

Blood Costs in Zimbabwe

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29 November 2017

Question

What are the blood costs for sub-Saharan African countries?

- Include a comparative analysis on whether Zimbabwe costs are higher or fair with what the region is offering.

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1. Overview

There is lack of published data on the costs of blood and blood transfusion in sub-Saharan Africa (Mafirakureva et al., 2016). Experts consulted for this rapid review confirm that the deficiency in the breakdown of components involved in costs hinders fair comparative analysis with different countries.

Although the focus for this rapid review is on costs associated with blood transfusion, an overall understanding of the costs (and the processes driving the costs) for all blood products (such as whole blood, and platelets or red blood cells, RBCs) is included. Key points are listed below:

- *Donor recruitment:* It is the aim of the World Health Organisation (WHO) to ensure that all countries practicing blood transfusions obtain their blood samples from voluntary blood donors (WHO, 2010). Currently in Malawi, the cost of donor recruitment is born by the families of the patients; in Ghana, patients who receive blood transfusions are often asked to ensure that someone replaces the blood on their behalf (replacement donation, RD). Students donate blood for free in Zambia.
- In Africa, the approximate average costs of producing a unit of whole blood (e.g. 450mls) is USD82.2 and USD95 for red cells concentrate (RCC), ranging from USD16.3 in Ghana to USD340 in Gabon (AFRO WHO, 2017: 7).
- *Operational cost calculation:* Although the WHO Blood Safety Unit asks its member countries for “*Total (estimated) funding (in US dollars) for operating the blood centres... (including staffing and operations)*”, many countries cannot provide this information. Therefore, it is unclear as to whether data reported is comparable across countries.
- *Costs for hospitals:* Costs are lower for government-owned hospitals than for private ones. However, in some countries (such as Cameroon) hospitals and clinics have their own systems, which affects costs.
- *Costs for patients:* Blood costs for patients in sub-Saharan Africa range from USD13 in Nigeria, USD16 in DRC, from USD21 to USD23 in Cameroon. However, blood is free in Kenya, Rwanda and Uganda due to Government subsidisation. Some hospitals refuse to give a patient a blood transfusion unless a blood donation is made on that patient’s behalf; in more extreme cases, patients are charged a high price for blood and are refused medical treatment if they cannot pay (GPJ Africa, 2017). In comparison, the cost in Zimbabwe was reduced from USD135 to USD80 in November 2017.
- *Centralised vs localised blood systems:* Zimbabwe has a centralised blood system. Although centralised structures have a greater degree of control, a unit of blood collected through a centralised system is 2 to 3 times more expensive than that collected through replacement donation (RD; defined as donation from family members or friends of the patient), the major alternative to voluntary and non-remunerated blood donation (VNRBD) in Africa (Bloch et al., 2012). In countries that do not collect enough blood to meet the demand, patients rely on friends and family members to donate blood on their behalf, to replenish the supply they use if they get a transfusion (GPJ Africa, 2017).

Although DFID places a particular emphasis on gender and disability, the evidence found for this rapid review is ‘gender-blind’ and non-disability focussed. The countries included in this report have a similar (centralised or localised/regionalised) structure of blood supply with Zimbabwe. However, evidence found for this review highlights that Zimbabwe is relying on cost-recovery systems to finance the operation of the National Blood Service (NBSZ).

2. Blood costs in sub-Saharan African countries

A blood transfusion is a common medical treatment around the world. However, in many African countries, patients are often charged a high price or go without. In some countries, this is because people do not donate enough blood to meet the national need (GPJ Africa, 2017).

Production costs

The costs included in the production of blood take into account the following (NBSZ, 2016):

Donor recruitment

There are 3 types of blood donors: voluntary unpaid; paid, and family/replacement:

Volunteer donors in sub-Saharan Africa are predominantly secondary school students, who are unavailable during school recesses and exam periods, therefore restricting blood supply for up to three months every year (Ala et al., 2012). Therefore, relying only on unpaid volunteer donors can lead to shortages in blood supply.

Collecting blood from paid donors is notoriously unsafe due to HIV risk, and is banned in most African countries. However, it still happens as a last resort (Ala et al., 2012).

Family donors should be a key target group for donation, but this relies on hospitals having more localised blood service resources, rather than the centralised hospital blood banks (HBBs) that - while sound practice in wealthy countries - are not as effective in most African countries (Ala et al., 2012). However, areas lacking facilities such as computerised donor registers have trouble distinguishing family members of patients ready to donate blood - leading to the exclusion of all family donors who constitute a cheaper and substantial source of blood (Ala et al., 2012).

Blood collection - cost per unit¹

WHO member countries provide annual data on blood safety and availability to the WHO Global Data on Blood Safety (GDBS) Blood Safety unit. One of the questions regarding costs of blood is Q 2.12: “*What is the approximate cost (in US dollars) of producing a unit of whole blood and/or red blood cells?*” This question has been collected over several years, and so can provide trends from countries, as well as information for comparative analysis (AFRO WHO, 2017: 28).

However, many countries cannot provide all of this information, such as staffing and operational costs. The experts consulted for this review were unsure as to whether the data reported is therefore comparable across countries.

¹ A unit of blood is usually equivalent to approximately 1 pint or 450 millilitres/ml.

Operational costs

Cost per unit of blood

In Africa, the approximate average costs of producing a unit of whole blood is USD82.2 and USD95 for red cells concentrate (RCC), ranging from USD16.3 in Ghana to USD340 in Gabon (AFRO WHO, 2017: 7).

Whole vs 'split' blood

Blood processing, i.e. separating or splitting-up blood into its different components (such as platelets, plasma and red cells [RBCs]), is another common Western practice becoming prevalent in African countries. However, this requires funding (Ala et al., 2012). While this approach is legitimate in the West, 'whole blood' is most often the best product for emergency transfusions - which constitute the vast majority of cases in Africa - but is regularly unavailable, as donations have been systematically split up (Ala et al., 2012).

Emergency transfusions

Whereas use of blood product in the West and high-income countries is often pre-planned or predictable, with 90% of transfusions planned, the vast majority (between 80 to 90%) of transfusions in Africa are emergencies (Ala et al., 2012).

In sub-Saharan countries that receive financial aid from affluent countries, like Uganda and Rwanda, between 50 and 80% of transfusions are related to a small number of similar emergency traumas - such as haemorrhaging in women as a result of childbirth and severe anaemia in children due to malaria (Ala et al., 2012).

Cost per transfusion

The total estimated funding and main sources of financing of blood transfusion are detailed in the Table below:

Table: Funding sources of blood transfusion services per sub-region

Subregion	Countries	Estimated total funding needs (USD)	Government (%)	Cost recovery (%)	External funding (%)	Total funding (%)
Central Africa	9	13,398,637	49.0	13.4	19.3	81.7
East & Southern Africa	20	257,787,510	7.0	83.8	7.0	97.8
West Africa	17	21,993,970	49.0	9.0	42.0	100
Total Region	46	293,180,117	12.0	75.0	10.2	97.2

Source: AFRO WHO, 2017: 7

As the Table shows, country governments provide the majority of funding for blood transfusion services in Central and West Africa (49%). However, this is not the case in East and Southern Africa where cost recovery² is the greatest funding source (83.8%).

Capital Expenses

Centralised⁶ vs localised/regionalised system costs

Employing the Western practice of centralising blood services in sub-Saharan Africa, where communication and transport links are unreliable and fuel shortages commonplace, inevitably results in delays that cost lives. Bespoke facilities are generally located in major urban areas, so rural populations struggle to get blood products in time (Ala et al., 2012), although using drones is an option which could bypass this.⁴

In the centralised system, donor recruitment is necessary for blood distribution; quality processes are also needed (Lara et al., 2007). However, a unit of blood collected through a centralised system is 2 to 3 times (Bloch et al., 2012) or even 5 times more expensive (Allain, 2011: 763) than that collected through replacement donation (RD; defined as donation from family members or friends of the patient), the major alternative to voluntary and non-remunerated blood donor (VNRBD)⁵ in Africa. Considerable pressure is applied by richer countries and international transfusion bodies to establish VNRBD as the only source of blood, excluding the traditional family/replacement donors on the grounds of a higher level of safety. Such a policy not only increases the cost of a unit of blood, but also exacerbates pre-existing blood shortages (Allain, 2011: 763).

With localised systems, patients bear no costs (Lara et al., 2007). Although there are no distribution costs, the quality may be an issue. Extra costs can remain moderate and only double the cost of blood when practiced by small blood centres that are usually attached to hospitals, the costs increase substantially when transfusion services are organised in a stand-alone, centralised, automated system, such as those established with substantial external funding in the capitals or large cities of several sub-Saharan African countries (Allain, 2011: 767).

Voluntary vs replacement donations

Despite policies advocating centralised transfusion services based on VNRBD, the hospital-based replacement donor (RD) system is widespread in sub-Saharan Africa (Lara et al., 2007). This is because RD is significantly cheaper than VNRBD (Bloch et al., 2012).

² This could be: no charges to patients; partial cost-recovery from collective in-patient charge or charge to blood recipient; or full cost recovery from collective in-patient charge or charge to blood recipients (Hensher & Jefferys, 2000: 291).

³ i.e. hospitals and clinics procure blood from a central bank.

⁴ <http://flyzipline.com/now-serving/>

⁵ People who give blood, plasma or other blood components of their own free will and receive no payment for it, either in the form of cash, or in kind.

Two critical issues which overshadow transfusion in sub-Saharan Africa are supply and cost (Allain, 2011: 767). Depending on the setting and the degree of blood shortage, the transfusion may only be performed if a replacement blood unit is obtained. In other cases, the patient is transfused with available bloodstock, the replacement donation reducing the cost of the transfusion to the family (Allain, 2011: 764).

External financial aid

African countries that do not receive external financial aid almost exclusively prepare 'whole blood' through their nationally funded blood services (Ala et al., 2012).

When including facilities, paying back equipment costs, specialised staff and vast overheads, the costs increase by three to fourfold. Being funded by external, affluent sources, Western-developed features of a blood service are often imposed, such as VNRBD-only, systematic preparation of blood components, automation of testing and IT infrastructure. With the possible exception of the Zimbabwe blood service in Harare, no centralised, VNRBD-only blood system has ever been established in sub-Saharan Africa without substantial external funding. That is to say that such a system and the consequent cost of blood is essentially unaffordable with local resources (Allain, 2011: 767-8).

Country examples

Blood costs from a selection of countries with a similar (centralised or localised/regionalised) structure of blood supply with Zimbabwe are displayed below:

Botswana

A centralised system for blood is used in Botswana.

Estimated need: Botswana needs 400,000 units of blood every year and currently the country collects 22,000 units of blood annually (Masokolo, 2015).

Cost to hospitals: Currently the Botswana National Blood Transfusion Centre (NBTC) charges the two main private hospitals Pula (P)900 (USD85.65) per bag of 450ml of blood.

Production costs: Usually the NBTC removes plasma from the blood since it is where most diseases are found. Most patients in Botswana require blood in the form of RBCs. All donated blood is tested for infections. The tests for donated blood include the following infectious diseases (ID)⁶: HIV-1/2, HTLV⁷-1/2, hepatitis B/C and syphilis (Masokolo, 2015). Donated blood is subjected to processing after it is collected, to make it suitable for use in specific patient

⁶ Costs of testing for infectious diseases (ID-NAT) is high and definitely not affordable. However, ID-NAT testing has to continue at all costs (Gouws, 2015). Unfortunately, the cost of testing for all known agents is not feasible because even a select test panel is often prohibitively expensive. Consequently, blood screening in Africa, with few exceptions, for example, HTLV-1/2 testing in Gabon, is limited to HIV, HBV, HCV, and syphilis owing to a regional prevalence of 0.5% to 16%, 3% to 22%, 2% to 7%, and 1% to 21%, respectively (Lara et al., 2007; Bloch et al., 2012).

⁷ The human T-lymphotropic virus, human T-cell lymphotropic virus, or human T-cell leukemia-lymphoma virus.

populations. Collected blood is then separated into blood components by centrifugation (Masokolo, 2015).

Costs per hospital: Blood is offered to private hospitals at a reasonable cost to encourage them to procure blood locally, instead of having to go to South Africa where it will be offered at higher prices, therefore imposing even higher charges for their clients when they need blood (Masokolo, 2015).

Costs per patient: Private hospitals charge its patients at least P2,500 (USD237.82) per litre for blood transfusion. There has been outcry from the public accessing private health facilities in regard to paying for blood transfusion when the blood is obtained freely from the donors. Blood is collected for free from voluntary donors, only government-owned hospitals get blood for free, while a levy is imposed on private hospitals according to NBTC (Masokolo, 2015).

Adequate supply: On average NBTC supplies between 600-800 bags of 450ml blood to private hospitals in Botswana (Masokolo, 2015). Although there have been concerns that the blood units that the country needs have not been met, the country has never run out of blood at any given point. The demand from the two main private as well as government-owned hospitals has been met (Masokolo, 2015).

Cameroon

The constant turmoil in North Cameroon and neighbouring countries has left the healthcare system in a bad position. The increase of **displaced people** only adds to the taxed healthcare system. Hospital blood banks (HBBs) in Cameroon are facing a crisis because of the prevalence of hepatitis infections and HIV among blood donors. January 2016 figures from WHO show that the prevalence rate in Cameroon for hepatitis B/C is 11.9%; which is a higher rate than HIV (5.4%). Local grassroots associations are being created in the country to help contribute to the blood supply.

Estimated need: The annual demand for blood and blood products is estimated at about 400,000 pints of blood. Available statistics from the Ministry of Public Health show that in 2015, 73,000 pints of blood were collected (mainly from government central and general hospitals).

Average cost to collect, test and store a unit of blood: According to information from laboratory technicians, this depends on the agreement a hospital or clinic makes with a donor. Some donors give blood for free, but others expect payment, usually of 5,000 Central African francs (about USD9). Most hospitals spend about 30,000 Central African francs (about USD54) on other related costs for each unit of donated blood (GPJ Africa, 2017).

Cost to patients: Hospitals and clinics all have their own systems (GPJ Africa, 2017). Patients at Padre Pio Catholic Hospital in the largest city, Douala, usually pay between 12,000 and 13,000 Central African francs (about USD21.50 to USD23.40).

Other factors: Leftover blood purchased by a patient can be used to help other patients who are in dire need but cannot afford to buy it themselves. In emergency cases, hospital personnel sometimes donate blood to save a patient.

Democratic Republic of Congo (DRC)

A national technical office within the Ministry of Health coordinates transfusion activities in the DRC (Kabinda Maotela et al., 2015).

Estimated need: A severe blood shortage is being experienced in eastern DRC, due in part to a reluctance among people to donate blood (GPJ Africa, 2017).

Average cost to collect, test and store a unit of blood: According to results from the Provincial Centre for Blood Transfusion in the capital city of Goma, costs vary. However, research has shown costs to be approximately USD107 for clinics in eastern DRC's North Kivu province (GPJ Africa, 2017).

Cost to patients: Each hospital and clinic sets its own rate, but most in North Kivu province charge about USD16 (GPJ Africa, 2017).

Other factors: Despite the impressive performance by the Ministry of Health to decrease HIV and hepatitis rates,⁸ enormous efforts are still required for the organisation of blood safety monitoring, the establishment of a safe supply of testing reagents and supplies, for sustaining the dynamics of voluntary associations of blood donors, and for providing stable funding for these blood safety activities (Kabinda Maotela et al., 2015).

Ghana

The National Blood Service Ghana (NBS Ghana) exists to mobilise blood from voluntary donors, process blood into safe and usable components which are then distributed to HBBs around the country.

Estimated need: 1,260 units of blood are required for transfusion in hospitals daily around Ghana (NBS Ghana, 2016). In 2015, only 30% of blood units around Ghana came from voluntary donors. Most blood came through family and friends (replacement donors, or RDs) who gave blood only because someone known to them required a transfusion (NBS Ghana, 2016). On 1 July 2017, Ghana's Republic Day, an annual mass donation exercise at the National Blood Service is used to augment stock levels.

Costs for patients: Blood is never sold in Ghana, but patients pay a processing fee of 50 to 200 Ghanaian cedi (about USD11 to USD45), to cover expenses (GPJ Africa, 2017).

Replacement requirement: According to information from community hospitals, patients who receive blood transfusions are often asked to ensure that someone replaces the amount used on their behalf, regardless of blood type (GPJ Africa, 2017).

⁸ Initially, the blood transfusion system applied a vertical (top-down) approach, but with the reform of the country's health system, the performance of blood safety became transversal. In the 12 years from 2001 to 2012, 112,882 volunteer blood donors were mobilised; more than 80% of blood products were checked for safety and covered all blood needs; and 81,806 HIV infections were avoided by routine testing of blood products. During the same period, 7,560 people were trained in blood transfusion. The prevalence of viruses among donors has also diminished sharply during this time (Kabinda Maotela et al., 2015).

Other factors: Patients who cannot pay the processing fee but who urgently need a blood transfusion do receive one, but they must arrange to pay the fee at a later date (GPJ Africa, 2017).

Kenya

The Kenya National Blood Transfusion Service (KNBTS), under the Ministry of Health, is mandated to provide safe and adequate blood and blood components in the country. KNBTS is managed through a national coordinating unit, six Regional Blood Transfusion Centres (RBTCs)⁹ and 11 satellites. The coordinating office also houses the National Testing Laboratory (NTL), which mainly conducts confirmatory testing for transfusion transmissible infections for the RBTCs, quality assurance and reference checking for KNBTS. The NTL also serves as a backup testing facility for the RBTCs (Wakaria et al., 2017).

Estimated need: Approximately 420,000 units per annum based on the WHO formula of 1% of the total population, currently estimated at 42 million.

Average cost to collect, test and store a unit of blood: 10,000 Kenyan shillings (about USD97) according to KNBTS (GPJ Africa, 2017).

Cost to patients: Blood donors are not compensated for giving blood, so patients at government hospitals can get blood free of charge (GPJ Africa, 2017).

Other factors: The country is experiencing a blood shortage because of the high cost of collecting and storing it. However, when blood is available, the KNBTS supplies it to hospitals from centres around the country (GPJ Africa, 2017).

Malawi

Data from Malawi has been taken from both local and centralised blood transfusion systems:

Estimated need: The Malawi Blood Transfusion Service (MBTS) is to provide adequate supplies of safe blood and blood products to meet the needs of all patients in all hospitals (public and private) in Malawi. Estimated national blood needs have increased from 80,000 to 120,000 whole blood units per annum (MBTS, 2017).

Average cost to collect, test and store a unit of blood: One study has evaluated of the costs of all laboratory resources¹⁰ needed to provide a unit of safe blood in rural Malawi (Ntcheu district) using the family replacement donor systems (Lara et al., 2007). Results showed that despite potential economies of scale, a unit of blood from the centralised system costs about three times as much as one from the hospital-based "replacement" system. Factors affecting these relative costs are complex but are in part due to the cost of donor recruitment in centralised systems.

⁹ The RBTC scope of service includes: (1) blood donor mobilisation, education, recruitment and retention; (2) blood collection and donor care, and laboratory testing of donated blood; (3) blood component preparation; (4) donor counselling and notification; (5) blood banking and distribution; and (6) haemovigilance (Wakaria et al., 2017).

¹⁰ Full economic costs of all hospital laboratory tests used to screen potential donors and to perform cross-matching.

Operating costs: 2014 WHO Blood Safety Unit figures state that this is USD51.2. However, these have also been reported as USD42 a pint (Chipunza, 2017).

Cost to patient: In the replacement system the cost of donor recruitment is entirely borne by families of patients needing a blood transfusion (Lara et al., 2007). Replacement donation (RD) is significantly cheaper than VNRBD: the cost of a unit collected through RD was shown to be USD16 vs USD56 for a unit collected from a centralised system (Lara et al., 2007; Bloch et al., 2012).

Namibia

All blood processing and testing is centralised in the capital Windhoek; 4 HBBs service 15 major hospitals (Gouws, 2015).

Estimated need: This data is unavailable, although 25,000 units was collected by The Blood Transfusion Service of Namibia (NAMBTS) in 2013. NAMBTS, a non-profit organisation that funds the majority of its operations through a cost-recovery system, is the only entity authorised to collect, process, and distribute blood and blood components, including RBCs. Nearly all transfusions in the country occur with components rather than whole blood (Pitman et al., 2015).

Screening costs: Since 2014, the South Africa National Blood Service (SANBS) Inland Region has conducted all the screening for transfusion transmitted infections (TTIs) for the blood programme in Namibia because of the lower costs, and added advantage of automated systems and improved blood safety using nucleic acid testing. During the 2005/6 financial year, it was at least N\$45 (USD6) per test cheaper to send the tests to South Africa than to do them locally. This also saved the MoHSS on tariff increases for blood products and services. However, there can be delays in the turn-around time, as well as other concerns with the arrangement for the TTI screening. Blood grouping is performed at NAMBTS (MoHSS, 2007: 8). PEPFAR support allowed NAMBTS to leverage domestic cost-recovery revenue to rapidly increase blood collections and the distribution of RCC. However, external support kept production costs lower than they would have been without PEPFAR (Pitman et al., 2015).

Operational costs: 2013 WHO Blood Safety Unit figures report this as USD126. Cost of blood collection is high due to the long distances to collect blood. According to NAMBTS, it is necessary to charge for the cost of collecting, testing, producing, storing and delivering safe blood products to patients, in order to sustain the service. No profit is made.

To ensure sustainability and appropriate development of the national blood programme, fees will be levied for all blood products and services provided by the partners in the national blood programme on cost recovery basis. This will be the main source for funds for recurrent expenditure and sustainable development. Private patients will pay the full cost of products and related services. Cost recovery on all administration and handling costs by HBBs, while preparing blood for transfusion purposes are recovered from NAMBTS (MoHSS, 2007: 23).

Cost to patients: The costs of pooled donations ranged from USD82 to USD597 in 2011 (Pitman et al., 2015). The State covers the cost of blood products at government-owned hospitals, while patients at private hospitals are charged as part of their inclusive hospital bill. Medical aid funds

cover the cost of blood products just like any other medical expense. PEPFAR¹¹ funding from 2005 to 2014 made RCC more affordable to patients. Product prices had to be increased gradually, 16% (2014), 17% (2015), 25% (2016) and 7% in 2017 (Gouws, 2015).

Voluntary donors receive no payment: this includes time off work. However, small tokens of acknowledgement or recognition, refreshments and reimbursements of direct travel costs are provided (MoHSS, 2007: 30).

Nigeria

Estimated need: Nigeria requires 1.5million pints of blood per annum. However, only 5% are voluntary donors, 60% commercial donors (who get paid for donating), 30% blood replacement (RD) by family members or friends of the patient (Benedict et al., 2012; Obinna, 2017). It is commonplace to find hospitals without robust blood banks (HBBs), and the attitude of the public on voluntary blood donation is not helpful either (Obinna, 2017). A study on 'Blood Donation in Nigeria' reveals that Nigeria is still highly reliant on family replacement and paid donors (Benedict et al., 2012). A national baseline data survey on blood transfusion indicates that, in the public sector, donor population is made up of 25% commercial donors and 75% RDs; the number of voluntary unpaid donors were negligible (Obinna, 2017).

Average cost to collect, test and store a unit of blood: According to the National Blood Transfusion Service (NBTS) it is approximately USD94 (GPJ Africa, 2017).

Cost to patients: About 5,000 naira (USD13.93) per unit if blood is available. However, the NBTS doesn't collect enough blood to meet country demand, therefore many patients do not receive the transfusions they need (GPJ Africa, 2017).

Other factors: Patients, particularly women who are about to give birth, are encouraged to have friends or family members donate blood on their behalf. Such donations replenish a hospital's supply and enable patients to receive the blood they need (GPJ Africa, 2017).

Rwanda

Rwanda has a centralised system. In February 2017, Rwanda National Centre for Blood Transfusion (NCBT) was awarded the highest – Level 3 – international standards accreditation by the Africa Society of Blood Transfusion (AfsBT).¹² This means NCBT is now an internationally recognised regional centre of excellence in blood transfusion practice, able to offer blood transfusion medicine and technical expertise services to neighbouring countries as needed. It also marks a milestone in Rwanda's HIV prevention through blood safety strategy. US government agencies through the Centres for Disease Control and Prevention (CDC) with

¹¹ The President's Emergency Plan for AIDS Relief (PEPFAR) or the Emergency Plan, is a five-year bilateral commitment by the United States Government to support HIV/AIDS prevention, care and treatment programs in developing countries.

¹² AfsBT is the continental body that acknowledges attainment of international standards, recognising blood banks as centres of excellence, in Africa.

funding from PEPFAR has helped transform NCBT by enhancing and expanding capacity as a core activity in HIV prevention (US Embassy Rwanda, 2017).

Estimated need: Although the actual amount is unavailable, there is an adequate supply, and anyone who needs a blood transfusion receives it (GPJ Africa, 2017). Need is estimated at approximately 650,000 units of blood per annum.

Average cost to collect, test and store a unit of blood: 2014 WHO Blood Safety Unit figures state USD121.4¹³. However, according to NCBT, it is about USD80 (GPJ Africa, 2017).

Cost to patients: Blood is always free to patients (GPJ Africa, 2017).

Other factors: The success of NCBT lies in its key activities that include blood donor mobilisation and recruitment of VNRBDs, blood testing and processing, storage and distribution. NCBT ensures 100% screening of all blood donated for TTIs - including HIV, hepatitis B/C and syphilis (US Embassy Rwanda, 2017).

South Africa

Estimated need: The South African National Blood Service (SANBS) aims to collect 3,000 units of blood per day. However, less than 1% of South Africans are active blood donors, and in September 2017 SANBS announced that blood supply is currently at just 1.8 Group O stock, compared with a healthy blood stock of 5,000 units or five days' stock.

Average cost to collect, test and store a unit of blood: 2014 WHO Blood Safety Unit figures state USD272.1.

Cost to public hospitals: USD139, according to an expert consulted for this review.

Cost to private hospitals: USD172 (both including VAT). A full list of the SANBS product prices is available on their website- see 'Key Website' below).

Uganda

Uganda has a centralised blood system: The Uganda Blood Transfusion Services (UBTS) is the national body responsible for all blood safety activities in Uganda.

Estimated need: Current estimations on need are not available.

Operating costs: According to the experts consulted for this review, 2016 operating costs per unit are stated at USD20. However, as PEPFAR funding ended after 15 years in March 2016, on average it costs USD40 (Shillings 143,800) to collect, process and issue a unit of blood (Otto,

¹³ WHO Blood Safety Unit ask the countries to provide "Total (estimated) funding (in US dollars) for operating the blood centres covered in this report (including staffing and operations)", but many countries cannot provide this information. Also, some countries may not include the salary of staff, but some may not. Personnel costs make up more than 30% of the fee hospitals pay "at the pump" - labour can be very expensive, since the staff is employed to recruit donors, collect blood, and then process it and test it for infections. The cost of the testing procedures themselves contributes about 25% to the final price of blood. The rest goes to administrative overheads—rent payments for buildings that house the blood centres, for example. Hospitals also mark up an extra charge to cover their administrative costs (NBSZ, 2016).

2017). The Ugandan government covers 100% of the costs associated with blood collection, storage, distribution and use (GPJ Africa, 2017).

Cost to patients: Blood is always free to patients (GPJ Africa, 2017).

Adequate supply: There are occasional shortages of rare blood types, but in general the supply meets the need (GPJ Africa, 2017).

Zambia

Zambia has a hospital-based blood system: The Zambia National Blood Transfusion Service (ZNBTS) based in Lusaka has nine fixed donation, testing and processing sites across the country.

Estimated need: 2015 estimations show that the population requires 140,000 of blood units. According to the Ministry of Health, Zambia occasionally experiences a blood shortage, but in general the supply is steady (GPJ Africa, 2017).

Donors: School students donate blood throughout the year. They are not paid, but refreshments are offered (budget allowing). Adults can also donate blood, but they are never paid.

Operating costs: USD50 per unit, as it is Government subsidised (GPJ Africa, 2017).

Cost to patients: It is illegal for a public or private health facility to charge a patient for blood. Zambians access blood for free at public health institutions as it is paid for by the Government (Chipunza, 2017).

Other factors: In 2016 there were reports that Zimbabweans from the north of the country were crossing the border to Zambia to procure cheaper blood.

3. Comparative cost analysis: Zimbabwe

Zimbabwe has a centralised blood system.

Estimated need: Every year approximately 100,000 packs of blood are transfused in the country. Haemorrhaging pregnant women (40%) and road traffic accidents and anaemic patients (60%) are the major consumers of blood in Zimbabwe (Chipunza, 2017).

Total costs: A study by Mafirakureva et al. (2016) has assessed the unit costs of producing blood in Zimbabwe using an activity-based costing (ABC) method.¹⁴ The total cost of producing safe blood in Zimbabwe for the year 2013 was USD8.6 million. Variable costs accounted for 51.2% of the total cost of production. The unit production costs for RBCs were USD15.94 for recruitment, USD34.62 for collection, USD17.88 for testing, USD11.49 for processing, and USD3.06 for storage plus distribution. **The overall cost of production of one unit of whole blood was**

¹⁴ The production of blood was broken down into recruitment, collection, testing, processing, and storage plus distribution. Data for the year 2013 were collected retrospectively from budgets, financial and expenditure reports, databases, and interviews with transfusion personnel and managers. All direct and indirect costs, in 2013 USD, were allocated, accordingly, to the activities of blood acquisition.

USD118.42 and RBCs was USD130.94 constituting 12.4 and 13.7% of the country's annual GDP per capita (Mafirakureva et al., 2016).

The high unit cost of producing blood relative to the annual GDP per capita demonstrates that acquiring safe blood is a burden on the health care sector in Zimbabwe. Introducing additional safety measures, such as nucleic acid amplification testing and pathogen reduction technology, although desirable, will further increase this burden (Mafirakureva et al., 2016).

*Average cost to collect, test and store a unit of blood: **USD80 a pint, in compliance with a Ministry of Health 1 November 2017 directive.*** This cost is closer to WHO Blood Safety Unit figures for Côte d'Ivoire (USD76.2) and Burkina Faso (USD61- which was an increase from USD54.7 in 2014), but not Malawi (USD42).

Cost to patients: About USD100 to cover the cost of collection and storage (in government institutions). This was revised from USD135 a pint in 2016 in order to improve the dire situation faced by patients, according to the Ministry of Health. In private hospitals the price is USD120, although this was reduced from USD140 (Chipunza, 2017). The only exceptions are for patients of any age who can prove that they've donated blood at least 10 times within the past 12 months, 25 times in a lifetime or is an active donor under the age of 21 who has made at least five donations. Everyone else, including small children, must pay (GPJ Africa, 2017).

Other factors: In most cases, patients who cannot afford to pay USD100 for a unit of blood do not receive the treatment they need, even if they urgently require it. In extremely rare cases, young children or seniors can get blood on credit (GPJ Africa, 2017).

According to the National Blood Service Zimbabwe (NBSZ), which is the sole blood transfusion institution in the country, it has not changed its status from a non-profit making organisation to a private limited organisation. According to a [statement](#)¹⁵ by the Board Chairman on 31 October 2017: *"The reason why blood is cheaper or free in other countries for public hospitals is due to partial or complete subsidy by either the Government or the donor agencies in those respective countries, which is what is missing in Zimbabwe. However, efforts are in progress to come up with sustainable funding models together with Ministry of Health and Child Care so that the cost comes down to affordable levels."*

Discussions between stakeholders in Zimbabwe are ongoing to further reducing the price (NBSZ has an example of a funding model¹⁶). The government will subsidise the blood costs, focussing on decreasing costs of processing the product, e.g. personnel/staffing.

4. Considerations for reducing blood costs

According to experts consulted for this review, it may not reasonable to conduct a 'superficial' comparison of the costs of blood since it is such a complex process. However, there are some important points consider:

¹⁵ <http://www.nbsz.co.zw/content/press-statement-0>

¹⁶ <http://www.nbsz.co.zw/content/finding-solution-cost-blood-zimbabwe>

Voluntary blood donors

It is the goal of the WHO “Global Framework for Action” that by the year 2020, all countries practicing blood transfusion therapy must obtain all their blood supplies from voluntary blood donors. Currently, 67 countries report collecting fewer than 10 donations per 1000 people: of these, 38 countries are in the WHO African Region. The second highest increase of voluntary unpaid blood donations is also in this region (37%).

The literature suggests that in a well-organised blood donor programme, voluntary donors, in particular regular donors, are well-informed about donor selection criteria and are more likely to self-defer if they are no longer eligible to donate, thus reducing the need for temporary or permanent deferrals. This also leads to less wastage of donated blood, with all its associated costs, because fewer blood units test positive for infection and need to be discarded (WHO, 2010: 19).

Blood donor programmes are often perceived to incur minimal costs, apart from expenditure on blood collection bags, because blood is donated free of charge by donors. As a result, they often receive lower priority in the allocation of funds than areas such as blood screening. Yet without an identifiable budget, the programme cannot reach out to blood donors. All too often, blood donor programmes report that they do not have sufficient funds for donor recall or to maintain vehicles and operate mobile donor sessions (WHO, 2016: 23).

When blood is donated voluntarily and without payment to donors, it is often regarded as a free resource and the real costs of the donor programme are often not fully taken into account. In reality, costs will be incurred for the purchase or rental of venues for donor sessions, vehicles and equipment used specifically for the donor programme as well as staffing and other recurrent costs, such as training, communications, media, fuel, donor refreshments, blood collection bags and other consumables (WHO, 2010: 40). Since the blood donor programme is the most publicly visible part of the service where partnership is particularly vital, sponsorship may also be sought from private sector donors who may be willing to adopt blood donation as a good cause by providing financial or in-kind support, such as covering the costs of campaigns in their workplaces or among their customers (WHO, 2010: 40).

Mobile donor sessions bring the opportunity to donate blood as close as possible to donors, reduces their time and travel costs, and makes it easier for them to build blood donation into their regular routines (WHO, 2010: 98).

The best blood donor is one who contributes to ensure sufficient blood supply at an affordable cost (Allain, 2011: 763). Using a family resource is not only the most readily available but also the cheapest, because it does not require a costly recruitment and collection process (Allain, 2011: 763).

Voluntary donors are typically recruited through centralised systems, for example, blood centres that remain independent of the hospital. VNRBD is logistically complex, requiring strategised recruitment, marketing, and collection to secure and, consequently, retain sufficient numbers of donors to approximate demand (Bloch et al., 2012: 166).

In Ghana, a partnership between a teaching hospital and a local FM radio station; continual appeal for blood donors resulted in 63.6% repeat donation over a 3-year period, a feat achieved at low cost (Bloch et al., 2012).

The Botswana Ministry of Health has also embarked on a campaign called Pledge 25 Club, a club for young blood donors that promote the value of donating blood to save lives. Through the initiative, young blood donors pledge to donate at least 25 times in their life-time (Masokolo, 2015).

Cost recovery

While Western models imposed on African blood services have brought some benefits - unintended negative consequences mean that approaches to funding blood services in the sub-Saharan region need to be urgently reviewed (Ala et al., 2012). The introduction of a blood processing fee could be a way of cost recovery through direct charging blood recipients in terms of user fees or hospitals (Isangula et al., 2016: 3).

Devolved blood services in hospitals are developed in parallel with centralised blood services, family-replacement donors are targeted as well as unpaid volunteers and the splitting of blood into its components is dictated by clinical requirement, with 'whole blood' availability dramatically increased (Ala et al., 2012). All of these factors contribute to an unnecessary inflation in the cost of blood and blood product in those African countries receiving financial aid, as much as "three to six times in aggregate" (Ala et al., 2012).

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Acknowledgements

We thank the following experts who voluntarily provided suggestions for relevant literature or other advice to the author to support the preparation of this report. The content of the report does not necessarily reflect the opinions of any of the experts consulted.

Kerry Millington & Imelda Bates, LSTM

Simon Stanworth, NHS Blood and Transplant & Oxford Radcliffe Hospitals NHS Trust

Tom Hodgett, NHS Blood and Transplant

Justina Ansah, National Blood Transfusion Service- Ghana

Junping Yu, WHO Blood Safety Unit

Dylan O'Driscoll, University of Manchester

Key websites

- WHO Global Data on Blood Safety (GDBS) – Blood Safety Unit: http://www.who.int/bloodsafety/global_database/en/
- South African National Blood Service 'retail' price lists online for private and state customers: <https://sanbs.org.za/product-price-list>

Suggested citation

Tull, K. (2017). *Blood Costs in Zimbabwe*. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.

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