


Quantifying the cost of in-kind contributions to a multidonor-funded health research capacity-building programme: the case of the Consortium for Advanced Research Training in Africa

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ABSTRACT

Introduction There are significant investments in health research capacity development in the ‘global-south’. The monetary value of contributions from institutions running these programmes is not known.

Methods Using the Consortium for Advanced Research Training in Africa (CARTA) as a case study we estimate in-kind contributions made by consortium members. We measured unpaid hours of labour contributed by staff members and converted this to full-time equivalents. We assigned a monetary value to the time contributed by staff based on salaries by seniority and region. We estimated the monetary value of the contribution made by the African institutions that hosted CARTA events by comparing the difference in cost between university-hosted events with those held in commercial venues. We calculated the foregone overhead costs associated with hosting the CARTA secretariat. We excluded many costs where data were difficult to verify.

Results Annually, CARTA member institutions committed a minimum of 4.3 full-time staff equivalents that are not funded by the grants. CARTA’s annual in-kind contribution represents at least 20% of total annual donor expenditure. African institutions accounted for 82.9% of the in-kind labour contribution and 91.6% of total in-kind contribution.

Conclusion The consortium’s institutions and academic and non-academic staff make significant contributions to ensure the effective implementation of donor-funded programmes. This is not unique to CARTA. These contributions are usually not counted, often not recognised at institutional level nor remunerated through grants. Knowing these costs would allow for sustainability appraisals and cost-benefit assessments. This paper offers a method of how to measure these contributions and begins a discussion around this.

INTRODUCTION

Higher education (HE) promotes social and economic development by producing locally appropriate human capital required to drive

Key questions

What is already known?

- The monetary value of donor investments in research capacity development is known or can be calculated.
- There is no published information on the in-kind contribution from, in particular, African academic and research institutions to capacity-building programmes.
- Few methods on how to calculate these contributions have been published or on how to standardise between different geographies.

What are the new findings?

- We offer a method to calculate in-kind contribution made by members of the Consortium for Advanced Research Training in Africa (CARTA); an Africa-led, Africa-based higher education capacity-building programme.
- While we have been very conservative in estimating the time and contributions and thus the monetary value made by CARTA partners, we find that CARTA’s annual in-kind contribution represents almost 20% of the total annual donor contributions to this programme.
- African institutions accounted 83% of the in-kind human resource contribution and 92% of total in-kind contribution (when labour, facilities and foregone overhead are taken into account).

development in areas such as health, education, agriculture, engineering and democracy.^{1–3} It is agreed among stakeholders that Africa needs more doctorate degree holders to spur and sustain transformation in the context of the complex challenges in the region.^{4,5}

Key questions

What do the new findings imply?

- ▶ Africa is making significant uncounted investment in its own development.
- ▶ This is the first attempt to quantify, in monetary terms, the investment made by capacity development grant recipients, both north and south, in grant-funded research capacity development programmes; discussions of this approach will advance future methods.
- ▶ Current practice by some donors to allow an 8%–10% indirect cost allowance does not offset in-kind contribution nor cover indirect costs and should be reconsidered.
- ▶ These costs should be measured to allow for efficiency comparisons.

African doctoral programmes have faced various challenges including staff shortages and brain drain which reduces universities' ability to meet supervision needs, the competing demand to meet undergraduate education needs and lack of infrastructural capacity including physical space, information technology, equipment, laboratories and access to academic literature. All of this has implications for the quantity and quality of doctoral graduates.^{6–9} The three broad effects include the preponderance of unsustainable programmes that fail to adequately compete at international level, suboptimal student throughput and low retention of staff.¹⁰ These, in combination, create a vicious cycle and demand a comprehensive response along the entire HE value chain. Nonetheless, creative ways to address these challenges exist. Recognising and pooling scarce but high-level skills across the continent can produce internationally competitive PhD training programmes.¹¹ Regardless, increased funding for this kind of activity from international and national sources is essential.

The last five decades have seen fluctuations in HE funding with concomitant variations in the associated benefits. Funding fluctuations were driven by assumptions by donors and African governments that investing in HE is costly, inefficient, benefited a few and focused on social sciences with limited job opportunities.¹² These assumptions are based on earlier reports suggesting lower returns on investment in HE when compared with investing in primary level education.^{13–15} This notion has been debunked but funding for HE has lagged and is still inadequate.^{4 16 17} The massification of university education¹⁸ begs the question of who will teach these new entrants into universities and this, too, underlines the importance of PhD-level training.

A World Bank (2010) report showed that close to \$2000 of public expenditure was spent per student per year in 2006 in Africa.¹⁹ Donor support has augmented this funding at a value running up to \$600 million per year through bilateral agreements, multilateral aid and private foundation investments. This has been used to fund university and government HE policy reforms, capacity building in science and postgraduate fellowship programmes, cooperation between universities for staff

and student development, and resource sharing and exchange agreements. Some approaches promote skill retention within the subregion⁴ but many graduates, especially those with the best undergraduate results, leave for graduate studies abroad, sometimes with support from their national governments.

While governments and foreign donors continue to make significant investments in HE institutions in Africa, universities themselves also continue to explore innovative and efficient resourcing opportunities. These include different models of human and material resource sharing within and between universities and countries. Furthermore, most donor-funded research and postgraduate training programmes in Africa rely heavily on local university human and material resources for their implementation. Such institutional investments by the African academy, in particular where there is African leadership, also facilitate programme ownership, reduce over-reliance on foreign technical support and improve the appropriateness and impact of donor investments. There is also evidence that local training can promote gender equality by allowing more women to study at the PhD level.^{20 21} Such local investments generally come from individual African academics who invest considerable amounts of time that is largely unremunerated and rarely counts as part of their university responsibilities and many of them continue to carry full teaching, supervision and administrative loads. Yet, without such investments of time, these donor-funded programmes will not achieve their results and impact. These vital contributions by African universities to externally funded programmes are seldom recognised nor quantified.

While there is some research to compute the proportion of indirect costs in grants to universities related to health service delivery programmes (eg, PEPFAR), there were none that we found which looked at education capacity development. Further the analysis conducted to assess university contributions in the PEPFAR (The U.S. President's Emergency Plan for AIDS Relief) study excluded African universities due to lack of sufficient data.²² A report by the Association of Commonwealth Universities (2013) described the nature of various contributions made by African governments and universities to donor-supported doctoral training programmes across the continent but did not quantify their monetary value.²³ Attempts at quantifying the value of such contributions raise methodological challenges, are time consuming and are hampered by the limited documentation and challenges in validation of actual time spent by university faculty and staff on such programmes.²²

Recently, a study documented 30 funders who supported health research capacity building in sub-Saharan Africa,²⁴ indicating that there is the possibility to apply or adapt our approach to many other programmes. This paper is a case study which seeks to quantify the in-kind contributions of members of the Consortium for Advanced Research Training in Africa (CARTA) to the implementation of the programme. In-kind contribution

in this study refers to unremunerated labour time, use of university physical and infrastructure resources, and unremunerated indirect costs.

CARTA was started in 2008 and recruited its first cohort of PhD fellows in 2010 who started their training in 2011. It is a multidonor-funded initiative comprising nine African universities, four African research institutes and select northern partners.^{11 25} CARTA offers an innovative model for doctoral training in sub-Saharan Africa and aims to strengthen the capacity of participating institutions to support, manage and lead internationally competitive research.

The CARTA model

The initiators of CARTA were aware that focusing only on producing PhD graduates is insufficient; a supportive research environment to retain scholars is equally essential.¹¹ CARTA therefore comprises a series of inter-related interventions including: internationally competitive PhD training; working with PhD supervisors to improve doctoral supervision; working with relevant academic and administrative staff at universities to promote research supportive environments; and securing the future of CARTA graduates to enable them to remain research active and located in Africa. CARTA prioritises fair and equal treatment of all partners and transparent decision-making and so invests in building trust in the consortium through its management structures and activities. The components of CARTA and the inclusion or exclusion of specific elements of each component in the estimation of in-kind contribution in this study are described in [table 1](#).

As of 2020, CARTA had enrolled 232 PhD fellows in 10 cohorts across 12 African universities and research institutions. Eighty-eight have graduated. Fellows, who are staff at African CARTA member institutions, undertake their PhDs while still working and are expected to graduate within 4 years; funding is provided for a maximum of 4 years but can be expended over a maximum of 5 years to accommodate any fellows who have a legitimate reason for a leave of absence. Partner institutions commit to continue paying fellows' salaries and to modify workloads for the fellows to enable them to fully participate in CARTA-organised activities and to dedicate sufficient time to their PhD studies. The details of CARTA, its theory of change, how it is structured and its various activities are described elsewhere¹¹; in [table 1](#) the elements of CARTA relevant to this paper are briefly described.

METHODS

We used data from 2014 to estimate the in-kind contribution to CARTA in a representative year; 2014 was the first year in which all CARTA annual programmatic events related to PhD training occurred. We use the term 'grant-funded' to indicate those people who contribute to CARTA and whose time is charged to the various CARTA grants. Non-grant funded refers to those university staff who contribute to CARTA but whose time is not

charged to the grant but is assumed to be paid through employees' usual university salary or is contributed as unpaid overtime.

Labour time

We enumerated the number of hours contributed by faculty participating at the various CARTA-specific events described in [table 1](#). We assigned an hourly cost based on seniority and experience, and then reported results in a common currency under the heading human resources. The hours contributed exclude time that is funded through CARTA grants (ie, CARTA-paid administrators, monitoring and evaluation officer, programme manager, and so on). We excluded many costs where we could not be confident of the exact magnitude or where it varied so much that collecting it was not practicable as indicated in [table 1](#). Only CARTA-specific work was counted and is defined as any work that is unique to CARTA and for which we could collect verifiable information; the work undertaken is not connected to an individual's normal academic commitments and the work is specifically required to ensure the effective implementation of the CARTA programme as described in [table 1](#). For example, PhD supervision time of CARTA fellows is not included as this is considered to be part of an academic's normal job.

For each CARTA-specific event we listed those who attended and the number of hours they contributed. For participants attending a meeting at their home institution, we assign the number of hours attended rounded to the nearest half day. For those who have travelled to the meeting and thus are not able to continue with work as usual we allocate an 8-hour contribution for each day they were present. We exclude evening meetings, travel and preparation times. Thus, any overestimates from rounding should be more than balanced out by underestimates resulting from these exclusions.

For the academic CARTA participants from universities, seniority and associated pay level are assigned using a four-level qualification scale (full professor, associate professor, senior lecturer, and lecturer). For non-academics (non-governmental organisation (NGO) employees, journalist, and journal editors) a qualification level is assigned based on seniority within the individual's field. For the administrative university staff we asked for their job titles and seniority and then assigned a value based on the University of the Witwatersrand (Wits) pay scales and the job description that most closely resembled that given by the participant. A member of the Wits human resources department assisted in this process.

Recognising there are regional variations in salary, we used three separate pay scales for assigning hourly wage to the four qualification levels. For employees of the African Population and Health Research Center (APHRC)—where the secretariat of CARTA is located—we used their actual salary scale as there is no agreed reference point for NGOs. For all non-African partners, we used the average pay scale of the University of Warwick and the University of Gothenburg, CARTA's leading global

Table 1 Elements of CARTA, its purpose, if it was included in in-kind estimation or not and reasons for exclusion

Programme component	Purpose	Nature of contribution	Costs included in analysis	Reason if excluded
Four-month-long, face-to-face Joint Advanced Seminars (JAS)* bringing all fellows in a cohort together for interdisciplinary training with an international teaching faculty	Formal structured interdisciplinary training for PhD fellows to supplement individual university-based discipline-specific learning	Labour time for facilitators	Yes	Data not available
		Teaching venues, internet connectivity, accommodation	Yes, estimate extrapolated from comparison events held in commercial venue	
Partners Forum (PAF)—2 days of face-to-face meetings to review CARTA activities, strategy and performance	Management of the programme, ensures transparency and collective decision-making	Library access, access to other academic programmes and university-based activities and infrastructure	No	No comparator to extrapolate costs from
		Labour time of partners	Yes	
Board of Management meeting	Decision-making and programme oversight	Venue and physical infrastructure	No	No comparator to extrapolate costs from
		Venue and physical infrastructure	No	
Focal persons' activities	Coordination of all university-based CARTA activities including: peer review of PhD applications, supporting PhD fellows, communication about CARTA to wider institution and M&E reporting	Labour time of focal persons (a reasonable estimate of this was made as actual time across all institutions was not always collected and varied by institution so an average was assigned to each institution)	Yes	Data not available
		Infrastructure costs	No	
Supervisors' workshop*	Enrich supervision, provide protected time for supervisor and PhD fellow during JAS 2	Labour time at workshop for supervisors and facilitators	Yes	No comparator to extrapolate costs from
		Venue and physical infrastructure	No	
Faculty and Staff Annual Seminar (FAS)*	Build skills and knowledge about roles and activities to support research in higher education institutions	Labour time at workshop for participants and facilitators	Yes	No comparator to extrapolate costs from
		Venue and physical infrastructure	No	
CARTA curriculum planning meetings	Develop and review PhD curriculum for each JAS and other workshops and trainings	Labour time, venue and infrastructure	No	Varies as the programme matures; very time intensive during start-up and did not want to skew results
CARTA vice-chancellor's meeting	Ensure CARTA is relevant, promote institutionalisation	Labour time and venue	No	Does not occur annually so would skew annual estimate
Fee waiver for staff doing PhDs at own institution	Statement of commitment of university to own staff development	Cost of fees	No	Varies year on year from institution to institution over the programme period
Additional time contributed by codirectors	Required to ensure programme leadership and quality	Labour time attributable at full professor level	No	Not collected so difficult to verify or reproduce results

*No preparation time or travel time included in the analyses, varies too much by individual participants. CARTA, Consortium for Advanced Research Training in Africa; M&E, monitoring and evaluation.

northern partners. Lastly, for all participants affiliated with an African institution, we use Wits pay scales. Annual pay scales were obtained from the four partner institutions (Wits, Gothenburg, Warwick and APHRC) and

converted to an hourly wage assuming a full work year of 1712 working hours.

Pay scales across Africa vary widely and are acknowledged as not constituting a living wage.²⁶ While South

Africa is an exception, we acknowledge that South African academic salaries are still low and do not compete with salaries in other sectors nor with international academic salaries. Academics employed at African universities outside of South Africa usually supplement their salaries either through research grants, consultancy work or other income-generating activities. When looking at the official university salary of the University of Malawi and combining this with what academics can earn from other activities, the Wits pay scale seemed a reasonable proxy particularly as this is, at a minimum, the rate CARTA would have to pay to 'hire' these academics for its programme activities. Primary costing was done using the pay scale midpoints and sensitivity analysis was conducted by using a minimum and maximum pay scale for each grade. All pay scales (South African rand, Swedish krona and British pound) were converted to US\$. The average exchange rates between 2009 and 2012 as reported by the US Federal Reserve were used for conversion as this was the years in which CARTA received grant funding in US\$ and we wanted to calculate the in-kind contribution as a proportion of the total grant income.

The pay scales and exchange rates used in the analysis are reported in online supplementary appendix 1. For northern partners, we only received the midpoint for full and associate professors. While there are variations in the minimum and maximum wages for each qualification level across the institutions, the midpoints for the various positions are remarkably much closer to each other. It is important to note that the amounts reported here are only for basic salaries for northern partners and do not include benefits. They are therefore lower than the actual cost to company associated with these staff. The Wits pay scales are total cost to company rates (salary and all benefits).

Non-labour cost calculations

In order to assess the value of in-kind contributions from the use of the facilities provided by CARTA consortium members for the various CARTA activities, we requested universities to indicate what they would charge when renting out their facilities. However, none of our universities have a real costing for the use of their facilities. In order to estimate a reasonable value for this in-kind contribution of training facilities to CARTA, we relied on the cost savings of hosting the trainings at universities vis-à-vis commercial facilities. Our decision was informed by the fact that Wits University hosts Joint Advanced Seminar (JAS) 2 and the University of Ibadan hosts JAS 3; but JAS 1 and 4 were held at a commercial venue in Nairobi. We could thus estimate the difference in the cost comparing the university-based training with the commercial venue costs. We considered the universities' in-kind contribution to CARTA to be the difference in cost between the two different types of venues. The most significant in-kind contributions came in the form of subsidised student accommodation and differences in conference facility costs. In the commercial venue, conference facility

costs include, for example, teaching venues and hire of internet access which would be free at a university. We have not included venue and infrastructure-related costs of hosting the Board of Management meeting, Partners Forum, Faculty and Staff Annual Seminar and supervisor training as we did not have a similar comparison to use. Again this underlines that our estimate of in-kind contributions is highly conservative.

Another major source of in-kind contribution by African institutions is in forgone overhead rates. Often, institutions funding capacity-building initiatives in Africa do not provide any overhead to the implementing institutions or cap their overhead rates at levels that are far below the true overhead rate of the implementing institutions. Since APHRC is the hosting institution for CARTA and the institution through which much of the CARTA funding is channelled, we limited the analysis of forgone overhead recovery to only APHRC. We calculated this by using APHRC's 2014 overhead from its 2014 audited accounts, applied this rate to total 2014 expenditure of CARTA (\$4 012 668.00) and then subtracted the total overhead recovered from CARTA grants expenditure in 2014. The difference is defined as the foregone overhead.

Thus, our methodology may underestimate total in-kind contributions, but we endeavour to include only the hours that are verifiable and directly attributable to specific CARTA activities that cannot be associated with the regular assignments of the university staff and that happen annually since the inception of the programme.

RESULTS

Table 2 provides a high-level overview of the total in-kind hours contributed by CARTA partners, classified by both institution and academic positions across the different CARTA events.

CARTA partner institutions contributed a total of 7324 person-hours to the implementation of CARTA programmes in 2014. We estimate the annual normal working hours (less leave days) is 1712 per year. Thus, CARTA institutions contribute 4.3 full-time persons to CARTA in 2014. More than a third of this time goes into facilitating the training of doctoral fellows. Another third is for faculty and staff training and the rest to supporting various oversight functions and review activities of CARTA.

Using the pay scales described in the Methods section we translated contributed hours into monetary values for in-kind labour time contributions in **table 3**.

In-kind labour contributions account for about 42% of the total contributions by the institutions to the implementation of the CARTA programme in 2014 with facilities and forgone overhead rates accounting for about 18% and 40%, respectively. The facilities contribution can be separated into the in-kind contribution from subsidised accommodation and conference facilities. The total in-kind contribution from subsidised accommodation was \$119 472 (\$66 614 from JAS 2 at Wits and

Table 2 In-kind labour time contributed for each CARTA event

CARTA event/meeting	Institution classification			Salary classification				Total hours by event
	APHRC	International	African	Professor	Associate professor	Senior lecturer	Lecturer	
JAS 1	93	388	132	305	130	92	86	613
JAS 2	16	176	372	252	44	212	56	564
JAS 3	56	192	768	416	216	280	104	1016
JAS 4	90	57	256	184	165	48	6	403
Supervisor training	32	32	966	158	360	512	–	1030
Faculty and staff training	36	96	2508*	108	192	300	672	2640
Partners Forum	32	80	232	160	136	48	–	344
Board of Management meeting	24	32	64	64	56	–	–	120
Focal persons' activities	54	96	444	256	338	–	–	594
Totals	433	1149	5742	1903	1637	1492	924	7324

*Faculty and Staff Annual Seminar (FAS) also had in-kind contribution of 1368 hours of support staff time which is included in the institutional classification but not depicted in salary classification section of the table. The total hours for FAS of 2640 and is correct.

APHRC, African Population and Health Research Center; CARTA, Consortium for Advanced Research Training in Africa; JAS, Joint Advanced Seminar.

\$52858 from JAS 3 at the University of Ibadan). The total in-kind contribution from conference facilities was \$13342 leading to a total facilities in-kind contribution of \$132816. Thus, the total combined in-kind contributions (labour time, foregone overhead and facilities) was \$788476 using the midpoint pay scale.

The annual expenditure for CARTA in 2014 was \$4012668. Thus, an annual in-kind contribution of \$788476 (range \$731 441–\$845 246) represents an annual contribution of 19.6% (range 18.2%–21.1%) by CARTA partners towards the running of CARTA in 2014. While one may quibble with the exact dollar amount, the in-kind contribution of these partners is still significant and as is highlighted throughout this article, it is a very

conservative estimate. African institutions accounted for 82.9% of the in-kind labour contribution and 91.6% of the total in-kind contribution (when labour, facilities and foregone overhead are taken into account). It should be noted, however, that if total cost to company of northern partner salaries was included, this proportional contribution would change.

Specific contributions from the African partners can be derived from these data. APHRC made 39.3% of the total in-kind contribution (driven largely from foregone overhead) while the Wits and the University of Ibadan made 16.1% and 13.6% of the total in-kind contribution, respectively (driven from hosting a JAS and significant labour time contributions). However, foregone overhead

Table 3 In-kind human resource and facilities contributions (US\$)

Activity	In-kind hours contributed	Midpoint contribution (US\$)	Minimum–maximum (US\$)
JAS 1 (27 fellows)	613	35 452	32 960–38 059
JAS 2 (27 fellows)	564	30 704	26 885–34 536
JAS 3 (19 fellows)	1016	55 676	46 666–64 762
JAS 4 (15 fellows)	403	24 539	20 493–28 603
Supervisor training	1030	52 458	42 536–62 379
Facility and staff training	2640	93 271	75 598–110 411
Partners Forum	344	20 642	17 514–23 793
Board of Management meeting	120	7 872	6 759–8 992
Focal point activities	594	35 026	29 195–40 876
Total labour contribution	7324	355 640	298 605–412 410
Total facilities contribution	N/A	132 816	
Total in forgone overhead	N/A	300 020	
Total contribution		788 476	731 441–845 246

JAS, Joint Advanced Seminar.

recovery from running the programme is a major source of in-kind contribution by African institutions to externally funded programmes. CARTA staff are located at APHRC, Wits, University of Ibadan and University of Gothenburg. They occupy office space that is not paid for and several other staff in these institutions invest much more time in the programme that is not paid for by the programme. The estimates here would be much larger if such foregone overheads at the other institutions were also included.

Contributions by institution are not particularly meaningful if only 1 year of data is used. Over time all institutions host events which will result in additional in-kind labour, venue and physical infrastructure contributions. Over the period of the grant, every institution, both African and non-African (with the exception of two), has hosted events. Wits and Ibadan, being regular hosts of JAS, and APHRC, which houses the secretariat, may often make a bigger percentage contribution because of the structure of the programme. All other institutions are likely, over time, to make very similar contributions and this varies year by year by institution as different members of the academy contribute their time and resources to CARTA activities.

DISCUSSION

In this paper we have attempted to both measure and put a monetary value to the in-kind contribution made by the members of one research training consortium in Africa. We counted the number of hours contributed by staff of CARTA member institutions and then assigned a dollar value to these contributions. We have also estimated cost savings from hosting CARTA training at African universities rather than at a commercial site and have assigned this value as an estimate of the in-kind contribution that the universities who are hosting CARTA trainings are making. We have added the forgone overhead contribution of only one partner where most of the CARTA grant-funded staff are located.

We have estimated that the in-kind contribution is approximately 20% of the annual operating costs covered by grants. Given all the exclusions, the amount estimated here represents a conservative estimate of the in-kind contributions being made by CARTA institutions to this programme. There are many activities that are not costed as described in [table 1](#). However, there are further exclusions that are not included in [table 1](#). One worth mentioning is the CARTA vice-chancellor's (VC) meeting; VCs (or equivalents from all partners, south and north) attended a 2-day CARTA VC's meeting in Johannesburg in 2013, Nairobi in 2017 and Kigali in 2019. Such high-level human resource contribution to CARTA is excluded in this analysis. The VC's meeting is specifically mentioned as it is a clear demonstration of partner universities' commitment to CARTA and would contribute significant in-kind time and associated costs to any estimate presented here.

We conclude from this study that African institutions are making substantial contributions on an ongoing basis to donor-funded postgraduate training programmes in the region and such contributions are key to the success of these programmes. CARTA is not the only programme that is taking place at the various African institutions so any calculation we make is only a small part of what these institutions are contributing in supporting similar initiatives.

There are a number of reasons to attempt to monetise the contributions recipient institutions make to donor-funded programmes. These are real costs and have to be paid by someone—at the very least it needs to be documented. Perhaps the first message is that there should be routine collection of information to allow these costs to be estimated with more accuracy. Knowing these costs are also essential for planning and sustainability appraisals and cost-benefit assessments. Both African governments and funders need to invest more in HE, in particular at the postgraduate level, and as they go forward they need to recognise the contribution being made by African institutions themselves. The ambition in Africa to train more PhDs and grow African research output has to be planned taking real costs into account, both on the part of national and international funders and the institutions themselves. At the national level, funding should cover costs if governments are serious about supporting research. At the international level, the 8%–10% of total funding overhead cap often allowed by funding institutions for programmes run by sub-Saharan African institutions underestimates the true cost of running such programmes. African institutions need to do more to document their true overhead rates and to start a process of negotiating with domestic and external funders' overhead recovery rates that approximate their true costs.

Our data show that at the individual level, both academic and non-academic staff in CARTA make significant personal contributions to ensure effective implementation of donor-funded programmes. In Africa, universities do not pay living wages and faculty and staff have to supplement their salaries through teaching at other universities, consultancies and other income-generating activities. Choosing to spend non-remunerated time on donor-funding programmes constitutes an opportunity cost on the part of these individuals. These University staff could have chosen to spend these thousands of hours in paid consultancies or additional paid teaching. They chose, instead, to invest them to support capacity building in Africa. Unfortunately, these contributions are rarely documented or recognised. Positions taken by some funders to deny payment of per diems and honoraria to these staff that make such programmes succeed often ignore the operating realities of these faculty members and the significant role they play in the success of the programmes. Similarly, northern academic partners contribute significant high-value time and while this may not have the same monetary consequences compared with African academics, it is often

not valued or recognised by their home institutions nor in their university's formal evaluation systems and thus also constitutes an opportunity cost and demonstrates the level of commitment of northern partners to capacity building and equity. These contributions need to be formally recognised within the university system in the north and the south.

Being able to measure the costs also provides another opportunity. Many donor investments in Africa are passed on to African universities through subcontracting with intermediary international and multinational agencies, and it has been found that less than a third of the amount pledged by funders actually reaches African institutions.²¹ CARTA is different in that all of its grants were directly awarded to an African institution. Being able to quantify African in-kind contribution and indirect costs for the many investments in Africa that pass through multiple intermediaries before reaching the African implementing partner would allow for comparison between donor-funded programmes that are led by African versus non-African institutions. This may allow more efficient methods of financing development programmes in Africa.

This is the first attempt, to the best of our knowledge, to document and assign monetary value to in-kind contributions in a donor-funded health capacity-building programme. This is only one possible approach to estimating costs and there may be debates as to how we arrived at our assessment of in-kind contributions. Limited data meant that many contributions were excluded and that we were not able to perform sensitivity analyses regarding excluded contributions. Nonetheless, this highlights an issue in both HE and development practice: that research institutions and universities and individuals, uncompensated by funded programmes, make significant sacrifices and contributions to the success of these programmes. These contributions should be recognised by their institutions and funders of the programmes and accounted for when assessing impact and sustainability of such programmes.

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Contributors The study was conceptualised by SF. JH conducted the analysis and participated in the interpretation of the findings. AM and DG contributed data and assisted in interpretation and decisions about data analysis. JOI contributed to the contextual background. SF and AE collectively interpreted the data and prepared the final manuscript which was reviewed by all authors who agreed to submission.

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