



Towards a sustainable blood service

A cost benefit analysis

January 2020

This is the fourth in a series of reports intended to offer an assessment of the benefits delivered by selected projects supported by the Business Advocacy Fund compared to the costs incurred by BAF in supporting the project. As we note in our factsheet (available from businessadvocacy.org), cost benefit analysis (CBA) is a technique used to estimate the monetary value of the benefits and the costs to the community to assess whether a proposed initiative is worthwhile. The concept was originally developed by Jules Dupuit, a French engineer, and was further elaborated by a British economist, Alfred Marshall. Much of the practical development, however, came about because of the US Federal Navigation Act of 1936 which required that the US Corps of Engineers carry out projects to improve the waterway system when the total benefits of a project, irrespective of where they accrued, exceeded the costs. Inevitably, there are a large number of assumptions made in preparing a cost benefit analysis and this is particularly true in environments where there is a lack of detailed data. However, we think that it is appropriate to provide these assessments publicly, partly so that interested parties can consider whether the projects offered value for money, but also to provide an opportunity for others to challenge our assumptions and to offer better data on which to base our calculations.

Promoting more effective blood transfusion

A cost benefit analysis

1. INTRODUCTION

The Kenya National Blood Transfusion and Transplant Service, formerly the Kenya National Blood Transfusion Service, was established in 2000 following the terrorist attack on the US Embassy. Until recently, it operated as a division within the Department of Diagnostic and Forensic Service (DDFS) in the Ministry of Health but is now a Department in its own right. Its mandate is to provide access to adequate and safe blood, through the creation of a strong, efficient and self-sustaining national blood transfusion service.

However, KNBTTTS has struggled to ensure the provision of safe and adequate blood in the country, due to lack of funding, systems and an organised way of collecting blood. Until recently, much of the cost of managing the transfusion service has been borne by USAID. However,

they have been reducing their support and made it clear that their support will end entirely.

The goal of KNBTTTS is to provide safe blood whenever it is needed, through creating a strong, efficient and self-sustaining national blood transfusion service capable of meeting the blood needs of the country on a voluntary basis.

KNBTTTS has not been able to meet its target to supply the national blood need estimated at 400,000 units annually. In 2016, only 167,000 units were collected from voluntary non-remunerated blood donors (VNRD).

It is now proposed to put the blood transfusion service on a statutory footing with the government picking up the cost. It is hoped that this will lead to a massive increase in the collection and availability of safe blood.

2. THE EVIDENCE

2.1 Value of statistical life in Kenya

It is clearly invidious to 'value' a life, but it is necessary if we are to conduct a cost benefit analysis. The value of

a life is the economic benefit from avoiding a fatality, though we are also potentially interested in the economic benefit that occurs from preventing or mitigating serious harm. Usually the value of life takes

into account the quality of life, the expected life time remaining, and the earning potential of the person. It should be noted that the value of life is then only a statistical term though it is important in making trade-offs for example in relation to the costs of health care. There is a challenge, however, in how the value of a life is calculated and often this is done assessing government spending on saving lives. That would be rather circular in this instance. We are rather more interested in suggesting the economic contribution that a person would make if they continued to live. Another, widely used method, is to sum the discounted value of lifetime earnings, though this poses a question about the discount rate to be used over such a long period. Australia has determined that the 'value of a statistical life' (VSL) is \$4.2m (or \$182,000 per year). Turkey has estimated the value at \$59,000, or 5.4 times per capita GDP. The US has several valuations but their so-called 'dialysis standard', which has become a de facto international standard for assessing new medical procedures, assumes a value of \$50,000 per year of quality life. Robinson *et al.* (2016) estimated VSL in Kenya, depending on elasticity, in the range \$25,000 to \$480,000. Their mid-point elasticity is 1.5, giving a VSL of

¹ Robinson L.A., Hammitt, J.K, Chang A.Y. & Resch, S (2017), Understanding and improving the one and three times GDP per capita cost-effectiveness thresholds, *Health Policy & Planning* 32(1), pp. 141-145 doi.org/10.1093/heapol/czw096

² Daily Nation (2018). Running Low. The Story of Kenya's blood Bank. Accessed at <https://bit.ly/2JG3Sln>

³ KNBS (2015) Kenya Demographic and Health Survey 2014, [online] <https://dhsprogram.com/pubs/pdf/fr308/fr308.pdf> accessed 3 Dec 2019

⁴ Republic of Kenya (2017). Saving Mothers Lives 2017, First Confidential Report into Maternal Deaths in Kenya.

\$110,000¹ (equivalent to \$5,600 per annum or a little over three times GDP per capita in 2018 consistent with the calculation in Turkey).

2.2 How many will benefit

Women and children are the most affected by blood shortages. Some 60 per cent of donated blood is required by women and children for birth-related needs.² Approximately 6,000 women lose their lives each year giving birth, accounting for 14 per cent of all deaths to women aged 15-49.³ MoH claims that 40 per cent of maternal deaths are due to obstetric haemorrhage⁴, meaning that 2,400 lives could be saved if there was an adequate blood supply.

Other individuals affected include those with non-communicable diseases such as cancer, anaemia, kidney or liver ailments, survivors of road accidents and those with medical emergencies.

Diseases such as malaria, HIV, pneumonia and cancer can lead to anaemia and anaemia is high cause of death.⁵ It is estimated that as many as 16,000 people died of anaemia

⁵ Reade MC, Weissfeld L, Angus DC, Kellum JA, Milbrandt EB. (2010) The prevalence of anemia and its association with 90-day mortality in hospitalized community-acquired pneumonia, *BMC Pulmonary Medicine*, 10 (15), doi: 10.1186/1471-2466-10-15; O'Meara E et al. (2006) Clinical correlates and consequences of anemia in a broad spectrum of patients with heart failure, *Circulation*, 113 (7), doi: 10.1161/CIRCULATIONAHA.105.582577; Papaioannou, I, Utzinger, J. & Vounatsou, P (2019) Malaria-anemia comorbidity prevalence as a measure of malaria related deaths in sub-Saharan Africa, *Scientific Reports*, doi.org/10.1038/s41598-019-47614-6

in Kenya in 2016⁶. A further 3,000 people died of road traffic accidents⁷. Whilst cancer patients may not survive for long, others such as victims of road accidents can be expected to go on to lead a full and active life.

It is difficult to be precise about how many lives could be saved if there was greater availability of blood. One way to calculate the total is to gross up on the basis that if 60 per cent of donated blood is required by women and children, then 4,000 lives per year that could be saved. However, that makes the assumption that the availability of blood does not increase. If it were to increase then many of those who might have died because of anaemia, or many of those who have lost blood in road traffic accidents could also be saved. For the purpose of this calculation, we have assumed that about half would die anyway. However, that still gives a figure in excess of 10,000 lives saved.

Poor quality blood (not always picked up through testing) and lack of cold chain means that even some people who receive blood may not survive. This will be expected to change once KNBTS is put on a legal footing. Since it is impossible to know how many people are affected, we have not included a figure in our calculations.

Many people who need blood have to wait for it and, as a result, stay in hospital for far longer than they would otherwise need. This is estimated by Dr Peter Mwamba

⁶ KNBS as reported by Institute of Economic Affairs [online] www.ieakenya.or.ke/number_of_the_week/major-causes-of-mortality-rates (accessed 21 Jan 2020)

Consultant Haematologist and Blood Transfusion specialist working at Kenyatta National Hospital and teaching at University of Nairobi), at around two weeks, with increased costs imposed on hospitals and on patients. However, we have not included this in the calculations either.

2.3 Cost of blood transfusion in Kenya

The average cost to collect, test and store a unit of blood is estimated to be around KES10,000 (about \$97).⁸ Dr Mwamba estimates that a haemorrhaging mother typically requires 10 units of blood but there are a number of other costs associated with screening, the use of non-whole blood products and drugs, giving a total estimated cost of about \$3,000.

Not all the blood required goes to save a life, and it is difficult to assess the extra value from improved health for someone who would not otherwise die. However, using this figure gives a likely maximum cost.

2.4 Total benefit

The net benefit to society then of each life saved is the VSL of \$110,000 less the cost of the blood of \$3,000, or \$107,000 per life saved. To allow for missed costs, we have rounded this benefit down to \$100,000. For 10,000 lives saved in a year, this is equivalent to \$1,000 million per annum.

⁷ Ibid.

⁸ See Global Press Journal at baf.fyi/costofblood (accessed 12 Nov 19)

3. COSTS

During 2019, BAF supported the Committee of Blood Donations and Transfusion Stakeholders (CBDS) through RSBTK with a grant totalling almost KES 6 million or about \$66,000 at an average exchange rate of KES90:\$1. In addition, there would be some costs attributed to the BAF team giving advice, guidance and support in the advocacy process. The total budget for BAF for the first three phases was \$13.5 million. The grant given through RSBTK was about 0.7% per cent of the total given as grants for advocacy, so a fair proportion of the total cost would be \$95,000. If we assume a time period of five years to recover the costs of the advocacy, then the

benefit to society is \$5 billion achieved at a cost to BAF of \$95,000.

The CBDS is a committee made up of eight institutions including RSBTK who were jointly lobbying for a statutory footing for the blood transfusion service. The CBDS drafted the bill, organised meetings amongst themselves to agree on the proposed legislation and lobbied the Parliamentary Health Committee to take up the cause. We therefore assess attribution as high and suggest that 80 per cent is a reasonable proportion. This gives a net benefit attributable to BAF's support of \$4 billion, giving a benefit cost ratio of more than 42,000.

4. CONCLUSION

The legislation has not yet been adopted but there is a high degree of confidence that it will be passed by Parliament. Whilst the level of benefit, on a five year view, will not change in the short term, the sooner that the government is able to adopt and implement the new legislation, the sooner the country will start to see the benefits. Having 14 per cent of deaths by women in the age group of 15-49 caused by childbirth is very high and there is little doubt that improved access to safe blood

could curb that considerably, allowing those women to contribute to family life and to the economy of Kenya.

We recognise that the data on which the calculations are based is limited. However, even if the benefits are overstated and the costs understated, the overall benefit will still be considerable. Moreover, saving the lives of productive mothers and many others is a significant and important impact.