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Paediatric haematology/oncology workforce and training programmes for Africa: a regional analysis

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ABSTRACT

Graduate medical education programmes in paediatric haematology/oncology (PHO) are necessary to train specialists to provide high-quality care for children and adolescents with cancer and haematologic diseases. In this study, we used the Education Program Assessment Tool (EPAT). The study consisted of three components: (1) mapping the PHO workforce and training programmes in Africa; (2) using the EPAT to evaluate the current PHO programmes in Africa and (3) using a design-thinking approach to develop priority interventions to expand PHO training capacity in Africa through a collaborative co-design process. There were 236 fellowship-trained paediatric haematologists/oncologists in 37 countries in Africa. 17 countries (32%), with a total population of 42 million under 14 years of age, had no paediatric haematologists/oncologists. The continent has an average of 205 new paediatric cancer cases per specialist. 22 PHO training programmes completed the EPAT. The average score was 72% (SD 9%). Programmes showed varying strengths in the elements of comprehensive training, with the highest EPAT scores in experiential learning domains. A priority-setting exercise established interventions to strengthen PHO training in Africa, including a PHO curriculum, a leadership skill development process and a path for the creation of exchange opportunities. The PHO workforce and training capacity are highly variable in Africa. Through international collaboration and a systematic evaluation of workforce density and training programme strengths, alignment on key regional priorities and the creation of a shared model of cooperation to enhance training programmes for Africa can be achieved.

SUMMARY BOX

- ⇒ A robust workforce is essential for paediatric haematology/oncology, but data are scarce in terms of workforce availability and training programmes, especially in Africa.
- ⇒ We report the first regional assessment of the paediatric haematology/oncology workforce and training programmes in Africa.
- ⇒ Through a design-thinking approach, we defined a strategy to expand capacity building in the continent.
- ⇒ These data emphasise the need for the continued prioritisation of paediatric haematology/oncology workforce growth and training in the African continent to increase care capacity.

INTRODUCTION

Access to high-quality care for children and adolescents with cancer depends on many factors, including sufficient numbers of adequately trained healthcare professionals.[1] A skilled workforce is the cornerstone of paediatric haematology/oncology (PHO), but a shortage of healthcare professionals impedes access to care for a growing population in Africa.[2] The education and training of professionals to strengthen and expand paediatric cancer care should be an integral part of the workforce strategy for the continent. Graduate medical education (GME) programmes in PHO are essential to train specialists to provide quality care for children and adolescents with cancer and haematologic diseases.[3]

PHO fellowship programmes aim to provide comprehensive clinical training across a diverse range of cancers and blood disorders that occur in children and adolescents. Given the growing need to expand care, PHO fellowship training programmes have been established in Africa,[4–7] but these

vary in duration, content and completion criteria. In some contexts, paediatric haematology and paediatric oncology are considered distinct specialties and training programmes.

To improve the PHO workforce, training programmes should aim to deliver competencies aligned with the needs of children and adolescents with cancer.[8] A more comprehensive workforce evaluation is needed to establish a PHO workforce that is sufficient in number and fit for this purpose.[9] Assessing the current number of specialists and the existing training capacity can help prioritise interventions to improve PHO training. To date, a comprehensive evaluation of the existing PHO workforce and fellowship training programmes in Africa has never been performed. The Education Program Assessment Tool (EPAT) is a validated tool that was developed to evaluate GME programmes in PHO, recognising country-level variations in specialist training approaches.[10] Thus, we aimed to develop a regional strategy for increasing PHO workforce capacity in Africa by using the EPAT to systematically evaluate the PHO programmes in the region to inform the prioritisation of interventions to strengthen training.

STUDY POPULATION, SETTINGS, METHODS AND DATA COLLECTION

This study consisted of three components: (1) mapping the fellowship-trained PHO workforce and training programmes in Africa; (2) using the EPAT to evaluate the current PHO programmes in Africa and (3) using a design-thinking approach to develop priority interventions to expand PHO training capacity in Africa (figure 1). Since its conception, this work involved a collaborative co-design process between the International Society of Paediatric Oncology's Africa Continental Branch (SIOP Africa) and St. Jude Global.

The numbers of trained PHO specialists per country were sourced from national and international PHO societies and peer-reviewed manuscripts.[11] Workforce density

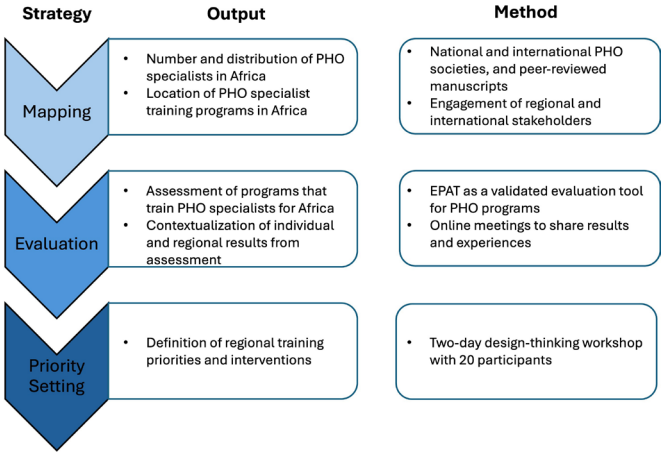

Figure 1 Study approach and components. EPAT, Education Program Assessment Tool; PHO, paediatric haematology/oncology.

was expressed as the number of fellowship-trained paediatric haematologists/oncologists per million children and paediatric cancer cases occurring in children under 14 years of age. Population estimates and country income classifications were obtained from the World Bank Open Data platform.[12] Paediatric cancer incidence data were obtained from GLOBOCAN 2022.[13]

The EPAT is a comprehensive, validated tool to evaluate PHO fellowship programmes.[10] To capture the different elements of PHO training programmes that provide graduates with the required competencies, the tool assesses 10 domains: hospital infrastructure, patient care, education infrastructure, programme basics, clinical exposure, theory, research, evaluation, educational culture and graduate impact (online supplemental table S1). Each domain includes questions that evaluate the elements required to provide graduates with the necessary competencies to care for children with cancer and blood disorders. Each question receives a value reflective of its relative importance to the domain. Responses are assigned scores that reflect the degree to which each component was satisfied. These scores are then expressed as a percentage for each domain. Descriptive outputs for each domain include each programme's strengths and the areas of opportunity to improve or adapt the programme. EPAT reports are created to describe the assessment outputs for each of the responding programmes.

The EPAT was completed by fellowship programme directors or other designated leaders between September and November 2022. The EPAT reports were generated and provided to each respondent in January 2023. After the reports were available, monthly online group meetings were held with participants to discuss the results. These sessions culminated in a 2-day design-thinking workshop in August 2023 held in Accra, Ghana.[14] EPAT respondents convened to contextualise the EPAT data for the region and define priorities to address the critical areas of need for improvements in PHO training in Africa. This dialogue was facilitated by four structured exercises: a strengths, weaknesses, opportunities and threats (SWOT) analysis of regional training, the identification of opportunities for collaboration, the development of interventions to expand training and the prioritisation of the proposed interventions.

AVAILABILITY OF PAEDIATRIC HAEMATOLOGISTS/ONCOLOGISTS IN AFRICA

There were 236 fellowship-trained paediatric haematologists/oncologists in 37 of 54 countries in Africa (69%). 17 countries (31%) had no fellowship-trained PHO specialists (figure 2A). Of the 17 countries without fellowship-trained PHO specialists, 7 are low-income countries (LICs), 7 are lower-middle-income countries (LMICs), 2 are upper-middle-income countries (UMICs) and 1 is a high-income country (HIC). Approximately 42 million children under the age of 14 live in these countries, with

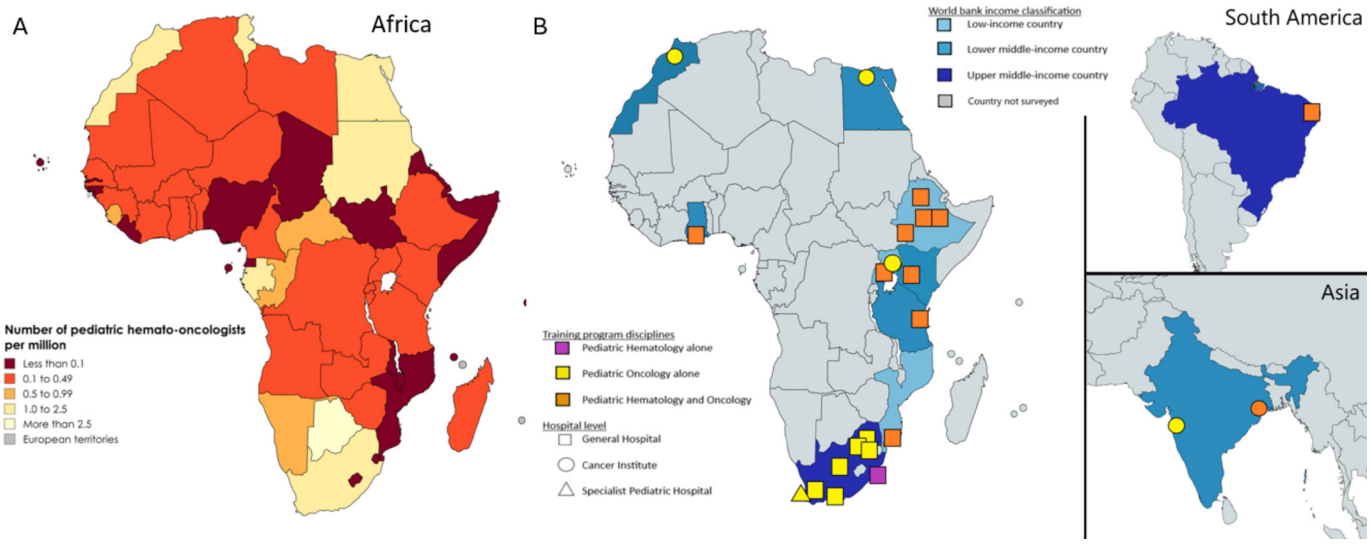

Figure 2 (A) The paediatric haematology/oncology workforce density per million children under 18 years of age in Africa. (B) Sites of paediatric haematology/oncology training programmes according to World Bank income classification, disciplines of the training programmes and the hospital type.

2168 incident cancer cases in 2022 (online supplemental table S2).

Based on an estimated 48 349 cases of newly diagnosed cancer in children under 14 years of age in Africa, the continent has 204.9 new cases per year per specialist. In countries with specialists, the ratio of new cases to specialists in each country ranged from 17 to 1648 cases per specialist per year. PHO specialist density was 0.35 per 1 000 000 children under 14 years of age (range 0–2.9 per 1 000 000) in Africa.

Our data show remarkable variability in the number of PHO specialists in the diverse countries in Africa, with almost a third of countries having no fellowship-trained PHO specialist. There is high variability in provider density in the countries with specialists, so these providers experience a large burden of clinical care. In HICs, recommendations of one paediatric haemato-oncologist for every 15 new patients per year have been proposed.[14–16] Using a modified Delphi consensus process, The Lancet Commission on Sustainable Paediatric Cancer Care suggested a ratio of one specialist for every 50 new patients per year.[11] Based on these ratios, Africa should have at least 967 (1:50) and up to 3223 (1:15) PHO specialists. Therefore, the current number of 236 specialists fulfils less than 25% of the continent's need. Additional analyses are required to investigate the factors that contribute to the lack of specialists in these countries and to assess who is currently caring for the children and adolescents who are diagnosed with cancer and haematologic diseases.

EXISTING TRAINING PROGRAMMES

A total of 24 institutions were invited to complete the EPAT, from which 22 programmes (92%) responded. 19 (86%) of the responding programmes were in Africa, 2 (9%) were in Asia and 1 (5%) was in South America (figure 2B). The three programmes outside Africa were included because they have consistently trained African PHO specialists. In the African region, there were nine (47%) from Southern Africa, eight (42%) from East Africa and one each (5%) from West and North Africa. Seven programmes (32%) were from LICs, six (27%) from LMICs, and nine (41%) from UMICs (table 1).

Most participating programmes (20 of 22 (91%)) are in government-designated regional referral facilities with sufficiently large catchment areas to provide an adequate volume of patients for trainee learning opportunities. 13 (59%) of the institutions serve a population of more than 10 million children. Institutions had a median of 170 new paediatric cancer cases per year (range 55–3000). Eight units (36%) reported that paediatric services were only provided for children up to a maximum age of 14 years. Most programmes (21 of 22 (95%)) were 2 years in duration, but one was 3 years.

EVALUATION OF FELLOWSHIP PROGRAMMES USING EPAT

The average EPAT scores of the 22 programmes are shown in figure 2A. The average score was 72% (SD 9%), with a range from 50% to 85%. The scores for each of the 10 EPAT domains are described in figure 2B. Educational infrastructure had the highest mean score (mean 90%; SD 10%), followed by theory (mean 79%; SD 13%) and clinical exposure (mean 78%; SD 8%). Graduate impact (mean 59%; SD 16%), educational culture (mean 60%; SD 17) and hospital infrastructure (mean 67%; SD 15%) were the lowest scored domains. Evaluation (mean 70%; SD 21%), research (mean 71%; SD 19%) and educational culture domains had the highest variability in scores. Programme-specific scores are shown in figure 3.

Educational oversight systems, such as dedicated affiliation with a university, existed in most programmes (20 of 22 (91%)). All participating

Table 1 Characteristics of responding institutions and programmes

Characteristic	n (%)
Country	
South Africa	8 (36)
Ethiopia	4 (18)
India	2 (9)
Uganda	2 (9)
Brazil	1 (5)
Egypt	1 (5)
Ghana	1 (5)
Kenya	1 (5)
Mozambique	1 (5)
Tanzania	1 (5)
Country income status	
High	0
Upper-middle	9 (41)
Lower-middle	6 (27)
Low	7 (32)
Type of hospital	
General	17 (77)
Cancer	3 (14)
Paediatric	1 (5)
Paediatric cancer	1 (5)
Hospital category	
Public	17 (77)
Private, not-for-profit	3 (14)
Hybrid	2 (10)
New paediatric cancer cases per year	
0–49	0
50–99	3 (14)
100–199	9 (41)
200–500	6 (27)
>500	4 (18)
Specialty scope	
Paediatric oncology	11 (50)
Paediatric haematology	1 (5)
Paediatric haematology/oncology	10 (45)
New fellows per year	
1–2	15 (68)
3–4	6 (27)
>4	1 (5)

programmes reported that trainees participated in team decision-making at diagnosis and communicated therapeutic options. Most institutions (20 of 22 (91%)) had multidisciplinary tumour boards to discuss clinical decisions. Trainees also had longitudinal exposure to a patient's care trajectory from the inpatient to ambulant care stages. Programmes facilitated increasing fellows' responsibilities over time, which is considered essential in building competence in clinical care and confidence in practising independently. Although 19 (86%) of the programmes required the completion of a scholarly activity to be eligible for graduation, only 12 programmes (55%) had protected time for research. At most programmes, trainees received a salary (21 of 22 (95%)), but only seven programmes (32%) included medical insurance coverage.

The distribution and strengths of PHO fellowship training programmes in Africa vary importantly. The EPAT assessment of these programmes identified a wide range of scores for the EPAT domains across the participating institutions. Institutions scored higher in traditional educational domains, such as clinical exposure and theoretical curriculum, but scored lower on elements of the educational environment and evaluation. This finding is unsurprising as GME has historically focused on theory and experiential learning, and some of the lower-scoring domains require more robust academic resources.

Training programmes should be guided by the clinical contexts of local practices to ensure that they are competency driven rather than based only on theory and practicality. The programmes we evaluated vary in their hospital infrastructure and resources, creating opportunities for trainee physicians to rotate through disciplines at outside institutions to gain clinical competencies, especially in advanced treatments such as bone marrow transplantation. In the context of the varying strengths of institutions and programmes, one prioritised intervention was the creation of a network of collaboration that would allow for trainee exchanges. Because many institutions and programmes do not care for patients older than 14 years of age, exposure to adolescents and young adults is largely lacking. Exchange programmes can facilitate this experience, but programmes should ultimately call for paediatric units to treat patients up to 18 years of age.

CO-DESIGN WORKSHOP AND OUTPUTS

After the completion of EPAT, during the online group meetings and design-thinking workshop, participants acknowledged that PHO training programmes were historically developed out of necessity and were guided by institutional visions and available resources. As Africa is a continent facing broad socioeconomic challenges, training programmes need to be optimised and standardised while enabling accommodation for local needs, circumstances and regulations.

The SWOT analysis identified strengths shared by participants, such as local expertise and sufficient patient volumes to enable experiential learning

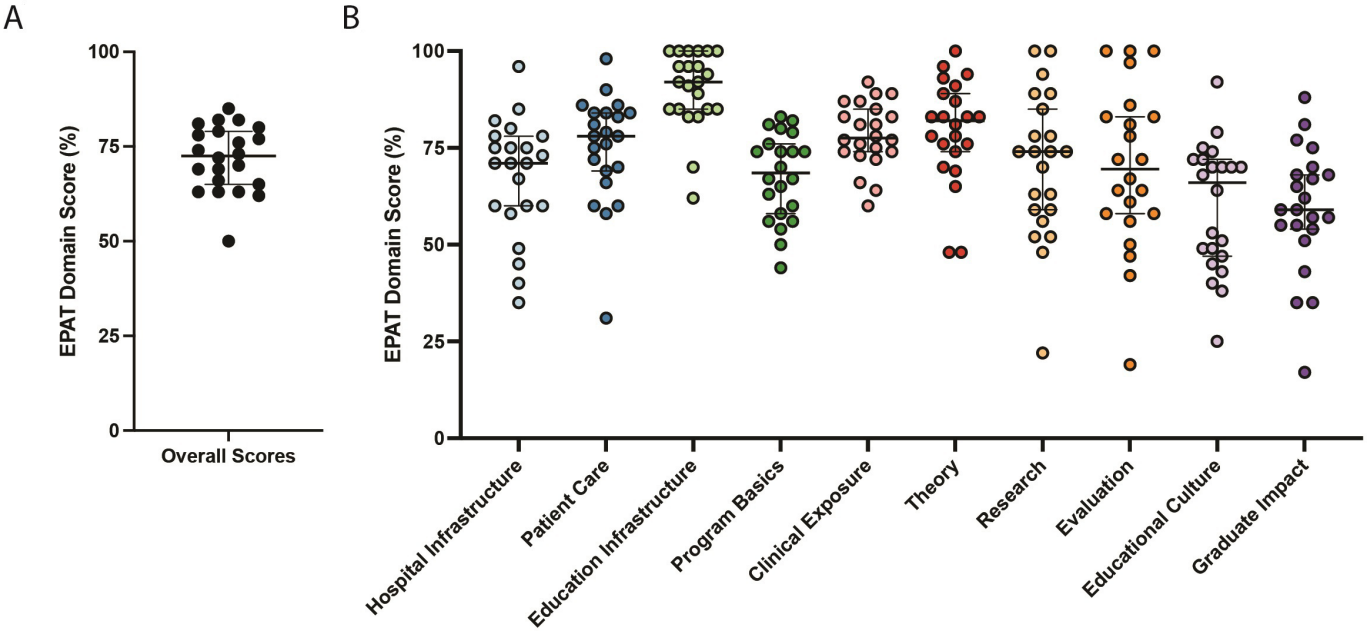

Figure 3 (A) Average Education Program Assessment Tool (EPAT) scores of the 22 responding programmes. (B) Scatter plot showing the EPAT domain scores of the 22 responding programmes.

(figure 4). Participants emphasised the importance of opportunities involving international collaboration and distance learning. Weaknesses and threats were primarily related to limited and inconsistent resources and overburdening of teaching faculty. Suggested interventions included restructuring curricula, seeking financial support and providing learning opportunities such as exchange programmes

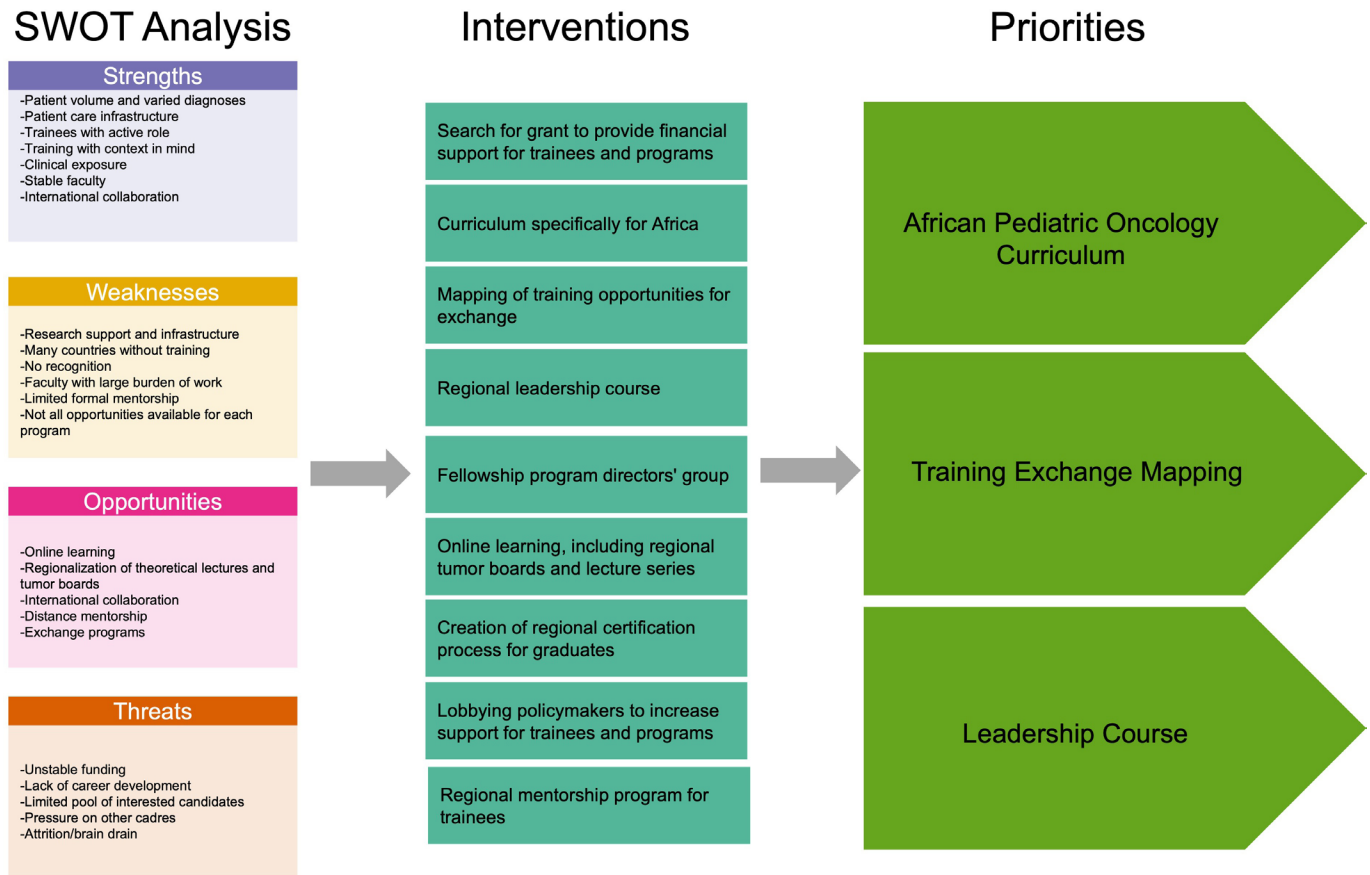

Figure 4 Results of the Education Program Assessment Tool design-thinking discussion and prioritisation. SWOT, strengths, weaknesses, opportunities and threats.

and leadership courses. During the workshop, interventions were prioritised through a structured exercise based on their impact and feasibility. The prioritisation process resulted in the identification of three strategies to advance the PHO training landscape in Africa: (1) develop a standardised PHO training curriculum for Africa, (2) map the training opportunities in Africa to establish trainee exchanges and (3) include leadership training as part of fellowship development.

The holistic co-design approach—to align stakeholders and define a regional strategy to expand training opportunities based on quantitative data—allowed for rich discussion and the prioritisation of valuable, relevant projects based on local expertise. These projects will build on other successful education programmes that currently exist in Africa.[4–7] Although the three identified priorities will not correct all workforce deficiencies, they will expand training opportunities and galvanise a community that is invested in education and training.

CONCLUSION

This study describes the variability of the PHO workforce and training capacity in Africa. To our knowledge, this study provides the first continental assessment of PHO workforce and training programmes. Our findings show marked disparities in workforce availability and training capacity in Africa, highlighting the urgent need to increase the PHO workforce on the continent through a robust evidence-based strategy facilitated by international collaboration. Although many PHO training programmes exist, these have varying strengths across the different elements of a comprehensive training programme. Expanding the workforce capacity on the continent is critical as the burden of paediatric cancer is anticipated to increase in the future. Therefore, enhancing the training programmes that build PHO workforce capacity is essential to provide high-quality care for children with cancer. Through international collaboration, we achieved alignment on key regional strengths and priorities to enable the design of a shared model that can strengthen training programmes for Africa.

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