Community-Based Health Insurance (CBHI) in Rwanda: Needs assessment for the improvement of Membership Management Systems’

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Approved by UR – RPGS Committee on 13th April 2018
DECLARATION

This research project is my original work and has neither been presented for a degree in any other University nor published in anywhere.

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I would like to use this moment to pass my sincere appreciation to all people who played a big role in supporting and assisting me to complete my study. First of all, I give glory and thanks to the Lord almighty for giving me good health and strength from starting up to the end of this program more precisely to finish this project successfully.

To my supervisors Prof. Gunnar Klein and Dr. Louis SIBOMANA, thank you for your enthusiasm, time and effort to guide me. Your comments, inputs, advice, suggestions and criticism have been very important all along this project time. Without them would not have come to realization.

To my wife, children and friends, thank you for your care and moral support you granted me during my course work.
DEDICATION

This work is dedicated to my family and all those who have supported me along the trajectory till the completion of this project. Thank you all and may the almighty God bless you.

ABSTRACT

Mutual recognition through systems integration is trusted to play a role in managing the community-based health insurance members, whereby the current CBHI system is facing some challenges related to lack of information sharing system capabilities which result into fraudulent cases, duplications and unnecessary trips made by beneficiaries. This research project addressed the issues of how CBHI members can be managed using ICT solutions, and pitfalls associated with improvement needed to the CBHI system which is under the management of Rwanda Social Security Board. This study aimed at exploring the current technological capabilities that are being used to support and leverage the CBHI systems that are already in place. The study was done by using qualitative research methodology approach and the structured interviews were conducted from the staffs of user department together with other stakeholders. The study found that the harmonization of the existing partners’ systems by matching the identifiers to fully integrate and be able to share individual data in the back-end systems is the needed refinement to enhance the system performance hence the improved quality of throughput. The gain from this project is beneficial to the academic field because it opens the impact assessment of the proposed solution to the side of CBHI beneficiaries. Again community-engaged practitioners can as well benefit especially in the digitalized public services domain towards discovered technologies which are currently encouraged to boost socio-economic development.

Keywords:

Information system, CBHI, systems integration, e-government and information sharing
### ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>3MS</td>
<td>Mutuelle Members Management System</td>
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<td>C2G</td>
<td>Citizen to Government</td>
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<td>CBHI</td>
<td>Community-Based Health Insurance</td>
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<td>DH</td>
<td>District Hospitals</td>
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<tr>
<td>EDPERS</td>
<td>Economic Development and Poverty Reduction Strategy</td>
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<td>E-Government</td>
<td>Electronic Government</td>
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<td>ESB</td>
<td>Enterprise Service Bus</td>
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<td>G2B</td>
<td>Government to Business</td>
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<td>Government to Citizen</td>
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<td>Health Center</td>
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<td>ID</td>
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<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>LODA</td>
<td>Local Administrative Entities Development</td>
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<td>MINALOC</td>
<td>Ministry of Local Government</td>
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<td>MIS</td>
<td>Management Information System</td>
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<td>MMI</td>
<td>Military Medical Insurance</td>
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<td>Mob-cash</td>
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<td>MOH</td>
<td>Ministry of Health</td>
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<td>Management Sciences for Health</td>
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<td>NICI</td>
<td>National Information Communication Infrastructure</td>
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NIDA : National Identification Agency
NIPR : National Population Registry
NISR : National Institute of Statistics of Rwanda
PH : Provincial Hospitals
PMC : Primary Health Care
PS : Point of Services
RAMA : La Rwandaise d’Assurance Maladie
RCS : Rwanda Correction Service
RDB : Rwanda Development Board
RDF : Rwanda Defense Force
RH : Referral Hospitals
RNP : Rwanda National Police
ROL : Rwanda Online
RSSB : Rwanda Social Security Board
RURA : Rwanda Utilities Regulatory Authority
SACCO : Savings and Credit Cooperatives
SOAP : Object Access Protocol
SRMP : Smart Rwanda Master Plan
UDDI : Universal Description, Discovery, and Integration
UNICEF : United Nations Children’s Fund
UR : University of Rwanda
USAID : United States Agency for International Development
USSD : Unstructured Supplementary Service Data
WHO : World Health Organization
WSDL : Web Services Description Language
XML : eXtensible Markup Language
# Table of Contents

ABSTRACT .................................................................................................................................................. iii

ACRONYMS ................................................................................................................................................ iv

LIST OF TABLES ......................................................................................................................................... viii

LIST OF FIGURES .................................................................................................................................... ix

1. INTRODUCTION ....................................................................................................................................... 1
   1.1 Background ........................................................................................................................................ 1
   1.2 Objective / Purpose of the Study ....................................................................................................... 2
   1.3 Scope ............................................................................................................................................... 3

2. LITERATURE REVIEW ............................................................................................................................... 4
   2.1 ICT and health sector development review ....................................................................................... 4
   2.2 Health insurance in Rwanda ............................................................................................................... 5
   2.3 CBHI stakeholders ............................................................................................................................. 6

3. METHODOLOGY ....................................................................................................................................... 9
   3.1 Introduction ....................................................................................................................................... 9
   3.2 Literatures Consulted .......................................................................................................................... 9
   3.3 Interviewees ...................................................................................................................................... 10

4. RESULTS AND ANALYSIS ...................................................................................................................... 11
   4.1 ICT in the current CBHI business process ......................................................................................... 12
      4.1.1 Current Business Process ............................................................................................................. 13
      4.1.2 Findings from the interviews ....................................................................................................... 14
      4.1.3 Summary of findings: CBHI Management Gap Analysis ............................................................. 17
      4.1.4 Mitigation Plan: CBHI information system harmonization and integrating with stakeholders ......................................................................................................................... 17

5. Discussion ................................................................................................................................................ 18
   5.1 Proposed improvement process (Business Process to be) ............................................................... 18
6. CONCLUSION .............................................................................................................................. 22

References ................................................................................................................................... 23

Annex 1. Questionnaire .................................................................................................................. 25
LIST OF TABLES

Table 1: General overview of findings from interviews
Table 2: Overview of characteristics of CBHI stakeholders’ systems: Based on indexes status
Table 3: Output Composite Matrix of final Indexes Vs Systems
LIST OF FIGURES

Figure 1: Current process “As-Is” model
Figure 2: Proposed / Business Process to be
1. INTRODUCTION

1.1 Background

Community-Based Health Insurance (CBHI) has been viewed as a means to address challenges and problems related to providing health care access to the poor people in developing countries (University of Rwanda, MSH, 2016). Specifically, CBHI has proven to be effective to extend financial protection allowing a large number of poor people to access health care services in countries where national insurance schemes are not existing and/or where public health care funding is not sufficient. In this respect, Rwanda is among the countries that have successfully implemented CBHI scheme in sub-Saharan Africa (University of Rwanda, MSH, 2016)(Solomon Feleke, Workie Mitiku, Hailu Zelelew, 2012). Yet the CBHI scheme in Rwanda faces some challenges, including limited management capacity and dependence on government for subsidies. In addition, there is a lack of an interoperable and fully integrated Information Communication Technology (ICT) system that supports the day-to-day management of the members of CBHI scheme, something which has resulted in many fraudulent cases due to lack of online authentication mechanisms(Joseph, 2016).

There have been so many advantages related to information sharing through systems integration and online authentication, so if resources are shared many advantages are expected like cost-cutting, no duplication of efforts, quick, quality of service and generally improved service delivery (Johnston, Vitale, & Johnston, 2017).

This study that focuses on CBHI needs assessment for the improvement of the Membership Management Systems is in the mainstream of e-government whereby the improvement needed is based on the use of ICTs in the activities related to the CBHI member’s management. It is a transformational act that intends to come up with an automated working environment, where possible processes be treated online without physical visits of service beneficiaries. In this perspective the main elements are people, process and technology whereby technology is a platform or media to help people interact with processes.“ e-Government is the use of information technology (IT) by public sector organizations” and “e-Government systems are information systems that are socio-technical: combining the technical and the human” (Heeks, 2006).

CBHI members’ validation process has been a shared responsibility conducted in collaboration with other institutions’ Management Information Systems (MIS). The UBUBEHE database, from the Local Administrative Entities Development Agency (LODA), is used for verifying household social category, which this determines the fee (premium) household members have to pay with government subsidies where applicable. The Rwanda Social Security Board (RSSB) has a system called Mutuelle Members Management System (3MS) that is used for identifying CBHI members who have paid their premium. This is done after having checked
among the household members who already exist in other health insurance schemes, those who belong to other health insurance schemes are identified by their cards which are provided or submitted, and again make sure that the paid amount corresponds to the remaining members of the Household (HH) before issuing cards to them. This business process and these verification modalities have not been automated; although there are technical systems involved in the operation which are still stand alone Information Systems. Human errors have been a challenge from the point of registration in the UBUDEHE system up to the premium payment; hence this has been followed by: poor service delivery, low quality of data, and gaps for double registration. These challenges have resulted in spending much money and time on data cleaning, government buying cards to be issued to CBHI members, and unmanageable fraudulent cases have been addressed in this study.

In particular, the study examines the current model of business process design and proposes an improved model based on integrating the existing information systems that span across organization boundaries in healthcare settings. The systems suggested to be involved include the National Population Registry for National Identification Agency (NIDA), the UBUDEHE system for LODA, and the 3MS for RSSB.

1.2 Objective / Purpose of the Study

This study aims at exploring how new technological capabilities can be introduced by linking and leveraging the systems that are already in place. In particular, the study examine the case of proposed improvement process that span across organization boundaries in healthcare settings. The types of systems covered include National Population Registry (NPR) and RSSB MIS. The study was based on how can members of CBHI smartly and economically be managed using ICT solutions?

This research has employed the following specified objectives to operationalize the main research question mentioned above.

- Identify and describe how existing information system applications are supporting CBHI management.
- Define gaps that have prevented the CBHI scheme from using current information technology in different service delivery operations, taking into consideration minimizing the number of trips citizens should make to get served.
- Design an integrative model of how an improved CBHI membership information system will effectively and efficiently work.
1.3 Scope

CBHI improvement needs assessment research could be done at different target levels. For example at CBHI government policies’ level, or at citizens’ service delivery focusing on their satisfaction, or at technology level focusing on ICT solutions used in CBHI for better and quick services, or many more other angles or approaches could be used to do CBHI assessment in the context of improvement needed. In this research, we concentrated on improvement needs assessment at the technology level. We studied what RSSB has in place, and what it needs to have, in terms of ICT to effectively and efficiently implement CBHI as an entrusted agency.
2. LITERATURE REVIEW

The assessments on the current movement of health insurance reforms in some of the developing countries are focused on achieving the universal health coverage. Rwanda is among these countries that are implementing universal health coverage (CBHI), and there is a common agenda in these countries of looking at “who, what services, and what proportion of health costs are covered” (Lagomarsino, Garabrant, Adyas, Muga, & Otoo, 2012). Going by “who” these are the people insured or beneficiaries covered in the health insurance scheme who are actually the topic in this study focusing on their better management using ICT solutions in regards to quality of service delivery. Some of the previous researches have concentrated on different challenges like: access to health care and financial risk protection in Rwanda (Saksena, Fernandes, Xu, Musango, & Carrin, 2011), analysis of the joint efforts put in health sector in Kenya (Wamai, 2009), and more others. Relatively in the current technology era, more initiatives are in places to strengthen the universal health whereby ICT has to be an enabler of the improvement needed. In the following parts of this literature review, there is gathered information relevant to the situation of ICT inclusion in the health sector and limitations in the current process.

2.1 ICT and health sector development review

Tracing the source of using ICT tools in CBHI in Rwanda, there is a need of having a clear background of the National Vision 2020, entitled “To transform Rwanda into a middle-income country and transition her agrarian economy to an information-rich, knowledge-based one by 2020” (Ministry of Youth and ICT, 2015), which was defined in the year 2000. This vision initiated a set of strategic programs designed to attain the target, including four phases of the National Information Communication Infrastructure (NICI) Plan and two phases of the Economic Development & Poverty Reduction Strategy (EDPRS) (Government of Rwanda, 2011). Along with this journey, the Government kept tracking, monitoring, evaluating and reviewing the process through a number of indicators derived from the strategic goals. Beyond these two major plans, there have also been other specific assignments that are sector-oriented and field or area-focused which will be achieved by using ICT solutions (Ministry of Youth and ICT, 2015).

In the Smart Rwanda Master Plan (SRMP) framework which also comprises the fourth cohort of NICI plan (2016-2020), health is one of the seven pillars (Health, Finance, Trade & Industry, Agriculture, Education, Government and Women & Youth Empowerment in Technology), all of which have three general enablers (ICT Capability, ICT Governance & Management and ICT Shared Infrastructure). The realization of SRMP will necessitate Ministries and Agencies to unfold and execute their own smart and comprehensive ICT strategies (Ministry of Youth and ICT, 2015). These pillars were constructed to be based on ICT in all aspects of socio-economic development as the country is in the transition from agricultural based economy to information-rich based economy. A set of ten core objectives was defined to operationalize the plan, and each
of the objectives was assigned two focus areas. The first objective is “expand medical and health services to enhance citizen’s quality of time”, and the associated focus area is “enhancing consumer healthcare systems” (Ministry of Youth and ICT, 2015).

2.2 Health insurance in Rwanda

Rwanda’s CBHI was acknowledged as one of the successful insurance schemes in the Sub Saharan Africa (Solomon Feleke, Workie Mitiku, Hailu Zelelew, 2012)(University of Rwanda, MSH, 2016) in the context of addressing the existing health service challenges and shared financing model of citizens’ contributions and government subsidies. The CBHI scheme is based on a highly prioritized reduction of disastrous health service expenditures which matches with the recommendation of World Health Organization (WHO) for countries to devise ways of “moving away from direct, out-of-pocket payments to using prepaid mechanisms to raise funds for health” (WHO, 2014). CBHI responds to this recommendation whereby citizens mutually pay in advance for the services they may or not consume, and part of the highlighted need for sustainability of health system achievements which is mentioned in the Health Financing Sustainability Policy (Ministry of Health, 2015). In March 2016, University of Rwanda (UR), an organization of Management Sciences for Health (MSH) and Rockefeller Foundation conducted a survey on the development of CBHI in Rwanda focusing on experiences and lessons. Historically, Rwanda has passed through the critical events in the development of CBHI before and after the 1994 genocide. Starting before 1994, Rwanda like other African Countries, especially located in sub-Saharan Africa, adopted the Bamako initiative that had been launched in 1987 under the sponsorship of the United Nations Children's Fund (UNICEF) and WHO, which aimed “to increase access to primary health care (PHC) by raising the effectiveness, efficiency, financial viability and equity of health services” (Kanji, 1989). In 1994, the public health system collapsed due to the genocide and during 1995 humanitarian (international agencies) provided support in most health services. In the same year, the development of a National Health Policy started, encouraging the development of mutual aid communities a three year period (1996-1999) followed the remarkable decrease in humanitarian assistance, and the government of Rwanda reintroduced user fees at public health facilities. Consequently, health service utilization decreased dramatically. Then the Ministry of Health (MOH), in partnership with the United States Agency for International Development (USAID), piloted three prepayment schemes. These were evaluated in the year 2000 by USAID and found to be successful and valuable. The lessons learned from the pilots were implemented by expanding the prepayment schemes by districts for five years (2000-2005). During this period, the National CBHI policy was developed with the purpose to consolidate all districts’ schemes into one. By 2006, the National CBHI Policy was implemented through ministerial instructions with specific agendas; family membership of CBHI made compulsory, pooling system established for districts, quality of care, measures for the protection of the poor, and population covered by then was 73% at a standard premium of 1,000 Frw per year per member. From 2008, when the new law governing CBHI (Law No 62/2007 of 30/12/2007) was enacted, up to 2012, all targets were
reached. However, the following two years CBHI membership fell from 91% to 73% of the targeted population. This led to the decision to move CBHI management from the MOH to RSSB in 2014 (University of Rwanda, MSH, 2016)

In Rwanda, having health insurance is a mandatory, as stated by the law: “whether a Rwandan or a Foreign who is on the Rwandan territory shall be required to have health insurance” (Office of the PM, 2016). There are two types of health insurance; social and commercial. Under social health insurance there are three categories; health insurance provided by public entities, community-based health insurance schemes, and insurance provided by health insurance associations. All these schemes are instructed by the law. Health insurance provided by public entities in Rwanda (called “La Rwandaise d’Assurance Maladie” (RAMA)) covers high government officials (leaders), civil servants governed by the special or general statutes of public service or employment contract. It also covers private sector employees and retired persons. Another social health insurance scheme is the one provided by associations, where members of the same association or different associations legally bound come together for a group-based health insurance purposes. For the association to be legally accepted it must be authorized by the health insurance regulator in Rwanda. One example of this scheme include the health insurance of University of Rwanda which covers its entire staff and their affiliates. Another scheme that brings together Rwanda Defense Force (RDF), Rwanda National Police (RNP) and Rwanda Correction Service (RCS) staffs with their affiliates is called Military Medical Insurance (MMI).

A third model is commercial health insurance, which is described in the same law, where a person or group of people can have an agreement or contract of health insurance with a commercial insurance provider (Office of the PM, 2016).

For everybody not covered by any of the above models, the Community-Based Health Insurance (CBHI) is stated as follows; “any Rwandan national without any other health insurance provided under this law must have a community-based health insurance” (Office of the PM, 2016). This means that other than the members mentioned above and together with their affiliates the rest belong to the CBHI. This subset of social health insurance is the focus of this research, specifically the information system that CBHI scheme uses to manage its members.

Considering that members of CBHI reside across the country; and these members are the clients of the health facilities across the country and they have different financial statuses. Despite all the above stated achievements, this study brings the essence of having a harmonized way of managing these members. The gaps are still in the ICT tools used in the management of CBHI members which is the main target in this assessment study.

2.3 CBHI stakeholders

Although RSSB is entrusted with the management of CBHI, in order to have an ICT-supported and integrative system, there are other institutions which are considered as key stakeholders that
partner with RSSB in the management of CBHI members. Among these there is NIDA as custodian of the National Population Registry data and LODA that owns UBUDEHE database which contains social categories of all Rwandan citizens, last but not the least is Rwanda Online platform that owns Irembo portal which avails web-based and mobile access to government services, it also share information with many systems involved in declaration and premium payment processes. The Ministry of Health (MOH) in charge of all health facilities that serve members of CBHI offers political support. These institutions have been identified as the key stakeholders and are part of this assessment of improving the current processes of CBHI members follow from registration throughout the end of validation. These selected partner institutions in this study have actively been interacting with people (citizens) in their core services which are community-based except ROL which offers a portal for digitally requesting public services. The following are short descriptions of their core businesses

National Identification Agency (NIDA): This is a public institution (established by the law No 43/2011 of 31/10/2011) entitled to issue identification cards and other related civil registration services in Rwanda. NIDA has all demographic and biometric data for Rwanda citizens aged 16 and older. This institution is well positioned to help in authentication.

Rwanda Social Security Board (RSSB): Is also a public institution established by the law No.45/2010 of 14/12/2010 that determines its mission of giving a high quality of social security services including community-based health services. Currently, RSSB is managing five schemes: Pensions, Occupational Hazards, Medical CBHI and Maternity Leave Benefits; RSSB, having the mandate of CHBI management, is looking for information systems solutions that can help to improve CBHI members' management, including simplifying and speeding up the processes as well as minimizing fraud.

The Local Administrative Entities Development Agency (LODA) is a Government fund under the supervision of the Ministry of Local Government (MINALOC). It came into existence with the enactment of Law n°62/2013 of 27/08/2013 that is determining its responsibilities, organization, and functioning. Among the responsibilities of LODA, there is social protection, which incorporates the UBDEHE program. Under this program, Rwandan citizens are grouped in social categories. Members of CBHI contribute different amounts to the medical insurance scheme depending on their social category, and this information is found in UBDEHE system. Since this is a key resource as far as CBHI is concerned, the study has investigated gaps related to this system on systems integration level, and the new information system model proposal includes measures to improve the performance in terms of data exchange. “Local Administrative Entities Development Agency (August 2013)Law establishing LODA and determining its organization and functioning. Retrieved from http://loda.gov.rw/fileadmin/user_upload/documents/Law_N__62.2013_of_27.08.2013_establishing_the_Local_administrative_entities_Development_Agency_LODA_.pdf”
After reviewing the existing ICT related policies and initiatives which have contributed towards the development of health insurance and health sector at large that are in place, again after analyzing the gaps in using ICT there is a need to look at the way of addressing these challenges. One of the ways these issues can be addressed is to digitalize the information and processes for better management, follow up, as well as reports for decision making. Realizing the Rwandan context of CBHI, the major infrastructures in place are like internet penetration of 28% by 2014 (Ministry of Youth and ICT, RDB, RURA, 2015) and resources needed have been established like having all Rwandans identified i.e.; an electronic National Population Registry from National Identity Agency (NIDA) and Social Protection database which classifies each every Rwandan in his or her social category (UBUDEHE database).

The legal framework does not stop only on the health system in this regard but also on the ICT part where the data protection, confidentiality, non disclosure and other concerns have to go in parallel with this legal preconditions in order to implement a fully and secure long term solution.
3. METHODOLOGY

3.1 Introduction

In order to realize the objectives of this study which is a qualitative research, I have used an interpretive research approach to the information collected from the four mentioned institutions which are stakeholders of CBHI. The main data collection techniques used during this study are interviews, literature review and documents analysis. During data collection a questionnaire was used with structured questions whereby I took time with eight informants from four institutions gathering information from them. More about literatures consulted, interviews conducted are explained in the following subsections.

Data analysis has been done following qualitative analysis of interview data using a step-by-step guide, this is a concept framework developed by Kent Lofgren that uses deductive reasoning towards a conclusion. The three main groups of the questionnaire (system or technology, data management and service delivery) cover the entire scope of this study, focusing at how new technological capabilities can link and leverage the existing CBHI system. The reason for choosing the three groups only was based on the expected improved CBHI system with minimum requirements for being able to manage CBHI members. More groups of questions were possible to be developed but, we considered these three in order to have a baseline system capable of sharing information with other systems that is able to manage data and serve the CBHI members.

3.2 Literatures Consulted

In the improvement need assessment of ICT tool used in CBHI membership management system, I have consulted a number of documents. In general, these documents give a deep understanding on; the implementation of CBHI in Rwanda, the encouragement, and importance of information sharing among systems, and the improved quality of service as a result of information sharing by using ICT tools. Searching the articles in the Google scholar and reports I used the following keywords; Information system, CBHI, systems integration, e-government and information sharing. Limiting the period on ten years back from now, the 16,900 results were not relevant to the study at an average of 99.999%, and then the alternative was to also contact RSSB together with partner institutions for some annual reports, national and international conference reports, or global reports specifically on Rwandan case study. On the other hand, laws and regulatory frameworks on CBHI scheme were provided by RSSB and partner institutions. The main criteria for choosing these articles and documents were simply because some are typically focused on Rwandan context.

A total number of twenty-four (24) articles, reports, laws, and regulatory frameworks were kept and consulted in this study, and Rwandan plan towards the promotion of ICT use in the
health sector. Furthermore, CBHI is a common practice in other countries like in sub-Saharan Africa; there was a need to look at how some of those countries have implemented and the level of ICT use, here two sampled countries Ethiopia and Ghana were consulted.

3.3 Interviewees

Eight senior staffs that have expertise in their respective institutions’ systems and understanding of business processes from the above-mentioned institutions were selected. Five from RSSB, and one from each of the remaining institutions have contributed to this study. I intended not to use many respondents just because this study targeted to have information about how each particular institution among these work together in terms of data sharing. The informants were in three levels of positions; one head of the department, one division manager, and six technical staff. RSSB being a key player in the management CBHI two out of five staffs are head of CBHI department and CBHI mobilization and registration division manager while the remaining three are technical staffs in the division of mobilization and registration. Other three respondents from the respective institutions (LODA, NIDA & ROL) are the technical staff with IT skills who work on their institution’s systems that interact with 3MS.

These staffs were selected because they understand their systems functionality, workflow, and client charter. Using both structured and semi-structured methods I have collected data from the above mentioned informants after asking them a set of questions annexed here, this could be done in form of discussion aiming to know system functionality, workflow as well as the gaps. Data collection took place in a period of two weeks for all four institutions, and I could conduct three interview sessions in each institution discussing questions related to technology, data management, and service delivery processes.
4. RESULTS AND ANALYSIS

As mentioned in the introduction, I did the assessment at technology level looking at what RSSB has in place in terms of ICT solution to effectively and efficiently implement CBHI as well as the room for improvement. CBHI scheme as a government or public service has laws and policies that govern the implementation IT-based service by following the national plan of digitizing services; I first gathered overview information about CBHI laws and policies before tackling to ICT solution. I visited the department of CBHI in RSSB four times to first understand their workflow or business process, then after discussed on information system models mixed back-end and front-end that facilitates the management of digital interactions. The following key points were discussed in the first phase to conceptualize the methods of analysis: policy concept, members of CBHI by law, identifying CBHI members, and management of CBHI members.

Members of CBHI

According to the law N° 03/2015 of 02/03/2015, Governing the organization of the community-based health insurance scheme: Chapter 2, section 2 (Art. 4 & 5) describe the members of community-based health insurance scheme and their categories. Members fall into two categories (ordinary and honorary members) and we found that a member start to be called a member after all members of the household (HH) he or she belongs have paid required contributions (premium). (Office of the PM, 2015)

Identification of CBHI members

Rwandan citizens are grouped in more than two million households, in these households’ members are beneficiaries of three different health insurances that we have in Rwanda. The department of CBHI in RSSB explained that members of CBHI are identified at two different levels; Level one is at UBUDEHE system where all Rwandans are obliged to be recorded with their respective households and specific social category, Level two is at RSSB where each household was asked to pay the premium that corresponds to the number of its members and social category, again if there is a member (s) who belong (s) to another health insurance scheme his or her insurance card should be presented to justify why he or she was not paid for.

Managing CBHI members

RSSB could use UBUDEHE system from LODA which contains all Rwandans grouped in households (HH) and classified in social categories, then every HH paid its premium for CBHI then the information could be captured in Mutuelle Membership Management System (3MS) for validation. So in summary two systems (UBUDEHE & 3MS) we found them jointly directly implicated in the management of CBHI members. Since all Rwandans belong to these HH, if a
member happen to belong to any other health insurance scheme he or she should present his her insurance card to justify why was not paid for.

### 4.1 ICT in the current CBHI business process

Based on the user department, digital interactions are so far half way whereby big numbers of CBHI members make payments through SACCOs and Mob-cash, since SACCO branches are not computerized yet after depositing money on the account of RSSB in SACCO citizens go to Mob-cash agent to make payment available online and then the citizens proceed to get validated in the 3MS by RSSB agent. Citizens or members of CBHI get interacted directly with these two systems in a semi-digital way, because there are other systems that get involved by doing manual verification i.e: UBUDHE system which is contacted for social categories and number of HH members’ information. This semi-digital process has the following pre-requisites:

**Registration at UBUDHE system**

Starting by UBUDHE DB structure; key information are HH number, head of HH, HH category and HH member’s particulars like names, Identification (ID) number to those who have, address of the HH. The information source channel start from local government authorities (Village – Cell – Sector to District) from the village level report goes to the cell level, the cell compiles all villages then reports to the sector level where the sector do compile all reports from its cells to be reported to the district office. In case of any changes made or new HH created to UBUDHE system each level has to inform it’s superior.

The information source mentioned above from local authorities, it is organized in such way that selection criteria are applied in the citizen’s gathering and decisions are taken from committees at village and cell levels not a single person.

**CBHI medical scheme and points of services**

RSSB staff at the HC do receive citizens who have paid (payment is done per household), after checking in the UBUDHE list if the paid household is there with the exact number of household members and corresponds to the social category, then the validation is done in 3MS where cards are issued to new HH members or validating stamps for the existing HH members.

According to the law mentioned above, in its Art. 9 it states the medical services covered by the community based health insurance which are drugs and medical services provided at health post, health centre, hospital of District or Province or referral hospital.

Following the above mentioned points of services at different levels, the process and procedures explain how the service start by the lowest level (health post or health centre) and move up to the level of referral hospital. From one level to another a copy of transfer should be there to justify that a member of CBHI / client / patient is coming from a lower point of service level.
**CBHI members phase out**

Membership can be phased out when one changes medical insurance scheme or looses life (passes away) otherwise it is changing HH or creating a new HH, the notification comes from local authorities informing RSSB through LODA either of the above mentioned changes that has happened.

### 4.1.1 Current Business Process

The figure below (Figure 1) show the information flow in the current model, as mentioned in the above statements the process is not yet fully digitized whereby the involved institutions’ systems are not electronically sharing information (online authentication).

*Figure 1: Current process “As-Is” model*
Following step by step the processes included in the CBHI membership procedures;

The first step marked (1) is a mandatory step whereby a member should first know the social category of his or her HH in order to know the premium to be paid for the entire HH. The tools that CBHI members are using to have this information are the lists distributed at the health facilities and cell offices, after checking the social category the head of the HH has to go to the bank commonly SACCO because they are ones that are close to them and make payment.

The second step marked (2) is the SACCO braches where payments are made and since they are not computerized the CBHI beneficiaries have to take the bank slips to the health center for justifying and get verified of their payments and then be put in the 3MS system.

The third step marked (3) is an alternative payment channel using Mobicash agent. Mobicash is a private mobile payment solution that is linked with almost all banks in the country to facilitate mobile and web based transactions to the 3MS.

Finally the fourth step (4.1 - 4.x), the CBHI members have to go at the nearby health center to deposit the bank slips and get validated by being given CBHI cards, this validation is a stamp that proves someone’s annual premium payment.

According to the CBHI department in RSSB, there are projects in the pipe line which they wish to be helpful in a near future. They have started to establish the links across the partner institutions (RSSB, NIDA, and LODA) together with the Rwanda online platform (Irembo) which is an emerging partner that has set solutions related to digitalization of the government services. At this point I was interested to find out how this will work and what the loopholes are in the existing systems that may still affect them to meet their expected result.

### 4.1.2 Findings from the interviews

The following table 1 shows the general findings from the four institutions based on their current business process model. The first column of the table contains the three main perspectives which are system technology, data management and service delivery that covers the scope of the study assessment. Second column contains the key assessment questions that were selected from the entire questionnaire (Annex 1) by considering questions which are typically focusing on the parameters of information sharing and systems integration. Then follows the third column which contains the findings from the interviews that were captured based on the notes “transcripts” taken during the data collection visits of all CBHI stakeholders. Keywords / indexes in the fourth column of table 1 were picked from findings whereby that particular work is consistent from the question throughout the responses of interviewee. The analysis is matched with and referred to “a guide of a basic step-by-step stated by Kent Lofgren on qualitative analysis of interview data” (Kent Lofgren, 2012).
### Table 1: General overview of findings from interviews

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Key Questions</th>
<th>Assessment Findings</th>
<th>Keywords / Indexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>System / Technology</td>
<td>Question 3: Is the system web-based?</td>
<td>• Systems are web based.</td>
<td>✓ Web based</td>
</tr>
<tr>
<td></td>
<td>Question 4: Is the system decentralized?</td>
<td>• Systems are decentralized</td>
<td>✓ Decentralized</td>
</tr>
</tbody>
</table>
|                        | Question 5: Is the system integrated with others? | The following Systems are integrated:  
• RSSB, LODA, NIDA  
• IREMBO, MOBICASH | ✓ Integrated                   |
| Data Management        | Question 6: What are the captured key identifiers? | The key information captured on CBHI members at RSSB level:  
• ID, Names, Residential Addresses, and Social Category | ✓ Identifiers     |
|                        | Question 8: Is the information captured shared? | Information entered to 3MS is shared with UBUDEHE.                                    | ✓ Shared          |
|                        | Question 9: Is the information updated? | The information in the system is updated up on the request.                         | ✓ Updated         |
| Service Delivery       | Question 11: What are the steps of becoming a member? | • Registration in the UBUDEHE system.  
• Payment of premium.  
• CBHI section (HC) issue validated card. | ✓ Membership Steps = 3manual steps |
|                        | Question 13: What are the steps of processing annual renewal? | • Make payment of the required premium.  
• At section (HC) with a proof of payment. | ✓ Validation Steps = 2manual steps |

Recalling from the objectives of this study about how the current model support CBHI, table 1 shows that the existing systems are: web-based, decentralized, and integrated. These systems also have identifiers, and are able to share data; more to this their data are updated on a regular basis. The mentioned keywords are the parameters in regards to information sharing and systems integration. However the level of how current situation support CBHI members’ management need more analysis of these keywords / indexes by looking at the harmonization of these indexes among the CBHI partner institutions.

The indexes are now to be analyzed institution by institution whereby the following table 2 shows the six indexes across the four institutions. Data representation is done by symbolizing the table content whereby “YES” stands for the validity of an index in an institution, just to say that a particular institution has or is doing so. Specifically on the identifiers each institution is given what it uses as an identifier, the indexes of membership and validation steps are dropped.
Table 2: Overview of characteristics of CBHI stakeholders’ systems: Based on indexes status

<table>
<thead>
<tr>
<th>Themes / Partners (System)</th>
<th>RSSB (3MS)</th>
<th>LODA (UBUDEHE)</th>
<th>NIDA (NPR)</th>
<th>ROL (Irembo)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Information Technology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web based</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Decentralized</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Integrated</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Data Management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifiers (Primary key)</td>
<td>ID number</td>
<td>HH code</td>
<td>ID number</td>
<td>ID number</td>
</tr>
<tr>
<td>Shared</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Updated</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

From the above table 2, all institutions have common parameters in regards to the kept indexes except on the identifiers where other institutions use ID number as primary key in their backend systems while identifying their beneficiaries and only LODA through UBUDEHE DB do identify beneficiaries using HH code. From this point of view all the four partner institutions are using IT solutions in their daily work whereby their central levels can communicate with their respective decentralized levels when sharing and updating information using web-based applications. This is actually a vertical integration which a good start to a horizontal one.

Referring to the second objective of this study, the gaps among the six indexes are elaborated by looking at the two of them which are halfway attained; these are identifiers and integration. On these indexes / keywords institutions have not significantly behaved the same in as far as information sharing is concerned. There is a need for harmonization of identifiers across the systems; once identifiers are harmonized any form of integration is possible so longer as beneficiaries are identified across the institutions.

The information sharing capability is presumed to contribute in the breaking of siloes (isolation) and avoid standalone systems. Table 3 simplifies the indexing to two keywords / indexes that have shown gaps which are considered as the RSSB limitation to the use of current information technology in the management of CBHI members. During this study, I found this as a big barrier as well as a loophole whereby a CBHI member can somehow or somewhere fail to be identified to or from UBUDEHE system. In the following Table 3, I mapped the integration and identifier as the final more important indexes or keywords in sense of gaps found in information sharing as earlier mentioned to have output composite matrix among the CBHI key stakeholders.

Table 3: Output Composite Matrix of final Indexes Vs Systems

<table>
<thead>
<tr>
<th>Theme / System</th>
<th>RSSB (3MS)</th>
<th>LODA (UBUDEHE)</th>
<th>NIDA (NPR)</th>
<th>ROL (Irembo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integration (Int.)</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Identifier (Id)</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Output Composite (Int. * Id)</strong></td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>
Output composite combined the remaining two more important indexes among others. This shows that even if systems can be linked or integrated but if they do not have same unique identifier across them, there will always be duplication of efforts due to manual processes because digital interactions between these systems could not go through hence errors and fraud cases loopholes. It is in this regard that the much emphasis is put on these two indexes that are complementary towards improving information sharing.

4.1.3 Summary of findings: CBHI Management Gap Analysis

The final two themes in the four institutions make a total of eight enumerates and out of eight only one is a “NO” that enumerates the gap in terms of intended data sharing. This gap is affecting the CBHI scheme in the following specific items; Payments are still deposited and verified manually, SACCOs as the potential payment mode are not connected (computerized), partial systems integration whereby identifiers (primary keys) are not identical or corresponding, access on changes made to UBUDHEHE system is not real time, internet connectivity issues to some points of services reduces the service coverage. This has several times resulted in fraudulent cases whereby CBHI could have ghost members due to lack any reliable verification model whereby source of trusted data can easily be shared, starting at registration of HH in the UBUDHEHE system up to the point of becoming CBHI members to 3MS.

4.1.4 Mitigation Plan: CBHI information system harmonization and integrating with stakeholders

The identified institutions’ systems with remarkable partnership in CBHI need to harmonize their identifiers, for example LODA system (UBUDEHE) has an identifier as household code which is never used anywhere else, however if they happen to use ID number as an identifier, all stakeholders mentioned in this study will be able to share information across them. Again increasing accessible payment modes brings facilitation options to the citizens to move a short distance, in this context SACCO and Rwanda Online cover all 416 sector offices in the country, however SACCO’s transactions are not electronic which means cannot be synchronized and centralized. In this regard I argue that if SACCO branches can be connected integrated, together with Irembo agents can smoothly serve the entire country and all payment transactions be accessed on a real time basis. The degree of realizing this plan is high due to the fact that the basic requirements are already in place, like fiber optics which is laid all over the country and political will is assured, the detailed feasibility and implementation plan can be developed, obviously without leaving behind the pros and cons.
5. Discussion

Understanding e-Government brings together technology, people, process and information and make an integrated solution of e-Government as an outcome and e-Government systems (Heeks, 2001). In a summarized way “e-Government is the use of information technology (IT) by public sector organizations” and “e-Government systems are information systems that are socio-technical: combining the technical and the human” (Heeks, 2006).

Coming back to CBHI in the Rwandan context, the discussions in the previous parts are elaborating the contributions of the four mentioned institutions towards the better management of CBHI members. However this is not straight forward as one can think, especially on the new proposed model. Currently the four key stakeholders mentioned in this study are vertically integrated whereby their decentralized points of services are able to enter data or make any change and be accessed at central level on real time basis. This is why actually they have been chosen to be the key stakeholders in the better management of CBHI members. The key points to discuss here are related to the feasibility of harmonizing identifiers across the four systems and the use of ID card as CBHI card.

This may involve some costs of change request which I think cannot be that much compared to the importance of having a harmonized unique identifier, more costs may be on the part of creating a separate common bus of managing information sharing. Integrating databases for these partner institutions was put out of scope because there is an ongoing national initiative of developing Enterprise Service Bus (ESB) that is not discussed in this study. This ESB will cater for all public and private online information exchange not only for CBHI purposes. For the case of using ID as CBHI card, it is a cost cutting opportunity to RSSB but also which is implying all citizens to be registered in both NPR and UBUDEHE systems as well as be issued ID to those who are 16 years and above. Then those who are below 16 years use their heads of the household IDs, the gap may only be if possible to find head of the household who is below 16 years old, I assumed there is no one, otherwise it will be a special case to be handled in a special way. Special cases were given scenario of how they can be treated; a household of all members having below 16 years old they should at least be registered in the NPR to be identified using application number. This household should be in the first social category that are being paid their premium by the government, the only thing RSSB will do is circulate their list to all health facilities and issue them membership cards that will identify them. More other challenges related to the workflow and processes that may pop up after the implementation of this new model will be treated as special cases.

5.1 Proposed improvement process (Business Process to be)

Based on the user department, digital interactions are made whereby big numbers of CBHI members need to make declarations and payments through web based platforms (like Irembo
portal which is given a mandate to avail more than 100 government services online), and then get validated in the 3MS. Citizens or members of CBHI may need to get interacted directly with these two systems, however there are other systems that get involved in the back-end, example given in the proposed model is National Population Registry which can be contacted for authentication of the members using ID number and UBUDEHE system which can also be contacted for social categories and number of HH members’ information.

![Diagram of Proposed Business Process](image)

**Figure 2: Proposed / Business Process to be**

Point of Services (PS), Referral Hospitals (RH), Provincial Hospitals (PH), District Hospitals (DH), Health Centers (HC) and the numbers (1, 2, 3, 4, 5 & 6) on the lines mark the sign of information exchange between partner institutions. Numbers represent the logic flow of the business process and the lines indicate the information sharing needed between the partner institutions.

The above figure (Figure 2) named proposed or to be model is designed to improve the existing model of CBHI scheme, and it addresses the raised gaps in the current business processes. Since the linkage is already established between all mentioned key stakeholders, the proposed model is
based on creating compatibility and interoperability environment by harmonizing identifiers to facilitate information sharing for authentication purposes in existing systems of the key stakeholders. Depending on the available resources, the existing linkage between institutions is done by establishing site to site virtual private network tunnels and online authentication uses web services which is built on top of three cores XML specifications: Web Services Description Language (WSDL) Simple Object Access Protocol (SOAP) Universal Description, Discovery, and Integration (UDDI). The above marked links are actually related to information exchange and sharing, more about these links are explained as follows;

Link 1: This is a proposed web and mobile application based at Irembo portal that can play a big role of available service online where a citizen is able to serve him or herself depending on one’s capability of having skill and access to these tools.

Link 2: This is actually an existing link between National ID Agency and Irembo portal that is used to help in online authentication to many other government services which have been digitalized. This serves to mean that even CBHI services can pass through Irembo portal as well.

Link 3: To this point, it is proposed to establish a link between RSSB and Irembo portal in order to be able to access information related to the payments made. This should be bidirectional due to the fact that Irembo has to inform RSSB who ever pays and the payments storage be kept shared between them to always be checked before processing payment on the side of Irembo. The payment can be made using mobile money or through the bank or any payment channel that able to be recognized by the 3MS so longer as it has system generated reference number.

Link 4: This link is proposed to help RSSB to compile and match the information related to payments from Irembo and social categories from UBUBEHE DB. This will finalize the ready information to be used at the front end by the RSSB staffs that are based at the health facilities.

Link 5: This link is proposed for data integrity purposes, whereby LODA should register their beneficiaries (new households) after they have been authenticated from NIDA system (NPR). Apart from data integrity, there are other benefits related to have one point of entre as NIDA system; this is like stop fraud cases since information will be shared across institution’s systems.

Link 6: This will link to the front end points of services where RSSB staffs in charge of CBHI at the health facilities have access on CBHI membership premium payments storage.

Once identifiers are harmonized across the CBHI partners’ systems back-end systems will be able to make more digital process to save citizens from doing many trips or physical visits while looking for the CBHI services.

In summary, one trip will be sufficient enough to get served and the rest processes be performed in the back-end systems. The points of services are very key in the management of CBHI members and the services offered to them whereby they play a big role of an intermediation
between RSSB as an entrusted institution and the beneficiaries. If the system is well built, it will reduce ghost members who used to benefit from CBHI scheme yet they are not eligible, these loopholes and other fraudulent cases can be terminated through harmonizing identifiers of the partner institutions’ systems.
6. CONCLUSION

This study has focused on the improvement need assessment of CBHI scheme in Rwanda based on the ICT use in the systems of RSSB together with close partners in the management of CBHI members. The experience and knowledge gained from this research are beneficial to the implementing agency of CBHI scheme and other partners in social protection programs as well as researchers in the field of health for mutual recognition aspects optimized by integrated systems. It is proposed that LODA does revisit or re-engineer its UBUDEHE system and make it possible to identify a household by the ID of its head in order to harmonize with the remaining institutions’ systems, and also identify under 16 people by their application number from National Population of NIDA.

The main benefaction of this study is to disclose the gaps that are in the CBHI membership management system and propose how they can be addressed based on IT solutions as an enabler for the better and services offered to the CBHI beneficiaries. The framework used here could be an essential instrument for the assessment of CBHI system and is based on the crucial findings from existing studies that use a basic step by step guide to qualitatively analyze the research data. The study had constraints, including the limited access to the institutional data by interviewing government officials to their daily duties, and no previous study on this particular system has been conducted.

The implementation of the proposed model of the new business process is believed to impact positively the digital interactions expected to improve the management of CBHI members at the institutional level as well as at the service delivery level. Further and future studies can come up with a concrete assessment on the side of clients’ satisfaction of the improved and optimized re-engineered system. As the three levels of assessment has been in this study system or technology, data management and service delivery of 3MS, systems integration based on the common identifier across the partner institutions’ systems is the new model based setup, which can as well be assessed on the other side of beneficiaries’ end side to find out if it is facilitative.
References


Joseph, A. (2016). The Identity Ecosystem of Rwanda:


Annex 1. Questionnaire

Research on Community-Based Health Insurance (CBHI) in Rwanda: Improvement needs assessment of Membership Management System

Period: October 2017 – January 2018

Institution: …………………………………………………………………………………

QUESTIONNAIRE

Respondent Position: …………………………………………………………………………..

Use tick symbol (V) to a respective Yes or No answer.

System / Technology:

1. What is the technology system (name) that RSSB uses to manage CBHI members?

2. How long has this system been in use?

3. Is this system web based? Yes [ ] No [ ]

4. Is this system decentralized? Yes [ ] No [ ]
   a. If yes, is it decentralized to which administrative level?
   b. If no, is there any reason/constraint?

5. Is this system integrated with any other system? Yes [ ] No [ ]
   a. If yes, how many are there and which ones? Number:
      i. ……………………………
      ii. ……………………………
      iii. ……………………………
      iv. ……………………………
      v. ……………………………
   b. If no, is there any reason/constraint?

Data Management:

6. What is the set of key identifiers information captured on members of CBHI (starts by primary key and proceed with secondary in the database)?
   a. …………………………………
   b. …………………………………
   c. …………………………………

7. Are these information identifiers captured manually? Yes [ ] No [ ]
   a. If yes are they authenticated through any other system? Yes [ ] No [ ]
   b. If yes which one is that? Name/Institution:
   c. If no, is there any reason/constraint?

8. Is this information feed from other integrated system? Yes [ ] No [ ]
   a. If yes which system is this? Name/Institution:
9. Is this information updated? Yes ☐ No ☐
a. If yes how regular is update done? Time interval: ………………… Months / Years
10. Is this information recreated? Yes ☐ No ☐
a. If yes how regular? Yes ☐ No ☐

**Service Delivery**

11. What are the steps of becoming a CBHI beneficiary/member?
   a. ………………………………………………………………..
   b. ………………………………………………………………..
   c. ………………………………………………………………..
   d. ………………………………………………………………..
   e. …………………………………………………………………

12. In case of an error, how does it be solved? Give two scenario examples possible
   a. Scenario 1: ……………………………………………………………………………………………
       …………………………………………………………………………………………………………………
       …………………………………………………………………………………………………………………
   b. Scenario 2: …………………………………………………………………………………………………
       …………………………………………………………………………………………………………………
       …………………………………………………………………………………………………………………

13. What are the steps of processing annual renewal/validation of membership?
       …………………………………………………………………………………………………………………
       …………………………………………………………………………………………………………………
       …………………………………………………………………………………………………………………