

The status of blood supply in sub-Saharan Africa: barriers and health impact



Sub-Saharan African countries continue to struggle with chronic, year-round blood shortages, limiting their ability to support patients and deliver on the health-related Sustainable Development Goals (SDGs).¹ Most blood recipients in sub-Saharan African countries are children and women around the time of childbirth² so achieving the health-related SDGs depends on blood and blood product availability to reduce maternal mortality, end preventable deaths of newborn babies and children younger than 5 years of age, and achieve universal health coverage. Blood shortages in sub-Saharan Africa can have devastating consequences. An estimated 70% of 287 000 pregnancy-associated deaths in the world in 2020 occurred in sub-Saharan African countries,³ predominantly due to obstetric haemorrhage. Insufficient blood supply for transfusion contributes substantially to such maternal deaths in hospitals in sub-Saharan Africa.⁴ Blood transfusions are also essential for managing sub-Saharan Africa's high rates of traffic accidents⁵ and childhood anaemia, which is commonly due to infections such as malaria, helminthiasis, and haemoglobinopathies. Sub-Saharan Africa is home to more than 75% of the 300 000–400 000 babies born each year globally with sickle cell disease (SCD);⁶ blood shortages contribute to 50–90% of these children dying before their fifth birthday.⁷ As the health-care systems develop in sub-Saharan African countries, we can also expect increased blood needs for advanced cancer therapies, such as transplantation and cell therapy, organ transplant, dialysis, and cardiac surgeries.

But there are several barriers to achieving an adequate and sustainable blood supply in sub-Saharan Africa. The average number of blood donations across the WHO African region is less than 6 units per 1000 population, with some countries such as Cameroun, Eritrea, and Madagascar collecting less than two units per 1000 population.⁸ Insufficient blood supply in sub-Saharan African countries is due to many factors, including inadequate organisation, regulation, and coordination of national blood services, and challenges with geographical distribution of blood for transfusion. There are also cultural barriers and stigma associated with knowing HIV status⁹ that deter some voluntary blood

donors, compounded by inefficient donor recruitment programmes, and inadequate funding and sustainable financing models for blood services. Several sub-Saharan African countries including Kenya, Lesotho, Malawi, and Uganda, built their national blood transfusion services on the back of HIV funding from donor agencies such as PEPFAR, the Global Fund to Fight AIDS, Tuberculosis and Malaria, and the European Union, but this funding has reduced considerably.¹⁰ Although 49% of sub-Saharan African countries receive some government funding for their blood services,¹¹ it is insufficient and national health insurance schemes are not available in many of these countries. Blood services therefore need to meet the shortfall by charging patients who receive blood transfusions, but this is administratively complex, poorly regulated, and disadvantages the poorest in society. Furthermore, abuses of out-of-pocket systems by health-care providers negatively influence trust among the population and hence reduce their motivation to donate blood.⁹

WHO recognises three types of blood donors: voluntary non-remunerated blood donors (VNRBD); family replacement blood donors (FRD) who donate blood for family members, friends or acquaintances; and paid donors. In high-income countries such as Denmark and the UK, the use of VNRBD ensures reliability of adequate national blood supply. In the WHO Africa region, the number of VNRBD increased from 1.89 million in 2008 to 3.42 million in (increasing total donations from 2.41 million units to 4.46 million units).¹² Despite this, donations from VNRBD are unable to meet the demand for blood in many sub-Saharan African countries. For example, of 21 sub-Saharan African countries with more than 80% VNRBD, only five (Botswana, Mauritius, Namibia, South Africa, and Swaziland) have met the minimum blood requirement of 10 units per 1000 population²—a target that, although globally adopted, is not based on robust evidence.¹³ Paid donors have a lower safety profile as compared with VNRBD and do not contribute to achieving adequate and safe blood supply.¹⁴

Hospitals in sub-Saharan African countries typically rely to varying extents on FRDs to meet the demand for blood, especially if they are remote from blood collection

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Panel: Examples of successful interventions for achieving blood supply in sub-Saharan Africa

To address the problem of inadequate, well-coordinated blood donor recruitment and retention strategy, Zimbabwe implemented Pledge 25 Club [A: is this voluntary? Non-profile?] for young and healthy citizens who commit to regularly donate blood at least 25 times in their lives. Pledge 25 Club led to increased blood donation in the month of December from 550 units of blood in 2003 to 4174 units of blood in 2017.¹⁶

Effective blood donor education and information help to address misinformation and misconceptions about blood donation and insufficient knowledge and awareness of the need for blood donation. The implementation of social media campaign in Senegal by the Senegalese National Blood Transfusion Centre has helped to increase awareness of the need to donate blood, especially during COVID-19, leading to 11% increased donation between 2020 and 2021.¹⁷ Similarly, partnerships with radio stations in Ghana led to increased blood collections through radio station campaigns from 16.2% (2002) to 27.4% (2008). [A: ref 18?] The overall units of blood collected through partnerships with radio stations in Ghana was 20.1% of the 45 515 units collected over the campaign period.¹⁸

centres.² These hospitals can struggle to build up blood stocks or to mobilise enough donors quickly when there are patients with significant bleeding events or mass casualties. Although the FRD system is locally owned and decentralised, it shifts the burden for finding donors away from the health service to the local community and patients' families and friends, and might sometimes involve payments to strangers to pose as family donors. Thus, the FRD system has ethical implications, including reducing access to blood for the poor and potential for exploitative coercion of the donor.

The concepts of VNRBD and FRD needs critical examination in the sub-Saharan African context.¹⁵ The policy focus on exclusivity for the VNRBD system is primarily based on its success in high-income countries.¹⁶ However, in sub-Saharan Africa there is a strong culture of commitment to one's community, and many FRDs consider themselves as VNRBD because despite being recruited by patients' family members or friends, they donated altruistically.⁹ They also prefer to donate at their local hospital knowing the blood will be used for their community members. The VNRBD system usually requires centralisation of donation and screening of blood, thereby disenfranchising local hospitals. Polarised concepts of VNRBD and FRD undermine constructive discussions

about innovations to the FRD systems that could help to improve blood supply and safety. For example, in some settings FRDs have expressed a willingness to become regular blood donors, and it is this regularity of donation with its attendant screening processes that supports safe blood donation.¹⁷

The challenges for blood services in sub-Saharan African countries require solutions that include government commitment to sustainable funding of blood safety programmes, strengthening the management and regulation of national blood services, and increased blood donor numbers through education and advocacy campaigns. Global health programmes such as those for child and maternal health, trauma, and haemoglobinopathies need to advocate for blood transfusion services to improve health outcomes. National blood services in sub-Saharan African countries should collaborate with academic institutions to explore how repeat donations can be encouraged from all types of donors, especially in areas remote from blood centres, and how blood service data can be harnessed to improve the health system. Some examples of successful interventions for addressing some of the barriers to increase adequate and safe blood supply in sub-Saharan African countries are highlighted in the panel.¹⁸⁻²⁰

Achieving an adequate and safe blood supply should be a key public health priority for all sub-Saharan African countries to help improve maternal and child health and manage trauma. Now is the time for more commitments from key stakeholders such as ministries of health, global health agencies, academic and research institutions, blood donor associations, and communities to sustainably strengthen national blood systems, and for interventions to attract and retain blood donors.

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- 1 UN. The 17 goals. <https://sdgs.un.org/goals> (accessed May 1, 2023).
- 2 WHO Regional Office for Africa. WHO African Region status report on blood availability, safety and quality. 2022. <http://apps.who.int/iris/bitstream/handle/10665/363421/9789290234814-eng.pdf?sequence=3> (accessed June 6, 2023).
- 3 WHO. Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and the UNDESA/Population Division. Feb 23, 2023. <https://www.who.int/publications/i/item/9789240068759> (accessed April 22, 2023).
- 4 Bates I, Chapotera GK, McKew S, Van Den Broek N. Maternal mortality in sub-Saharan Africa: the contribution of ineffective blood transfusion services. *BJOG-Int J Obstet Gy* 2008; **115**: 1331–39.
- 5 Tyson AF, Varela C, Cairns BA, Charles AG. Hospital mortality following trauma: an analysis of a hospital-based injury surveillance registry in sub-Saharan Africa. *J Surg Educ* 2015; **72**: e66–72.
- 6 Kato GJ, Piel FB, Reid CD, et al. Sickle cell disease. *Nat Rev Dis Primers* 2018; **4**: 18010.
- 7 Piel FB, Hay SI, Gupta S, Weatherall DJ, Williams TN. Global burden of sickle cell anaemia in children under five, 2010–2050: modelling based on demographics, excess mortality, and interventions. *PLoS Med* 2013; **10**: e1001484.
- 8 WHO Regional Office for Africa. Current status on blood safety and availability in the WHO African Region—report of the 2013 survey. 2017. <https://apps.who.int/iris/handle/10665/254656> (accessed April 23, 2023).
- 9 Asamoah-Akuoko L, Ullum H, Appiah B, et al. Determinants of intention to return to donate blood among first-time blood donors in Ghana. *Vox Sang* 2021; **116**: 324–35.
- 10 Adepoju P. Blood transfusion in Kenya faces an uncertain future. *Lancet* 2019; **394**: 997–98.
- 11 WHO Regional Office for Africa. Current status on blood safety and availability in the WHO African Region—report of the 2013 survey. 2017. <https://apps.who.int/iris/handle/10665/254656> (accessed April 3, 2023).
- 12 WHO. Global status report on blood safety and availability. 2018. <https://www.who.int/publications/i/item/9789240051683> (accessed June 7, 2023).
- 13 Bates I, Hassall O, Mapako T. Transfusion research priorities for blood services in sub-Saharan Africa. *Br J Haematol* 2017; **177**: 855–63.
- 14 WHO. Towards 100% voluntary blood donation: a global framework for action. 2010. https://apps.who.int/iris/bitstream/handle/10665/44359/9789241599696_eng.pdf (accessed May 20, 2023)
- 15 Asamoah-Akuoko L. Evolving strategies to encourage repeat donations among first time voluntary and replacement blood donors in southern Ghana. PhD thesis, University of Liverpool, 2018.
- 16 Weimer A, Tagny CT, Tapko JB, et al. Blood transfusion safety in sub-Saharan Africa: a literature review of changes and challenges in the 21st century. *Transfusion* 2019; **59**: 412–27.
- 17 Asenso-Mensah K, Achina G, Appiah R, Owusu-Ofori S, Allain JP. Can family or replacement blood donors become regular volunteer donors? *Transfusion* 2014; **54**: 797–04.
- 18 Muchokwani E. Unlocking the potential for blood adequacy in Africa. 2018. https://globalbloodfund.org/wp-content/uploads/2020/07/UNLOCKING_THE_POTENTIAL_FOR_BLOOD_ADEQUACY_IN_AFRICA.pdf (accessed May 22, 2023).
- 19 WHO Regional Office for Africa. Senegal takes to social media to boost blood donations. June 16, 2022. <https://www.afro.who.int/countries/senegal/news/senegal-takes-social-media-boost-blood-donations> (accessed May 22, 2023).
- 20 Owusu-Ofori S, Asenso-Mensah K, Boateng P, Sarkodie F, Allain JP. Fostering repeat donations in Ghana. *Biologicals* 2010; **38**: 47–52.