procedures followed were in accordance with the Helsinki Declaration as revised in 2013 (World Medical Association, 2013). Each interview participant was informed prior to the interviews that their responses were confidential and would be seen only by the evaluation team and reported in summary. Interviewers requested permission from each interviewee before audio recording the interviews. All but one participant consented to recording and in the case of the exception, interviewers took notes. All interviews were conducted in English.

Data Analysis

Following each interview, interviewers completed debriefing notes summarizing the key points. These notes were used to prepare a preliminary codebook of primary and secondary themes aligned with the evaluation questions. Audio-recorded interviews were transcribed, and transcripts and notes were entered into qualitative data analysis software (NVivo, version 9). Evaluators coded the data using the method of constant comparative analysis (Creswell, 2007) adapting the codebook as needed. Key quotes were identified to illustrate the emerging themes. Evaluators summarized the results in a report to the consortium secretariat and requested their feedback as a check on the validity of the findings. A member of The Evaluation Center team, who had not participated in the interviews, also reviewed the report as a further check on the logic and validity of the findings.

The trustworthiness of the study results was ensured in several ways. Firstly, by allowing different researchers conduct similar interviews during the pilot study, we proved the dependability of the method and the data collection tool used. Secondly, we assumed that by conducting the study in three different sites located in three different countries, transferability was taken care of. Thirdly, by providing an audit trail of the entire data analysis to various stakeholders involved in the study an attempt was made to show confirmability. Lastly, the credibility of the process was checked by the data triangulation used and also by the independent member of the Evaluation Center team.

Results

Stakeholders' (University Leaders, Faculty Members, Ministry Leaders, Potential Post Doc fellows & a postdoc fellow) perceptions on advantages of post-doctoral fellow positions

Advantages to Individuals

All interviewees identified important benefits to individuals taking up post-doctoral fellowships; many viewed the additional financial and professional support (including mentorship) as crucial to the career development of a recent PhD graduate. The financial support, described as "seed funding" by some two interviewees and as a "soft landing" into the world of scientific research by two others, was also viewed as a very important benefit to participants. The transitional period afforded by a postdoctoral fellowship was described as an opportunity for emerging researchers "to put their things in order" and "a transition between being a student to being someone who is able to work independently" as well as an opportunity to conduct more advanced research in their current field. One University leader stated that;

> *You can mature as a researcher. … You can get to be certain of the path that you want to take in terms of your research endeavors and future research agenda. Also… there is a transition between being a student to being someone who is able to work independently. It is something that does not occur overnight.*

Interviewees also described how post-doctoral fellowships and published research findings had been used as additional supporting evidence of achievement for recent PhD graduates in support of their promotion applications within the university. One faculty member explained how a

post-doctoral position would enhance promotion in multiple ways:

> *They look at the teaching [for promotion]. They look at the research. What kind of research have you been conducting? Obviously, if you are doing a postdoc, then you have … some things to report ... The postdoc will give you opportunities to publish as you go along, so that also enhances your potential for promotion. Then they look at … contribution to the life of the university.... For the kind of research that we do, probably I would have to buy some lab equipment ... that would also benefit the university in the long run because the lab is running within the university... Also... If I'm doing a postdoc, I'll be relating with other institutions that also raises the image of the university. Yes. So, definitely, it would be very beneficial for me in an academic setting.*

All eleven interviewees eligible for future SACORE post-doctoral fellowships perceived the individual benefits as sufficient and were interested in applying. Four of the eleven noted the opportunity to remain in their home country while completing their postdoctoral fellowship was an additional personal benefit.

> *I think what would appeal to me would be something that would allow me to probably remain here but be able to do the research and learn those new concepts or new things that I want. I might have to go and work in another lab somewhere where they are doing something we are not doing here ... I'll go there and learn it so that I can transfer it here.*

Advantages to the Universities

The presence of post-doctoral fellows was seen as providing significant institutional benefits at each of the three universities. Interviewees indicated fellowships would enhance the research environment by increasing the number of researchers and serving as role models, mentors and future research leaders. A number of University and Ministry leaders interviewed believed that fellows would be more competitive for grants early in their research work, and this would make them more productive researchers in the long run.

> *They [post-doctoral fellows] are going to be the research leaders for the future… your senior research scientists. … They will be, hopefully, much more productive, and therefore, they will look out for their own funding and building their research careers, but in this process, enhancing a research-related income within the institutions. They also become role models. They are a very important group of individuals that we need to try to encourage.*

Some said that post-doctoral fellows would contribute to the research infrastructure by expanding research capacity through new equipment and technology. One interviewed leader noted the connection between researchers and funding:

> *Having a few more people conducting good research, applying for grants, and … collaborating with other individuals in their field of study would be a great boost ... Having more postdoctoral fellows will increase a critical mass of individuals doing research and,*

> *therefore, will improve the status of that institution as far as research is concerned ... The more researchers you have, the more money is flowing.*

Advantages to the Country

Post-doctoral fellows at local universities were also seen as benefiting participating countries. For instance, locally trained researchers were expected to have an interest in identifying and conducting research relevant to local healthcare concerns that would subsequently inform public healthcare policies. University and Ministry leaders felt that having more people conducting research in their country increased the likelihood of having evidence-based policy making processes. One leader emphasized the importance of such research:

> *We expect research to be transcended into policy change. So there is no point to do research which does not take us anywhere, not to be transcended into policy. [If we] see policy change, [we will] see improvement in the health care.*

One potential postdoc candidate described this interest in benefiting one's home country through research:

> *Inasmuch as you are trying to advance your career path, you are also trying to help your country... because you are contributing to research. And once research is promoted, it means development in all areas ...of healthcare.*

Stakeholders' perceptions of the disadvantages and challenges of post-doctoral positions

University and consortium leaders reported that the primary challenge to filling the post-doctoral fellowships was the inadequate supply of eligible applicants. Since the positions were designed for PhD-level researchers considered to be "junior researchers", there were few recent PhD graduates locally because PhD programs were just being established (CoM and UNZA) or recent economic crises had disrupted the academic pathway (UZCHS). Because of these circumstances, PhD students typically went to other countries to earn their degrees and once they were overseas it was difficult to interest these students to return to their home countries once their research careers were established elsewhere. One consortium leader explained:

> *The major reason [the positions were not filled was] there wasn't anybody who was then qualified. We set up the criteria that someone within about six months to three years post obtaining their PhD… At the time the SACORE grant came in, there was nobody who could meet those criteria—absolutely nobody.*

In addition, PhD graduates are highly sought after and offered competitive salaries as teachers, in industry, by government and non-governmental organizations, and as clinicians, further reducing the pool of eligible applicants. Furthermore, due to the shortage of faculty members, especially at UNZA and UZCHS, which results in extremely high teaching loads, most potential researchers and grant applicants might get discouraged from taking up full-time research positions.

However, at all three institutions, interviewees indicated the supply situation was improving, potentially resulting in more applicants for future post-doctoral positions. University officials reported that they anticipated seven PhD graduates within the next year at CoM, sixteen at UNZA and eighteen at UZCHS. Officials at UZCHS reported current PhD students outside of the country were expressing interest in returning to Zimbabwe for professional work.

In addition to this shortage in supply of eligible applicants, potential postdoc fellows and faculty members interviewed reported that the current

research culture at the universities had several deficiencies making the post-doctoral position unattractive to potential applicants. These deficiencies included few existing research groups with grant funding and ongoing research projects, a limited number of mentors and senior research faculty in specialized areas of interest, and a shortage of state-of-the-art equipment necessary for laboratory research.

Another obstacle to filling the positions was the lack of a clear definition of the researcher role within the context of African universities. The career option of post-doctoral fellow was not always clearly understood or accepted within the existing university structure at the three institutions. During the interview, one PhD student asked for clarity on the difference between a PhD and a post-doctoral fellow thinking that the two roles were similar. Another faculty member explained:

> *Within the university, I don't think this concept ... is clearly understood nowadays or clearly defined. I think this has been the major challenge, for example, with SACORE being able to fulfill those fellowships ... It is rare to hear anybody talk about the post-doc ... which means it is not a common term in the university ... At the moment we don't have a clear program of developing a researcher…We need a process that supports the PhD, beyond the PhD. That system is not there.*

While some university officials reported recent progress to define the role of a post-doctoral fellow within a research track, at least in policy, having a career solely in research was not established. At one institution, faculty interviewees reported that they felt a career in research was less secure than a career in teaching. These members reported the teaching track was perceived as having higher value with less personal risk. One faculty member explained this by saying,

> *If people would want to take a research track, it is possible, but it has not been used much because of anxieties of job security ... You can take a track to be a research person, where you are doing very minimal … teaching, but ... it means you have to be prolific, to raise funds, to support your training, so we tend not to have people going that route ... It might be more attractive for someone just to take up a teaching post at university because there is more security to start.*

Another faculty member explained how research was not an accepted career pathway:

> *I know of maybe one or two people who have actually advanced using the research pathway. It is just not implemented ... Maybe there are not that many people who actually know about it, not that many who are in the faculty who are purely researchers. Most of them have to have a sort of a teaching job at the same time ... The support systems for a post-doc, for a PhD student, are not really there in Africa, as opposed to in the West ... I don't think, even if you asked lecturers here, they would not even know what a post-doc is. I think it would be nice to try to define it in an African context, what a post-doc is. I think it is close to non-existent here in Africa.*

Some faculty members who were eligible to apply for the positions expressed their reservations in devoting their career solely to

research and their fears about being overwhelmed by simultaneous teaching and administrative responsibilities. Five of them, though eligible to apply, noted that post-doctoral work could involve personal hardships because of time away from families and financial stress. One potential institutional disadvantage cited by some institutional leaders was that offering recent PhD graduates an alternate career pathway in research might decrease the pool of faculty members.

Stakeholders' recommendations to increase the likelihood of filling post-doctoral positions

All categories of stakeholders also identified specific challenges in how the post-doctoral positions were advertised and structured and offered recommendations to improve the process in the future. These recommendations included increasing publicity concerning the opportunity (as five interviewees believed there had not been sufficient publicity to engage potential applicants) and clarifying eligibility requirements including the acceptable types of research and time commitment. Other interviewees recommended increasing communication with potential applicants providing guidance during and after the application process (as three eligible candidates reported they had applied for fellowships but received no acknowledgement or feedback on their proposals). Some also recommended that there was need to communicate clearly about the amount of the stipend and how it could be used, as eligible candidates were not sure about the stipend's purpose and whether it was meant to cover salary and/or equipment and technology. Some interviewees indicated the stipend was inadequate, while others reported it was sufficient, which may be due to some SACORE institutions augmenting the stipend with a lecturer appointment and additional funding.

The overwhelming recommendation of most interviewees was that SACORE continues to offer the position. Additional recommendations included increasing support for students during their PhD studies in order to build a pipeline of eligible post-doctoral candidates. Interviewees also suggested increased flexibility as well as alternate models for recruiting post-doctoral candidates that might be more conducive within the context of low income countries in Africa. These suggestions included inviting existing research groups to recruit post-doctoral fellows to work with their senior researchers on specific, locally relevant research with SACORE support; encouraging exchange options between the three universities; and working with Ministry and University officials to further define the role and career pathway of the post-doctoral fellow in university and governmental settings.

Discussion

The concept of a post-doctoral fellowship is quite common in western institutions but relatively new in Africa. In many countries around the world, post-doctoral fellowships are considered to be a well-established and crucial step in the scientific career progression (National Postdoctoral Association, 2009). Malawi, Zambia and Zimbabwe were British protectorates and have essentially adopted the British higher education system. Despite this, there is currently no institutionalised post-doctoral career plan for PhD graduates in any of these medical schools. Figure 1 depicts the existing career pathways for academics to progress to full professorship in the three institutions in this study. If an academic member of staff opts to pursue a research career, a post-doctoral fellowship would be the inevitable next step towards full professorship after completing a PhD although currently this is not the case as this pathway is not officially recognised.

Given this career pathway model, it was not surprising that all potential applicants interviewed in this study regarded such a transition as crucial for their career development by providing funding to launch their own research career and by connecting them to mentors who would assist them in grant writing and potential research collaborations. This finding is consistent with the common views of British (Research Councils UK, 2001) and American (Council of Graduate Schools report,

2012) academics at a similar stage in their career. However, what remains to be addressed is how the various contributions of a post-doctoral fellow (such as supervision of graduate or doctoral students, grants awarded, publications attained, presentations made at international conferences and leadership) can support their promotion process. Currently those who join the academic institutions as associate lecturers have their career paths and promotion criteria defined much more clearly than those who opt to take the research route.

In the UK, the USA, and to some extent in South Africa, universities are ranked by indicators of researcher productivity (such as the quality and quantity of research projects, number of publications in peer-reviewed journals per year, and the number of citations on the publications (Testing Service World University Rankings, 2014)). Therefore, if universities from African countries are to be competitive in terms of setting the research agenda and securing research grant funding, there is need to restructure systems and strengthen the depth and breadth of research expertise. To this end, universities in the three African countries in this study need to prioritise support for their research scientists. A key method to provide such support is the establishment of a cohesive and robust post-doctoral fellowship program, which is likely to yield increased researcher productivity.

As a prerequisite, institutional leaders need to ensure that pursuing a research career is more attractive. Aspiring researchers at Masters and Doctoral level need to be encouraged and mentored to aim for research excellence. Institutions need to continue to enhance their PhD programmes, ensuring quality supervision (from both internal and external research supervisors as necessary) and develop a conducive career pathway that encourages PhD graduates to become independent researchers. To achieve this, the career path for an academic who opts for the route of a researcher must be well defined and marked in the institutions' hierarchy.

The respective governments have a critical role to play in recognising post-doctoral fellowships as essential for local development. Optimally, this recognition would be reflected in national policies and allocation of funds to support such posts. Working hand in hand with the private sector, government could also link fellows with specific companies to co-fund or support their research. Such collaborations could potentially help in to curbing the brain-drain problem common in these countries.

While these institutional changes are being introduced, the data presented here suggest that SACORE, working in liaison with the respective institutions, can likely improve both the quantity and quality of applications by advertising more widely and ensuring that the scope and purpose of the fellowships is apparent. Nesting fellowships within existing research projects with experienced research investigators is also likely to yield the greatest rewards, as strong and supportive mentoring from both local and international researchers is more likely to be available. As a result of this study, the SACORE programme leaders have initiated a more targeted approach towards recruitment of post-doctoral fellows, identifying successful PhD students and linking them with potential mentors who can help them develop fundable project proposals. It is anticipated that this approach will ultimately improve the quality of research and the capacity of research staff at these institutions.

It is crucial that progress made during this programme with Wellcome Trust funding serves as a foundation for the continuation and expansion of the programme to develop this cadre of scientists if Africa is to enjoy scientific growth and socioeconomic development.

Some of the limitations for this study were that with the exception of one group (potential postdoctoral fellows who had just finished their PhD programmes, six male and five female), the other groups of interviewees had more male participants than female. This could have potentially caused some gender bias. In addition, the sample sizes for some groups, especially the

one postdoctoral candidate, were small but this was inevitable due to the nature of the study.

Conclusions

Although leaders at all three institutions participating in the study encountered difficulties in recruiting post-doctoral fellows under the SACORE initiative, all stakeholders were in agreement about the importance of the fellowship program and potential for future success. Potential post-doctoral fellows viewed the scheme as advantageous for their career development and made specific suggestions about how to make the fellowships more attractive. Within the institutions, a clear-cut career progression for researchers needs to be established. Both institutional and country leaderships were in agreement about the need for and importance of post-doctoral fellowships in order to strengthen research capacity.

Abbreviations

SACORE – Southern Africa Consortium of Research Excellence
LICs – Low Income Countries
CoM – College of Medicine
UNZA – University of Zambia
UZCHS – University of Zimbabwe College of Healthy Sciences

Competing interests

The authors declare that in the past five years they have not received reimbursements, fees, funding, or salary from any organisation that may in any way benefit, either financially or non-financially, from the publication of this manuscript. The study being reported in this manuscript and the process of writing and submitting this manuscript, has been funded entirely by the Wellcome Trust, and they do not stand in any way to benefit from the publication of this manuscript. The authors also declare that they do not hold any stocks or shares in any organisation that may in any way gain or lose financially to the publication of this manuscript, either now or in future. The authors also hereby declare that we do not hold nor are we applying for any patents relating to the contents of this manuscript. None of the authors have received any reimbursements, fees, funding or salary from any organisation that holds or has applied for patents relating to the content of the manuscript. The authors also declare that they do not have any financial or non-financial competing interests in relation to this manuscript.

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Authors' contributions

SC and AC were involved in conducting the interviews, WM, SC, AM, FC and MM wrote the manuscript with edits provided by MN and EG. All authors read and approved the final manuscript.

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Appendix A: Interview Guides
Interview Guide 1: For University Leaders and Faculty

Introduction:

Hello, Thank you for agreeing to this interview. I work at the University of Colorado-Denver in the Evaluation Center. As you may know, SACORE contracted with us to explore the postdoctoral position and better understand why the available positions have not been filled. SACORE plans to use the information that we gather to inform future programmatic decisions. Your responses will remain confidential and will be combined with other responses when we report the results back to SACORE.

The overall goal of SACORE (Southern Africa Consortium for Research Excellence) is to develop the research culture in the participating Southern African institutions, namely the College of Medicine in Malawi, University of Zimbabwe College of Health Sciences, and University of Zambia. A key strategy is to build a critical mass of research scientists through the appointment of post-doctoral fellows. The budget allows for appointment of eight post-doctoral fellows, but only one candidate has been identified. We are interested in learning more about this dilemma.

1. First, can you please tell me a little about yourself, your position here at [university], and your involvement with SACORE?

2. We'd like to learn more about how your institution works. Please tell me about the current career pathway for clinical and science academics at [university]?

3. What are the criteria for promotion here at [university]?

4. We would also like to understand what you know about the postdoctoral positions available through SACORE.
    a. Can you tell me what you know about the SACORE postdoctoral positions?
    b. What do you believe the role of the postdoctoral scientist would be at [university]?

5. If the postdoctoral positions were filled and there were as 1-4 postdoctoral scientists working at [university],
    a. What advantages do you think the presence of these postdoctoral scientists would bring to your institution?
    b. On the other hand, what disadvantages and challenges might the presence of postdoctoral scientists bring to [university]?

6. As you may know, [university] has not been successful in recruiting qualified postdoctoral candidates under the SACORE program. In your opinion, what barriers to recruitment may have prevented the successful recruitment, application, and acceptance of candidates?

7. Do you have any additional comments or questions?

Interview Guide 2: For Ministry Leaders

Introduction:

Hello, Thank you for agreeing to this interview. I work at the University of Colorado-Denver in the Evaluation Center. As you may know, SACORE contracted with us to explore the postdoctoral position and better understand why the available positions have not been filled. SACORE plans to use the information that we gather to inform future programmatic decisions. Your responses will remain confidential and will be combined with other responses when we report the results back to SACORE.

The overall goal of SACORE (Southern Africa Consortium for Research Excellence) is to develop the research culture in the participating Southern African institutions, namely the College of Medicine in Malawi, University of Zimbabwe College of Health Sciences, and University of Zambia. A key strategy is to build a critical mass of research scientists through the appointment of post-doctoral fellows. The budget allows for appointment of eight post-doctoral fellows, but only one candidate has been identified. We are interested in learning more about this dilemma.

1. First, can you please tell me a little about your involvement with SACORE, if any?

2. We would also like to understand what you know about the postdoctoral positions available through SACORE.
    a. Can you tell me what you know about the SACORE postdoctoral positions?
    b. What do you believe the role of the postdoctoral scientist would be at [university]?
3. If the postdoctoral positions were filled and there were as 1-4 postdoctoral scientists working at [university],
    a. What advantages do you think the presence of these postdoctoral scientists would bring to your institution?
    b. On the other hand, what disadvantages and challenges might the presence of postdoctoral scientists bring to [university]?
4. As you may know, [university] has not been successful in recruiting qualified postdoctoral candidates under the SACORE program. In your opinion, what barriers to recruitment may have prevented the successful recruitment, application, and acceptance of candidates?

5. Do you have any additional comments or questions?

Interview Guide 3: For Eligible Students

Introduction:

Hello, I work at the University of Colorado-Denver in the Evaluation Center. As you may know, SACORE has contracted with us to explore the postdoctoral position and better understand why the available positions have not been filled. SACORE plans to use the information that we gather to inform future programmatic decisions. Your responses will remain confidential and will be combined with other responses when we report the results back to SACORE.

1. First, please tell me about yourself, including your course of study and academic background?
    a. Probe, if needed: When will you complete your PhD?

2. What are your career plans?

3. What, if anything, do you know about the postdoctoral position funded through SACORE?
    a. Did you see the position advertised? What did you think of the opportunity when you saw it?
    b. For current student- are you planning to apply for it - if yes why - if no why not?

(At this point, allow the participant to review postdoctoral advertisement so that everyone being interviewed is familiar with the position and able to answer the following questions.)

4. Have you (or would you) considered applying for the postdoctoral position funded through SACORE? Why or why not?

5. What do you perceive to be the advantages and disadvantages of taking a post-doc position at [university]?

6. What barriers prevent you from applying for and taking the position?

7. I'd also like to learn more about your understanding of [university]. Based on your understandings, what are the criteria for promotion at [university]?

8. Do you have any additional comments or questions?

Appendix B: SACORE Post-doctoral fellowship advertisement

UNIVERSITY OF MALAWI
COLLEGE OF MEDICINE

SOUTHERN AFRICA CONSORTIUM FOR RESEARCH

EXCELLENCE (SACORE) POST DOCTORAL FELLOWSHIPS

The SACORE (Southern Africa Consortium for Research Excellence) project has available funding for 2 Post Doctoral Fellowships in any health related field. The project is a multisite collaborative project with a Secretariat at the College of Medicine in Blantyre, Malawi with other collaborative African sites at University of Zambia School of Medicine, Lusaka; College of Health Sciences at the University of Zimbabwe, Zimbabwe; University of Botswana; Stellenbosch University and University of Cape Town. The European SACORE partners include London School of Hygiene and Tropical Medicine (LSHTM), University, College London (UCL), Barts and the London School of Medicine (BTL), University of Liverpool and Liverpool School of Tropical Medicine (referred to together as Liverpool). The project is funded by the Wellcome Trust. The focus of the SACORE initiative is targeting training of individuals at PhD and Post-doctoral levels. Two (2) Post Doctoral Fellowships are currently available for this purpose.

The SACORE Post doctoral fellowships are tailored to primarily provide outstanding young Malawian (and any citizen of the partner Southern African countries – Zambia, Republic of South Africa, Zimbabwe and Botswana) with opportunities to carry out cutting- edge research at the College of Medicine and/or its affiliates thereby strengthen research and post doctoral training capacity at the college.

1. The programs proposed should focus on both basic science and operational/clinical research questions.

2. There are no predetermined research themes but research questions addressing health issues with potential of cutting-edge basic medical science and evidence based medicine are welcome.

3. The Post doctoral programs are Junior research Fellowships to be offered to recently qualified Malawian postdoctoral researchers to conduct research at CoM.

4. These programs will be conducted with the intent of south-south and south-north research strengthening activities and thus will draw on collaboration among the aforementioned SACORE universities and their European counterparts.
5. The fellowships cover a monthly salary and research support funds as well as

Figure 1: Possible Career Pathways for academics in Malawi, Zambia and Zimbabwe