

'I am not only beneficial to the community but to the entire country, I am trained as a researcher now'.

Developing health research skills in low-income countries: the power of a North-South-South partnership

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Abstract

Background

Partnerships between Higher Education Institutions (HEIs) in the global south and north are important for building capacity in health research in low-resource contexts. In this paper we present experiences of partners involved in a North-South-South partnership between HEIs in Democratic Republic of Congo (DRC), South Africa and Norway. The partnership aimed to establish a postgraduate programme in nutritional epidemiology at the University of Kinshasa, DRC, and develop a cadre of researchers and academic leaders to provide locally generated health research to inform policy-makers and to address nutrition and public health challenges in the DRC.

Methods

In-depth interviews were conducted with purposively selected stakeholders, facilitators, and students from all partner institutions between October – December 2019. Interviews were conducted in English or French, depending on participants' language of preference, and were audio recorded, transcribed verbatim, and translated when required. A thematic approach was used to analyse data.

Results

Participants expressed positive experiences about the partnership, mentioning that it was an excellent opportunity for partners to network and learn from one another. The partnership was valued and offered benefits for all partners at individual, institutional, and country levels. Project activities were planned by all partners jointly and were strongly focussed on building research and academic capacity at KSPH and addressing nutrition problems in DRC. Individual participants felt that the contributions of collaborating partners enriched their learning, enhanced their academic growth and provided opportunities to interact with the scientific community. Participants perceived that establishing and maintaining a common vision for the partnership with ongoing communication, regular meetings and the building of strong relationships between partners, were important determinants of success. However, there were challenges with co-facilitation and co-supervision where communication and common purpose could have been improved. Further, some participants were concerned about sustainability of the programme once the partnership ends.

Conclusion

North-south-south partnerships can be harnessed to address skills shortages in health research in low income settings, with extensive benefits for individuals and partner institutions, as long as participants

work towards a common vision. However, important questions of sustainability remain and it is important that sustainability be at the forefront of decision-making.

Background

Health research partnerships between higher education institutions (HEI) from countries in the global North and the global South have received increased attention in the literature over recent years [1-4]. Low- and middle-income countries (LMIC) suffer from a high burden of public health and nutrition challenges, yet these countries often have limited resources and research capacity to address these burdens [5, 6]. North-South partnerships between HEIs provide an opportunity to address this disparity and have been successful in achieving this [7]. However, such partnerships have also been criticized for unequal power dynamics, communication barriers, and skewed ownership of research deliverables, often favouring the North side of the partnership [7]. Crane (2010) suggested that these partnerships often create an intellectual dependency of the south to the North, making it difficult for low-income countries to continue on their own without the partnership [8]. The North usually has control of funding, research activities, and reporting of research findings, with the danger that partners in the South have sometimes been reduced to the role of data collectors [2, 9]. However, according to Stern and Green, good partnerships based on commitment between partners, mutual trust, equal ownership, and common goals among the partners, can have wide ranging benefits for all partner institutions [10]. Successful partnerships have been able to achieve their collaborative goals through mutual respect, equality in running the project, setting of clear goals, and good communication [1, 9].

Most research partnerships between HEIs in the North and South have included two partners, but a number of research partnerships have been established more recently with one partner in the North and two or more partners in the South. Recent research exploring these North-South-South partnerships shows that the three-way partnership is important as it facilitates contextually relevant knowledge and skills sharing, shifting the focus from the North capacity-building the South [11]. Funds and research skills development are required to support sustainable southern research centres for southern partners to initiate their own health research projects and break the cycle of running after funding provided by northern donors at the expense of addressing local research gaps [12]. Three-way partnerships between North and South institutions provide an opportunity to mitigate some of the challenges experienced with North-South partnerships.

Many sub-Saharan African countries have high rates of malnutrition, making context relevant and evidence-based interventions important to inform policy-makers and address nutrition problems. The Democratic Republic of Congo (DRC) has some of the highest rates of malnutrition and food insecurity in the world, among both children and adults, and has limited resources to tackle health challenges [13]. In DRC approximately 42% of children under 5 years are stunted (29% in urban areas and 50% in rural areas) and 7% have severe malnutrition [14]. This has far-reaching consequences, not only for individual affected children, but for the country as a whole. The country has limited health care resources and poor

access to interventions to alleviate nutritional problems facing the country and a poor track record of health research[15].

The GROWNUT project was a three-way partnership between HEIs in DRC, Norway, and South Africa that aimed to build institutional capacity in the Kinshasa School of Public Health (KSPH), establish a postgraduate programme in nutritional epidemiology and support development of academic leadership and research in nutrition in DRC. In this paper, we present findings from a qualitative study describing the experiences of students, staff and stakeholders participating in the project and their perceptions about the partnership, highlighting successes, challenges faced and lessons learnt.

Description of project

GROWNUT was a collaborative partnership between KSPH at UNIKIN in DRC, Centre for Rural Health (CRH) at University of KwaZulu-Natal (UKZN) in South Africa, and Centre for International Health (CIH) at University of Bergen (UiB), Norway. The aim of the partnership was to deliver high quality postgraduate nutrition education and develop institutional capacity, by developing and implementing a master's and PhD programme in nutritional epidemiology at KSPH. The programme was developed in collaboration with the National Nutrition Programme (PRONANUT) at the Ministry of Health, DRC, with the aim of providing research support to develop evidence-based interventions and policies to address malnutrition in DRC. The programme was funded by the Norwegian Agency for Development Cooperation (Norad) through the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED), and was conducted from 2014-2020.

Key elements of the GROWNUT partnership were to support processes and infrastructure for a postgraduate nutritional epidemiology programme, including the development of a rural research site, provision of bursaries for selected students, library facilities and facilities for e-learning. All partners had different home languages, so English was used as a medium of instruction, as this was the common language among partners. The establishment of a rural research site was important for the vision of the partnership to ensure that students had the opportunity to learn practical skills in nutrition and research, and were exposed to the real problems of rural communities in the DRC. The nutritional epidemiology programme was housed at the KSPH and conferring of degrees was the responsibility of UNIKIN.

Institutional partners collaborated to develop the master's programme using interactive learning methodologies including elements of both theory and practice (also known as the 'learning by doing' approach) and capacity building for junior academic staff at KSPH. For the first academic year the content was mainly theory, comprising 18 classroom modules conducted at KSPH by experts from all three universities. According to the vision of the partnership, teaching was conducted jointly with local and international facilitators, but from the third year of the project political unrest in DRC prevented travel for facilitators from partner institutions and KSPH facilitators provided all the teaching. In the second academic year, students undertook a 3-month residential internship at the rural research site, where they also collected data for their research project. For the research, all students had a primary supervisor in DRC and a co-supervisor from a partner institution.

Four cohorts of master's students were enrolled in the nutritional epidemiology programme from 2014-2018. A total of 41 master's students were enrolled, 40 of whom graduated. Six PhD students registered: two graduated, two will graduate in 2020 and two PhD students de-registered. All PhD students were given the opportunity to spend time in one of the partner universities, as part of their learning experience, to enrich their skills. Some students had the opportunity to present their research at international scientific conferences. Research findings were also disseminated to the community in the rural research site.

Nutritional epidemiology graduates have since been employed in the nutrition field at the DRC Ministry of Health (4), WHO (1), UNICEF (2) and other non-governmental organisations (5). Other graduates are teaching at KSPH (3) and other universities (3). Three master's graduates have registered to study for a PhD.

Methodology

A qualitative methodology was employed, using in-depth interviews to explore the experiences of participants involved in the GROWNUT partnership, focusing on the role and value of the partnership between the three HEIs. Interviews were conducted with stakeholders, facilitators/supervisors, and students.

Study site

UNIKIN is one of the three major universities in DRC, with 12 academic divisions, and French as the language of instruction. KSPH is a part of the Faculty of Medicine and was established in 1984. KSPH has five departments namely, Biostatistics and Epidemiology; Health Management and Policy; Nutrition; Community Health; and Environment Health. It currently offers five master's degree programmes: Master in Public Health (MPH), Health Economics, Bioethics, Field Epidemiology and Laboratory Training Programme (FELTP) and, from 2014 also a Master in Nutritional Epidemiology.

The University of Bergen is the second largest university in Norway, and consists of seven faculties. Within the faculties are 60 specialised departments, centres and institutes. CIH was launched in 1988 and is now part of the Department of Global Public Health and Primary Care and the Faculty of Medicine with which there is a close collaboration, as well as across other Departments and Faculties at UiB, and other national and international institutions. Key tasks of CIH include research, education and leadership development with the aim of improving health in LMICs and addressing global health challenges. CIH teaching and training activities include master's programmes, PhD supervision, a research programme for medical students and a Global Health Course.

The University of KwaZulu-Natal (UKZN) has four colleges, distributed across five University campuses. CRH is an externally funded research centre, established in 1987, and is one of the seven departments under the School of Nursing and Public Health (SONPH). The goal of CRH is to improve the health and well-being of people in under-served areas by engaging in interdisciplinary implementation science

research. The primary function of CRH is research, and staff at CRH collaborate with partners from South African and international universities, other African and international countries, as well as international agencies including WHO and UNICEF. The scope of CRH incorporates research focusing in health systems strengthening, human resources for health, and health and social justice.

Recruitment and sampling

The study population consists of three groups 1) stakeholders, 2) supervisors/facilitators, 3) master's and PhD students. Stakeholders included those who were involved in the inception or management of the project at the three participating institutions and at PRONANUT. Stakeholders comprised managers from UNIKIN, KSPH, UKZN, UiB, as well as representatives from Norad, PRONANUT and the rural research site.

All facilitators/supervisors who had been involved in providing teaching and supervision for GROWNUT students were requested to participate.

Master's students were purposively selected to participate in the study from among 40 students who had graduated or were currently enrolled in the GROWNUT programme. Three participants from each of the four cohorts were recruited, which included at least one female participant from each cohort. Students were selected on the basis that they were willing and available to participate, and were able to come to KSPH to be interviewed. Three PhD students (two graduated and one currently enrolled) were requested to participate.

Data collection

Data was collected using in-depth interviews between October and December 2019. A semi-structured interview guide was used to guide the interviews and allow conversation, giving the researchers an opportunity to prompt further from what was said by participants. Interviews were conducted by two female researchers (SL and SM), who are trained to masters and honours level, and had not been directly involved in GROWNUT previously. Face-to-face interviews were conducted in Kinshasa and Durban (27); and telephone (1) and Skype (3) interviews were conducted with participants who were not available in Kinshasa or Durban, predominantly participants based in Norway.

Interviews were conducted in English or French, based on preference of participants. An interpreter was employed to assist with interviews conducted in French, all of which were conducted face-to-face in Kinshasa. Interviews were between 20 and 90 minutes.

Data analysis

All interviews were transcribed verbatim and those interviews conducted in French were translated to English. Transcripts were quality controlled by researchers who listened to a selection of audio-recordings to ensure that transcripts were correct and accurate. Data was analysed by researchers (SL, SM) using thematic analysis approach [16]. Researchers first familiarised themselves with the transcripts to develop an initial coding framework and later met with the research team to discuss initial findings and finalise the coding framework. Key focus areas were identified for coding, and data analysis. Nvivo v12 was used

for data analysis. The team met weekly to discuss emerging themes to be added to the analysis framework.

Ethical considerations

Ethical approval to conduct the study was obtained from UKZN Humanities and Social Sciences Research Ethics Committee (HSSREC) (HSS/0258/019), University of Kinshasa School of Public Health Ethics Committee (ESP/CE/247/2019), and Norsk Senter for Forskningsdata (NSD) (Ref 466503). All participants provided written informed consent for the interview. Participants were given unique study numbers to maintain confidentiality and anonymity. All identifiable information was removed from transcripts prior to data analysis. Participants who travelled to UNIKIN were compensated with \$5 to cover costs of transportation to get to interview.

Results

Thirty-one interviews were conducted with stakeholders, facilitators/supervisors and students involved in the programme from all the partner institutions. Of these interviews, 12 were with students in KSPH (9 master's students, 3 PhD students), 11 with facilitators or supervisors from all three partner institutions, and eight interviews from stakeholders at UNIKIN, KSPH, rural research site, and Bergen (Table 1). One PhD student had also graduated on the master's programme.

Four selected participants were unavailable to participate in an interview during the study period. These were one master's student, one facilitator from KSPH and one from UKZN, and a stakeholder from Bergen. The master's student was replaced by another student from the same cohort. One KSPH facilitator was replaced by another staff member from KSPH who had participated in teaching one module. One UKZN facilitator had left the university and could not be reached and was excluded. Overall, 13 interviews were conducted in French and 18 in English.

Characteristics of participants are shown in Table 1. Many of the facilitators and stakeholders were in management positions in the different institutions, and there was overlap between the two roles with five facilitators also having a management role in the project.

The findings are presented below under the main themes: perceptions of the partnership, experiences of joint teaching and supervision, and perceived benefits of the GROWNUT programme.

Table 1: Demographic details of participants

Supervisors/facilitators (n=19)/stakeholders n= 19	
Age (median)	54 (IQR 12)
Gender	
Male	9
Female	10
Role	
Managers at KSPH	4
Manager at UNIKIN	1
Norad representative	1
Rural site representative	1
Facilitator/supervisor on the GROWNUT programme	11
Current position	
Professor/academic staff	15
Project manager/advisor	2
Director of nutrition (PRONANUT)	1
Community leader rural research site	1
Institution in which based	
University of Kinshasa	12
University of KwaZulu-Natal	3
University of Bergen	4
Students (n= 12)	
Age (median)	39 (IQR=11.5)
Gender	
Male	8
Female	4
Occupation	
Medical doctor	9
Academic assistants	3
Level of academic of study	

PhD / Doctoral degree	3
Master's Degree	9
Partner university who co-supervised the degree	
UKZN	5
University of Bergen	6
Did not have a co-supervisor from a partner university	1
Attended training at partner universities	
Attended training at UKZN	9
Attended training at UiB	3

Perceptions of the GROWNUT partnership

Several stakeholders and facilitators/supervisors mentioned that a guiding principle of the GROWNUT partnership was that from its inception all partners had the health and nutrition needs of the DRC in mind. According to these participants, the main aim of the project was to produce a cadre of health professionals to work and conduct research in the field of nutrition in the DRC to address nutritional diseases and improve health in the country.

The partnership between the three institutions facilitated the establishment of the nutritional epidemiology master's and PhD programme at KSPH, providing an opportunity for the training of a new cadre of researchers in DRC. Teams from the three institutions collaborated in bringing different skills and resources to capacity building at KSPH through curriculum development, support of KSPH staff, and joint teaching and supervision of students. Project activities were set to be shared among the three institutions, allowing for the exchange of knowledge and skills.

The main aim of GROWNUT is, I think it is clearly written here, is fostering capacity, capacity building, because before GROWNUT, we did not have staff and also people out of the staff with a known background in nutritional epidemiology ... So, the idea was to place specialised persons with a known background in nutrition, especially in nutritional epidemiology, in the most affected health zones [health areas] and to do so you need staff with training or well trained in nutritional epidemiology. (Stakeholder 3, KSPH).

All participants perceived the partnership positively, feeling that the contributions of all three partner institutions added value to programme activities. A facilitator at KSPH summarised the overall benefits of the partnership as follows:

It was a very good experience, an experience of exchange, an experience of sharing between the three institutions. It did allow us [to] improve the level of our university, of our school of public health because the facilitators came from everywhere; Bergen, KwaZulu-Natal ... sharing experiences between three

universities of quality, the schools of public health of quality; it was a very good experience ... I can say that it was very good to exchange and share knowledge. (Facilitator 5, KSPH).

The nutritional epidemiology programme was the first of its kind in KSPH and in DRC. The educational programme mixed theory with clinical practice at the rural site, and included facilitators from partner institutions in all aspects of the programme. The KSPH mission was structured around three distinct pillars, teaching, research, and community service, and the GROWNUT partnership provided opportunities to address all three pillars.

And you know a particular programme for GROWNUT was very good for us because they give us the means or the occasion to mix theory and practice. You know the University has three missions, the first one is to teach, the second one is to research and the third one is the service to community. GROWNUT gives us an opportunity to link all of them, you know the training of our students in Popokabaka [rural research site] were very important so there they were doing the research but serving the population too (Stakeholder 2, KSPH).

However, the nutritional epidemiology programme was dependent on external funding, which paid for bursaries, maintaining the rural site, travel to the rural site and travel to partner universities and to conferences. Many students were able to enrol in the programme through the funding opportunities provided. Several participants mentioned that it may be difficult to continue running the programme without external funding, posing challenges of sustainability after the partnership is over.

I am not sure actually that this programme will continue as it is if there is no external interest and funding (Facilitator 9, Bergen).

The importance of a common vision

The partnership was funded by the Norwegian government in response to a funding call. As a result, it was planned at the outset to comply with the requirements of the funders. However, it was important for partners to identify a common vision in running the project, so that it would benefit all partners. Some stakeholders and facilitators mentioned that bringing together partners with different cultures, expectations and requirements was very challenging at times, and emphasised the importance of developing and keeping a common vision throughout the project period.

... the experiences with bringing three different universities with three different cultures, three different kind of backgrounds together and run a long programme together has been in one way a challenge but also very much something that we have learnt from ... (Facilitator 2, Bergen).

Project leaders and facilitators had meetings specifically aimed at establishing and maintaining a common vision to guide teaching and co-supervision between the partners. This was helpful for co-supervisors in capacitating them to provide supervision in partnerships.

I participated in the [supervisors] Workshop in Durban. The workshop was a good experience because it improved my skills on how to supervise students' research project (Facilitator 4, KSPH).

Regular meetings and communication between the three institutions were highlighted as being important, and communication between participating partners continued throughout the project with regular Skype meetings that facilitators described as being useful for maintaining common goals.

I think the team, although we are in three different cities, we talk regularly, we have regular Skype meetings and our Bergen colleagues are very good at writing down the action points, following up on the action points, making sure things get done, we have not really been in any conflict around the plans (Facilitator 7, UKZN).

One challenge mentioned by the participants, that impacted on the development of a common purpose, was a concern about how the hierarchy and power dynamics played out between the partners. Some participants suggested that the partnership was viewed as a one-way partnership with the two partnering universities capacitating UNIKIN instead of a three-way partnership benefiting all three institutions. In some cases, the collaborating partners were perceived as experts and took on the leadership role in running the activities of the program.

I think the leaders are very much from Norway and the UKZN and my observations are that they are the stronger partners and the bigger voice and they drive the kind of agenda (Facilitator 11, UKZN).

Experiences of joint teaching and supervision

Teaching

Teaching was shared between the three partners, and during the first two years of the project, facilitators from collaborating partner universities travelled to KSPH to provide teaching jointly with local facilitators, with English as the medium of instruction. However, in many cases local facilitators failed to work in partnership with facilitators from partner universities, leaving them to teach alone. In addition, the use of English limited participation of some academic staff from KSPH because they did not feel confident to teach in English or to interact with international facilitators.

In the first year it was kind of very much divided so that when the Norwegian was teaching, there were only Norwegian teachers in the classroom. When the South Africans were teaching, there were only South African teachers in the classroom but then after the first year we decided we need to do this kind of, as a process where the Congolese teachers, there should always be a Congolese teacher in the classroom to follow so, that they can take over (Facilitator 2, Bergen).

Facilitators from collaborating universities were very much appreciated by the students who perceived their participation as an opportunity to gain additional insights into their studies and research topics. However, in some cases the language barrier made it difficult for students to understand English-speaking facilitators and hindered the learning experience for students.

For me the problem was the English language. To be honest, I did not finish the module because the English was very strong. Moreover, I did not want to appear stupid because I am passionate about school (Student 9, PhD).

Due to political unrest in DRC, international facilitators were unable to travel from the third year of the project and from the enrolment of the third cohort of master's students the responsibility for providing classroom teaching fell on local facilitators. However, students in cohorts three and four travelled to South Africa for a two-week course on proposal development, giving facilitators from collaborating universities the opportunity to provide teaching and interact with the students as part of the common vision for the programme.

I think it was a big advantage in a way that we moved the proposal writing to Durban. Uh, not least because we then got the chance to have all the three universities together and all the three, kind of three mindsets present in the same room and doing really collective teaching. It was not one teacher observing the others but we were kind of doing this together (Facilitator 2, Bergen).

As a result of the travel ban not all KSPH based facilitators benefited from joint teaching. Many of the Kinshasa based facilitators regretted that the face-to-face teaching was largely discontinued after the second year. Local facilitators continued with teaching inspired by lessons learnt in the first and second cohort of the project.

It is true that when the programme started it was understood that the external professors will come to provide some form of coaching, bring their international expertise to Kinshasa and ensure that when he goes back Kinshasa will carry on with teaching and learning using the new methodology. I would say that it is what was done because during the first year of the programme each course facilitated had two professors, one from here and one from outside ... It was the local facilitators, inspired by the experience of the first year, which had to replicate the teaching and learning approach of the first cohort (Facilitator 4, KSPH).

Supervision

Supervision was done in partnership between local and international supervisors; each student had a local supervisor and a co-supervisor from a partner university for their research. Communication between supervisors was often a problem, and supervisors reported that a lack of effective communication between supervisors in relation to comments on students' written work caused tension between supervisors. Co-supervisors mentioned that their views and recommendations on students' work were often disregarded, with students failing to address comments. In particular, co-supervisors' recommendations about whether the work had reached acceptable quality for submission were sometimes ignored. KSPH had the final say on students' graduation, causing some disagreement among partners about the quality of theses submitted.

Based on our agreement the main supervisor was from the school [KSPH], the school should be in the driving seat, so the main supervisor was from our school and others were coming in from other places. So, for instance, when a student was drafting his thesis he or she would submit first to us and then share the feedback with other colleagues from UKZN or Bergen, so but most of the time the main decision was coming from our side, that we accept or do not accept ... Sometimes a supervisor from our side will go ahead and not take into account or not wait for the feedback from colleagues from elsewhere, that was frustrating for our colleagues but we were trying to address that (Facilitator 8, KSPH).

Some students also questioned whether the roles of the two supervisors were clear and mentioned that a lack of communication and co-ordination between supervisors meant that feedback was sometimes contradictory, making it difficult to know which advice to follow.

The negative side that I noted was that the co-supervisors were not collaborating between themselves and I was the bridge between them. However, I do not think they were discussing my work among themselves (Student 7, Master's student).

Students and supervisors from all partner institutions expressed frustration with the communication between supervisors and students, the distance and lack of travel opportunities made it difficult for co-supervisors and students to develop strong relationships, thus making communication and resolutions of disagreement about students' theses difficult.

I think that [supervision] was the biggest challenge, there were a number of challenges in the supervision. I think timelines were very difficult, people did not keep to timelines, they seemed to be quite flexible in Kinshasa, you thought you knew when people were going to Popokabaka [rural research site] and submitting their theses and so on and so on. Those timelines seemed to shift and move around and be fairly flexible, it was difficult to predict what needed to be done by when, you tended to have a lot of students wanting feedback all at the same time (Facilitator 7, UKZN).

Co-supervisors from partner institutions were perceived by students to be experts in their field but students felt that local supervisors had a better understanding of the context in which they were working. Students mentioned that it was much easier to receive feedback face-to face. The long-distance nature of the interactions was described as difficult at times, particularly given that co-supervisors communicated in English.

That [co-supervision] is a very important thing because it allows the student to have more knowledge as he has comments from all the supervisors. This helps the student to get perfection in the job done. I always say that having feedback from different supervisors is very beneficial for me, although some supervisors would have different preferences on the method of research. I take all the comments and feedback into consideration and apply all the suggestions because I believe that they have all read the document, and found mistakes that they want me to correct, after both supervisors have reached common ground. This makes for good quality and it is in my favour (Student 10, Master's student).

Perceived benefits of the GROWNUT programme

KSPH

Facilitators/supervisors at KSPH felt that the contributions of collaborating partners enriched and strengthened their learning experiences and enhanced their academic growth by providing a variety of skills and insights from researchers at partner institutions. Some stakeholders also mentioned that the partnership was beneficial not only for KSPH but also for DRC by providing resources to address nutritional problems in the country. The interactions arising from the partnership were particularly valuable in capacity building for KSPH academic staff, including junior staff, and participants expressed appreciation for the opportunity to learn and advance their academic skills through the relationship with the partners.

I was not trained in advanced epidemiology but I had to teach it. As such, I had to learn the subject to be able to facilitate it. This contributed to improve my knowledge and skills in the subject of epidemiology. As such, GROWNUT helped me to build my own capacity (Facilitator 4, KSPH).

One of the benefits of the programme was the establishment of a rural research site in Popokabaka, and participants mentioned that the project provided an opportunity to disseminate findings from student research at the rural training site. One of the stakeholders from the rural site mentioned that the conference organised by the project in Popokabaka was helpful in getting the community to understand some of the nutritional issues they were facing.

It was done in two stages where some members of the community were selected, due to scientific nature of the project, to participate. Secondly, we used the local radio and the local language to allow the entire community to understand what the students were doing (Stakeholder 8, Popokabaka).

Some stakeholders from KSPH mentioned that through the partnership they were now moving towards a new system of learning within the university, an online system similar to what is done by international universities.

Now we are building e-learning system ... We can teach from here to KwaZulu[-Natal] and we can also receive courses, training from KwaZulu[-Natal] to here. We have just to build a very good platform for that. We have now equipment and the School of Public Health will be accompanied in these programmes by Bergen (Stakeholder 1, UNIKIN).

The programme included support and resources for KSPH staff and students to present research findings at international conferences, which was highly valued by participants. Attending conferences gave participants exposure to the broader scientific community, providing opportunities for networking with other nutrition researchers, and for engagement with a range of academics with different experience of health research across Africa and elsewhere. In addition, the contribution of the partners added to the quality of the research outputs, thereby adding credibility to the research produced by the GROWNUT students.

In terms of the quality of the research projects that I supervised, the quality was higher than those of the other [master's] programmes. Perhaps the advantage of GROWNUT was that supervision was not conducted only locally but internationally. This brought about a level of rigour from both local and international pushing student to be more committed and less lazy than those in the other programmes (Facilitator 4, KSPH).

Collaborating partners

Facilitators and stakeholders from partner universities mentioned various positive benefits of the partnership including personal development and career development, and some international facilitators mentioned they gained skills and knowledge in nutrition, training and career growth opportunities for staff.

... it has given myself and my team a different perspective in lots of areas, ... I have learnt a lot about nutrition (Facilitator 7, UKZN).

Some of the facilitators/supervisors mentioned that the partnership opened opportunities for advancing their careers, including publication of research papers and employment opportunities.

I have learned a lot and I even benefitted from it with papers from University of Bergen, because as part of being now employed at the University of Bergen because of this programme, they forced me to take this university pedagogy and I have used kind of the experiences from GROWNUT in writing up papers for those courses (Facilitator 2, Bergen).

Students

Although some of the students mentioned they were unaware of the GROWNUT partnership prior to enrolling for the Master in Nutritional Epidemiology, after enrolling the students felt that the partnership added value in their training and learning experiences.

For me, the partnership is good because it allows the programme to have high value, you see. The University of KwaZulu-Natal and the Bergen University are well known universities and take the higher rank worldwide. Having Professors coming all the way from there to our university here is huge. This triangulation, partnership shows that what we are learning is of high level and all these are for our interest (Student 10, master's student).

For the students, the partnership offered opportunity for career pathing and opened the door to seek opportunities outside of DRC. Some of the students were employed by KSPH as assistants to provide teaching, being involved in the project improved their skills in teaching.

I am like a GROWNUT teacher, I feel like this program helped me to have more skills in my institution. To be a good teacher (Student 03, master's student).

Some PhD students were able to publish papers during the project period. However, none of the master's students have published any papers thus far. One of the PhD students mentioned that the partnership of institutions helped him in improving the quality of work published.

... the main objective to me is to become competitive, you know, before the programme, before starting this programme I used to publish local journals and some low quality reviews but working with the two other universities it was an important to me to aim high, you know ... my paper needs to be relevant for the scientific community so I need to work hard and the skill I got from the project I think maybe I can say that the project, the two universities, Bergen and KwaZulu-Natal helped me to increase my view on scientific evidence of some array, especially for nutritional aspect in the DRC (Student 12, PhD student).

Discussion

Over a 6-year implementation period, the GROWNUT partnership successfully implemented a new postgraduate nutritional epidemiology programme, producing a substantial number of master's and PhD graduates, building institutional capacity at KSPH and health research skills and academic leadership in DRC. The partnership provided support and enriched learning experiences for academic staff at all partner institutions, leading to increased engagement with wider research communities, and development of relationships that will provide future opportunities for collaboration. Collaborating partners were able to navigate challenges by maintaining open communication and building a strong unified vision for the project, rooted in the common goal of improving health and nutrition for the DRC population. Challenges commonly experienced in such partnerships, including issues of power and hierarchy between partners, did arise but were mitigated by the strong relationships built between partners. Further, our study suggests that there are sufficient benefits to go around, so that all partners can benefit without any single partner dominating the partnership. However, sustainability remains a concern and the duration of the collaboration was short, given its ambitious aims.

The GROWNUT partnership provided a different perspective on the traditional North-South partnerships by including a second southern partner, thereby re-balancing partnership dynamics, as well as by considering DRC context and needs at the forefront of all planning and implementation. Previous research has suggested that research agendas of North-South partnerships are frequently driven by priorities of the North partners rather than the needs of the south side of the partnership [9, 12]. North partners often failed to engage fully with partner's needs, and south partners agreed to participate in unequal partnerships not based on local priorities in order to obtain crucial funding [12]. Stakeholders in our study reiterated that the need to find solutions to nutritional problems in DRC was the key driver in the development of the GROWNUT partnership. All partners were involved in developing and planning the proposal and applying for funding, and had a shared vision based on achieving benefits for all the partners and the DRC. Further, the GROWNUT partnership was firmly sited in DRC, thus avoiding another pitfall for international health research capacity building partnerships, which is the migration of LMIC participants to partner countries. In addition, deployment of students to rural areas, strengthened the links between the programme and the needs of local communities in one of the most deprived areas of the

country. Power dynamics were more balanced between the different partners, because although the funding agency in the north had control over funding, decisions about project strategy and activities were made jointly among partners and submitted to the funders. In addition, KSPH had power on decisions about student research and graduations, and so were able to control much of the research agenda.

Challenges with co-supervision were a strong theme highlighted by participants. Literature highlights multiple benefits of co-supervision that include shared expertise between supervisors and students, second opinions on written work for students, and insurance for continuity of work should anything happen to one supervisor [17, 18]. However, challenges with communication between students and supervisors, misunderstandings, lack of co-ordination among supervisors, and conflicting feedback from supervisors are some of the issues that participants raised about co-supervision in our study and elsewhere [18]. GROWNUT students reported that they benefitted from co-supervision, but supervisors struggled with challenges often faced in co-supervisory relationships. Pre-supervisory meetings, continued regular meetings among supervisors and students, and discussions among supervisors about feedback prior to sharing this with students have been suggested as ways to mitigate challenges in co-supervision relationships [17, 18]. To address the challenges GROWNUT held a workshop among supervisors but this was insufficient to build strong working relationships between supervisors partly because the travel ban reduced opportunities for meetings between supervisors and students. However, supervisor-student meetings could have used electronic media and email to reduce communication barriers and misunderstandings, and strengthen the relationship between DRC supervisors, co-supervisors and students. A future partnership would specifically address co-supervision to improve planning, coordination and communication, and build relationships to ensure that all participants can gain the benefits of co-supervision.

The GROWNUT partnership provided a wide range of opportunities and benefits for all partners, at individual, institutional, and country levels. Benefits varied depending on the needs and interests of individual participants and institutions. The partnership provided opportunities for academic staff and students to learn from one another, and develop strong relationships and networks that would outlast the project period [19]. The partnership produced a cadre of health professionals with research skills in the field of nutrition who have already begun to provide capacity to explore and develop interventions to address health problems in the years to come. Graduates are currently working in many key institutions in DRC, thus increasing the potential for future research to identify local solutions to nutritional problems facing the country.

For individual participants the partnership offered opportunity to grow in their careers and broaden their horizons, gaining opportunities to interact with international partners and exposure to the wider field of nutrition and health research. For some students, attending international conferences and traveling to partner institutions opened opportunities to interact with international experts in the field of nutrition. Although such activities are limited by funding and may be difficult to sustain, they are of lasting value to individuals and provide a platform for the development of future academic leaders in the field of nutrition, adding value to institutions and individuals.

Academic staff from all partner HEIs gained experience and skills in providing teaching, and students took up teaching roles in KSPH and at other universities. Literature suggests that international partnerships provide opportunities for career pathing for only the south side of the partnership [9], but we showed widespread benefits and career pathing opportunities across all partner institutions, including in Norway and South Africa. As academics in the field of global public health, participating in such a collaboration provided important opportunities for growth for senior academic staff, including skills in writing funding proposals, grants management, and opportunities for collaborating on research publications relating to key global public health challenges. Several junior academic staff at partner institutions were given opportunities to develop skills within the GROWNUT partnership.

Research outputs is a key output of all academic institutions and a North-South partnership provides opportunities to improve and support high quality research outputs. DRC, like many LMICs, has poor research outputs, particularly in health research and nutrition [15, 20], emphasizing the importance of having credible research findings in the country to inform policy development. One of the shortfalls of the GROWNUT partnership was a failure to translate students' research to published research to inform policy development and interventions in DRC. Most student dissertations were not written up for publication or reported to the Ministry of Health in DRC, threatening the outcomes of the project in terms of impacting on nutrition policy. However, a small number of publications are being drafted by students in the final months of the partnership. A future partnership would have a stronger focus on developing a coherent research agenda, strengthening credibility of research findings and providing support for dissemination of results, particularly from the rural research site.

North-South partnerships have been criticized for being unsustainable in terms of the benefits of the partnership itself and the resources provided [2], and this was a concern for the GROWNUT partnership. However, because KSPH was at the forefront of decision-making about resources required and sustainability was a strong consideration throughout, there will be continued benefit to KSPH. UNIKIN and KSPH gained resources that included e-learning platforms, libraries, and improved approaches to learning, which will be maintained by the university after the partnership is over. The KSPH will continue to provide support for e-learning, because they are building on existing initiatives in the school and providing opportunities for blended learning in the future.

However, many students were dependent on bursaries that may no longer be available and may threaten the programme going forward, with students in future cohorts having to seek alternative funding. The rural research site and rural research internship was strongly emphasized by several stakeholders as important in the learning process, and was one of the key pillars of learning for the nutritional epidemiology programme. The rural internship had benefits for the rural population and strengthened students' experience of the nutrition needs of rural communities. However, the rural research site was fully funded by the project, and is likely to be unsustainable. Thus, sustainability is a concern for such partnerships, but should not take away from the long-term benefits of the successes achieved during the project period.

Conclusion

This partnership was successful leading to sustainable benefits for individuals, participating institutions of higher learning, and for the public health and nutrition research capacity of the DRC. North-South-South partnerships can be harnessed to address skills shortages in health research in low income settings, with extensive benefits for all participants, as long as participants focus on a common vision. However important questions of sustainability remain so that in establishing partnerships involving LMICs, it is important to consider sustainability at the forefront of all decision-making.

Abbreviations

CIH	Centre for International Health
CRH	Centre for Rural Health
DRC	Democratic Republic of Congo
FELTP	Field Epidemiology and Laboratory Training Programme
GROWNUT	Growing Partnership for Higher Education and Research in Nutritional Epidemiology
HEI	Higher Education Institutions
KSPH	Kinshasa School of Public Health
LMIC	Low-Middle Income Countries
MPH	Masters in Public Health
NORAD	Norwegian Agency for Development Cooperation
NORHED	Norwegian programme for capacity development in Higher Education and Research Development
PRONANUT	National Nutrition Programme
SONPH	School of Nursing and Public Health
UiB	University of Bergen
UKZN	

Declarations

Ethics approval and consent to participate

Ethical approval to conduct this evaluation was obtained from the University of KwaZulu-Natal Humanities and Social Sciences Research Ethics Committee (HSS/0258/019), University of Kinshasa School of Public Health Ethics Committee (ESP/CE/247/2019), and Norsk Senter for Forskningsdata (NSD) (Ref 466503). All participants provided written informed consent to participate in the evaluation. Each participant was given unique study number to ensure confidentiality and anonymity.

Consent for publication

Not applicable

Availability of data and material

All data, transcripts and study tools to support the findings of this study are available from the Centre for Rural Health, UKZN, and will be made available upon reasonable request to the principal investigators.

Competing interest

The authors declare that they have no competing interests.

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Authors' contributions

CH, LH, SL and SM designed and planned the study with inputs from VJ, MMA and AH. SL and SM collected and analysed the data. SL and CH wrote the first draft with input from AH, LH, SM, and VJ. All authors (AH, SL, VJ, LH, SM, PM, TT, IE, CH, MMA) reviewed and commented on the manuscript

throughout the writing process. All authors (AH, SL, VJ, LH, SM, PM, TT, IE, CH, MMA) read and approved the final manuscript.

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