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PERFORMANCE AUDIT REPORT OF
THE AUDITOR-GENERAL
ON THE MANAGEMENT OF BLOOD TRANSFUSION SERVICES IN HEALTH DELIVERY IN GHANA
This report has been prepared in compliance with Article 187(2) of the 1992 Constitution of Ghana and Section 13(e) of the Audit Service Act, 2000 (Act 584) for submission to Parliament in accordance with Section 20 of the Act.

Johnson Akuamoah Asiedu
Acting Auditor-General
Ghana Audit Service
9 July, 2021

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9 July 2021

Dear Rt. Hon. Speaker,

**PERFORMANCE AUDIT REPORT OF THE AUDITOR-GENERAL ON MANAGEMENT OF BLOOD TRANSFUSION SERVICES IN HEALTH DELIVERY IN GHANA**

I have the honour, in accordance with Article 187(2) of the 1992 Constitution of Ghana, Sections 13(e) and 16 of the Audit Service Act, 2000 (Act 584) to submit a performance audit report on the Management of Blood Transfusion Services in health delivery in Ghana.

2. The audit was commissioned to determine whether the National Blood Service (NBS) ensured that there was adequate and safe blood at the Zonal Blood Centres (ZBC) and Hospital Blood Banks (HBB) to meet the demand for blood transfusion in the country.

3. We carried out the audit between July and December 2020 and covered the period 2017 to 2020.

4. We reviewed documents and conducted interviews of officials of NBS, HBBs and the public as well as inspecting 12 HBBs and three Zipline Centres to gather evidence to support our observations.

5. We found NBS collaborated with stakeholders to educate the public to donate blood voluntarily. However, NBS was able to achieve 21% of the national requirement for blood from 2015 to 2019 because of public misconception that their blood would be used for ritual purposes and fears of knowing their health status.
6. To ensure that blood at the HBB is safe for transfusion, it is required of NBS to monitor the activities of the HBB to ensure that the appropriate equipment, test kits and reagents are used to screen donated blood and stored at their right temperatures. A confirmatory test is also required as a control measure to guarantee safety.

7. We found that all the ZBC and HBBs were using Food and Drugs Authority approved test kits to screen for transfusion transmissible infections in the donated blood. However, a significant number of HBBs did not carry out confirmation test.

8. We noted that NBS zoned the country into three and established Zonal Blood Centres (ZBC) in each zone to collect and distribute blood and blood components to HBB to ensure timely accessibility of blood. It also partnered with Zipline Ghana through the Government of Ghana to use their drone services for the distribution of blood and blood components to the HBB. However, we found that the HBB had to travel for hours to access blood and its components because the ZBC could not collect adequate blood to supply them either directly or indirectly through Zipline Ghana.

9. We concluded that, NBS has to strategize and widen its voluntary donor base to enable them to provide safe, adequate and efficacious, blood and blood products timely and accessible to all patients requiring blood transfusion therapy.

10. I have made recommendations to NBS to address the public misconceptions associated with blood donation by targeting their education activities appropriately.

11. NBS was also asked to institute and implement measures to convert first time and family replacement donors to regular donors to increase the donor base.

12. I have also recommended that, NBS should improve its monitoring of blood banks to ensure that blood that is found to be infected after confirmatory test are destroyed. Further to this, I have recommended that freezers and refrigerators are calibrated and maintained to keep blood and its components at their appropriate temperatures.

13. To improve timely delivery, I recommended to NBS to identify HBB with the potential to collect blood and equip them to collect and supply blood and blood components to supplement the work of the ZBC and Sub-ZBC.
Yours faithfully,

JOHNSON AKUAMOAH ASIEDU
ACTING AUDITOR-GENERAL

THE RT. HON. SPEAKER
OFFICE OF PARLIAMENT
PARLIAMENT HOUSE
ACCRA
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<th>Description</th>
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<tr>
<td>BMC</td>
<td>Baptist Medical Centre</td>
</tr>
<tr>
<td>CCTH Cape</td>
<td>Coast Teaching Hospital</td>
</tr>
<tr>
<td>CRC</td>
<td>Concentrated Red Cells</td>
</tr>
<tr>
<td>CSOs</td>
<td>Civil Society Organisations</td>
</tr>
<tr>
<td>CZBC</td>
<td>Central Zonal Blood Centre</td>
</tr>
<tr>
<td>ELIZA</td>
<td>Enzyme-Linked Immunosorbent Assay</td>
</tr>
<tr>
<td>FDA</td>
<td>Food and Drugs Authority</td>
</tr>
<tr>
<td>FFP</td>
<td>Fresh Frozen Plasma</td>
</tr>
<tr>
<td>HHB</td>
<td>Hospital Blood Banks</td>
</tr>
<tr>
<td>HTH</td>
<td>Ho Teaching Hospital</td>
</tr>
<tr>
<td>KATH</td>
<td>Komfo Anokye Teaching Hospital</td>
</tr>
<tr>
<td>KBTH</td>
<td>Korle-Bu Teaching Hospital</td>
</tr>
<tr>
<td>MDAs</td>
<td>Ministries, Departments and Agencies</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NBC</td>
<td>National Blood Committee</td>
</tr>
<tr>
<td>NBS</td>
<td>National Blood Service, Ghana</td>
</tr>
<tr>
<td>NBTS</td>
<td>National Blood Transfusion Service</td>
</tr>
<tr>
<td>NZBC</td>
<td>Northern Zonal Blood Centre</td>
</tr>
<tr>
<td>RBTS</td>
<td>Regional Blood Transfusion Service</td>
</tr>
<tr>
<td>RDTs</td>
<td>Rapid Diagnostic Test Kits</td>
</tr>
<tr>
<td>SZBC</td>
<td>Southern Zonal Blood Centre</td>
</tr>
<tr>
<td>TTI</td>
<td>Transmission Transmissible Infections</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organisation</td>
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<td>ZBC</td>
<td>Zonal Blood Centres</td>
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## GLOSSARY OF TERMS

| **Blood** | Blood (whole blood) is a highly specialized fluid in the human body which exchanges oxygen, transports essential nutrients, disposes the body’s waste products, and helps the body to fight infections. |
| **Blood components** | These are constituents of human blood that are derived after the blood is processed. |
| **Voluntary donors** | These are people who donate blood for free and out of their own will. |
| **Family replacement donors** | Donors that donated blood for their relatives who needed blood transfusion therapy. |
| **Confirmation tests** | A second test carried out on donated blood to rule out false negatives and false positives. |
| **Transfusion transmissible infections** | These are infections or blood related diseases that are transmissible from one person to another through blood transfusion. |
| **Screening of blood** | Testing donated blood to find out if they are void of HIV AIDS, Syphilis, and Hepatitis B and C. |
| **Blood transfusion** | Injection of a volume of blood, previously taken from a healthy person into a patient. |
EXECUTIVE SUMMARY

Blood transfusion is the process of transferring blood and blood products from one person (donor) into the blood stream of another person (recipient). Conditions leading to blood loss during pregnancy and delivery, severe trauma from road-traffic or industrial accidents, severe malaria, sickle cell anaemia, and cancers may necessitate a blood transfusion. Blood transfusion has in some cases resulted in transmitting blood borne diseases such as HIV, hepatitis B and C and syphilis from donors to recipients. An effective health system ensures that patients get access to safe blood and blood components in sufficient quantity in a timely manner.

2. Shortage of blood in the country has been perennial. In 2016, the country experienced shortage of 109,376 units of blood, representing 40.5% of the national demand of 270,000 units.

3. According to the Director of the National Blood Service on World Blood Donor Day in June 2020, the total blood collections declined by 21% from 73,063 units recorded between January and May 2019 to 57,268 units over the same period in 2020. The World Health Organisation estimates that lack of timely blood transfusions is responsible for 25% of maternal deaths and 15% of child mortality in Sub-Saharan Africa (WHO; 2003).

4. A report on licencing exercise of 57 public and private hospital blood banks carried out by Food and Drugs Authority (FDA), 2019 showed that 52 of the blood banks were not ensuring safety of the blood at their disposal.

5. These concerns necessitated an audit for which the Auditor General in line with the Audit Service Act, 2000 (Act 584), Section 13(e) commissioned this performance audit. The purpose of the audit was to ascertain whether the National Blood Service (NBS) ensured that there was adequate and safe blood at the Zonal Blood Centres (ZBC) and Hospital Blood Banks (HBB) to meet the demand for blood transfusion in the country.
6. The audit examined the activities of NBS from 2015 to 2020, in relation to
the collection of blood by the ZBC to meet national demand, safety of blood and
blood components at the ZBC and HBB, as well as the timely accessibility of blood
and blood components by HBB.

7. The audit was carried out at the head office of NBS, the ZBC, twelve (12)
HBB across the country and three (3) Zipline Offices in the country.

What we did
8. We reviewed documents and interviewed officers of NBS, ZBC, HBB. We
also visited and inspected some blood storage facilities as well observing a
demonstration of blood delivery at Zipline offices.

9. We focused on the following areas.
   i. Collection of blood to meet national demand.
   ii. Safety of blood and blood components.
   iii. Timely accessibility of blood and blood components.

10. NBS responses to our observations and recommendation have been
incorporated in this report.

What we found

Collection of blood to meet national demand
11. We noted that NBS collaborated with stakeholders such as the media,
traditional leaders, religious organisations, and secondary and tertiary
institutions, etc. to educate the public to donate blood voluntarily. However, NBS
was able to achieve 21% of the national requirement for blood from 2015 to 2019
as interviews with the public during the audit revealed that they were not
motivated to donate due to the misconception that their blood would be used for
ritual purposes, fears of knowing their health status, etc.
12. We recommended to NBS to address the public misconceptions associated with blood donation by targeting their education appropriately. NBS should also institute and implement measures to convert first time and family replacement donors to regular donors to increase the donor base.

**Safety of blood and blood components**

13. To ensure that blood at the HBB is safe for transfusion, it is required of NBS to monitor the activities of the HBB to ensure that the appropriate equipment, test kits and reagents are used to screen donated blood and the screened blood stored at their right temperatures. A confirmatory test is also required as a control measure to guarantee safety.

14. We found that all the ZBC and HBB were using Food and Drugs Authority approved test kits to screen for transfusion transmissible infections in the donated blood. However, Northern Zonal Blood Centre (NZBC) and most of the HBB did not carry out confirmatory test on donated blood apart from ZBC at Korle-Bu and Komfo Anoye Teaching Hospital (KATH), Koforidua Regional Hospital, Cape Coast Teaching Hospital and Ho Teaching Hospital that had carried out confirmatory test.

15. We also found that some HBB did not monitor the temperatures of the blood and blood components as required to maintain their efficacy. The HBB did not also calibrate their blood bank equipment to ensure they give accurate readings.

16. **We recommended to NBS to:**
   - monitor the blood banks to ensure that blood that is found to be infected after confirmatory test are destroyed, and
   - freezers and refrigerators are calibrated and maintained to keep blood and its components at their appropriate temperatures.
**Timely accessibility of blood and blood components**

17. The NBS zoned the country into three and established Zonal Blood Centres (ZBC) in each zone to collect and distribute blood and blood components to HBB to ensure timely accessibility of blood. It also partnered with Zipline Ghana through the Government of Ghana to use their drone services for the distribution of blood and blood components to the HBB. However, we found that the HBB had to travel for hours to access blood and its components because the ZBC could not collect adequate blood to supply them either directly or indirectly through Zipline Ghana.

18. We recommended to NBS to identify HBB with the potential to collect blood and equip them to collect and supply blood and blood components to supplement the work of the ZBC and Sub-ZBC.
CHAPTER ONE

INTRODUCTION

1.1 Reasons for the audit

Blood transfusion is the process of transferring blood and blood products from one person (donor) into the blood stream of another person (recipient).\(^1\) Many medical conditions such as massive blood loss during pregnancy and delivery, severe trauma from road-traffic or industrial accidents, severe malaria, sickle cell anaemia, and cancers may necessitate a blood transfusion during one’s lifetime.\(^2\) Blood transfusion has in some cases resulted in transmitting blood borne diseases such as HIV, hepatitis B and C, and syphilis from donors to recipients. An effective health system ensures that patients get access to safe blood and blood components in sufficient quantity in a timely manner.

2. The National Blood Service of Ghana (NBS) is required by the National Blood Policy, 2006 to ensure that safe, effective, and quality blood are available when required whilst ensuring that basic standards and protocols are followed in the transfusion of blood.

3. Shortage of blood in the country has been perennial. In 2016, the country experienced shortage of 109,376 units of blood, representing 40.5% of the national demand of 270,000 units.\(^3\) In 2014, the Southern Area Blood Centre, which is responsible for blood transfusion needs within the Greater Accra, Volta, Central and parts of the Eastern and Western regions, needed a minimum of 200 units a day, while the maximum needed a day was 300 units. However, it recorded a stock of about 100 units a day, far below its requirement.\(^4\) Available statistics from the Accra Area Blood Centre reveal that the annual demand for blood in 2012 in the Accra catchment area was almost 50,000 units of blood, of which the Centre was able to supply 27,611 (55%) units.

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\(^2\) https://nbsghana.org/someone-lives-when-someone-gives/
4. The Director of the National Blood Service on World Blood Donor Day in June 2020 mentioned that total blood collections declined by 21% from 73,063 units recorded between January to May 2019 to 57,268 units over the same period in 2020. Unavailability of blood can cost the lives of patients in need of blood transfusion. The World health Organisation estimates that lack of timely blood transfusions is responsible for 25% of maternal deaths and 15% of child mortality in Sub-Saharan Africa (WHO; 2003).

5. A report on licencing exercise of 57 public and private hospital blood banks carried out by Food and Drugs Authority (FDA), 2019 showed that 52 of the blood banks were not ensuring safety of the blood at their disposal. According to the report, some of the blood banks were not maintaining the right temperature to store the blood, processed blood was stored together with unprocessed ones, and freezers not labelled to distinguish processed blood from unprocessed ones.

6. The unwillingness of donors to donate and the poor storage conditions of blood led to decline in quantity and quality of blood putting the life of patients in need of blood and its components at risk. This necessitated the Auditor-General, in line with Section 13e of Audit Service Act, 2000 (Act 584), to commission a Performance Audit into the Management of Blood Transfusion Services in Ghana.

1.2 Purpose and scope

7. The purpose of the audit was to ascertain whether National Blood Service (NBS) ensured that blood at the Zonal Blood Centres (ZBC) and the Hospital Blood Banks (HBB) was adequate and met quality standards for use when needed at the hospitals for patients that needed blood transfusion therapy.

8. The audit was carried out from October to December 2020 at the National Blood Service, three Zonal Blood Centres, and Zipline Offices at Suhum, Ashanti Mampong and Walewale. The three ZBC namely Southern, Central and Northern Zonal Blood Centres were selected because they represented NBS in the three

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zones in which the country had been divided into. Each ZBC managed a zone. The Zipline Offices in these zones were also selected because they stored and distributed blood and blood components to hospital blood banks in their zones. We also visited 12 hospital blood banks (HBB) (listed in Appendix ‘A’) during the audit. The audit covered the period 2015 to 2020 and focused on collection and safety of blood by NBS as well as timely accessibility of blood by HBB.

1.3 Audit objectives
9. The audit objectives were to determine whether the measures put in place by NBS were ensuring the:
   - Collection of blood to meet national demand,
   - Safety of blood and blood components, and
   - Timely accessibility of blood and blood components at the hospitals.

1.4 Audit Questions and Assessment Criteria
10. The audit questions, assessment criteria and sources used to assess the performance of NBS on the management of Blood Transfusion Services in health delivery in Ghana is attached as Appendix ‘B’.

1.5 Methods of data collection
11. We used interviews, reviewed documents, physically inspected and made-observation to collect data for the audit.

1.5.1 Interview
12. The audit team interviewed key officials of NBS, ZBC and the selected HBB to know whether the measures they had put in place were yielding the required results as well as the challenges in their implementation. The interviewees and reasons for the interviews are attached as Appendix ‘C’. We also interviewed 420 members of the general public in the three zones in which the country had been divided to find out whether they were aware of the need to donate blood, and whether they had ever volunteered to do so. We also interviewed them to know the reasons for not donating.
1.5.2 Document review
13. We reviewed documents to know what activities NBS carried out in the blood management chain to ensure that blood and blood components were adequate and safe. It also helped us to know the status quo in the collection and management of blood and blood products at the ZBC and HBB. The list of documents reviewed is attached as Appendix ‘D’.

1.5.3 Physical Inspection
14. We inspected the equipment for collecting, screening and storing blood and blood components at the Zonal Blood Centres (ZBC) and the selected Hospital Blood Banks to know whether they were in good condition. We also inspected the refrigerators and freezers to find out whether blood and blood components were stored at their required temperatures. We inspected blood and blood components in blood bags to find out how they were labelled and whether they had not expired. We also used the spring balance to weigh the blood in the blood bags to find out whether the right quantities were collected from donors.

1.5.4 Observation
15. The team also observed the process donors go through before, during and after donating blood as well as blood distribution at the three ZBC. We observed how blood centres collected, screened, stored and distributed blood and blood components according to laid down standards and procedures.
CHAPTER TWO

DESCRIPTION OF THE AUDIT AREA

2.1 Background of the audit

16. Prior to 1960s, management of blood in Ghana were in the hands of individual hospitals. These hospitals determined their own way of collecting, storing and transfusing blood to patients as there were no guidelines or standards and institution in place to coordinate and manage blood and blood components in the country.

17. In the 1960s, surgeons of the Korle-Bu Teaching Hospital (KBTH) advocated for the country to have a system in place that will bring uniformity and assurance in the management of blood and blood products. This led to the establishment of the Regional Blood Transfusion Service (RBTS) in Accra. In the quest to improve blood management nationwide, the Government of Ghana upgraded the RBTS into a National Blood Transfusion Service (NBTS) in 1973.

18. In 1986, the emergence of HIV/AIDS as a major global health concern led to the review of the policy framework of the NBTS. The policy review resulted in the establishment of Zonal Blood Centres (ZBCs) to complement the work of the Service and were to be controlled by the Regional Directors of Health Services (RDHS). Following the promulgation of Ghana Health Service and Teaching Hospital Act, 1996 (Act 525), the NBTS was placed in the Institutional Care Directorate (ICD) of the Ghana Health Service.

19. A second revision of the NBTS policy framework was necessitated in 1999 due to operational challenges. This time, the ZBCs were placed under the control of a National Director. The NBTS was given greater financial autonomy and increased funding to provide adequate and safe blood to health facilities which offer blood transfusion therapy. A National Blood Committee (NBC) was constituted to develop and oversee the implementation of the revised NBTS policy. The committee was also tasked to develop a National Blood Policy with the help of the World Health Organisation (WHO).
20. The National Blood Policy required that the country establishes a National Blood Service (NBS) to manage blood and blood related issues in the country. Cabinet approved the National Blood Policy and established the NBS in 2006. The NBS was granted a semi-autonomous status as an agency under the Ministry of Health (MOH) with a mandate to provide safe, adequate blood and blood components to patients who require blood transfusion therapy in public and private health facilities in Ghana. 

2.2 Mandate

21. The National Blood Service, Ghana is required by the National Blood Policy, 2006 to ensure an effective and coordinated national approach to the provision of safe, adequate and efficacious, blood and blood products, making it timely, accessible and affordable to all patients requiring blood transfusion therapy in both public and private health care institutions in the country. The 2006 policy was revised and approved by Cabinet in March 2020 and backed by law – National Blood Service Act, 2020 (Act 1042) – in December 2020.

2.3 Mission

22. To provide safe, adequate blood and blood components for patients who require blood transfusion therapy in public and private health facilities in Ghana.

2.4 Vision

23. To provide safe, adequate and sustainable blood supply for a healthy population.

2.5 Goal

24. To attain a sustainable national supply of safe blood that relies on 100% voluntary unpaid blood donations in a manner responsive to the need of patients requiring blood transfusion therapy in both public and private health institutions in Ghana.

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6 Employees' Handbook of NBS
2.6 Functions of NBS relevant to the audit
25. Providing guidelines for effective delivery of blood services.
   • Initiating and reviewing legislations in relation to blood service delivery.
   • Monitoring and evaluating service delivery of all service centres both in the public and private sectors.
   • Coordinating the activities of blood centres, partners and stakeholders involved in blood service provision.
   • Collaborate effectively with MDAs, CSOs and other partners in blood service delivery.
   • Educates the general public, recruit donors, collect blood or bleed donors, screen blood collected or received from hospital blood banks, stores the screened blood and distribute the blood to hospital blood banks.

2.7 Organisational Structure of NBS
26. The Organisational structure of NBS for the management of blood in health delivery is attached as Appendix ‘E’.

2.8 Funding
27. The National Blood Service (NBS) funds its activities from Government of Ghana (GoG) and its internally generated funds (IGF). From 2015 to 2020, the Service spent GH¢24.7 million out of a total receipt of GH¢26.1 million representing 94.6% of its total receipts. Details of NBS receipts and expenditure from 2015 to 2020 is presented as Table 1.
Table 1: Receipts and expenditure of NBS from 2015 to 2020

<table>
<thead>
<tr>
<th>Year</th>
<th>Receipt</th>
<th>Expenditure</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>GoG</td>
<td>IGF</td>
</tr>
<tr>
<td>2015</td>
<td>0</td>
<td>3,499,122.33</td>
</tr>
<tr>
<td>2016</td>
<td>0</td>
<td>4,499,061.08</td>
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<td>2017</td>
<td>100,000.00</td>
<td>4,892,565.94</td>
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<tr>
<td>2018</td>
<td>58,880.00</td>
<td>4,311,603.90</td>
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<td>2019</td>
<td>130,000.00</td>
<td>4,371,943.60</td>
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<td>2020</td>
<td>500,000.00</td>
<td>3,775,409.80</td>
</tr>
<tr>
<td>Total</td>
<td>788,880.00</td>
<td>25,349,706.65</td>
</tr>
</tbody>
</table>

Source: NBS Annual Corporate Plan and Budget, 2015-2020

2.9 Roles and responsibilities of key players
28. The roles and responsibilities of key players involved in the management of blood in the country is attached as Appendix ‘F’.

2.10 Roles and responsibilities of key officials
29. The roles and responsibilities of key officials in the management of blood transfusion is attached as Appendix ‘G’.

2.11 Process description
30. In ensuring that blood and blood components are available and safe, the NBS educates the public, recruits’ donors, collects blood or bleed donors, screens and process blood collected or received from hospital blood banks, stores the screened blood and distribute the blood to hospital blood banks. The Service also monitors the activities of the Zonal Blood Centres and the hospital blood banks to ensure they operate according to the standard of operations. This process is presented as a flow chart with details attached as Appendix ‘H’.
2.12 Current development

31. The Parliament of Ghana in December 2020 enacted the National Blood Services Act, 2020 (Act 1042). The Act will enable the Service to put in place the relevant structures for the management of blood and blood components in the country. It is hoped that when the structures are in place some of the challenges enumerated in this report may be resolved.
CHAPTER THREE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

3.1 Introduction
32. The audit sought to find out whether National Blood Service (NBS) ensured that blood and blood components were available, safe, adequate and timely distributed in the country for transfusion. The findings are categorised under:

- Collection of blood to meet national demand.
- Safety of blood and blood components.
- Timely accessibility of blood and blood components.

3.2 Collection of blood to meet national demand
33. Section 7.3.1 of the National Blood Policy, 2006 required the National Blood Service (NBS) to collect blood through its Zonal Blood Centres (ZBC) to meet the demand of the Hospital Blood Banks (HBB) across the country. The World Health Organisation (WHO) estimates that regular blood donation of at least one percent of a country’s population is adequate to meet a nation’s demand for blood. By the WHO estimation Ghana’s population of 30 million cumulatively will require 1,650,000 units of blood to meet national demand for the period 2015 to 2020. To meet the requirement of WHO, Sections 7 and 8 of the National Blood Policy 2006 requires NBS to collaborate with stakeholders to educate the public to donate and retain blood donors. We therefore expected NBS to educate the public and increase the number of regular donors for sustainable supply of blood and blood components.

34. We noted that National Blood Service (NBS) through the ZBC collaborated with the media, telecommunication companies and traditional leaders to educate the public to donate blood. It also carried out educational activities in the second cycle and tertiary institutions, religious organisations and encouraged donors to repeat donations at least once every year. According to the 2018 and 2019 Annual Performance Review, Evidence of Grant Application; Research and Development Department, NBS.
Performance Review, NBS carried out over 323 and 344 educational activities respectively on the need to donate blood to save lives. We interviewed 420 people from the public and 365 of them, representing 87%, said they were aware of the need to donate blood.

35. At the time of the audit, NBS was able to collect 289,277 units of blood against their own estimate of 1,350,000 units representing 21% between 2015 and 2019. Details are shown in Table 2.

### Table 2: Status of blood collected by the ZBC (2015-2020)

<table>
<thead>
<tr>
<th>Year</th>
<th>Units of blood collected by the ZBC</th>
<th>Nationwide requirement for blood</th>
<th>Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>55,124</td>
<td>250,000</td>
<td>194,876</td>
</tr>
<tr>
<td>2016</td>
<td>60,282</td>
<td>250,000</td>
<td>189,718</td>
</tr>
<tr>
<td>2017</td>
<td>54,810</td>
<td>280,000</td>
<td>225,190</td>
</tr>
<tr>
<td>2018</td>
<td>60,204</td>
<td>280,000</td>
<td>219,796</td>
</tr>
<tr>
<td>2019</td>
<td>58,857</td>
<td>290,000</td>
<td>231,143</td>
</tr>
<tr>
<td>2020</td>
<td>0(^8)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>289,277</td>
<td>1,350,000</td>
<td>1,060,723</td>
</tr>
</tbody>
</table>

Source: NBS Performance Review (2015 to 2019)

36. We noted through interviews with management of NBS and ZBC that though NBS to a large extent educated the public to donate blood, it was not effective as section of the general public had misconceptions (such as use of blood for rituals, fear of knowing one’s health status, collapsing, etc), feared the needles and lacked interest in blood donation. These assertions were confirmed by the 365 of those we interviewed during the audit. Out of 365 people, 113 representing 31% had never donated blood and were not willing to donate due to fear of being pricked with the needle, fear of being diagnosed with Transfusion Transmissible Infections (TTI) and misconceptions of the usage.

37. Our analysis also showed that 90 people (25%) had also not donated due to lack of interest. We found that 47 people who had donated before were not

\(^8\) Data being compiled as at the time of the audit.
willing to donate again because they said there was no motivation as they were asked to replace blood when they needed blood for their relatives.

38. We found that NBS collected more blood through family replacement than through voluntary donations. We noted that NBS on the average collected 65% units of blood from the public through family replacement from 2015 to 2019. Details are shown in Table 3.

Table 3: Trend analysis of voluntary and family replacement donations from 2015-2019

<table>
<thead>
<tr>
<th>Year</th>
<th>Voluntary Donations</th>
<th>Family Replacement</th>
<th>Units of blood collected by the ZBC</th>
<th>Percentage of Voluntary Donations</th>
<th>Percentage of Family Replacement Donations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>18,742</td>
<td>36,382</td>
<td>55,124</td>
<td>34</td>
<td>66</td>
</tr>
<tr>
<td>2016</td>
<td>21,702</td>
<td>38,580</td>
<td>60,282</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>2017</td>
<td>19,732</td>
<td>35,078</td>
<td>54,810</td>
<td>36</td>
<td>64</td>
</tr>
<tr>
<td>2018</td>
<td>22,275</td>
<td>37,929</td>
<td>60,204</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>2019</td>
<td>20,011</td>
<td>38,846</td>
<td>58,857</td>
<td>34</td>
<td>66</td>
</tr>
<tr>
<td>2020</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>289,277</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: NBS Performance Review (2015 to 2019)

39. Before a patient was transfused with blood and blood components, the ZBC collected blood from family members of the patient to replace the units of blood to be transfused. This compelled family members to donate blood to save the lives of the sick relative.

40. With regards to NBS increasing the number of regular donors to sustain blood supply, we noted that the ZBC had data on voluntary donors (donors who donated blood out of their own volition) and family replacement donors (those who donated for their relatives) within the audit period.

41. The heads of the donor recruitment of the ZBC mentioned that though they did not have list of voluntary and family replacement donors who had been converted to regular donors, they had contacts of few reliable donors whom they fall on whenever there was an emergency. They added that they also tried to

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9 Data being compiled as at the time of the audit.
convert first time donors to regular donors by calling to encourage them to repeat
donation of which some of them obliged. However, there was no evidence to
support this assertion.

42. Consequently, NBS could not increase blood collection to meet national
requirement.

Conclusion
43. NBS could only meet 21% of the national requirement for blood because
their education had not been able to convince people to voluntarily donate. blood.
It was also not able to increase the donor base. As a result, it will be difficult for
NBS to sustain the supply of blood and its components to the HBB to meet
national demand.

Recommendation
44. We recommended to NBS to.

1. Address the public misconceptions of blood being used for rituals purposes,
fear of knowing one’s health status, collapsing, etc. associated with blood
donation and to target their education to dispel them, and

2. Institute and implement measures to convert first time and family
replacement donors to regular donors to increase the donor base.

Management Response

- Regarding the misconceptions of blood being used for rituals and fear of
knowing one’s health status, NBS has carried out operational research to
obtain targeted interventions for education to dispel these misconceptions.

- The NBS educational programmes are informed by the outcome of the
operational research, and it is an on-going process.

- Contacts of every first-time donor is acquired for the purposes of appreciating
them through text messages and post-donation counselling if necessary. Follow-up calls are placed to first-time donors to remind them to donate
voluntarily. It is targeted that about 2% of projected 26,641 family
replacement donors will be converted to voluntary unpaid blood donors in
2021.
3.3 Safety of blood and blood components

45. Blood and blood components are said to be safe when they are free from transfusion transmissible infections (TTI) such as HIV AIDS, Syphilis, and Hepatitis B and C. Safe blood which is processed into blood components stand the risk of being infected if the processing is not carried out as required. Blood and blood components also lose their efficacy when they are not stored at their required temperatures. This makes them unsuitable to remedy the ailment for which they were administered.

46. In this regard, the National Blood Service (NBS) Charter (2016) mandates NBS to ensure that blood and blood components transfused at the hospital blood banks (HBB) across the country are safe. Section 7.3.1 of the 2006 National Blood Policy required the National Blood Service (NBS) to screen, process and store blood and blood components and to monitor the use of these in conformity to laid down standards. We noted that NBS had no monitoring plans and reports on the activities of its ZBC and HBB to show that blood collected met the safety standard. According to the Director of NBS, the ZBC were to monitor the HBB to ensure that blood and blood components at their disposal were safe. We found through interviews with the heads of the blood banks we visited that NBS did not monitor their activities. The Director of NBS explained that they were not able to persuade the HBB due to lack of legislation.

47. Due to the inability of NBS to carry out monitoring, the Northern Zone Blood Centre (NZBC) and all the hospital blood banks we visited had challenges in the following areas:
   - Screening of blood for TTI,
   - Storage of blood and blood components, and
   - Calibration and maintenance.

3.3.1 Screening of blood

48. Section 4.1 of WHO Screening Donated Blood for Transfusion Transmissible Infections document requires that screening shall be performed using highly sensitive (i.e., equipment capable of detecting infections at their
window or early stage) and specific screening equipment that have been approved for blood screening for TTIs. According to Section 6 of the same document, donated blood shall be subjected to a secondary TTI testing or confirmatory testing to rule out false-negatives or false-positives before issued out for transfusion.

49. We found that ZBC and HBB used Rapid Diagnostic Test Kits (RDTs) to screen for TTIs i.e., HIV, Syphilis, Hepatitis B (HBV) and Hepatitis C (HCV). The ZBC and the HBB used the 1st Response Test Strip supplied by the Ghana AIDS Commission to test for HIV. Regarding RDTs for testing HBV and HCV, we noted that blood facilities used test kits such as Wondfo, Accurate, Healgen, Micropoint, Diaspot etc. The ZBC and HBB also used Micropoint, Biosek, Advance Quality among others to test for syphilis. These RDTs were approved by Food and Drugs Authority (FDA) and conform to the approved testing kits by WHO.

50. Though it is required of all donated blood units to be subjected to a secondary TTI testing or confirmatory testing, we found that five out of the fifteen (15) blood facilities we visited (Southern Area Blood Centre – Korle-Bu, Central Area Blood Centre-KATH, Koforidua Regional Hospital, Cape Coast Teaching Hospital and Ho Teaching Hospital) adhered to the requirement. These facilities used highly sensitive screening equipment known as Enzyme-Linked Immunosorbent Assay (ELISA) for confirmation to detect infections at their early stage.

51. The heads of the remaining ten (10) blood banks we visited mentioned that they did not carry out confirmatory tests on donated blood. They explained that from their experience, the results from the confirmatory tests were the same as the initial test, hence stopped carrying out confirmatory tests. According to them, to ensure that there is no false-negative or false-positive in the test results of the donated blood, they validated their test kits (RDT) with known results of donated blood samples. This gave them the assurance of the viability of their test kits.

52. We also noted that though, Northern Zonal Blood Centre (NZBC) and Sogakope Municipal Hospital had ELISA at the time of the audit, they had not put
them into use and did not also carry out confirmatory tests on donated blood. NZBC management explained that, staff of the blood bank were yet to move to the fully furnished Northern Area Blood Centre (NZBC) building which had modern blood bank equipment including ELISA for screening of blood. The head of the blood bank at the Sogakope Municipal Hospital also explained that the laboratory did not have the appropriate reagent for the ELISA for confirmatory testing because it was either not on the market or expensive for them to be procured.

53. We noted through interviews that NBS have been advocating for the consolidation of testing of blood for TTI at blood centres to ensure uniformity of standards and improve blood safety. However, according to management of NBS, this has been difficult to achieve since the hospitals insist on testing of blood in their laboratories.

54. We noted for example that at KATH, between 11 and 16 October 2020, the RDTs showed that 116 test results were non-reactive but ELIZA test results proved otherwise. At Ho Teaching Hospital (HTH), we also noted that 22 screened bloods, received from other hospitals were detected to be infected with one or two of the four TTIs after the ELISA was used to confirm the status of the blood. There were also incidents at the Cape Coast Teaching Hospital and Koforidua Regional Hospital where ELIZA test results proved otherwise. The heads of the blood banks mentioned that they returned all detected infected blood they received from the other blood banks.

55. Patients who were transfused at hospitals that did not conduct confirmatory tests or use highly sensitive screening equipment stood the risk of contracting TTIs.

3.3.2 Storage of blood and blood components

56. Section 10.3 of the 2006 National Blood Policy required NBS to store Blood and blood components and distribute it at an appropriate temperature in a controlled facility. Whole blood and concentrated red cells (CRC) shall be stored at a temperature between +2°C and +8°C and the fresh frozen plasma (FFP) and
cryoprecipitate stored at temperatures of -20°C or below. The platelet concentrate is also required to be stored between +20°C and +24°C (Section 5.2 of WHO Guidelines and Principles for Safe Blood Transfusion Practice, 2009). The temperature of the blood and blood components are to be monitored and recorded three times a day to ensure they are stored at the required temperature.

57. When transporting blood from one facility to another, Section 5.4 of WHO Guidelines and Principles for Safe Blood Transfusion Practice (2009) required that all blood units shall be packed in cold boxes surrounded by ice packs and temperature monitoring device to monitor the temperature of the blood and blood components. The issuing or supply facility is required to record the details of the blood including the temperature. The receiving facility is required to do same and record the temperature at which the blood and blood components were issued to its laboratory officer for storage.

58. We found that the Southern Zone Blood Centre (SZBC) and Central Zone Blood Centre (CZBC) had storage equipment which stored and recorded the required temperatures of blood and blood components hourly. We noted from the readings of the blood bank refrigerators and freezers that the whole blood and concentrated red cells were stored at a temperature between +2°C and +4°C. The fresh frozen plasma (FFP) and cryoprecipitate were stored at temperatures of -40°C and below whilst the platelets were also stored at +21°C which were all within and conform to the stated temperatures requirement.

59. We also found that the temperature readings on the freezers and refrigerators of Northern Zone Blood Centre (NZBC) and Baptist Medical Centre (BMC) were not within the required temperatures. For instance, the NZBC stored FFP at a temperature of -5.2°C instead of the required temperature of -20°C or below as at the time of our visit. Baptist Medical Centre (BMC) at Nalerigu in the North East Region stored FFP at a temperature of +5.2°C. Koforidua Regional Hospital, Tetteh Quareshie Memorial Hospital and Winneba Trauma and Specialist Hospital did not have monitoring devices to monitor the FFP freezers.
60. The SZBC, CZBC, Cape Coast Teaching Hospital, Korle-Bu Teaching Hospital, Ho Teaching Hospital and Bolgatanga Regional Hospital monitored the temperatures of refrigerators and freezers containing blood and blood components three times per day and documented the results as required. This ensured that blood and its components at their disposal were safe and potent. We found that NZBC, Sunyani and Koforidua Regional Hospitals, Walewale and Sogakokpe Municipal Hospitals, Holy Family, Winneba Trauma and Specialist, Baptist Medical Centre and Tetteh Quarshie Memorial Hospitals did not monitor the temperatures of the blood and its components as required. These ten blood banks could not provide the audit team with records of spoilt blood which resulted from high temperature or poor storage. This implies that these blood banks might transfused spoilt blood and blood components.

3.3.3 Calibration and maintenance of blood bank equipment

61. Section 7.8 of WHO document on Screening Donated Blood for Transfusion Transmissible Infections (2009) states that all equipment and instrument that measure specific parameters shall be calibrated to ensure their readings are accurate. The Section also requires blood banks to maintain all their equipment to ensure that they work efficiently. Per this section, we expected NBS to ensure that ZBC and HBB calibrated and maintained blood bank equipment.

62. We noted that NBS did not have the calibration and maintenance plans of the ZBC and HBB. They also did not have equipment maintenance reports of the facilities to know whether the facilities calibrated and maintained their equipment. NBS did not also have any mechanism in place to ensure that the blood banks calibrated and maintained their equipment for managing blood. The Director and management of NBS explained that they had no control over the activities of the blood facilities except for SZBC.

63. We found that three (3) out of the 16 blood facilities namely SZBC, CZBC and Zipline (Drone Services) had on their blood bank equipment calibration stickers of the Ghana Standards Authority which is the authorised institution in the country to calibrate blood bank equipment. These stickers showed that those
equipment and instrument had been validated and certified by Ghana Standard Authority to measure specific parameters to ensure readings were accurate. It also indicated that the calibration had not expired as at the time of the audit. The Cape Coast Teaching Hospital (CCTH) had expired stickers embossed on its equipment which was dated October 2014 as shown in Picture 1 and was confirmed by the head of the HBB.

**Picture 1: Freezer with expired calibrated sticker’s embossment**

64. Twelve (12) of the blood banks did not have calibration stickers on their blood bank equipment. These blood banks were the NZBC, Koforidua, Bolgatanga and the Sunyani Regional Hospitals, the Cape Coast and Ho Teaching Hospitals and the Baptist Medical Centre. The rest were the Tetteh Quarshie Memorial Hospital, Winneba Trauma and Specialist Hospital, Walewale and Sogakokpe Municipal Hospitals and the Holy Family Hospital. Management of NZBC and the HBB mentioned that they have not calibrated their equipment because it is very expensive.
65. Regarding maintenance of equipment, we noted that all the blood facilities had two types of maintenance which they carry out. The first of the two was routine or daily maintenance which involved cleaning and washing of the equipment after the day’s use. This type of maintenance was carried out by all the blood banks we visited. However, the second type of maintenance which require the use of technicians were only carried out by SZBC, CZBC and Zipline.

66. We noted that except for SZBC, CZBC, Zipline, Winneba Trauma and Specialist Hospital, Baptist Medical Centre, Walewale Municipal Hospital, Korle-Bu Teaching Hospital and Cape Coast Teaching Hospital, the eight (8) HBB\(^{10}\) had at least one of their equipment broken down. For instance, Koforidua Regional Hospital and Sunyani Regional Hospital had one of their blood freezers broken down. The NZBC had one of its blood freezers faulty. These blood banks could not make available their maintenance policy, plan and maintenance implementation report to show that they maintain their blood bank equipment.

### Conclusion

67. NBS did not monitor the blood banks to ensure that they carried out confirmatory tests on all donated blood to erase false-negative or false-positive in the test results. They also did not ensure that infected blood from other blood banks were discarded thereby risking the possibility of being used to transfuse. Again, NBS did not monitor the blood banks to ensure they calibrated their equipment to give accurate readings. There is therefore the risk that blood and blood components may not be stored at their appropriate temperatures, hence losing its efficacy.

### Recommendations

68. According to the functions of NBS as stated in Section 2.6 of this report, “NBS shall monitor and evaluate service delivery of all service centres both in the public and private sectors”. We therefore recommended to NBS to:

\(^{10}\) NZBC, Sunyani Regional Hospital, Koforidua Regional Hospital, Bolgatanga Regional Hospital, Ho Teaching Hospital, Sogakope Municipal Hospital, Tetteh Quarshie Memorial Hospital, Holy Family Hospital
1. monitor the blood banks to ensure that blood that is found to be infected after confirmatory test should be destroyed and not returned to the blood bank that supplied them.

2. monitor the blood banks to ensure that freezers are maintained at their appropriate temperature.

3. ensure that hospital blood banks put together a maintenance schedule and operationalise it to ensure that all equipment are well calibrated to provide accurate readings.

**Management Response**

- The NBS through its ZBCs will continue monitoring HBBs to ensure that standards are adhered to. The NBS will request for needed resources to intensify monitoring of Hospitals Blood Banks.

- Infected blood units are not issued to health facilities. However, any blood unit that is found to be infected must be returned to the issuing facility in line with best practice.

- Blood equipment forms part of every hospital’s laboratory equipment pool. It is the responsibility of all hospitals to ensure calibration of every equipment in their facilities. The NBS through its ZBCs will ensure that equipment is adequately maintained.

- The NBS through its ZBCs will intensify monitoring of HBBs to ensure that equipment is adequately maintained.

### 3.4 Timely accessibility of blood and blood components

69. The National Blood Service (NBS) Charter (2016) mandates NBS to ensure the timely accessibility of blood and blood components to all patients requiring blood transfusion therapy in both public and private health care institutions in the country.

70. We noted that NBS in the quest to distribute blood and its components timely to HBB, zoned the country into three and established Zonal Blood Centres (ZBC) to collect, process and distribute blood and its components to HBB within the zones. The ZBC were the Sothern Zone Blood Centre (SZBC) at Korle-Bu, Central Zone Blood Centre (CZBC) at Komfo Anokye Teaching Hospital and the Northern Zone Blood Centre (NZBC) at Tamale Teaching Hospital (TTH). The SZBC
served HBB in the Greater Accra, Central, Western, Eastern, Volta and Oti Regions. The CZBC covered HBB in the Ashanti, Bono, Bono East, Ahafo and Western North Regions. The NZBC also served HBB in the Northern, Savana, North East, Upper East and Upper West Regions. HBB in the zones had to travel long distances to the ZBC for blood and its components for transfusion which according to management of NBS and ZBC put the life of the patients in need of blood at risk.

71. We also noted through interviews with management of NBS that they had identified seven (7) HBB that had the capacity to collect, screen, process, store and distribute blood and blood components to other HBB and made them Sub-ZBC. These hospitals were the Korle-Bu, Cape Coast and Ho Teaching Hospitals, Sunyani, Koforidua, Bolgatanga and Effia-Nkwanta Regional Hospitals. The heads of the blood banks we visited during the audit, except Effia-Nkwanta Regional Hospital, confirmed the claims of NBS. According to them, staff of these Sub-ZBC were trained to carry out their functions as required.

72. NBS through the Government of Ghana also entered partnership with Zipline Ghana to use their drone services for the distribution of blood and blood components. The drone services covered a range of 80km air-radius. The areas the drone services covered is shown in Picture 2.
73. We noted that the ZBC were responsible for supplying Zipline Offices with blood and blood components. However, at the time of our visit at the three (3) Zipline Offices namely Omenako, Mpanya and Vobsi Drone Centres, none of them had blood and blood components in stock due to the inability of the ZBC to supply them. We found through interviews with officers at the three Zipline Drone Offices that HBB that enjoyed the services of Zipline Ghana had blood delivered to them in less than one hour from the time of request when it is available. Though the Drone Centres did not supply HBB with blood and its components at the time of our visit, we observed that they supplied medical supplies to Kuntanase District
Hospital which is 76Km from Mpanya Drone Centre. The hospital requested for the medical supplies at 11:25am. The Mpanya Drone Centre processed and packaged the medical supplies and launched the drone for delivery at 11:33am. The drone returned to the Drone Centre around 12:25pm. That is, it took about one hour from the time of the request, delivery and back to base at the Zipline Drone Centre. This means it would take approximately the same hour for Kuntanase District Hospital to receive blood and blood components from Zipline should they request for it given that Zipline had blood.

74. However, HBB which were outside the 80km air-radius range had to travel to the nearest ZBC and Sub-ZBC for blood and its components. Also, we found that the Sub-ZBC could not supply the HBB in their catchment area because they could not collect adequate blood due to their reliance on family replacement method of blood collection. The ZBC, like the Sub-ZBC, could not also collect enough blood to supply the Sub-ZBC and Zipline Drone Centres who in turn supply it to the HBB.

75. From our interviews with management of NBS and the heads of the blood banks, we noted that blood and blood components, if available, it will take on the average one hour from request to supply. Management of the ZBC and Sub-ZBC mentioned that the untimely distribution of blood because of long travelling hours for accessibility is a threat to patients especially those in critical conditions such as accident victims and surgical patients, among others.

**Conclusion**

76. Blood and blood components were not accessed timely by the HBB the ZBC and Sub-ZBC could not collect enough blood to supply the Zipline Drone Centres and the hospital blood banks.
Recommendation

77. We recommended to NBS to identify HBB with the potential to collect blood and equip them to collect and supply blood and blood components to supplement the work of the ZBC and Sub-ZBC.

Management Response

➢ Through the monitoring of hospital blood banks, a few facilities have been identified for upgrade to Sub-Centre Status to collect blood under the supervision of ZBCs.

➢ These are Koforidua Regional Hospital, Cape Coast Teaching Hospital, Ho Teaching Hospital, Upper East Regional Hospital, Effia-Nkwanta Regional Hospital in the Western Region and St. John of God Hospital in the Western North Region.

➢ Currently, capacity building is on-going in three (3) hospitals in three (3) regions. These are the Upper East Regional Hospital, Effia-Nkwanta Regional Hospital in the Western Region and St. John of God Hospital in Western North Region. These sub-centres will be expected to collect, store and supply blood and blood components to other hospitals for transfusion.

➢ Hospital Blood Banks that have not been upgraded and accredited to collect blood are to work with the nearest ZBCs or sub-centres that are designed to supply blood to the HBBs.

➢ This support may include assisting with organising blood donation sessions where the blood is collected, screened, tested, processed, stored and issued to the HBBs for transfusion to patients.
3.5 **Overall conclusion**

77. The audit sought to ascertain whether National Blood Service (NBS) ensured that blood at the Zonal Blood Centres (ZBC) and the Hospital Blood Banks (HBB) was adequate and met quality standards for blood transfusion therapy. The audit revealed that NBS education on the public was not effective because people were not willing to donate blood due to misconceptions on its usage and fear of knowing their health status among others. As a result, blood available at the ZBC and HBB was not adequate and blood banks to rely more on family members donating to replace the units of blood required to be transfused on their sick relative.

78. The quality of blood and blood components at the blood banks were also questionable because NBS did not ensure that the HBB performed confirmatory tests on all donated blood.
APPENDICES

Appendix ‘A’

List of hospital blood banks visited
1. Korle-Bu Teaching Hospital Blood Bank, Accra
2. Sunyani Regional Hospital Blood Bank, Sunyani
3. Holy Family Hospital Blood Bank, Techiman
4. Bolgatanga Regional Hospital Blood Bank, Bolgatanga
5. Walewale Municipal Hospital Blood Bank, Walewale
6. Baptist Medical Centre, Nalerigu
7. Koforidua Regional Hospital Blood Bank, Koforidua
8. Tetteh Quarshie Memorial Hospital Blood Bank, Akuapim Mampong
9. Ho Teaching Hospital Blood Bank, Ho
10. Sogakokpe Municipal Hospital Blood Bank, Sogakokpe
11. Cape Coast Teaching Hospital Blood Bank, Cape Coast
12. Trauma and Specialist Hospital Blood Bank, Winneba
## Appendix ‘B’

### Audit Questions and Assessment Criteria

<table>
<thead>
<tr>
<th>Audit objective</th>
<th>Audit Question</th>
<th>Audit Criteria</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collection of Blood to meet national demand.</td>
<td>How has NBS ensured that blood collected are adequate to meet national demand?</td>
<td>The National Blood Service (NBS) is required to collect blood through its Zonal Blood Centres (ZBC) to meet the demand of the Hospital Blood Banks (HBB) across the country; And under no circumstance are the HBB mandated to collect blood directly from donors for transfusion.</td>
<td>Section 6.8.2 and 7.3.1 of the 2006 National Blood Policy.</td>
</tr>
<tr>
<td>2. Safety of blood at the ZBC and HBB.</td>
<td>Did NBS ensure the safety of blood and blood components at the ZBC and HBB.</td>
<td>National Blood Policy required the National Blood Service (NBS) to screen, process and store blood and blood components and to monitor the use of these in conformity to laid down standards.</td>
<td>Section 7.3.1 of the 2006 National Blood Policy</td>
</tr>
<tr>
<td></td>
<td>a) Did the ZBC and HBB screen blood for TTIs?</td>
<td>Blood banks were required to use highly sensitive and approved screening equipment to screen for TTIs. They were also required to perform confirmatory test to rule out false-negatives or false-positives before issued out for transfusion.</td>
<td>Section 4.1 of Screening Donated Blood for Transfusion Transmissible Infections (WHO)</td>
</tr>
<tr>
<td></td>
<td>b) Did the ZBC and HBB store blood and blood components at the required temperatures to maintain their viability?</td>
<td>Blood and blood components shall be stored in appropriate blood freezers and refrigerators and monitored to ensure that they are stored at their required temperatures</td>
<td>Section 10.3 of the 2006 National Blood Policy. Section 5.4 of WHO Guidelines and Principles for safe Blood Transfusion Practice (2009)</td>
</tr>
<tr>
<td></td>
<td>Did the ZBC and HBB calibrate and Blood banks shall calibrate all equipment that measure</td>
<td>Blood banks shall calibrate all equipment that measure</td>
<td>Section 7.8 of WHO</td>
</tr>
<tr>
<td>Maintain their equipment to ensure they gave accurate readings and worked efficiently?</td>
<td>Specific parameters to ensure their readings are accurate. It is required of blood banks to also maintain all their equipment to ensure that they work efficiently. Per this section, we expected NBS to ensure that ZBC and HBB calibrate and maintain blood bank equipment.</td>
<td>Document on Screening Donated Blood for Transfusion Transmissible Infections</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>3. Timely accessibility of blood and blood components.</strong></td>
<td>Did NBS ensure that HBB accessed blood and blood components timely?</td>
<td>NBS is required to ensure the timely accessibility of blood and blood components to all patients requiring blood transfusion therapy in both public and private health care institutions in the country.</td>
<td>NBS Charter 2016</td>
</tr>
</tbody>
</table>

*Source: Audit team compilation from various sources*
## Appendix ‘C’

### Interviewees and reasons for interview

<table>
<thead>
<tr>
<th>Interviewee</th>
<th>Reason for the Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of NBS</td>
<td>To know measures put in place by NBS to ensure that ZBC and HBB perform their functions as required; and the measures NBS put in place to ensure that the HBB do not collect blood directly from donors for transfusion.</td>
</tr>
<tr>
<td>Training Coordinator, NBS</td>
<td>To know how NBS identifies training needs, develop training programmes for staff of ZBC and HBB, and outcomes and challenges in the implementation of the training programmes.</td>
</tr>
<tr>
<td>Head of Administration, SZBC &amp; CZBC</td>
<td>To find out the support NBS had given to ZBC and the HBB</td>
</tr>
<tr>
<td>Head of Finance, NBS/SZBC</td>
<td>To find out how they arrive at their budget, sources of funding,</td>
</tr>
<tr>
<td>Head of Quality Control, SZBC</td>
<td>To find out how NBS ensured that blood and blood components were safe for transfusion.</td>
</tr>
<tr>
<td>Head of Donor Care, SZBC &amp; CZBC</td>
<td>To find out how the ZBC collected blood for transfusion and challenges they were confronted with; whether NBS had trained staff of ZBC and HBB to collect blood; and whether equipment for blood collection had been calibrated and maintained periodically.</td>
</tr>
<tr>
<td>Heads of Laboratory, ZBC and HBB</td>
<td>To know whether NBS had trained staff of ZBC and HBB to collect blood, test, process and store for transfusion; and whether laboratory equipment had been calibrated and maintained periodically; monitored temperature of blood and blood components.</td>
</tr>
<tr>
<td>Heads of Donor Organisers ZBC</td>
<td>To know the content of public education on the need to donate blood and measures put in place to increase blood donation.</td>
</tr>
<tr>
<td>Head of Korle-Bu Blood Bank</td>
<td>To know whether they had the capacity to collect blood for transfusion; and to also know the support received from NBS.</td>
</tr>
<tr>
<td>General Public</td>
<td>To know the proportion of the public who had knowledge on blood donation and the challenges preventing them from donating.</td>
</tr>
</tbody>
</table>
## Documents reviewed and the reasons for reviewing them

<table>
<thead>
<tr>
<th>Documents</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Audit Report</td>
<td>To understand and identify financial information and risks, and to find out whether risks management procedures are working effectively.</td>
</tr>
<tr>
<td>External Audit Report</td>
<td>To understand financial information and risks of the National Blood Service.</td>
</tr>
<tr>
<td>Performance Review Reports</td>
<td>To determine programmes and activities undertaken with due regards to economy, efficiency and effectiveness in relation to the resources utilised.</td>
</tr>
<tr>
<td>National Blood Service Act 2020 (Bill)</td>
<td>To understand the objectives of the Service with regards to the provision of safe and adequate blood and blood products to patients who require blood transfusion therapy both in public health care institutions and private health care institutions.</td>
</tr>
<tr>
<td>FDA Reports</td>
<td>To identify the number of Blood Facilities FDA had audited and number of blood facilities licensed during the audit period.</td>
</tr>
<tr>
<td>Employee Handbook</td>
<td>To understand the historical background of the NBSG. To identify and understand the Organisation of the National Blood Service, as well as Functions and Structure of Blood Service.</td>
</tr>
<tr>
<td>National Blood Policy</td>
<td>To understand policy direction towards the attainment of a sustainable supply of safe and adequate blood and blood components for transfusion in both public and private health facilities in Ghana.</td>
</tr>
<tr>
<td>Clinical Blood Transfusion Policy</td>
<td>To understand safe procedure from the requisition for blood component to collection, transportation, and administration to patients.</td>
</tr>
<tr>
<td>Service Charter</td>
<td>To know NBS objectives and to understand its functions.</td>
</tr>
<tr>
<td>Correspondences</td>
<td>To know the institutions NBS interacted with regards to blood donation.</td>
</tr>
<tr>
<td>Training Plans and Programmes</td>
<td>To know the number of training plans/schedules and programmes put in place to upgrade officers’ knowledge on the job.</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Training Reports</td>
<td>To comprehend how officers met their specific requirement or needs of NBS activities.</td>
</tr>
<tr>
<td>Blood Donor Selection and Care Manual of NBS</td>
<td>To know how healthy blood donors with low risk of transfusion-transmissible infections are selected to ensure adequate supplies of safe blood for transfusion.</td>
</tr>
<tr>
<td>Screening donated blood for transfusion transmissible infections (WHO)</td>
<td>To understand accepted international practice of management of blood for transfusion.</td>
</tr>
<tr>
<td>Standards for the practice of Blood Transfusion in Ghana</td>
<td>To understand their system of identifying staff training needs and ensure whether the training needs are met.</td>
</tr>
<tr>
<td>Annual corporate plan and Budget</td>
<td>To know their budget, sources of revenue and expenditure.</td>
</tr>
</tbody>
</table>
Appendix ‘E’

Organogram of National Blood Service

The NBS, consists of a National Headquarters in Accra and three (3) Blood Centres in Accra, Kumasi and Tamale. The Blood Centres are networked with hospital blood banks (HBB) throughout the country to provide safe blood and blood components to meet the needs of public and private health facilities. Hospital blood banks are not part of the NBS. They are part of hospital laboratories under the overall supervision of the management of the respective hospitals.

Organogram for National Blood Service
### Key Players and their responsibilities

<table>
<thead>
<tr>
<th>Key Players</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| Ministry of Health (MoH)           | • formulate health policies,  
• set standards for the delivery of health care in the country,  
• provide strategic direction for health delivery services,  
• monitor and evaluate the health service delivery by GHS, NBS, Teaching Hospitals, other Agencies, Development Partners and Private Sector.  
• provide framework for the regulation of food, drugs and health service delivery and practice. |
<p>| National Blood Service             | Educate the general public on the need to donate blood, recruit donors, collect blood, screen and process and deliver safe blood and blood components for blood transfusion. They are also to develop guidelines and SOP and monitor the ZBC and HBB to ensure blood is collected, screened, stored and distributed according to laid down standards and procedures. |
| Food and Drugs Authority           | Regulates and issue license to blood facilities in the country.                                                                                                                                                   |
| Ghana Standards Authority          | Validation and Calibration of blood facilities equipment in the country.                                                                                                                                          |
| Media                              | NBS collaborates with the media to create awareness to the general public on the need to donate blood.                                                                                                             |</p>
<table>
<thead>
<tr>
<th>Civil Society Organisations CSOs, Religious bodies, Schools, Corporate institutions.</th>
<th>NBS collaborates with these bodies to create awareness on the need to donate blood.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zipline – Drone Services</td>
<td>Transport blood and blood components, and medical supplies to blood facilities across the country.</td>
</tr>
<tr>
<td>National Blood Committee (NBC)</td>
<td>The committee ensures that NBS carries out its functions.</td>
</tr>
<tr>
<td>Area Blood Centre Committee (ZBCC)</td>
<td>They ensure the implementation of the blood policy in the catchment area of the blood centre.</td>
</tr>
<tr>
<td>Regional Blood Committee (RBC)</td>
<td>They ensure that the District Blood Committee function effectively.</td>
</tr>
<tr>
<td>District Blood Committee (DBC)</td>
<td>They ensure that the blood needs of the district are met.</td>
</tr>
<tr>
<td>HBB</td>
<td>They store and transfuse blood it receives from the ZBC.</td>
</tr>
</tbody>
</table>
### Key officials and their responsibilities

<table>
<thead>
<tr>
<th>Key Officials</th>
<th>Responsibilities</th>
</tr>
</thead>
</table>
| The Director of NBS                       | • Provides strategic, technical, and operational leadership for the achievement of the mandate of the National Blood Service.  
                                           | • Advises the MoH on matters relating to standards and regulation of blood services in Ghana.                                                   |
| Heads of ZBC                              | Provide strategic direction and ensure availability of safe and adequate blood and blood components within their catchment areas.                    |
| Head of Finance NBS/SZBC                  | Responsible for budgeting, preparing financial statements and disbursement of funds. The department ensures sound financial management practices in the Service. |
| Heads of Donor Organisers of ZBC and HBB | Responsible for, among others;  
                                           | i. educating the general public about voluntary non-remunerated blood donation.  
                                           | ii. identifying safe target groups,  
                                           | iii. mobilising communities, schools, work places, etc for blood donation,  
                                           | iv. building and sustaining adequate blood donor base,  
                                           | v. ensuring the retention of voluntary blood donors,  
                                           | vi. providing pre-donation counselling to prospective voluntary donors, and  
                                           | vii. providing post-donation counselling to donors with transfusion transmissible infections (TTIs) |
| Heads of Laboratory Services | The laboratory services department of the ZBC and HBB are responsible for;  
|------------------------------|-----------------------------------------------------------------------------|
|                              | i. Supervising and ensuring the provision of accurate laboratory reports, blood and blood components within acceptable turnaround times,  
|                              | ii. Ensuring the efficient delivery of laboratory services in the facility, with regards to safe blood and blood components  
|                              | iii. Supervising routine and specialist clinical laboratory tests within the facility to ensure the efficient delivery of such services, and  
|                              | iv. Participating in external quality control activities.  
| Head of Quality Control NBS  | This department performs the following functions in the management of blood and blood components.  
|                              | i. Lead in the interpretation of standards and guidelines to guide quality management,  
|                              | ii. Lead in the adoption of health and safety for use in the area centres,  
|                              | iii. Facilitate the application of quality and standard in all units within the area centre,  
|                              | iv. Periodically evaluate Area Centre quality management systems and interventions in line with the objectives of the Service, and  
|                              | v. Provide on-site supervision and training to staff in the blood centres.  
| Head of Research and Development | This department performs the following functions.  
|                              | i. Design and implement research and development protocols or projects to promote the collection of blood,
<table>
<thead>
<tr>
<th>Heads of Donor Care</th>
<th>The donor care department/unit is responsible for;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>i. Contributing to the development of nursing and donor care standard.</td>
</tr>
<tr>
<td></td>
<td>ii. Lead in the implementation, monitoring and evaluation of standards in NBS.</td>
</tr>
<tr>
<td></td>
<td>iii. Provide leadership for nursing and donor care services development and implementation in the NBS in accordance with the national requirement</td>
</tr>
</tbody>
</table>

ii. Facilitate the training of the blood transfusion researchers, and

iii. Evaluate all data and scientific reports.
Appendix ‘H’

Process/System Description

Awareness creation
1. The NBS creates awareness through correspondences to institutions, print and electronic media and their donor recruiters. At the beginning of every fiscal year, blood recruiters of the NBS are assigned targets. The recruiters then go to the communities, schools, churches, etc. on weekly basis to educate and encourage people to donate blood. The recruiters compile the data received on interested persons from the communities, schools, churches, organisations, etc. and submits it to the head of donor recruitment. The head of donor recruitment compiles all information on the places to undertake the donor collection exercise.

Blood collection
2. The head of donor recruitment together with the heads of donor care and transport plan and schedule the dates for the blood collection exercise. The date for the collection is then communicated to the interested or potential donors. On the planned date for the blood collection, the donor care officers counsel the potential donors after which samples of their blood are taken and screened to determine whether they have enough blood to donate. Donors who are determined unfit are counselled and asked to seek medical treatment. On the other hand, donors who are determined fit are bled (blood collected), allowed to rest for 10 minutes after bleeding and refreshed. They are again counselled on the reactions they are likely to encounter and advised on the actions to take. The units of blood collected are labelled, kept in labelled blood bags, and transported to the laboratory of the blood centres for processing.

Screening/Processing of blood
3. The Blood collected or bled from donors is brought to the laboratory for screening. Before the processing, samples of the blood are screened or tested for transfusion transmissible infections (TTIs) such as HIV/AIDS, Syphilis, Hepatitis B and C. Blood with such underlying infections is discarded or disposed of since these blood units are not suitable for use.
4. The whole blood collected from blood donors which is suitable for use, is then processed into Concentrated Red Cells (CRC), Fresh Frozen Plasma (FFP), Cryoprecipitate (Cryo) and Platelet Concentrates. The whole blood is also grouped into the various blood groups. The processed blood is labelled for storage.

**Blood Storage**

5. Blood and blood products/components are required to be stored in blood refrigerators and freezers. Temperatures of the refrigerators are to be recorded hourly or three times daily either electronically (i.e., measuring device on the refrigerators) or manually. This helps the laboratory offices to know the temperatures at which the blood and blood products were stored and to give the assurance of their potency as they were stored under the required temperatures. The whole blood and concentrated red cells are stored at a temperature between 2°C and 8°C to maintain its oxygen-carrying ability. These products expire 35 days after collection. The fresh frozen plasma (FFP) and the cryoprecipitate are kept at a temperature of -20°C or below and expire after a year of collection. The platelet concentrate is stored within 20°C and 24°C and expires after five days.

**Transportation/Distribution of the blood**

6. Before a processed blood is distributed/transported to blood facilities, a Blood Facility submits a request form to NBS/ZBC Laboratory indicating the type of blood it needs. NBS/ZBC Laboratory (officer in charge) then issues Cross-match Form indicating the type and number of bloods that had been requested. The blood facility pays for the cost of blood at the finance department and submits a copy of the payment receipt to the laboratory for collection of the blood. The NBS/ZBC laboratory records the temperature of the blood or blood component issued, likewise the facility.

7. Blood and blood components are to be transported in the appropriate cold boxes or bags to maintain their required temperature. At the blood bank of the hospital, the recipient of the blood or blood component documents the details of the blood including time and temperature of arrival. The transit time for blood and blood components should not normally exceed 24 hours. At the Blood
Facility, the blood is either stored in its Blood Bank for an opportune time or immediately used for transfusion.

**Monitoring**

8. The NBS monitors the operations of the blood centres and hospital blood banks using monitoring template. The blood centres and banks record their activities in the templates and keep them for review when called upon. The quality control department of NBS are to visit the blood centres and banks to find out whether they are operating according to the guidelines or standard of operations. Blood banks which do not operate as prescribed in the guidelines or standard of operations are offered training to enhance their service delivery.
Mission Statement

The Ghana Audit Service exists

To promote

good governance in the areas of transparency, accountability and probity in Ghana’s Public financial management system

By auditing

to recognised international standards and reporting our audit results

And

reporting to Parliament