






'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

Anne Hatløy ^{a,b}, Silondile Luthuli^c, Vaughn John^d, Lyn Haskins ^c,
Sphindile Mapumulo^c, Paulin Mutombo^e, Thorkild Tylleskär ^a,
Ingunn M. S. Engebretsen ^a, Christiane Horwood ^c and Mala Ali Mapatano^e

^aCentre for International Health, University of Bergen, Bergen, Norway; ^bFafo Institute for Labour and Social Research, Oslo, Norway; ^cCentre for Rural Health, School of Nursing and Public Health, University of KwaZulu-Natal, Durban, South Africa; ^dSchool of Education, University of KwaZulu-Natal, Pietermaritzburg, South Africa; ^eKinshasa School of Public Health, University of Kinshasa, Kinshasa, Democratic Republic of Congo

ABSTRACT

Partnerships between Higher Education Institutions in the global South and North have potential for building capacity in public health research in low-resource countries. We present experiences of partners involved in a North–South–South partnership between universities in Norway, the Democratic Republic of Congo (DRC) and South Africa. 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. In-depth interviews were conducted with 31 purposively selected stakeholders, facilitators, and students from partner institutions. All participants expressed positive experiences, indicating that the partnership provided excellent opportunities to network, enriched participants' learning and enhanced academic growth, with benefits at individual, institutional, and country levels. Participants suggested that maintaining a common vision was important for success, facilitated by joint planning of project activities, focussing strongly on building research and academic capacity at Kinshasa School of Public Health and addressing local nutrition problems. Important challenges highlighted for future partnerships included failures of co-facilitation and co-supervision, poor research dissemination and policy impact, and concerns about sustainability. Notwithstanding, North–South–South partnerships can address skills shortages in public health research with significant benefits to all partner institutions.

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Background

Health research partnerships between higher education institutions from countries in the global North and the global South have received increased attention in the literature over recent years (Atkins et al., 2016; Barrett et al., 2011; Kok et al., 2017; Loukanova et al., 2014). Low-and

CONTACT Anne Hatløy  anne.hatløy@uib.no  Centre for International Health, Box 7804 University of Bergen, N-5020 Bergen, Norway

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middle-income countries suffer from a high burden of public health challenges, and often have limited resources and research capacity to address these burdens (Chastonay et al., 2015; Protsiv et al., 2016). North–South partnerships between higher education institutions provide an opportunity to address this disparity and have been successful in achieving this (Matenga et al., 2019). However, such partnerships have also been widely criticised for unequal power dynamics, communication barriers, and skewed ownership of research deliverables, often favouring the North side of the partnership (Boum, 2018; Matenga et al., 2019). 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 (Crane, 2010). The North usually has control of funding, research activities, and reporting of research findings, with the danger that partners in the south are reduced to the role of data collectors (Corbin et al., 2013; Kok et al., 2017; Van der Veken et al., 2017). However, according to Stern and Green, good partnerships based on the commitment between partners, mutual trust, equal ownership, and common goals among the partners, can have wide-ranging benefits for all partner institutions (Stern & Green, 2005). Successful partnerships have been able to achieve their collaborative goals, despite huge inequalities between institutions, through mutual respect and joint ownership, equality in running the project, setting of clear goals, and good communication (Atkins et al., 2016; Corbin et al., 2013; Crane, 2011).

Many North–South partnerships between higher education institutions include two or more Southern partners and this may serve to provide a more balanced partnership. Riitaoja and colleagues suggest that when western modes of teaching and learning dominate, learning may fail to provide for social justice and contextually relevant skills sharing, with little space for cultural diversity and Southern epistemologies. Developing an understanding of the views, contexts and diversity of perspectives can enhance learning and challenge the status quo, thus moving from educational tourism to true collaborative learning and professional development (Riitaoja et al., 2019). Funds and research skills development are required to support sustainable southern research centres for southern partners to initiate their own public health research projects and break the cycle of running after funding provided by northern donors at the expense of addressing local research and knowledge gaps. Increased explicit investment and focus on South–South collaboration within such partnerships could promote sustainability (Van der Veken et al., 2017).

Many sub-Saharan African countries have high rates of malnutrition, making context relevant and evidence-based interventions important to inform policy-makers and address poor nutrition. 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 (USAID, 2021). In DRC approximately 42% of children under 5 years are stunted (29% in urban areas and 50% in rural areas) and 7% have acute malnutrition (INS, 2019). This has far-reaching consequences, not only for individual children, but for the whole country. DRC has limited health care resources, inadequate access to interventions to alleviate nutritional problems and a poor track record of health research (McKee et al., 2012).

The GROWNUT project was a three-way partnership between higher education institutions in DRC, Norway, and South Africa (SA) 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 capacity in public health and nutrition in DRC (Ali et al., 2021). In this paper, we present findings from a qualitative study describing experiences of students, staff and stakeholders participating in the project and their perceptions about the partnership, highlighting successes, challenges and lessons learnt.

Description of project

GROWNUT was a collaborative partnership between KSPH at University of Kinshasa in DRC, Centre for Rural Health (CRH) at University of KwaZulu-Natal (UKZN) in SA, and Centre for

International Health (CIH) at University of Bergen, Norway. The partnership ran for more than six years from 2014 to end 2020. 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 inform evidence-based interventions and policies to address malnutrition.

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 selected as the 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, ensuring that students had opportunities to learn practical skills in nutrition and research, and were exposed to the real-world problems of rural communities in DRC. The nutritional epidemiology programme was housed at KSPH and conferring of degrees was the responsibility of the University of Kinshasa. Details of project activities and roles of partners are shown in [Table 1](#).

Institutional partners collaborated to develop the master's programme using interactive learning methodologies including elements of both theory and practice. 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. Research topics were selected by students and included breastfeeding practices, food insecurity, dietary habits, agricultural practices and the double burden of malnutrition, among others. For the research, all students had a primary supervisor in DRC and a co-supervisor from a partner institution. The nutritional epidemiology training programme for master's students is described in more detail elsewhere (Ali et al., 2021).

Four cohorts of master's students were enrolled in the nutritional epidemiology programme from 2014 to 2018. A total of 41 master's students were enrolled, 40 of whom have graduated. Six PhD students registered: two graduated, two will graduate in 2021 and two PhD students de-registered. All PhD students had the opportunity to spend time at a partner university to enrich their learning experience and develop 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.

Materials and methods

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

Study site

The University of Kinshasa is one of the three major universities in DRC, with 12 academic divisions, and French as the language of instruction. KSPH was established in 1984 and is part of

Table 1. Activities of partners by project phase and timeline over project period (2014–2021).

Project phase	Objective	Activities (lead partner)	Timeline
1. Inception phase: preparation and planning	Development of common vision	Three face-to-face meetings between partners in Kinshasa (2) and Bergen (1) Based on the vision of the Scaling Up Nutrition (SUN) movement and MDGs Partnership developed with participation of DRC Ministry of Health (PRONANUT)	2014
	Curriculum development	17 modules designed (all partners) Curriculum developed to align with other masters programmes at KSPH (KSPH) Curriculum approved by Secretary General of Academic Affairs, University of Kinshasa (KSPH)	2014
	Identification and establishment of rural research site	MOU signed with Diocese of Popokabaka to set up rural research site (KSPH) Renovations undertaken to provide accommodation for students at Popokabaka (KSPH)	2015
	Establishment of resources for GROWNUT students	Library facilities/books provided (University of Bergen) Students give access to UIB library (University of Bergen) Equipment for nutritional studies and research purchased (UKZN)	2014–2015
2. Establishment of the nutritional epidemiology programme	Communication between partners	Annual meetings commenced (University of Bergen) Regular online meetings every two weeks (University of Bergen) Study trip to Makerere University, Uganda (all partners) GROWNUT presented to the Minister of Higher Education in DRC in a formal ceremony Visits to the South African Embassy and Norwegian Consulate in Kinshasa	2015
	Nutritional Epidemiology masters programme	Students selected and enrolled (KSPH) Bursaries provided to selected students (KSPH)	2014
	Teaching programme for Master's students commenced	Teaching of modules allocated to different partners (all partners and Ministry of Health [PRONANUT])	2014–2015
	First cohort Master's students deployed to rural research site (four-month internship)	Student teaching and supervision at rural site (KSPH)	2015
	Research projects undertaken by Master's students	Primary supervision (KSPH) Co-supervision (University of Bergen and UKZN)	2015
	PhD programme commenced	Two PhD students selected and enrolled (KSPH) Joint supervision with partner institutions (all partners)	2015
	3. Implementation phase	Ongoing enrolment of cohorts of Master's students (cohorts 2–4)	Ongoing enrolment Master's students annually (KSPH) Annual bursaries awarded (KSPH) Co-teaching (all partners) reduced after second cohort due to DRC travel ban but students travelled to South Africa Primary supervision (KSPH) Co supervision (UKZN and University of Bergen) Rural internship (KSPH)
Graduation of Master's students		Theory examinations (KSPH) Examination of research theses (KSPH) Awarding of degrees (KSPH)	2016–2020
PhD students		Students undertook placement at UKZN (UKZN) Further two PhD students selected and enrolled (KSPH)	2016
Ongoing communication between partners		Two weekly online calls (UIB) Annual meetings with all partners (all)	Project

(Continued)

Table 1. Continued.

Project phase	Objective	Activities (lead partner)	Timeline
4. Cementing project and Evaluation	Dissemination of students' research	Regular social and team building activities during face-to-face meetings (all) Students' conference presentations (KSPH students)	2017–2020
	Mid-point partners workshop	Students publications (KSPH PhD students) Workshop conducted in Durban with all partners to revisit vision, clarify roles and responsibilities of partners and address concerns regarding co-supervision (UKZN)	2017
	Extension of project period Students graduated	Project period extended to end 2020 40 Master's students graduated (KSPH) 2 PhD students graduated (KSPH)	2019–2020 Project period
	Internal evaluation undertaken	Data collection among students, supervisors and stakeholders (UKZN) Three manuscripts submitted from evaluation findings (all partners)	2019–2020
	Dissemination of students' research	Writing workshop for students in Kinshasa (UKZN) Mentoring of students' manuscripts (all partners) Five masters' students manuscripts in draft Students conference presentations planned for 2020 cancelled due to covid	2019–2020
	Conference undertaken at rural research site Deployment of resources for blended learning	Research findings presented to local community in Popokabaka (KSPH) Computers and software Videoconference facilities Internet access	2019 2019–2020

the Faculty of Medicine. KSPH has five departments namely, Biostatistics and Epidemiology; Health Management and Policy; Nutrition; Community Health; and Environmental 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, consisting of seven faculties, within which are 60 specialised departments, centres and institutes. CIH was launched in 1988 and is part of the Department of Global Public Health and Primary Care at the Faculty of Medicine. Key CIH tasks include research, education and leadership development aimed at improving health in low- and middle-income countries and addressing global health challenges.

UKZN has four colleges across five campuses. CRH is an externally funded research centre, established in 1987, and is part of the School of Nursing and Public Health. The goal of CRH is to improve health and well-being of people in under-served areas by engaging in interdisciplinary implementation science research focusing on health systems strengthening, human resources for health, and social justice. CRH staff collaborate widely with South African and international universities, in other African countries, and with international agencies including WHO and UNICEF.

Recruitment and sampling

The study population consists of three groups: (1) stakeholders, (2) supervisors/facilitators, and (3) master's and PhD students. Study participants were approached to participate via email. All identified stakeholders were requested to participate, including individuals involved in the inception or management of the GROWNUT project at the three participating institutions and at PRONANUT. Stakeholders comprised managers from the University of Kinshasa, KSPH, UKZN, University of Bergen, as well as representatives from the funder (Norad), DRC Ministry of Health (PRONANUT)

and the rural research site. All facilitators/supervisors involved in providing teaching and supervision for GROWNUT students were requested to participate.

Master's students were purposively selected 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, including at least one female participant from each cohort. Students were selected based on their willingness and availability to participate in interviews. Three PhD students (two graduated and one currently enrolled) were requested to participate.

Data collection

Data were collected using in-depth interviews, using a semi-structured interview guide to guide the interviews and allow conversation, giving the researchers an opportunity to prompt further from what participants said. Interviews were conducted by two female researchers (SL, SM), who are trained to masters and honours level, and had not been directly involved in GROWNUT previously. The researchers were experienced qualitative researchers employed in research positions at UKZN and had previously met several of the participants.

Interviews were conducted in English or French, based on preference of participants. An interpreter assisted with interviews conducted in French, all of which were conducted face-to-face in Kinshasa. Otherwise only the participant and interviewer were present during interviews. Interviews were between 20 and 90 min. Data collection was completed as planned, at which time researchers determined that data saturation had been reached.

Data analysis

All interviews were audio-recorded, transcribed verbatim and 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 were analysed using a thematic analysis approach (Braun & Clarke, 2006). A sample of transcripts were coded independently by two members of the research team (SL, SM) to identify a priori themes based on the research questions and new themes emerging from the data. Researchers later met with the research team, comprising five senior researchers from the GROWNUT project, 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), KSPH Ethics Committee at University of Kinshasa (ESP/CE/247/2019), and Norsk Senter for Forskningsdata (NSD) in Norway (Ref 466503). Participants were informed about the purpose of the research and provided written informed consent. 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 the University of Kinshasa for the interview were compensated with US\$5 to cover the costs of transportation.

Results

Thirty-one interviews were conducted with stakeholders, facilitators/supervisors and students from all the partner institutions between September and December 2019. Face-to-face interviews were conducted at a private venue at KSPH in Kinshasa and at CRH in Durban (27); and telephone

(1) and Skype (3) interviews were conducted with participants not available in Kinshasa or Durban, predominantly those based in Norway. 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 8 interviews with stakeholders at the University of Kinshasa, KSPH, rural research site and University of Bergen (Table 1). One PhD student had also graduated on the master's programme.

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

Characteristics of participants are shown in Table 2. Many 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 partnership.

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

Table 2. Demographic details of participants.

	Supervisors/facilitators (n = 19)
Age (median)	54 (IQR 12)
Gender	
Male	9
Female	10
Role	
Managers at KSPH	4
Manager at University of Kinshasa	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	
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
Partner university who co-supervised the degree	
UKZN	5
University of Bergen	6
Did not have a co-supervisor	1
Attended training at partner universities	
UKZN	9
University of Bergen	3

DRC in mind. According to these participants, the main aim of the project was to produce a cadre of health professionals to conduct research in the field of nutrition in the DRC, 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. 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 planned to be shared among the three institutions, allowing for 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 ... 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, 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 curriculum mixed theory with clinical practice at the rural site, and included facilitators from partner institutions in all aspects of the teaching 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 [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 of the rural site, travel to the rural site and travel to partner universities and 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 think the school is trying to continue (with the nutritional epidemiology programme) but we are facing financial difficulties and it is everywhere in this country, you know. We are not getting support from the government other than legal support and all that, but in terms of finances, we have to really knock at different doors. So, as much as we would like to continue to push it, we realise that it is going to be a challenge. But we will wait and see. (Facilitator 3, KSPH)

The importance of a common vision

A funding proposal was developed by the partners in response to a call for proposals by the Norwegian Agency for Development Cooperation (Norad), and as a result the project was planned from 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 there would be benefits for all partners. All partners met several times in the inception phase to develop the vision for the project, this vision was maintained and revisited during regular online and in-person meetings throughout the project

period and during a supervision workshop conducted with all partners at UKZN in 2017. 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 maintaining 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, University of Bergen)

Project leaders and facilitators had meetings specifically aimed at establishing and maintaining a common vision to guide teaching and co-supervision between partners.

The planning process, given the challenges, has actually been very positive. I think all of the people in the team, despite the fact that they are all strong and with their own ideas, have also been very willing to put their heads together and come up with a common plan. (Facilitator 7, UKZN)

Regular meetings and communication between the three institutions were highlighted as being important, and communication between partners continued throughout the project with regular Skype meetings that facilitators described as useful for maintaining common goals. However, time was needed to develop relationships and trust between the partners, which was an important foundation for the project.

It takes quite a bit of time ... to establish a working relationship which includes ... trust in and knowledge about each other, confidence. I think now in this 5-year period ... I think we have reached (that). We have all of that now and now we can kind of float and continue. You do not do that only in some months when you have irregular meetings and have your skype meetings, you build that over years. (Facilitator 10, UiB)

One challenge mentioned by participants, that impacted 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 the University of Kinshasa instead of a three-way partnership benefiting all three institutions. There was also some acknowledgement that partners perceived the North partner, and to a lesser extent the South African partner, as being 'expert' leading to a degree of hierarchy within the partnership.

So, I think there is a genuine attempt to try and almost flatten some of those hierarchies that play out in [inaudible] partnerships, but that is partly because of the kinds of people that are running it. I think the models are still very much hierarchical, the models of development, and that comes because of where the funders are. (Facilitator 11, UKZN)

Partners mentioned that the Bergen team took on the leadership role in running the activities of the programme, but this role was accepted and appreciated by other partners.

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)

Experiences of joint teaching and supervision

Teaching

During the first two years of the project, facilitators from collaborating partners travelled to KSPH to teach all modules jointly with local facilitators, with English as the medium of instruction. However, initially local facilitators failed to work in partnership with facilitators from partner universities, leaving them to teach alone. One reason for this was that the use of English limited the 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 ... there should always be a Congolese teacher in the classroom to follow, so that they can take over. (Facilitator 2, University of Bergen)

Facilitators from collaborating universities were 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 (Horwood et al., 2021).

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, facilitators from partner universities were unable to travel from the third year of the project, so from the enrolment of the third cohort of master's students the responsibility for classroom teaching fell on local facilitators. As a result, not all KSPH-based facilitators benefited from joint teaching, and many regretted that face-to-face teaching was largely discontinued after the second year. Local facilitators continued with teaching inspired by lessons learnt in the first two cohorts, particularly the second cohort where a specific effort was made to ensure that all teaching was conducted jointly. This had the effect of empowering and capacitating local facilitators.

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)

However, all 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 teach and interact with the students. This provided an opportunity for a broader teaching collaboration with representatives from all institutions participating.

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, University of Bergen)

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 lack of effective communication between co-supervisors regarding comments on students' written work caused tension. Co-supervisors mentioned that their feedback on students' work was often disregarded, with students failing to address comments. In particular, co-supervisors' recommendations about whether the work had reached an acceptable standard for submission was 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, 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 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 disagreements 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 [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. For some students the benefit of having different inputs from two co-supervisors was positive, while for other students it was frustrating and counter-productive. The following quotes from students illustrate the contrasting views expressed:

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. (Student 10, Master's student)

It [interacting with two supervisors] was not easy. You have to find the right the balance between all feedbacks that you are getting from two supervisors and the problem also I can say this one, was I can say was not good ... so I think when you are talking to someone face to face compared to by mail, it is not the same, this was not easy, here we were with our supervisor where we can meet at any time that you need you make the appointment, the other one from Durban you have to write or send a mail so you can get the feedback from her or him, this was not easy in my opinion. (Student 11)

Perceived benefits of the GROWNUT programme at 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.

The fact of having partnership with foreign institutions for me, adds value, weight, and credit to our institution. If the collaboration was to continue in one way or another even without much money it will be a very good thing for our institution. When you are isolated, you think that you are doing things in the best possible way, but when you encounter other people and exchange experiences, it is then that you realised that you still have a lot of room for improvement and growth. I would really love to see the collaboration continuing. (Facilitator 4, KSPH)

Some stakeholders also mentioned that the partnership was beneficial not only for KSPH but also for DRC by providing resources to address nutritional and public health problems in the country.

Interactions were particularly valuable in capacity building and for the empowerment of 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 stakeholder 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 faced.

It was done in two stages where some members of the community were selected, due to the 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, Rural research site)

Some stakeholders from KSPH mentioned that through the partnership they were 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, University of Kinshasa)

The programme included support for KSPH staff and students to present research findings at international conferences, which was highly valued by participants. This 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 health research experience across Africa and elsewhere. In addition, the contribution of the partners added to the quality of research outputs, 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 (facilitators), pushing students 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 positive benefits of the partnership including personal and career development, and some international facilitators mentioned they gained skills and knowledge in nutrition, and 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 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 the experiences from GROWNUT in writing up papers for those courses. (Facilitator 2, University of Bergen)

Students

Although some students mentioned they were unaware of the GROWNUT partnership prior to enrolling for the Master in Nutritional Epidemiology, after enrolling they 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 an 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, and 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 published papers during the project period. However, none of the master's students have published any papers thus far. One PhD student mentioned that the partnership of institutions helped him improve the quality of published work.

... 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 skills 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 in some areas, especially for nutritional aspects 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 public 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 in the DRC. 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. Although the Norwegian partner was seen as taking a type of leadership role, particularly in terms of administrative functions, this was appreciated by the partners and not necessarily viewed as taking a dominant role. 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, we acknowledge several major challenges, in particular the failure to translate students' research findings into either peer-reviewed publications or changes in health policy. In addition, sustainability remains a major 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 South Africa as a second southern partner to provide African expertise to support the partnership and a different perspective to enrich the learning in the nutritional epidemiology programme. The data clearly suggests that it was not just the Northern partner but also UKZN as the Southern partner that was viewed by the DRC partner as experts. This altered the

dynamic of the North–South hierarchy, and we suggest that UKZN may have served to bridge the inequalities and differences in expectation between the North and South partners, which have been identified as challenges to forming meaningful partnerships (Crane, 2011). A true partnership is one that is owned by all partners and is beneficial to all (Okeke, 2018), and by bringing the partners closer together, we suggest that the South African partner strengthened the mutually beneficial nature of the GROWNUT partnership and enabled the spread of benefits across all partners.

Previous research 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 (Corbin et al., 2013; Van der Veken et al., 2017). North partners frequently failed to engage fully with the partner's needs, and south partners frequently agreed to participate in unequal partnerships, not based on local priorities, to obtain crucial funding (Van der Veken et al., 2017). Stakeholders in our study reiterated that finding solutions to nutritional problems in DRC was the key driver in the GROWNUT partnership. All partners participated in developing the proposal and applying for funding, and had a shared vision based on achieving benefits for all partners and for 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 low-income country participants to partner countries. In addition, the 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 partners, because although the funding agency in the north had control over funding and provided some leadership, decisions about project strategy and activities were made jointly among partners and submitted to the funders. In addition, KSPH had decision-making power about student research and graduations, and so was able to control much of the research agenda. We therefore feel that we largely achieved the aim of building an equitable partnership.

Challenges with co-supervision were a strong theme highlighted by participants. Literature highlights multiple benefits of co-supervision including 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 (Olmos-López & Sunderland, 2017; Paul et al., 2014). However, challenges with communication between students and supervisors, misunderstandings, lack of co-ordination and conflicting feedback from supervisors were issues that participants raised about co-supervision in our study and elsewhere (Olmos-López & Sunderland, 2017). Some GROWNUT students reported that they benefitted from co-supervision, but others were frustrated by conflicting feedback in writing from supervisors far away, and preferred to speak face-to-face with supervisors who understood their challenges. Language diversity between supervisors and students, further exacerbated these challenges, these are further described elsewhere (Horwood et al., 2021). Supervisors struggled with challenges often faced in co-supervisory relationships and, in some cases, co-supervisors' serious concerns about the quality of students' work were not addressed. Pre-supervisory meetings, continued regular meetings among supervisors and students, and discussions among supervisors prior to sharing feedback with students, have been suggested as ways to mitigate challenges in co-supervision relationships (Olmos-López & Sunderland, 2017; Paul et al., 2014). To address the challenges, a workshop was held among partners to revisit the vision of the partnership, and address concerns about co-supervision, but this was insufficient to build strong working relationships between co-supervisors, in part because the travel ban reduced opportunities for meetings. However, electronic media and email to reduce communication barriers could have been used to strengthen the relationship between DRC supervisors, co-supervisors and students, while acknowledging that internet access was frequently challenging in DRC. Co-supervision was a key contribution of the GROWNUT partner institutions and, if fully realised, could have strengthened the quality of students' research and would likely have improved research outputs. However, we failed to achieve the full benefits of co-supervision, despite this being a quite straightforward activity and it would be essential for any future partnership to specifically address these concerns.

It is important to define supervisors' roles and responsibilities, improve planning, coordination and communication, and build relationships to ensure that all participants 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 (Färnman et al., 2016). The partnership produced a cadre of health professionals with research skills in the field of nutrition and public health who have already started providing capacity to address health problems in the years ahead. Graduates are currently working in many key institutions in DRC, increasing the potential for future research to identify local solutions to nutritional problems facing the country.

For individual participants, the partnership offered an opportunity to grow in their careers, broaden their horizons, interact with international partners and gain exposure to the wider field of nutrition and public health research. For some students, attending international conferences and travelling to partner institutions provided 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 public health and nutrition, adding value to institutions and individuals.

Academic staff from all partner universities gained experience and skills in providing teaching, and students took up teaching roles in KSPH and at other universities. A key GROWNUT objective was to provide skills development and career pathing opportunities for KSPH staff, particularly junior academic staff, to promote the sustainability of the nutritional epidemiology programme, but we showed widespread benefits and career pathing opportunities across all partner institutions. 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 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 low-income countries, has poor research outputs in public health research and nutrition (INS, 2019; Olmos-López & Sunderland, 2017), emphasising the importance of producing credible research findings in the country to inform policy development. One of the major shortfalls of the GROWNUT partnership was a failure to translate students' research to published research to inform policy and interventions in DRC. Supporting quality research outputs was a vital role of the partner universities that they failed to achieve. Most student dissertations were not written up for publication or reported to the DRC Ministry of Health, threatening the project outcome of impacting on nutrition policy. However, a writing workshop was conducted with master's graduates at the end of the project and a number of publications are currently being drafted by students. There were several reasons for this, including a lack of foresight to build a strong research agenda based on real-life knowledge gaps, and an active ongoing partnership with policy-makers in the DRC at the project outset. Research topics were selected by the students themselves rather than contributing to an overall co-ordinated research agenda. A particular challenge was to ensure that research conducted by students, particularly master's students, achieved sufficiently robust results for publication or to inform policy. A future partnership would have to address this and place a stronger focus on developing a coherent research agenda, developing a team-based approach to undertaking research to strengthen the credibility of research findings. Additional support is needed for dissemination of results, with added focus on the development of policy briefs as well as the publication of research articles.

North–South partnerships have been criticised for being unsustainable in terms of the benefits of the partnership itself and the resources provided (Kok et al., 2017), and this was a concern for the GROWNUT partnership. Externally funded partnerships are by their nature transient, which is a major limitation to long-term success, making poor sustainability almost inevitable. However, sustainability is most likely to be achieved by partnerships that aim at strengthening local capacity for knowledge generation (Okeke, 2018). We would therefore argue that despite this undoubted concern, significant sustainability was achieved in terms of local skills development. In addition, because KSPH was at the forefront of decision-making about resource allocation and because sustainability was a strong consideration throughout, there will be a continued benefit to KSPH. The University of Kinshasa 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. KSPH will continue to provide support for e-learning, building on existing initiatives in the school to provide opportunities for blended learning in the future. A new cohort of nutritional epidemiology master's students has been enrolled in 2020 without support from GROWNUT funding.

However, many students depended on bursaries that may no longer be available and could threaten the programme going forward, with students in future cohorts having to seek alternative funding. The rural research site and rural research internship were emphasised by several stakeholders as important in the learning process, and was a key pillar of learning for nutritional epidemiology students. The rural internship benefitted 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.

We are in the fortunate position of having now secured an additional five-year period of funding for the GROWNUT partnership (2021–2026) which will enable us to address the lessons learned. Going forward into the second funding period we aim to focus on developing a coherent integrated research agenda, improving co-supervision, as well as the quality and relevance of research outputs using a team-based approach. We will build a strong partnership with policy-makers from the outset and put focus on developing policy briefs in key priority areas. In addition, we will put in place explicit strategies to improve sustainability.

Strengths and weaknesses

The study was conducted by experienced qualitative researchers who had not been directly involved in the project, but since this was an internal evaluation there was likely some conflict of interest. In addition, some participants were known to the researchers which may have led to bias in the interaction, students may have associated the researchers with the management of the GROWNUT project, and been reluctant to criticise the programme. The language was a barrier between researchers and participants in interviews where the preferred language was French. Researchers relied on interpretation, which may have not been an accurate expression of the participants.

Several authors on this paper were also studied participants. All transcripts were carefully reviewed to remove identifying information and only the researchers (SL & SM) were involved in the analysis. Other authors were given access to coded data and assisted with writing of the manuscript.

Conclusion

The GROWNUT partnership was successful in leading to sustainable benefits for individuals, participating higher education institutions, and for the public health and nutrition research capacity of DRC. North–South–South partnerships, particularly those aimed at strengthening local knowledge

generation, can be harnessed to address skills shortages in health research in low-income settings, with extensive benefits for all participants. However, there were significant failings and important lessons were learned for improving supervision, quality of research outputs and policy impact that would increase benefits for future partnerships. Sustainability remains a key challenge for short-term partnerships and explicit actions should be identified and implemented to address this concern.

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Data availability statement

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

ORCID

Anne Hatløy  <http://orcid.org/0000-0002-3668-3216>
 Lyn Haskins  <http://orcid.org/0000-0003-3636-5370>
 Thorkild Tylleskär  <http://orcid.org/0000-0003-4801-4324>
 Ingunn M. S. Engebretsen  <http://orcid.org/0000-0001-5852-3611>
 Christiane Horwood  <http://orcid.org/0000-0003-4395-1423>

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