

# The African Pediatric Fellowship Program: Training in Africa for Africans

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Africa has a significant burden of childhood disease, with relatively few skilled health care professionals. The African Paediatric Fellowship Programme was developed by the Department of Pediatrics and Child Health at the University of Cape Town to provide relevant training for African child health professionals, by Africans, within Africa. Trainees identified by partner academic institutions spend 6 months to 2 years training in the Department of Pediatrics and allied disciplines. They then return to their home institution to build practice, training, research, and advocacy. From 2008 to 2015, 73 physicians have completed or are completing training in general pediatrics or a pediatric subspecialty. At 1 year posttraining, 98% to 100% are practicing back in their home institution. The impact of the returning fellows is evident from their practice interventions, research collaborations, and positions as stakeholders who can change health care policies. Thirty-three centers in 13 African countries are partners with the program, and the program template is now followed by other partner sites in Africa. Increasing and retaining the skills pool of African child health specialists is building a network of motivated, highly skilled clinicians who are equipped to advance child health in Africa.

The World Health Organization (WHO) estimates that children in low- or middle-income countries are 16 times more likely to die before 5 years of age compared with children in high-income countries.<sup>1</sup> Almost 75% of childhood deaths are due to 6 conditions: neonatal causes (preterm birth, asphyxia, and infections), pneumonia, diarrhea, malaria, HIV, and measles. In resource-limited settings, the burden is heavily skewed toward Africa, where almost half of these childhood deaths occur, and many of the survivors suffer long-term complications.<sup>1</sup>

A workforce equipped with the skills to address these issues is lacking in

Africa.<sup>2-4</sup> The estimated density of pediatricians practicing in countries in the continent range from 0.03 to 0.8 per 100 000 population.<sup>5-10</sup> The actual workforce numbers may be far less, as these estimates are often based on the number of registered practitioners rather than those actively working in the country. When compared with European figures (11 to 86 pediatricians per 100 000 population in the UK and Germany) the need for additional pediatric health practitioners in Africa is all the more evident.

The challenge of the “brain drain,” or the migration of skilled personnel, has led to policy changes in African

## abstract

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Prof Wilmshurst conceptualized and designed the study, designed the data collection instruments, coordinated and supervised data collection, and drafted the initial manuscript; Mrs du Preez assisted with data collection and analysis and table and figure construction; Assoc Prof Morrow, Dr Githanga, and Prof Kennedy reviewed and revised the manuscript; Prof Zar critically reviewed the manuscript; and Prof Wilmshurst, Assoc Prof Morrow, Dr Githanga, Prof Kennedy, and Prof Zar approved the final manuscript as submitted.

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countries whereby trainees are sent to other centers based in Africa that have accredited general pediatric training programs.<sup>11</sup>

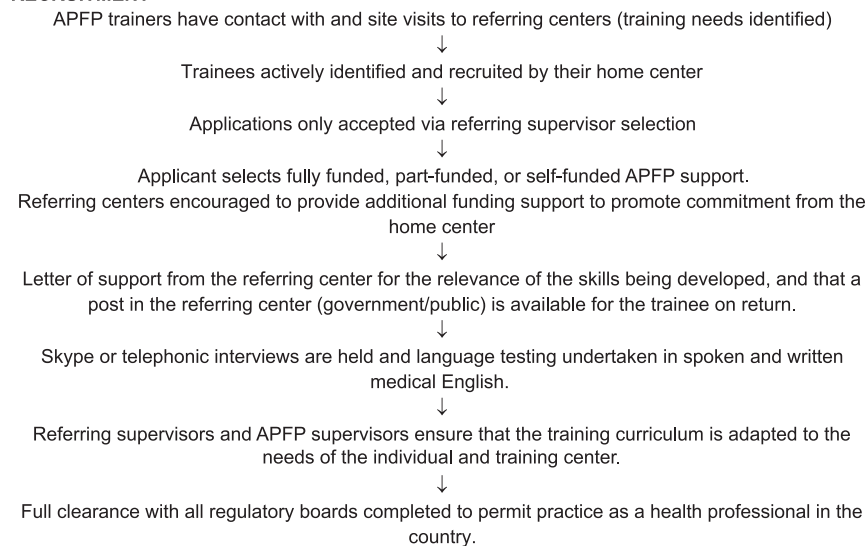
The African Paediatric Fellowship Programme (APFP) was established in the Department of Pediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, a tertiary teaching hospital and the largest dedicated children's hospital in sub-Saharan Africa. The department serves as a referral center and has the capacity to manage children with a spectrum of complex diseases specific to Africa, as well as other disorders of more international relevance. In 2008, the APFP was intensified, with the strategic aim to develop African skills in child health and reduce the brain drain.

The authors are not aware of other unified training programs funded by African centers to train African doctors in such diverse pediatric disciplines within Africa. Clinical training scholarships exist for individuals to train in most cases in international settings. Other programs offer online courses and send visiting experts to establish service development in African centers. As such, this program is unique in that it encompasses diverse pediatric disciplines and supports an extended and expanding number of African centers.

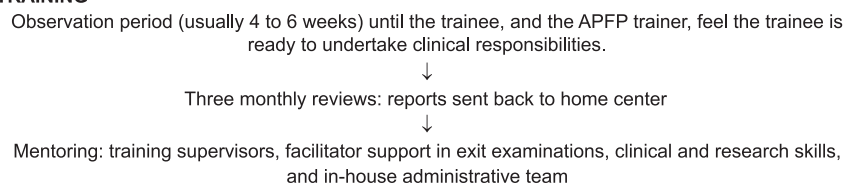
### STRUCTURE OF THE APFP

The coordinators of the APFP liaise with referring institutions who identify areas of health care skills deficiency, according to the burden of disease and skills needed. From these categories, the referring institutions identify suitable applicants, who are guaranteed a position on their return after they complete training through the APFP. The program will not duplicate training in an area already offered by the referring center unless the training capacity

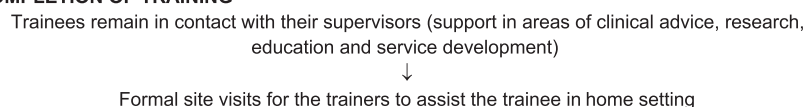
### RECRUITMENT



### TRAINING



### COMPLETION OF TRAINING



**FIGURE 1**

Flow chart illustrating the standard operating procedure for the APFP.

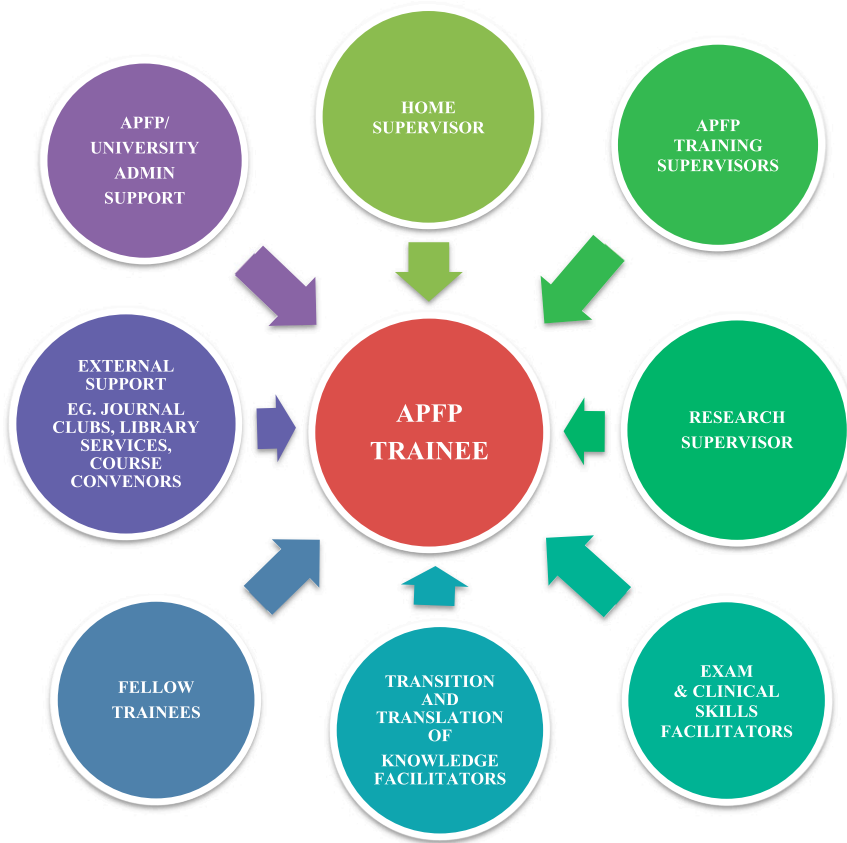
for that discipline is exceeded in the region. The APFP ensures that the referring center recognizes the South African qualifications acquired by the trainee on his or her return, but these qualifications cannot be used to practice in South Africa unless the trainee becomes a resident.

Figure 1 summarizes the standard operating procedure for the APFP from the first contact with a potential referring site through recruitment, training, and posttraining interactions. Before being accepted to the program, the trainee, the referring supervisors, and the APFP supervisors enter into a dialogue to ensure that the training curriculum is adapted based on the needs of the individual and the training center. Full clearance with all regulatory

boards is completed to permit practice as a health professional in the country for the training period.

Once the trainees begin the program, they receive mentoring from their training supervisors, facilitator support in exit examinations and clinical and research skills, and support from the in-house administrative team (Fig 2). Trainees are encouraged to become a part of the training discipline's clinical team and to be fully integrated with the local South African trainees, who are already part of the standard university training program.

On completion of the program, and on return to their home country, trainees remain in contact with their supervisors, who continue to support them in areas of clinical advice,



**FIGURE 2**  
Support infrastructure available to trainees as part of attachment under the APFP.

research, education, and service development. Formal site visits for trainers to assist trainees in their home settings are worked into the program.

Prerequisites for entry into the program for general pediatric training are equivalent to that of trainees who are accepted from South Africa, namely a minimum 2 years of pediatric exposure; most have completed the Fellowship of the College of Pediatricians, part 1. Entry for training in a subspecialty for most disciplines requires recognition as an accredited pediatrician; exceptions are psychiatry, medical genetics, and surgery, which require the trainee to be accredited in the equivalent adult discipline.

Training is available in general pediatrics and diverse subspecialties. Trainee-to-trainer ratios are maintained according to the local

training regulatory authority recommendations of the Health Professions Council of South Africa (HPCSA), namely, a maximum of 2 trainees to 1 trainer. Constant adaptation of the program is maintained to ensure that relevant training needs are met (Figs 1 and 2).

The fellows complete an exit examination in the discipline of study, which accredits them as specialists (pediatrician) or subspecialists (pediatric discipline). Master's degrees are awarded after 2 to 4 years of clinical training (depending on the area of study), passing the exit examination, and completion of a thesis. Alternatively, postgraduate diplomas are awarded after 1 year of clinical study, completion of a shorter thesis, and an exit examination.

Immediate outcomes include completion of the training term, skills

acquired, and ideally completion of an accredited outcome (eg, clinical master's, postgraduate clinical diploma, subspecialty exit examination). Long-term outcomes include trainee retention in the home setting; adaptation and development of health care services based on the skills developed; research, education, and training activities; and quantitative or qualitative evidence of changes in health care delivery, morbidity, and mortality rates.

The program is supported by funding from international philanthropic and nongovernment organizations, as well as the referring host institutions. The University of Cape Town has reduced tuition fees for African students entering the APFP. In Africa, to train at a university-affiliated teaching hospital, students are registered for postgraduate degrees, which are typically master's degrees (2 to 4 years' duration), and a smaller number of postgraduate diplomas for 1 year. The training costs include registration for the degree, standard university tuition fees, exam fees (including clinical specialty exit examination), educational courses related to the training, registration with the national professional body, and attendance at national and international meetings (usually 1 of each per training period provided that academic work is presented). The APFP covers the cost of these activities for partly and fully funded trainees. The APFP provides a stipend to assist with living costs such as accommodations, travel, and medical insurance, adjusted depending on whether the trainee is fully or partly funded. The APFP facilitates the process to enable a trainee to register with the HPCSA and Educational Commission for Foreign Medical Graduates and helps with flights to and from the training center. This process can take up to 1 year to complete. The cost to

train a fellow per year equates to ~US\$22 500. The referring center is encouraged to maintain additional financial support for the fellow, often in terms of a proportion of their salary or as a university allowance, relative to the center's capacity.

## OUTCOMES OF THE APFP

The process whereby applications are submitted only via the referring institutions to the APFP, and not from isolated individuals, results in a more streamlined system. The referring center selects and recommends the fellow for training. Fellows referred for subspecialty training are usually at the junior consultant level, and those for pediatric training are usually based in the pediatric units of the referring centers, where they are working as medical officers or junior registrars. The median number of years after qualifying before entering the pediatric training program is 6 years (range, 3–13 years), and of pediatric experience before entering the subspecialty program, 5 years (range, 1–28 years). The APFP usually has 1 to 3 years' advance knowledge of the trainee selection. The main limiting factor is related to maintaining trainer-to-trainee ratios and adequate funding. From 2008 to 2015, 73 doctors from multiple referring centers were accepted into the program, 60 of whom finished by the end of December 2015, with 13 remaining in training in diverse disciplines (Fig 3, Table 1). From 120 applications received in 2015 for training placement in 2016, 94 were not offered positions because the requested training area did not have capacity ( $n = 56$ ), the training already existed in the referring county ( $n = 5$ ), or the applicant did not meet the inclusion criteria ( $n = 33$ ). When the training capacity

is full, trainees are offered waiting list positions. Figure 3 is a map of Africa demonstrating the locations of the referring institutions, and Table 1 provides an overview of the number of trainees in specific disciplines trained and those who attained postgraduate qualifications. In 2016, 26 fellows from 10 partner countries will train in 13 different pediatric disciplines.

Completed or completing trainees ( $n = 73$ ) consisted of 41 men and 32 women, median age of 25 years (range, 23–38 years) for general pediatrics trainees and 33 years (range, 22–44 years) for subspecialty trainees, with a median duration of training time of 24 months (range, 3–48 months).

Over the last 5 years, the program has had a consistent increase in the number of trainees entering per year (from 7–27 per year) and areas of training undertaken (from 7–20), as well as in the number of affiliated referring countries, which increased from 2 to 13, and referring centers, from 2 to 33 (Fig 3).

Outcomes include a 98% to 100% 1-year retention rate for trainees returning to work in their home countries. The 60 fellows who completed their training have been working in their home setting for a median of 37 months (range, 1–96 months), excluding 5 trainees who finished at the end of December 2015. Eleven trainees have reached the  $\geq 5$ -year posttraining time period, all still working in their home country. Of the trainees who either did not complete the program or failed to return to work in their home country, 1 left for full-time research studies and 1 returned home early for health reasons. Therefore, most trainees complete the program, return, and remain in their home center. Beyond 1 year, the program is still relatively new, but to date only 2 other trainees have left their home center after

completing training, 1 to take up a cardiology fellowship in Canada and another to a clinical and a lecturer position in pediatrics for the University of Botswana.

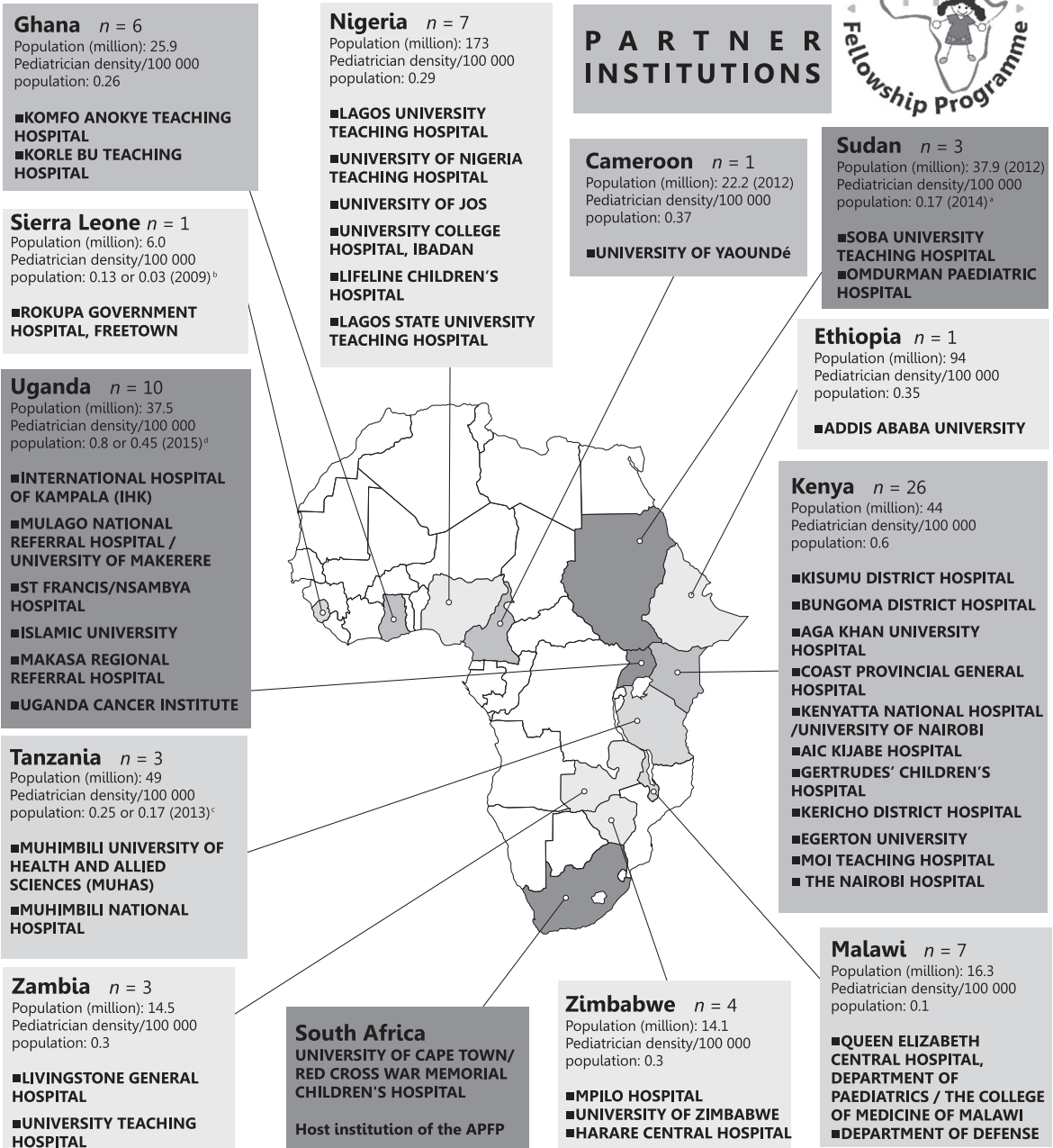
As the program has matured, more trainees are acquiring postgraduate degrees ( $n = 10$ ) and completing exit examinations for accreditation in their specialty field ( $n = 34$ ) (Table 1). Of the 63 fellows who have attended national and international conferences, 36 have presented on research areas that they have developed during their APFP attachments.

Research is encouraged, and the number of peer-reviewed publications are expanding as returning trainees develop their own research enterprises in their home centers, often in collaboration with their APFP supervisors. To date, 87 peer-reviewed publications have been completed by the trainees during or after their training time, with many more underway.

Measuring clinical outcomes that can be directly causally linked to the APFP is challenging. To date, the quantitative outcomes are limited, while qualitative outcomes dominate (Table 2).

Five APFP doctors from Malawi have completed the program as accredited general pediatricians and returned to practice. A significant improvement in retention of pediatricians is evident, such that by 2013, the number of pediatricians in the country had doubled to 16; however, this is well short of the minimal WHO recommended ratio.<sup>13</sup> As the Malawian partner site has consolidated its skills capacity in general pediatrics, it has identified major areas of health need. One of the general pediatric trainees returned to the APFP in 2015 to subspecialize in neonatology, and another is training in hematology and oncology.





	Neonatal median mortality rate per 1000 live births (2013)	Infant median mortality rate per 1000 live births (2013)	Under-5 median mortality rate per 1000 live births (2013)
<b>MEDIAN VALUES DEVELOPED WORLD ESTIMATES (MDG 2013)</b>	28.7	55	77.5
<b>DEVELOPING WORLD ESTIMATES (MDG 2013)</b>	3.4	5.4	6.3
<b>DEVELOPING WORLD ESTIMATES (MDG 2013)</b>	22	38.6	55.3

**FIGURE 3**

Map of Africa demonstrating the locations of the referring institutions. <sup>a</sup>Based on the National Human Resources for Health Strategic Plan Sudan, 2012. But only 65 pediatricians believed actively practicing in the country. <sup>b</sup>Based on personal communication with trainee and data from National Health Sector Strategic Plan 2010–2015 for Sierra Leone. <sup>c</sup>Based on a survey in 2012 which found that 1356 of 2246 registered doctors remain working in Tanzania. <sup>d</sup>Lower figure for Uganda based on a report from parliament <http://newvision.co.ug/D/8/13/717871> and based on Ugandan Medical and Dental Practice

Further examples of qualitative outcomes are documented in Table 2. A number of the returning fellows are the first trained subspecialists in their hospital or country, for example, the first pediatric hematology/oncology specialist returned to Komfo Anokye Teaching Hospital in Kumasi, Ghana; the first pediatric intensivist in Ghana; and the first trained developmental pediatrician in the referring center in Nigeria. Some fellows have been instrumental in establishing specialist units at their hospitals, including a dedicated pediatric oncology unit in Uganda and PICUs in Kenya and Ghana; developing or updating clinical protocols; and strengthening systems to improve patient referral, treatment, and care. Returning fellows are involved in pediatric training in their home countries (including developing new curricula and training programs) and are actively conducting research and organizing specialist symposia. Many are respected as key opinion leaders in their fields and are in strategic positions, including heads of departments or representatives on national and international boards.

As the program has evolved, various innovative concepts have been developed. These include national training referral systems, whereby referring centers work through a central body in the country. Such a centralized, national referral system for trainees through the Kenyan Pediatric Association (KPA) is now established. The KPA confirms that the requested

training is in an area of subspecialty need, relevant to the health needs of the region, and from a region that the trainee will return to, with a position planned for them. This ensures that a balanced selection of trainees from across the country can access APFP training. Strategic training programs are being developed whereby the referring centers plan 3 to 5 years ahead for their key training needs across disciplines and identify role-players for multidisciplinary teams, inclusive of specific health care workers (medical, nursing, and rehabilitation therapy). Centers in Tanzania (the University Hospital of Muhimbili, Muhimbili University of Health and Allied Sciences) and Ghana (the Komfo Anokye Teaching Hospital, Kumasi) are forerunners in this. Partner APFP training sites are becoming established, whereby shared training between  $\geq 2$  sites is offered. This is illustrated by the College of Medicine of Malawi, Blantyre, at Queen Elizabeth's Hospital, who have developed their own general pediatric training program, which has extended to provide training for 3 of the 4 years for local Malawian doctors, and in the near future will offer all training on site. "Malawi APFP" will become the first sister site to the South African APFP, with independent funding. This institution has strengthened the multidisciplinary team approach by training doctors and pediatric care nurses concurrently to function in supportive teams upon their return and to become trainers for the Malawi APFP.

Postgraduate clinical diplomas (in which shorter, highly structured skills training is developed) are offered through a series of 1-year postgraduate diplomas in key subspecialty areas, consisting of highly focused modules addressing specific foundation skills needed to establish services in the African setting. These represent a stepping-stone approach to building skills capacity in centers where no support for a discipline exists and that lack the capacity to "lose" valuable members of staff for  $>1$  year. Examples include the cardiology diploma, whereby through acquired echocardiology skills, large numbers of children can be screened and surgically remedial cardiac cases can be referred early to specialist centers for early intervention. The diploma in basic electrophysiology interpretation and management of children with epilepsy permits more accurate diagnoses, confirmation of epilepsy, and structured management of children suffering from this disease of high burden in Africa. The neonatology diploma trains doctors in standard interventions such as "kangaroo care" and bubble continuous positive airway pressure (CPAP). The transition and translation of knowledge modules are completed by all trainees to enable them to transition their specialized skills into the care delivered from the primary health care level through to tertiary-level hospitals, introducing interventions and health care approaches with government support. During the training period, the skills

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**FIGURE 3** Continued

register; no record if doctor working in the country. References: [http://unicef.org/statistics/index\\_step1.php](http://unicef.org/statistics/index_step1.php) and <http://apps.who.int/gho/data/node.main.A144>.

**TABLE 1** Summary of the Areas of Training Disciplines by the Pediatric Fellows From 2008 to 2014

Specialty and Country (Region)	Total Trained	Number per Country	Postgraduate Qualifications <sup>a</sup>	Master's Theses
Allergology <sup>b</sup>	4			
Kenya (East Africa)		3	2	
Nigeria (West Africa)		1		
Anesthesia	2			
Kenya (East Africa)		2		
Cardiology	2			
Uganda (East Africa)		1		
Zambia (Southern Africa)		1		
Child and adolescent psychiatry	1			
Uganda (East Africa)		1	1	
Critical care	3			
Ghana (West Africa)		1	2	Cardiac arrest in children preceding PICU admission: etiology and outcome in a developing country
Kenya (East Africa)		1		
Uganda (East Africa)		1	1	
Developmental pediatrics	2			
Nigeria (West Africa)		1	2	The validation of a new development screening tool for neurodevelopmental delays among HIV-infected South African children
Zimbabwe (Southern Africa)		1		
Emergency pediatrics	2			
Kenya (East Africa)		1		
Ghana (West Africa)		1		
Gastroenterology	7			
Ghana (West Africa)		1	1	
Kenya (East Africa)		5	2	
Sudan (North Africa)		1		
General pediatrics	9			
Malawi (East Africa)		5	5	
Sierra Leone (West Africa)		1		
Zimbabwe (Southern Africa)		3		
Infectious diseases	3			
Kenya (East Africa)		1		
Nigeria (West Africa)		1	1	
Uganda (East Africa)		1		
Medical genetics	2			
Cameroon (West Africa)		1	1	
Sudan (North Africa)		1	1	
Neonatology	5			
Kenya (East Africa)		2	2	Growth velocity of extremely low birth weight preterms at a tertiary neonatal unit in South Africa
Uganda (East Africa)		2	4	The influence of birth site on short-term outcomes of encephalopathic newborn infants treated with therapeutic hypothermia at Groote Schuur Hospital, Cape Town, South Africa
Zambia (Southern Africa)		1	2	A prospective study quantifying proportion of mothers providing breast milk and maternal barriers to the provision of breast milk in a neonatal unit in South Africa
Nephrology	5			
Kenya (East Africa)		1		
Nigeria (West Africa)		2	4	(1) An audit of pelvi-ureteral junction obstruction at Red Cross Children's Hospital; a six year review; (2) Vitamin D status of children with moderate to severe chronic kidney disease at Red Cross Children's Hospital, Cape Town
Sudan (North Africa)		1	1	
Tanzania (East Africa)		1		
Neurology	5			
Ethiopia (East Africa)		1	—	
Ghana (West Africa)		1		
Kenya (East Africa)		1	2	Characteristics of tuberous sclerosis complex in a South African cohort: description and parental understanding
Nigeria (West Africa)		1		

**TABLE 1** Continued

Specialty and Country (Region)	Total Trained	Number per Country	Postgraduate Qualifications <sup>a</sup>	Master's Theses
Tanzania (East Africa)		1	1	
Neurosurgery	1			
Kenya (East Africa)		1	1	
Oncology	4			
Ghana (West Africa)		1		
Malawi (East Africa)		1		
Uganda (East Africa)		2		
Physiotherapy	1			
Tanzania (East Africa)		1		
Pulmonology	7			
Kenya (East Africa)		5	1	
Nigeria (West Africa)		1		
Uganda (East Africa)		1		
Rheumatology	1			
Kenya (East Africa)		1	2	Demographic and clinical characteristics of children with juvenile dermatomyositis in Cape Town
Surgery	6			
Ethiopia (East Africa)		1		
Kenya (East Africa)		2	2	Local anesthetic wound infusion versus standardized analgesia in pediatric post-operative pain control: a double-blind randomized control trial
Uganda (East Africa)		1		
Zambia (Southern Africa)		1		
Malawi (East Africa)		1		
Urology	1			
Ghana (West Africa)		1		
Total	73			

<sup>a</sup> Postgraduate qualifications equate to master's degrees, diplomas, and subspecialty exit examinations.

<sup>b</sup> These trainees were training under pulmonology and acquired an additional diploma in allergology.

being attained are reviewed to ensure that they remain relevant; further, that the trainees remain in communication with their home centers and put into place plans for the introduction of these skills on their return. Training for health and rehabilitation therapists is essential to develop multidisciplinary teams. As such, expanding existing training opportunities beyond those for medical and nursing professionals (through the allied program for Child Nurse Practice Development Initiative) have been developed whereby a similar platform for child health and rehabilitation therapists exists.

### THE FUTURE AND RELEVANCE OF THE APFP

This report provides an overview of the APFP, an innovative program, and documents measurable

variables to assess the efficacy of this concept. The training program was developed to strengthen core skills within Africa, promoting African training, education, research, and capacity development with the aim of improving health care for African children.

Whereas qualitative outcomes can be monitored (Tables 1 and 2), it is more challenging to evaluate the actual impact on health care from the program. Multiple variables influence child health outcomes, and accurately quantifying the contribution of the program to these is not possible. Returning fellows have established and strengthened services, for example, oncology care in Uganda and neonatal innovations in Malawi (Table 2). Changes in practice are evident in these settings, for example, the use of bubble CPAP in Malawi<sup>12</sup> and the new vaccination

programs introduced in Kenya. Many of the trainees return to positions in working groups with the capacity to influence policy to change practice. In addition, they are strengthening their own local training programs.<sup>14</sup>

The high retention rate and the adaptation of the training content to be locally relevant for each trainee support the effectiveness of training African health care professionals within Africa.<sup>11</sup> Training takes into account the local infrastructure, with the result that trainees are empowered to effect change on their return.

The evolution of the program includes the promotion of partner APFP training sites across the continent, dual training between such sites, development of strategic plans for long-term health care goals, and



**TABLE 2** Examples of Qualitative Outcomes of Returning APFP Trainees

Country	Outcome Event
Sudan, North Africa	<ul style="list-style-type: none"> <li>• One nephrology trainee has established success dialysis service for children at the main teaching hospital in Khartoum.</li> </ul>
Ghana, West Africa: Komfo Anokye Teaching Hospital (KATH)	<p>A trainee returned as the only Pediatric Critical Care Specialist in Ghana:</p> <ul style="list-style-type: none"> <li>• assisted establishment of an 8-bed PICU, the first in the country;</li> <li>• introduced use of bubble CPAP to assist infants with breathing difficulties, which has successfully cut down on deaths from infants with respiratory diseases in the emergency unit;</li> <li>• teaches medical, nursing, and auxiliary health students in the management of critical illness at Kwame Nkrumah University of Science and Technology;</li> <li>• engages with the College of Physicians to explore the establishment of specialist pediatric critical care training in Ghana.</li> </ul> <p>A pediatric hematology/oncology trainee:</p> <ul style="list-style-type: none"> <li>• established a pediatric Tumor Board, formed a multidisciplinary team, and runs an in- and outpatient service at the hospital, training nurses to be part of this service;</li> <li>• helped introduce bone marrow aspirates: number of confirmed leukemia cases increased by 30% at the facility;</li> <li>• works with training and lobbying groups, organizing a pediatric oncology workshop, funded by World Child Cancer and targeted to health workers;</li> <li>• is involved with a stakeholders group for palliative care in Ghana and the Wilms Tumor Collaborative study (International Society of Pediatric Oncology Committee of Developing Countries initiative);</li> <li>• is securing funds so that ~40% of children have chemotherapy free of charge;</li> <li>• awarded winners of Conquer Cancer Foundation's International Development and Education Award 2015.</li> </ul> <p>The first trained pediatric gastroenterologist:</p> <ul style="list-style-type: none"> <li>• established a gastroenterology service and drafts protocols for GIT disease management;</li> <li>• trains nurses in gastroenterology and is involved with public education;</li> <li>• raises funds to support patients who cannot afford laboratory investigations and treatment;</li> <li>• initiated teaching sessions with the nutritionists in the pediatrics department to improve the care of children with secondary malnutrition.</li> </ul>
Malawi, East Africa	<p>General pediatrics trainee</p> <ul style="list-style-type: none"> <li>• is head of the Pediatric Department at Kamuzu Central Hospital in the capital City of Malawi, Lilongwe;</li> <li>• introduced triaging systems to improve recognition of sick children and critical care pathways; mortality reduced from 7% to 2.3%.</li> </ul> <p>General pediatrics trainee:</p> <ul style="list-style-type: none"> <li>• was appointed consultant pediatrician at Queen Elizabeth Central Hospital in Blantyre;</li> <li>• is lead clinician on the neonatal ward and has promoted and published data supporting the use of affordable bubble CPAP<sup>12</sup>;</li> <li>• is developing Malawi's first donor breast milk bank and an expansion of the existing kangaroo care unit.</li> </ul>
Uganda, East Africa	<p>Pediatric hematology/oncology trainee:</p> <ul style="list-style-type: none"> <li>• was appointed head of Pediatric Oncology Service at the Uganda Cancer Institute (UCI) in Kampala;</li> <li>• coordinates a multidisciplinary team including pediatrician, medical officer, 6 dedicated nurses, and counselor;</li> <li>• supervised postgraduate students in their research in the Children's Service at UCI;</li> <li>• addressed shortage of healthy meals for children and lack of reliable access to efficacious antibiotics;</li> <li>• applied for additional grants to initiate early screening for cancers and improved approaches for early detection and management of neutropenic fevers;</li> <li>• helped make UCI 1 of the 9 sites in 5 counties involved in the Collaborative Wilms Tumor Project (with Malawi, Ghana, Cameroon, and Ethiopia); this is the first time the Children's Service is engaging in a collaborative initiative, and the experience has already caused UCI to better streamline care of Wilms tumor patients, while also spilling over to result in improved care of other children with solid tumors.</li> </ul> <p>Neonatology trainees returned to the International Hospital Kampala, Mulago National referral hospital, and the Nsambya hospital:</p> <ul style="list-style-type: none"> <li>• develop therapeutic hypothermia for asphyxiated neonates care and infection control guidelines;</li> <li>• advocate for kangaroo care rooms in hospitals in Uganda;</li> <li>• identify immediate and long-term interventions that could be implemented to reduce the mortality rate;</li> <li>• teach intern doctors, undergraduate students, and postgraduate students at Mulago National Referral Hospital;</li> <li>• lobby for equipment (incubators, radiant warmers, CPAP) and promoted bubble CPAP units;</li> <li>• collaborate with organizations such as Save the Children to provide a few equipment such as CPAP;</li> <li>• collect data on survival after hospital discharge of very low birth weight babies in Mulago National referral hospital.</li> </ul> <p>The first child and adolescent psychiatry trainee returned to Mulago National Referral Hospital:</p> <ul style="list-style-type: none"> <li>• coordinates a child and adolescent psychiatry service at Mulago National Referral Hospital and Butabika Hospital;</li> <li>• is developing ways to establish a multidisciplinary team consisting of occupational therapist, child clinical psychologist, child social worker, speech therapist, child and adolescent psychiatrist, child psychiatric nurse, and special needs teacher;</li> <li>• is leading a course for postgraduate training and master of medicine in pediatrics, supervising theses in child and adolescent psychiatry topics, and is involved in a research project (the CHAKA study) that is funded by the Wellcome Trust;</li> <li>• is training other professionals on the complexities of child development and mental health, including professionals completely outside the traditional health sector (eg, teachers, police, politicians).</li> </ul>

TABLE 2 Continued

Country	Outcome Event
Kenya, East Africa	<p>Returning fellows to Nairobi:</p> <ul style="list-style-type: none"> <li>• one is the Chair of the Department of Pediatrics at the University of Nairobi;</li> <li>• one is involved in advising the national government on policy for TB programs for children;</li> <li>• pulmonology fellows have promoted vaccination programs to improve pulmonary care and initiated new programs in child lung health;</li> <li>• nephrology fellows are developing nephrology capacity such that renal transplants for children are now possible;</li> <li>• an intensive care fellow is developing a PICU;</li> <li>• a fellow is developing curricula at the University of Nairobi and Kenyatta National hospital for a fellowship in pediatric emergency and critical care medicine;</li> <li>• a neurology fellow is a member of Pediatric Commission for the International League Against Epilepsy and is lobbying to ensure that appropriate pediatric antiepileptic drug formulations are available.</li> </ul> <p>Moi Teaching and Referral Hospital, Eldoret:</p> <ul style="list-style-type: none"> <li>• a gastroenterology fellow works as a consultant, establishing a gastroenterology service, and successfully acquired equipment such as a pediatric scope;</li> <li>• most fellows serve as board members for the national body, the Kenyan Pediatric Association.</li> </ul>
Zambia, Southern Africa	<p>Cardiology fellow:</p> <ul style="list-style-type: none"> <li>• successfully introduced a pediatric cardiology service in Lusaka at the main teaching hospital;</li> <li>• upregulated the care given to the local community, raising awareness of reversible cardiac disease and developing models of care relevant to the region and the resources;</li> <li>• in collaboration with APFP trainees, is exploring the next stage of expanding the service.</li> </ul>

development of multidisciplinary teams including nursing and rehabilitation.

Optimizing relationships with institutional partners is essential to ensure that appropriate development of training is focused strategically on health care needs. The APFP will not duplicate an existing training program, but it will assist in development of parallel training, with the aim that a skills network is established across the continent.

Some of the challenges faced by fellows include homesickness, lack of a family support system, culture shock, adjusting to new environments, coping with financial constraints, and so on. The fellows receive an exceptionally high level of pastoral support from the APFP core team. When the trainees return to their home centers, they face enormous challenges, with limited equipment and other trained staff to work with. The transition and translation of knowledge modules is integral in enabling the trainee to adapt to the home setting, to prioritize key areas to develop where there are realistic chances of success.

Detailed reports and budget documentation to donors are

supplied and outcomes are maintained according to agreed monitoring and evaluation criteria. The APFP recruits funding support from multiple sources to avoid dependence on single donors. Where possible, the program has cosponsorship from referring partners, and has successfully lobbied for reduced tuition fees through the University of Cape Town, which has also begun to encompass various aspects of the program administration.

The challenge of the brain drain is substantial for health care workers in resource-poor countries.<sup>15–20</sup> A study assessing the career intentions of medical students from 6 sub-Saharan African countries<sup>21</sup> found that 40% planned to train abroad and 21% intended on relocating outside sub-Saharan Africa. The factors for the lack of retention were listed as career and training opportunities, remuneration, access to equipment and advanced technology, regulated work environment, and the politics of health care in Africa. These factors, wherever possible, are addressed in the coordination of the APFP. Anecdotally, the maturity of many of the fellows is a significant advantage to their resilience.

An innovative initiative complementary to the program is videoconferencing between pediatric surgery centers, which allows interactive teaching lectures to be accessed by multiple sites<sup>22,23</sup> ([www.surgicalskills.co.za](http://www.surgicalskills.co.za)).

Other African training projects are aimed at strengthening health professions education; examples are those supported by the Medical Education Partnership Initiative, US National Institutes of Health.<sup>24</sup> These initiatives using international experts add to the wealth of training potential at a local level.<sup>25</sup> The health professionals returning from APFP training are encouraged to collaborate and be the local leads in such enterprises.

Training support must be relevant to local health issues.<sup>26</sup> Visiting expert programs enable a specialist with specific skills to spend time in an Africa center, assisting the center to develop models in education, training, or health care delivery.

There is a lack of publications in the peer-reviewed literature from authors in sub-Saharan Africa.<sup>27,28</sup> Local research is important to change practice for the better; without this, policies are often

based on poor-quality data.<sup>29,30</sup> The Consortium for Advanced Research and Training in Africa was established in 2010 to strengthen research infrastructure and build capacity in African universities through the enhancement of doctoral training programs, promoting research that is Africa based, with much of the mentorship and supervision also based in Africa.<sup>31</sup>

The APFP aims at clinical training and increasing clinical capacity in child health in Africa. There is also a dire need for increasing clinical research capacity and for clinician scientist training in child health on the continent. Programs that enable the development of pediatric clinician scientists are needed, and many of the APFP alumni have the ability to fill this void.

## ABBREVIATIONS

APFP: African Paediatric Fellowship Programme  
 CPAP: continuous positive airway pressure  
 HPCSA: Health Professions Council of South Africa  
 KPA: Kenyan Pediatric Association  
 WHO: World Health Organization

by international philanthropic and non-government organizations, the Children's Hospital Foundation, Red Cross War Memorial Children's Hospital, the Harry Crossley Foundation, the ELMA Foundation, Vitol Charitable Foundation, the University of Cape Town, and the referring institutions.

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