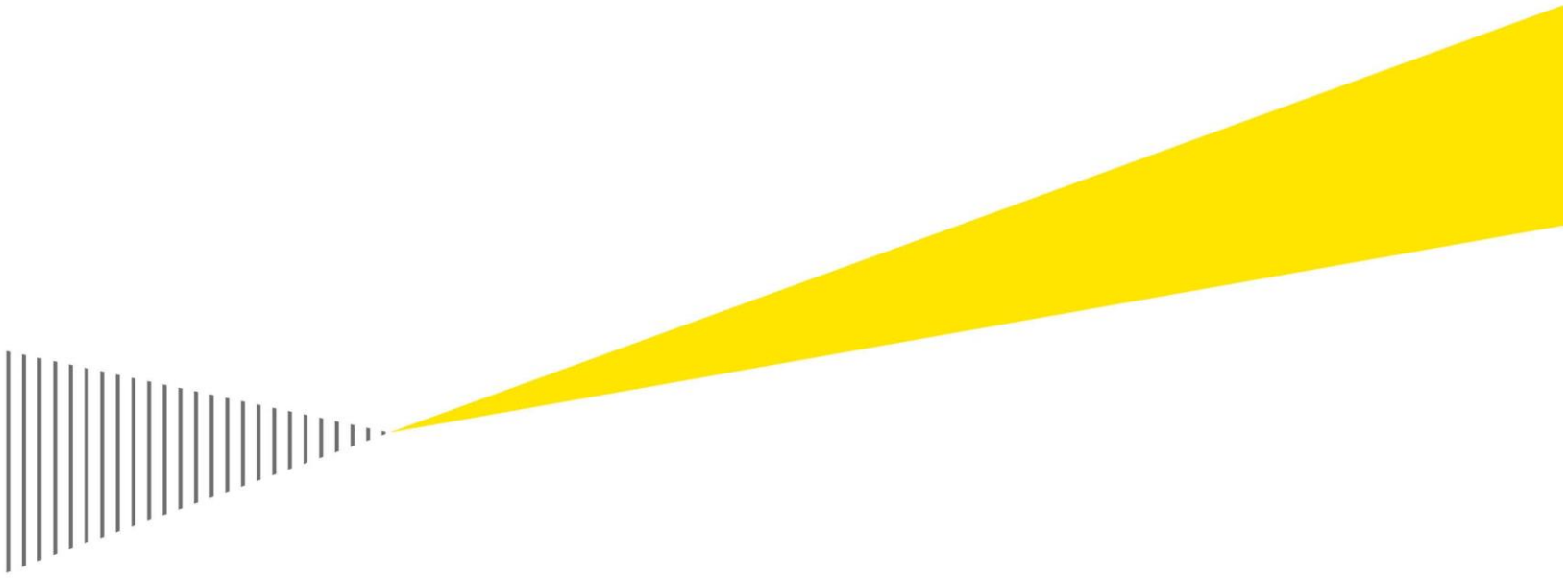
Final Report on the Actuarial feasibility study of the Single National Health Insurance Fund for Tanzania

February 2017



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EY has not provided any assurance over the data supplied to us by various sources referenced in this report. Health Policy Plus remains responsible for the design and operation of the Single National Health Insurance Fund and is responsible for the accuracy and completeness of the information received and applied in this feasibility assessment.

The report is based on documentation, information and explanations supplied to us, and from discussions with management and personnel of the HP+ project. We have relied upon the documentation, information and explanations made available to us in good faith to conclude on the information included therein albeit that we determine such to be reasonable in the circumstances in which such was received.

As agreed with you, we have limited our work to the agreed scope, and we have not considered any further areas of the feasibility exercise (e.g. review of the Health Financing Strategy (HFS), review of the implementation plan and budget etc.). Our work has been based on our understanding of the likely HFS requirements (as they stand as at 30 June 2016) and the interpretation and application of those requirements by Palladium Group. However, these requirements (and hence their application) are not yet finalized.

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2. List of Acronyms

Acronym	Definition
AFS	Audited Financial Statements
BMI	Business Monitor International (Ltd)
BOT	Bank of Tanzania
CHF	Community Health Fund
CPI	Consumer Price Inflation
DPP	Department of Policy & Planning
EES	Employment and Earnings Survey
EY	Ernst & Young Advisory Actuarial Services (Pty) Ltd
FFS	Fee-for-service
FP/RH	Family planning and reproductive health
GOT	Government of Tanzania
HBF	Health Basket Fund
HBS	Household Budget Survey
HCCI	Healthcare Cost Inflation
HFS	Health Financing Strategy
HIV and AIDS	Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome
HP+	Health Policy Plus
HPP	Health Policy Project
IBNR	Incurred but not reported
iCHF	Improved Community Health Fund
ILFS	International Labour Force Survey
IT	Information technology
JKN	Jaminan Kesehatan Nasional
LGA	Local Government Authority
MBP	Minimum Benefit Package
MBP+	Minimum Benefit Package Plus
MDG	Millennium Development Goals
MNCH	Maternal, new-born, and child health
MOHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
NHIF	National Health Insurance Fund
NSSF-SHIB	National Social Security Fund - Social Health Insurance Benefit
PHC	Primary Healthcare
PR	Public Relations
PSSN	Productive Social Safety Net
RBF	Results Based Financing
SDG	Sustainable Development Goals
SHP	Social Health Protection
SNHI	Single National Health Insurer
SSRA	Social Security Regulatory Authority
TIKA	Tiba kwa Kadi
TZ	Tanzania
TZS	Tanzanian Shillings
UHC	Universal Health Coverage
USAID	United States Agency For International Development
USG	United States Government
WHO	World Health Organization

3. Executive Summary

The draft Health Financing Strategy 2016-2020 proposes a Single National Health Insurer (SNHI) as a means to:

- end fragmentation of health insurance coverage,
- increase resources for health,
- provide a minimum benefits package for all, and
- increase the efficiency of health spending

Through stakeholder consultations, the MOHCDGEC and others have requested an actuarial feasibility study of the prospective SNHI. EY Africa Actuarial has been contracted to conduct this actuarial study through the USAID funded Health Policy Plus project, to complement previous analyses.

This report is a comprehensive consolidation of strategic research, healthcare expertise and actuarial analysis conducted in the following four broad areas that define the scope of work concerned:

- Forecasted the multi-year revenues and outgoing healthcare claim costs expected to be paid by the SNHI.
- Incorporated projected administrative expenses, including enrolment costs, to understand sustainability of the SNHI fund given projected resources.
- Conducted scenario analysis on the projected revenues and outgoing healthcare claims costs as a result of varying in turn utilization rates, administrative expenses and other factors.
- Provided an overall summary of the forecasted sustainability of the SNHI and recommendations to reduce the risk of insolvency.

The results of this comprehensive undertaking of analysis are provided in this report, the main findings of which are described below. All figures shown below are quoted in Tanzanian Shillings (TZS) and gross surplus/deficit is defined as the end of year surplus/deficit before any investment income earned in that year or any additional sources of revenue have been received.

Gross Surplus/Deficit (Billions)	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Scenario 1: Affordability of MBP+ for poor/near-poor population	-130	-179	-134	-45	71
Scenario 2: Healthcare utilization increases over time under a fully FFS MBP+ package	297	260	353	484	640
Scenario 4: EY best estimate	263	16	-109	-207	-347

The base scenario provides a view of sustainability on the basis that the underlying data and assumptions be an accurate reflection of the funds risks. Furthermore, the base scenario is based on the total enrolment targets reflected in the Health Financing Strategy. The base scenario assumed that the formally employed access the MBP+ benefit package whilst the rest of the population (informally employed an unemployed) access MBP. From this base scenario, it can be seen that the SNHI fund demonstrate that the fund is feasible, and the strength of feasibility grows over time.

Further to this, it can be seen from Scenario 1 results that the fund is unsustainable when the poor/near-poor populations are offered MBP+ benefit coverage.

Scenario 2 highlights the critical requirements for the utilization assumption to be as accurate and reasonably reflective of the underlying populations claiming behavior as well as the MBP+ benefit package costs to be controlled through varying reimbursement methods.

In summary, if actual experience deviates from the assumptions and the costs implied by the underlying data, the feasibility is significantly threatened. Any deviations to the underlying assumptions will present risks to the fund. These risks differ in significance but ultimately threaten the solvency of the fund.

It is our view that the base assumption of utilization and healthcare costs derived from the data are underestimated due to the data issues and explanations provided in the methodology discussion in this report. In addition, the base scenario assumes a fairly high enrolment rate. We believe that given the current performance of both the NHIF, CHF and iCHF, it is unlikely that these coverage levels will be achieved in year one. The base also assumes full contribution compliance which is unlikely for the informal and unemployed populations. As a result, in Scenario 4 we have provided a best estimate view of the sustainability of the fund. In this scenario we adjust the base assumptions that are unlikely to be borne out in practice. From the results, it can be seen that if the funds actual experience is closer to EYs best estimate view of assumptions, the funds sustainability is significantly threatened, which is exacerbated over time.

From the above results and discussion, it can be seen that multiple simplifying assumptions have been applied, mainly due to the lack of clarity and lack of detail inherent in the design phase of the fund. We therefore strongly suggest that the detail underlying the funds design and operations are thoroughly considered and confirmed prior to implementation. These considerations and further recommendations include the following:

- Reevaluate the feasibility once appropriate data has been collected or alternatively closely monitor the funds experience on a monthly basis following implementation
- Maintain a healthy cash surplus from month to month
- Review and finalize the expense information to account for a reasonable expectation of year one costs
- Minimize the percentage of total expenditure on administration expenses
- Maintain a non-health expense ratio of between 8-10%
- Set capitation rates that are calculated accurately and in consultation with service providers, actuaries and clinical risk analysts in order to ensure that quality of care is not compromised whilst still allowing for a fair reimbursement rate
- Set capitation rates separately for different regions and service provider facility types
- Assess resource shortages and supply side challenges in parallel to the financing feasibility of the fund and develop the implementation strategy such that these supply side deficiencies are accounted for
- Implement monitoring mechanisms associated with the benefits packages and reimbursement methods
- Ensure that the mix of reimbursement methods promotes optimal resource allocation
- Implement appropriate care pathways and clinical protocols
- Maximize the overall percentage of population covered by SNHI, by target group however phase in implementation so the funds operational model can be refined in a pragmatic manner
- Set the ratio of prepaid contributions to total costs (i.e. the overall prepayment ratio) of the SNHI benefit package at an acceptable rate
- Set the prepayment ratio by target group, at acceptable levels
- Minimize the percentage of households with catastrophic spending.

In addition to the above, it is important to note that the analyses in this report indicates that should external funding stop, the financial feasibility of the system will be seriously compromised. We therefore further recommend that plans are put in place to mitigate against this risk.

Thank you for giving us the opportunity to help on this important analysis.

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4. Introduction

4.1 Scope of services

In Tanzania, Palladium is working with USAID as part of the global five year cooperative agreement, the Health Policy Plus (HP+) project. The purpose of HP+ is to improve the enabling environment for equitable and sustainable health services, supplies, and delivery systems through policy development and implementation, with an emphasis on voluntary, rights-based family planning and reproductive health (FP/RH); maternal, newborn, and child health (MNCH); and HIV and AIDS.

The Ministry of Health, Community Development, Gender, Elderly and Children (MOHCDGEC) is proposing a single national health insurer under the draft Health Financing Strategy (HFS). The Single National Health Insurance Fund (SNHI) would combine existing pre-payment risk pools in Tanzania and will be accompanied by enabling legislation amending the appropriate acts as well as an administrative structure to manage funds and enroll participants. Under the Health Policy Project (HPP), a senior economist provided support to the MOHCDGEC's Department of Policy & Planning (DPP) to conduct cost and fiscal space analysis, including several aspects of sustainability from a payer and provider perspective. These analyses were incorporated in the draft of the HFS as of June 2016. The HFS will be reviewed by a Cabinet committee and it is expected that enabling legislation will be tabled in Parliament. Stakeholders requested additional analyses to support this consultative process in order to understand all aspects of the SNHI's operation and viability.

EY has been commissioned by Palladium to perform an actuarial valuation study that will assess the feasibility of the proposed Single National Health Insurance Fund for Tanzania. As part of the scope of services EY has:

- Forecasted the multi-year revenues and outgoing healthcare claim costs expected to be paid by the SNHI.
- Incorporated projected administrative expenses, including enrolment costs, to understand sustainability of the SNHI fund given projected resources.
- Conducted scenario analysis on the projected revenues and outgoing healthcare claims costs as a result of varying in turn utilization rates, administrative expenses and other factors.
- Provided an overall summary of the forecasted sustainability of the SNHI and recommendations to reduce the risk of insolvency.

This report details the findings and results in respect of the above. All figures produced in this report are quoted in Tanzanian Shillings (TZS) unless otherwise stated.

4.2 Overview of the Single National Health Insurance Fund

The information contained in this section is a direct extract from the draft HFS Strategy document (or parts thereof) provided to us by HP+. No changes, additions or alterations have been made. We have reproduced this content merely to provide the reader with strategic context regarding SNHI. We take no responsibility for any inaccuracies or inconsistencies in the below paragraphs pertaining to this section.

Globally, millions of people fall into poverty each year as a result of paying for healthcare out of their own pockets. Many more are too poor to even consider seeking care at health facilities. In addition, adequate healthcare is often not available, especially in remote areas, further limiting the ability of vulnerable population groups to access needed health services. This holds true also in Tanzania.

To address these issues, Tanzania, like many other low- and middle income countries, is intending to establish a Social Health Protection (SHP) system which strives towards Universal Health Coverage (UHC) – a goal also to be included in the post-Millennium Development Goals (MDG) agenda, the Sustainable Development Goals (SDG).

This Health Financing Strategy (HFS) outlines the strategic interventions and critical path necessary for Tanzania to move closer to UHC through an effective SHP system.

The primary aim of the HFS, according to the HFS draft strategy, is to establish a mandatory Single National Health Insurance (SNHI) under which the entire population of Tanzania will have access to a standard minimum healthcare benefit package at all levels of care (aligned to the National Essential Health Care Intervention Package 2013) which will:

- end fragmentation of health insurance coverage,
- increase resources for health,
- provide a minimum benefits package for all, and
- increase the efficiency of health spending.

SNHI as proposed in HFS will be mandatory, bringing all existing public and community health insurance together with the view of reducing fragmentation. The legal framework will safeguard the mandatory membership nature of SNHI and protect a standard Minimum Benefit Package (MBP) that will be an entitlement of the entire population.

Benefit entitlement under SNHI:

In the short- to medium-term there will be two types of MBP, namely the Standard MBP and the MBP plus or MBP+. The National Health Insurance Fund (NHIF) currently covers the MPB plus. The intention is to first provide the Standard MBP to all Tanzanian citizens and then over time move from the Standard MBP to MBP plus for all Tanzanian citizens. Specification of the Standard MBP will evolve through SNHI implementation but it will initially be established based on levels of care.

The standard MBP, which will be accessible to everyone, will include all individualized preventive and curative services at dispensaries, health centers, district hospitals, and regional hospitals. It will exclude public health services such as water and sanitation programs and education and promotion campaigns. Access to regional hospitals and district hospitals will be granted upon receipt of referral letter from a dispensary or health center.

Public and accredited private facilities will be contracted to provide the Standard MBP for SNHI members. In areas where there is no public primary facility, special arrangements will be made to ensure that there is an accredited private facility within that area in order to guarantee availability of care to everybody in need.

In addition to what is provided as part of the Standard MBP, the MBP plus will include access to regional referral, zonal referral and access to national hospitals as is currently covered under the National Health Insurance Fund (NHIF). It is not the intention of the SNHI to reduce the size of health care benefit package that is currently consumed by the members of the NHIF. Such members together with employees in the formal non-public sectors will be accessing the current NHIF package (referred to as MBP plus) but this package will be '"frozen" until the time when the SNHI is sustainable enough to increase the benefits offered under the Standard MBP to the MBP plus level that is equivalent to the current NHIF package. Again, the long-term goal is to ensure that every SNHI member has access to the level of benefit package that is currently provided by the NHIF. And this is the long term definition of the SNHI MBP. Individuals who are currently not employed in the formal sector but would wish to enjoy MBP plus straight away can do so by contributing a premium in addition to the standard premium rates.

Service provider reimbursement:

SNHI envisions a gradual shift from input-based to output-based provider payment systems purchasing the MBP. A combination of provider payment systems is envisaged under the new SNHI, combining some form of capitation payment blending some elements of result based financing (RBF) at the primary healthcare (PHC) facility level (dispensaries and health centers) and case-based or fee-for-service at district hospital and above. Payments will be made by the SNHI directly to the facility responsible for providing services. It is anticipated that some degree of autonomy will be introduced at all levels of health care provision in order to allow flexibility of facilities in determining the best mix of resources to provide services and spending their own resources for health care quality improvement, especially in primary level facilities

Revenue and sources of funding:

The revenue to pay for the SNHI will come from multiple sources in both the public and private sector. These sources are expected to include the following:

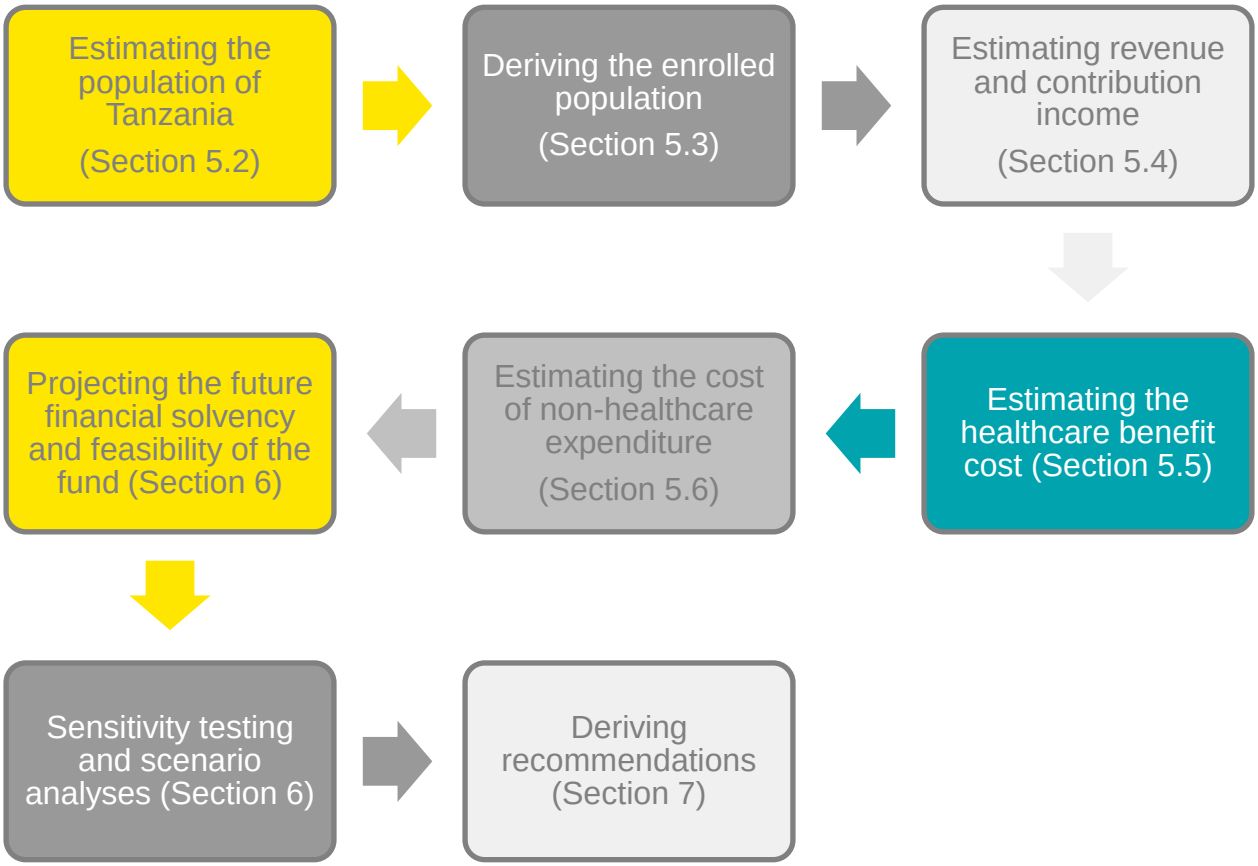
- Current general government spending on health will be rechanneled and, in all likelihood, increased.
- Local Government Authority (LGA) own-source revenues could also contribute.
- Government contributions and the matching civil servants' contributions to the National Social Security Fund – Social Health Insurance Benefit (NSSF-SHIB) will have to be rechanneled.
- Specific government levies might be earmarked for SNHI.
- The AIDS Trust Fund and other vertical programs' funding could be folded into the SNHI revenue pool.
- Private contributions by employers and employees to NHIF will be rechanneled.
- Private contributions to Tiba kwa Kadi (TIKA) and Community Health Fund (CHF) will be rechanneled.
- Some users of services covered by the SNHI will be asked to make small out-of-pocket payments.
- The investment earnings of NHIF could be contributed.
- External funds through the Health Basket Fund (HBF) could supplement the domestic resources that must make up the great bulk of the funding for the SNHI pool.

Other private sources of contributions might be sought.

5. Actuarial methodology:

5.1 Overview

The actuarial feasibility study entails modelling and estimation of separate variables and financial components that are relevant to assessing the SNHI feasibility. The modelling of these variables has been broken up into phases for the purposes of this report. These phases include the following:



The remaining subsections provide further details on the methodology in respect of each phase depicted above. We also discuss the various assumptions, the reasonability thereof as well as the limitations of each assumption derived pertaining to each phase.

5.2 Estimating the Tanzanian population

As per our understanding of the SNHI fund as detailed in Section 4 of this report, it is expected that the fund will be mandatory for all Tanzanian citizens. Therefore, we required an estimation of the Tanzanian population for 2017 including projections up until 2021.

The population estimates need to be segmented by age and gender as well as by employment category. The employment categories considered for the purposes of the modelling are as follows:

- Formally employed in the public sector
- Formally employed in the private sector
- Informally employed
- Unemployed population including the poor/near-poor population.

5.2.1 Data

A summary of the data sources used to estimate the Tanzanian population is detailed below:

- Tanzanian National Bureau of Statistics 2012 Census data
- Business Monitor International (BMI) for 2017 to 2021
- International Labor Force Survey 2014 (ILFS 2014)
- Formal Sector Employment and earnings Survey (EES), 2014
- Household Budget Survey (HBS) 2011/2012 report
- 2015/2016 data from the National Health Insurance Fund (NHIF)
- 2015-2016 data from the Improved Community Health Insurance Fund (iCHF)
- Tanzania Health Financing Strategy 2016-2026 (HFS).

The subsections that follows describes how each data set has been applied to estimate and categorize the Tanzanian population.

5.2.2 Methodology

Our population estimation methodology can be categorized into the following stages:

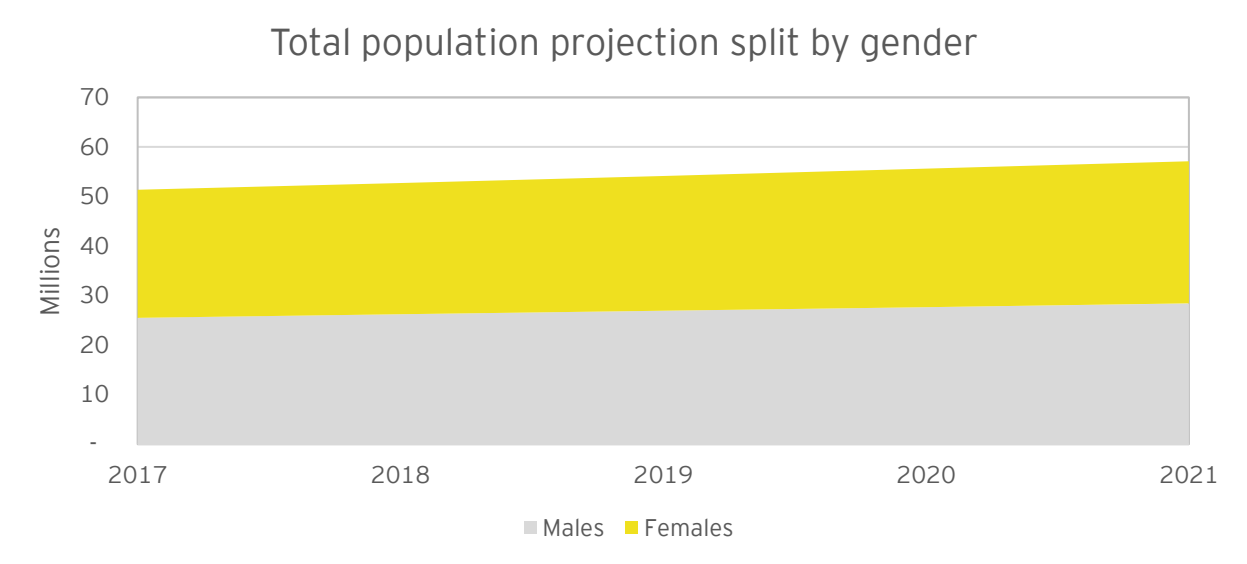
- Estimate the total Tanzanian population as at 2017 including projections to 2022.
- Derive the employed population by the following broad categories of employment:
  - Formally employed in the public sector
  - Formally employed in the private sector
  - Informally employed
- Derive the dependent population in respect of each of the broad employment categories above.
- Estimate the unemployed population based on the outputs of the above.

5.2.2.1 Total Tanzanian Population Projection

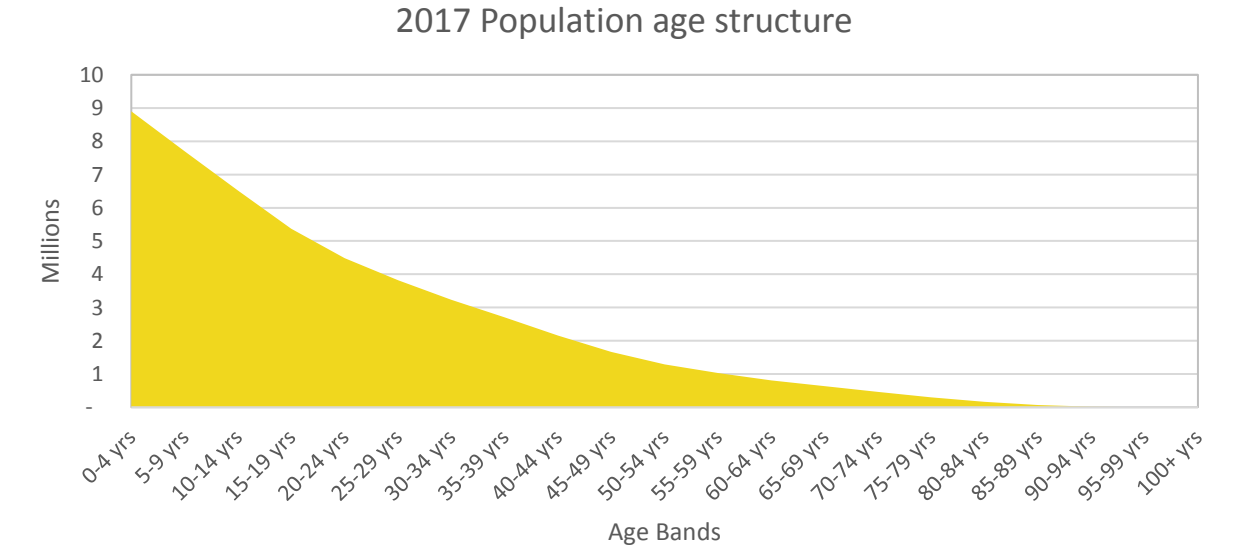
The Tanzanian National Bureau of Statistics 2012 Census data indicated that the 2012 Tanzanian population was 44,928,923. The same report indicated that the Average Annual Intercensal Growth Rate, for Tanzania between 2002 and 2012 was 2.7% per annum. Applying this growth rate to the 2012 data, we estimated the Tanzanian population as 51,330,823 in 2017. The results can be seen in the table below:

	2017	2018	2019	2020	2021
Total Tanzanian population	51 330 823	52 716 755	54 140 107	55 601 890	57 103 141

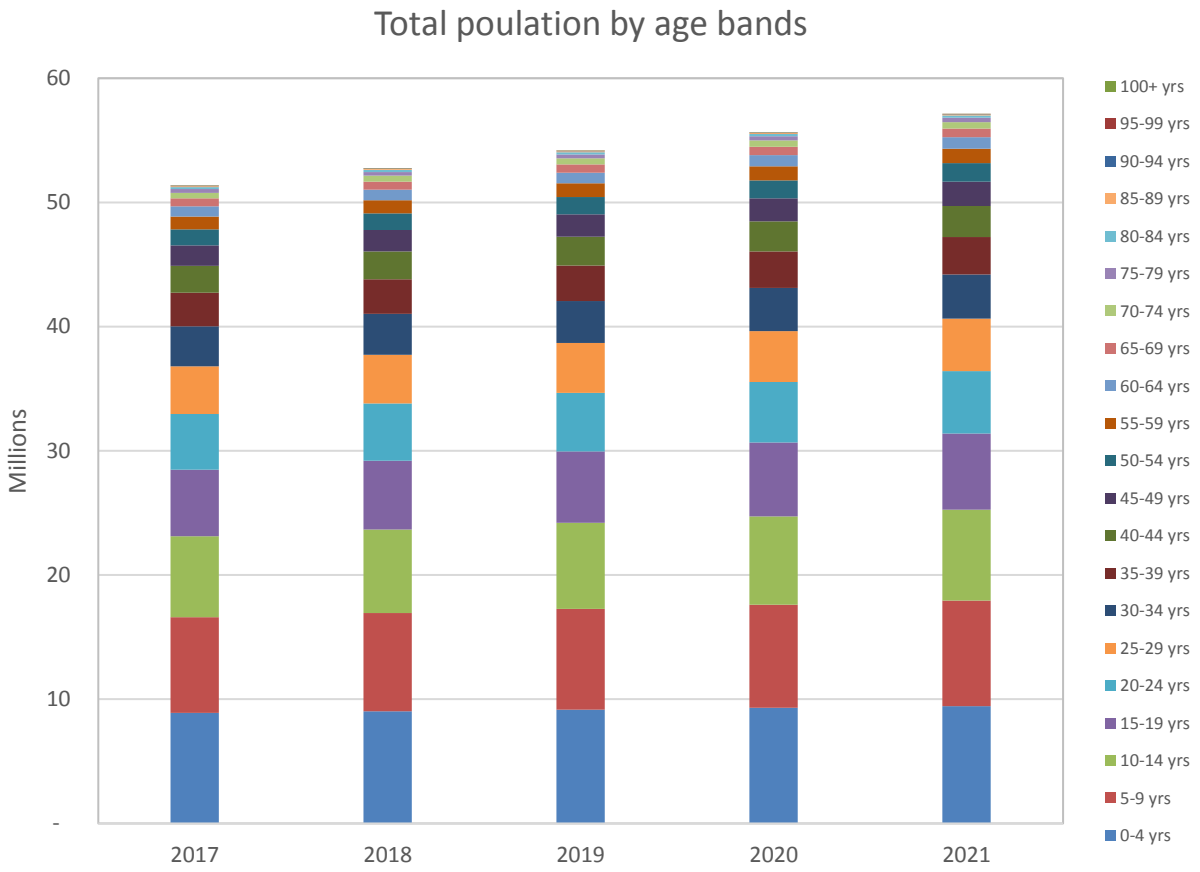
Further to the above, in order to categorize the populations by age and gender, we relied on the gender and age distributions of the Tanzanian population produced by Business Monitor International (Ltd) ("BMI" or "BMI Research") for each respective year. A graphical representation of the results can be seen below:



The population age structure remains broadly consistent over time. Displayed below is the age structure for 2017:



The projected distribution of the population across age bands from 2017 till 2021 is reflected below.



5.2.2.2 Employed Population Composition

In order to estimate the total and segmented employed population, we have applied the following data found in the 2014 Analytical Report of the Integrated Labor Force Survey (ILFS):

1. **Number of working age population by gender, age group and area**. This was used to estimate the age and gender distributions of the labor force.

2. **Employment to population ratio by gender and age group.** This was applied to the estimated labor force in order to determine the total employed population by age and gender.

3. **Number of employed persons by sector and gender.** This was used to segment the total employed population by broad sector. The sector categories are based on the definitions in the ILFS Analytical Report. These categories are as follows:

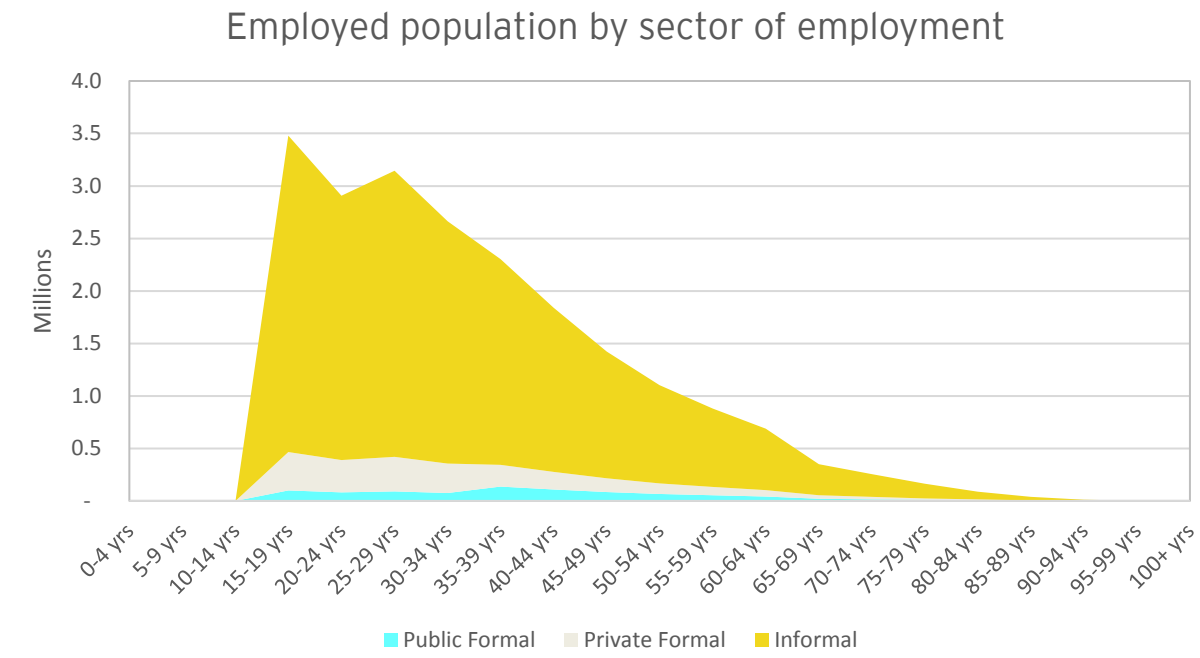
Category	Employment sectors included in category
Formally employed in the public sector	▸ Central Government ▸ Local Government ▸ Parastatals
Formally employed in the private sector	▸ Private non-agricultural employment
Informally employed	▸ Agricultural sector

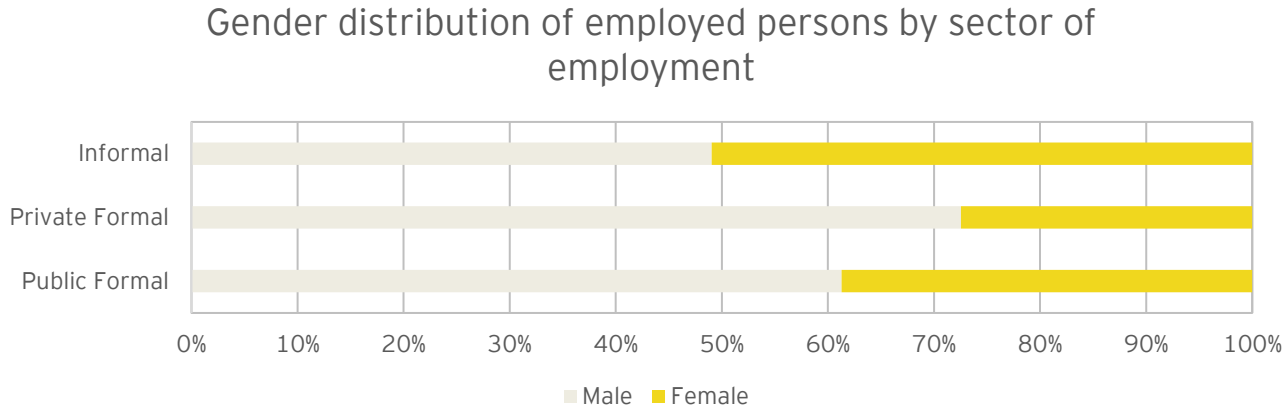
	▸ Informal enterprises ▸ Household duties
Unemployed	▸ Balancing item (reasonability checks will be performed in this regard)

4. **Employed youths by sector and gender.** The estimations in point 3 above were not available by age and gender. The employed youth by sector and gender provided gender and sector estimations for employed persons between the ages of 15 and 35. We combined this information with the total estimates derived in point 3 to estimate the distribution of total employed population by age, gender and sector.

5. **Number of unemployed working age persons by area, gender and age group**. The unemployed labor force is merely a balancing item between the total employed population and the total labor force. The unemployment information in the ILFS survey was only used to assess the reasonability of the distribution of the modelled unemployed population.

It is important to note that the ILFS distributions were not adjusted/amended to reflect changes from the time the ILFS survey was published to the current date. In addition no adjustments were made to the various distributions for subsequent years. The distributions derived from the ILFS report were applied directly to estimate the employed and unemployed population segments for 2017. The resulting 2017 employed population segments are detailed below.





5.2.2.3 Extending the Projection from labor force to total population

The extension of the categorization from the labor force to the total population relies on an assumption of family sizes. However, the labor force cannot simply be multiplied by a family size figure, as various complications invalidate the result. For instance, an entire family may be employed; multiplying each family member by the corresponding family size would result in a number that is too large (by a multiple of the family size). Due to the myriad of interactions and complications that arise, family sizes were incorporated into a calculation that results in a proxy family size multiplier. The proxy family size multipliers ensure that, when all categories within the labor force are multiplied by their appropriate multiplier, the total population equals the population as per above projections. At the same time, the relative family sizes for each category of the labor force are kept consistent with empirical evidence.

To estimate the sizes of employed individuals' families, we used information from:

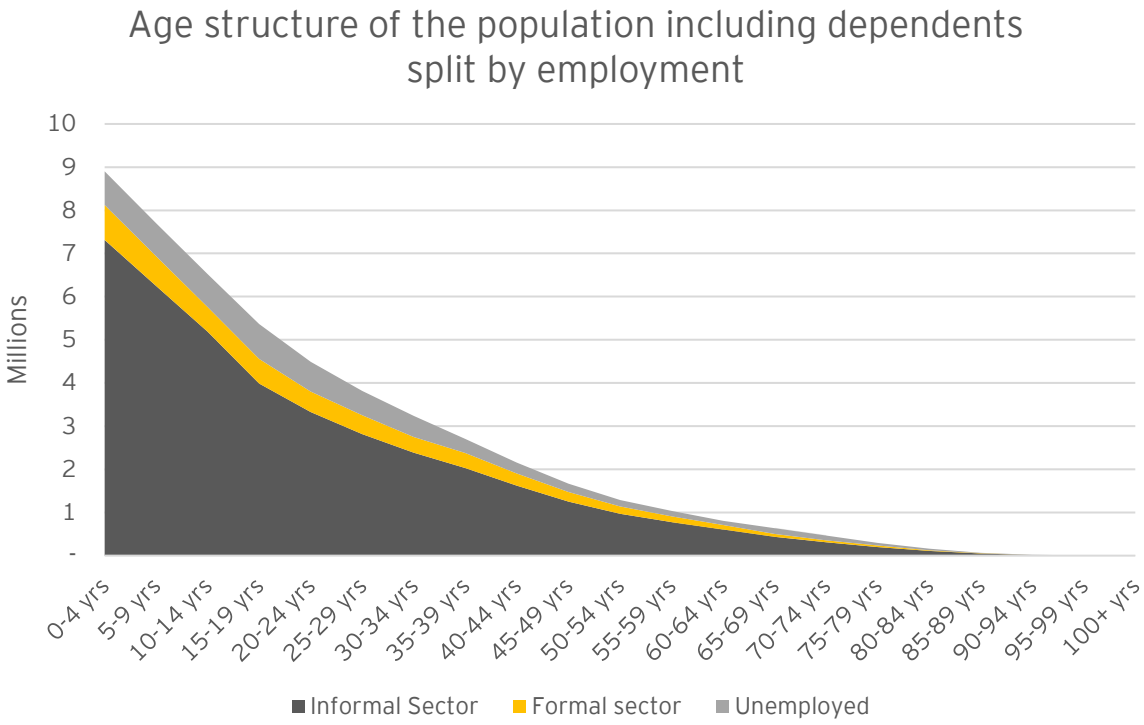
- Family sizes from ILFS.
- Improved Community Health Fund (iCHF) data to estimate the family sizes of the informally employed population.
- NHIF data to estimate the family size of the formally employed.

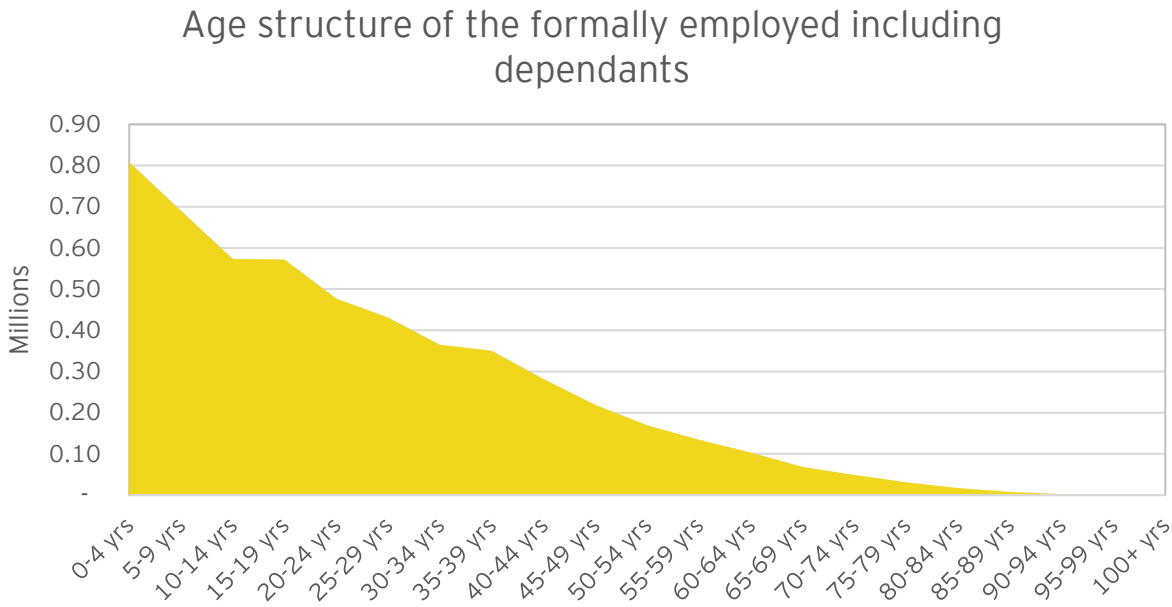
A summary of the family sizes that were used to calculate the proxy multipliers were as follows:

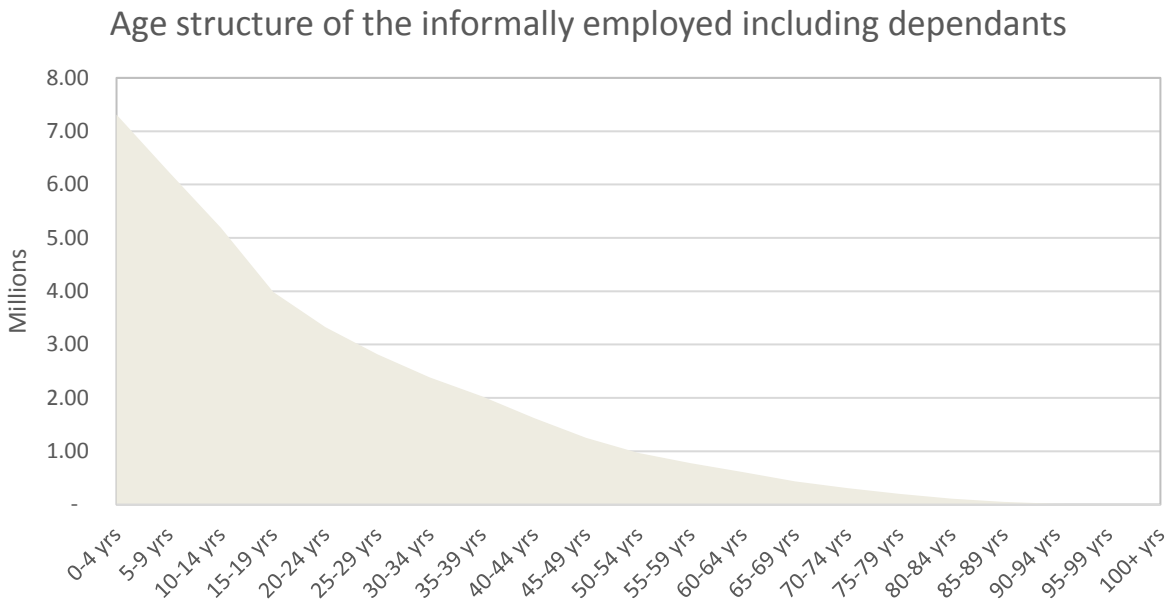
Source	Average Family Size
ICHF	4.375
NHIF	3.70

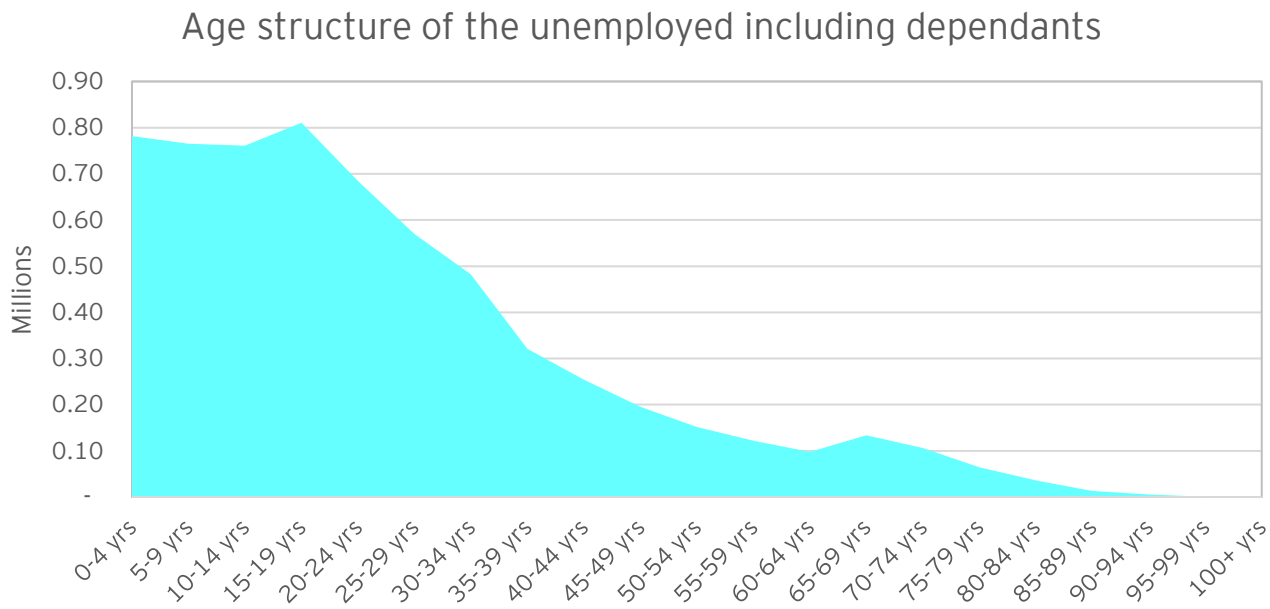
For 2017, the unemployed population is estimated as the balancing item between the total population, formal and informal populations estimated in Section 5.2.2.1. The results of these estimations for 2017 are provided below:

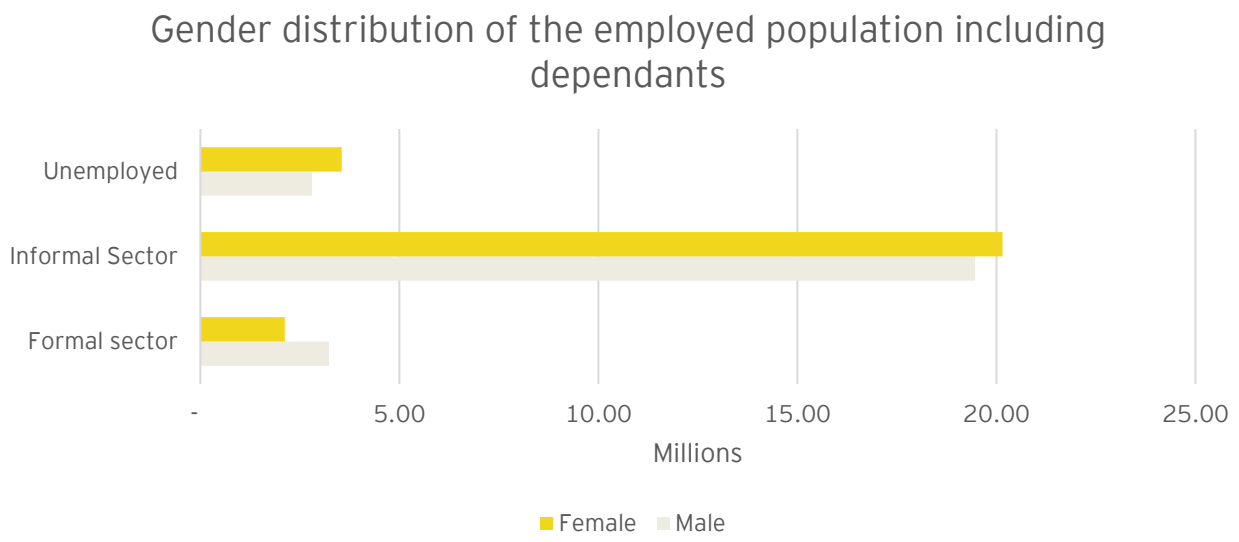
Total population	51 330 823
Employed population	21 333 800
% employment	42%
% unemployed incl. dependants of those employed	58%
% employed in formal sector	5.8%
% employed in informal sector	35.7%
% employed in formal sector incl. dependants	10.4%
% employed in informal sector incl. dependants	77.2%
% unemployed incl. dependants	12.4%
% of total population that are food poor/near-poor	7.7%
% of the unemployed population that are poor/near-poor	76.4%
% urban based on BMI/World Bank data	33.0%
% rural based on BMI/World Bank data	67.0%


Age structure of the population including dependents split by employment
Millions
10
9
8
7
6
5
4
3
2
1
-
0-4 yrs
5-9 yrs
10-14 yrs
15-19 yrs
20-24 yrs
25-29 yrs
30-34 yrs
35-39 yrs
40-44 yrs
45-49 yrs
50-54 yrs
55-59 yrs
60-64 yrs
65-69 yrs
70-74 yrs
75-79 yrs
80-84 yrs
85-89 yrs
90-94 yrs
95-99 yrs
100+ yrs
Informal Sector
Formal sector
Unemployed


Age structure of the formally employed including dependants
Millions
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
-
0-4 yrs
5-9 yrs
10-14 yrs
15-19 yrs
20-24 yrs
25-29 yrs
30-34 yrs
35-39 yrs
40-44 yrs
45-49 yrs
50-54 yrs
55-59 yrs
60-64 yrs
65-69 yrs
70-74 yrs
75-79 yrs
80-84 yrs
85-89 yrs
90-94 yrs
95-99 yrs
100+ yrs


Age structure of the informally employed including dependants
Millions
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
-
0-4 yrs
5-9 yrs
10-14 yrs
15-19 yrs
20-24 yrs
25-29 yrs
30-34 yrs
35-39 yrs
40-44 yrs
45-49 yrs
50-54 yrs
55-59 yrs
60-64 yrs
65-69 yrs
70-74 yrs
75-79 yrs
80-84 yrs
85-89 yrs
90-94 yrs
95-99 yrs
100+ yrs


Age structure of the unemployed including dependants
Millions
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
-
0-4 yrs
5-9 yrs
10-14 yrs
15-19 yrs
20-24 yrs
25-29 yrs
30-34 yrs
35-39 yrs
40-44 yrs
45-49 yrs
50-54 yrs
55-59 yrs
60-64 yrs
65-69 yrs
70-74 yrs
75-79 yrs
80-84 yrs
85-89 yrs
90-94 yrs
95-99 yrs
100+ yrs



5.2.3 Estimating Population Projections by Sectors of Employment

In order to project the various employed population segments up until 2021 the following assumptions were made:

- The total population will grow by 2.7% p.a.
- The formal sector will grow at 10% p.a.
- Constant unemployment rates over time.

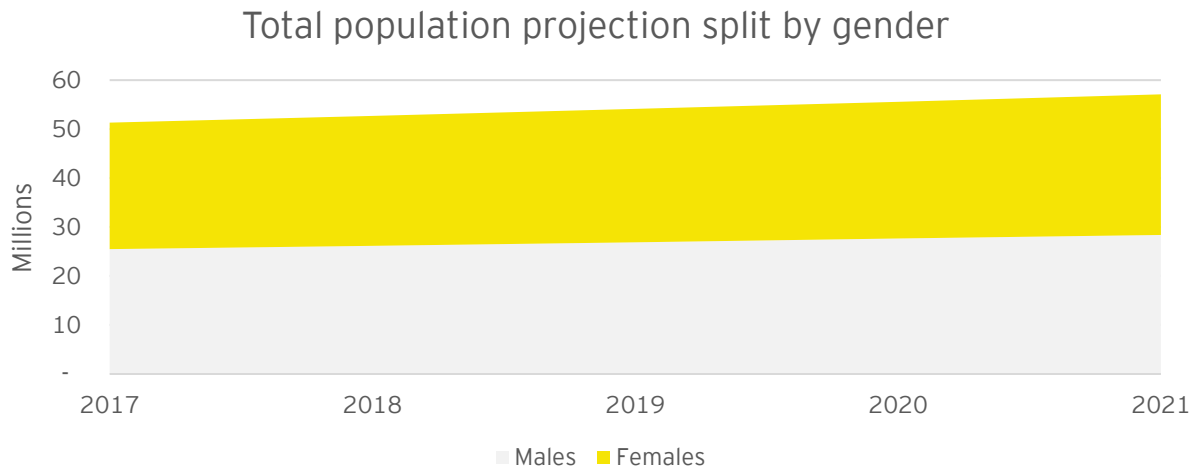
The above assumptions are derived from the information and reported past growth rates in the Tanzanian National Bureau of Statistics 2012 Census report, the Formal Sector Employment and Earnings Survey 2014, and the International Labor Force Survey (ILFS).

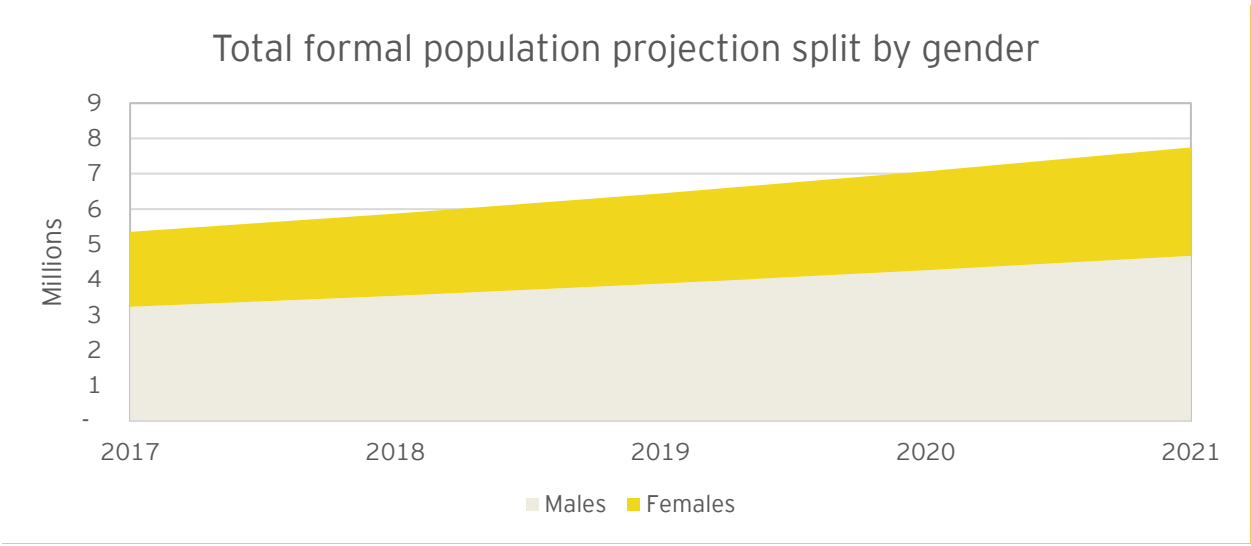
Given the assumption of constant unemployment rates over time, this means that the informally employed population reduces over time. This ultimately implies that formal sector growth implies a transition of persons informally employed to formal employment instead of an increase in total employment.

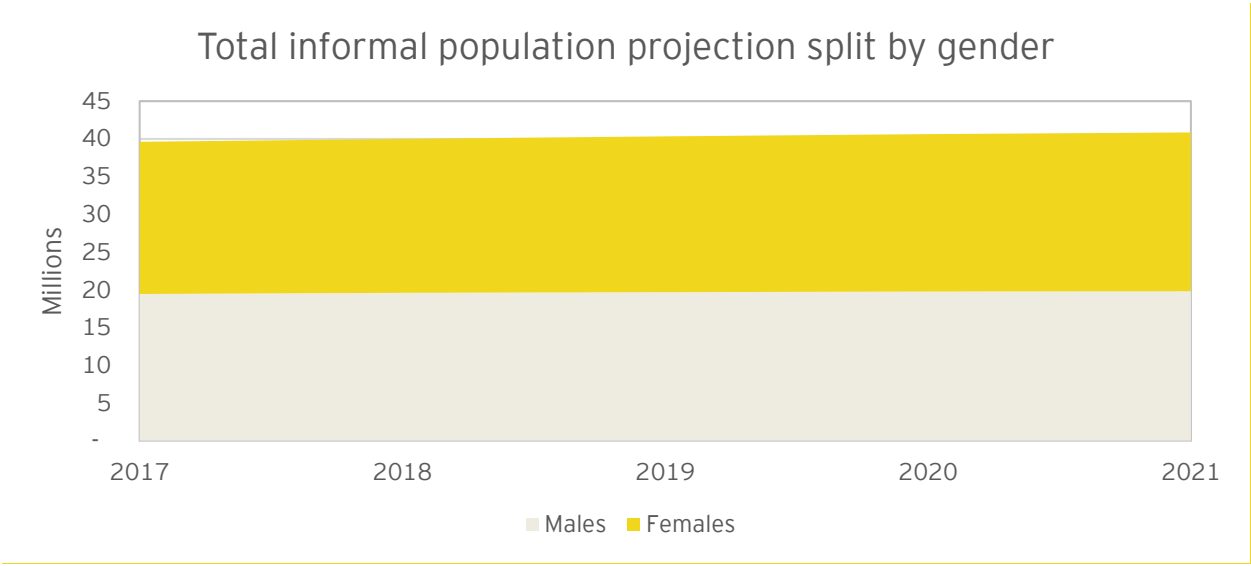
When projecting the dependants of the formally and informally employed persons up until 2021, it is assumed that the same family sizes as discussed in Section 5.2.2 i.e. family sizes and consequent dependency ratios remain consistent over time. Therefore our methodology does not allow for any increases to family sizes for formally employed persons over time. Since the informally employed are assumed to have a higher family size, a transition from informal employment to formal employment results in a "lost" number of dependants. The model formula automatically allocates these "lost" dependants to the unemployed population, creating an automatic increase in total unemployment in future years. This is the main limitation of the model and methodology. To correct this over time is extremely time-consuming and mathematically complicated. Given the small change in unemployment over time we deem the results reasonable.

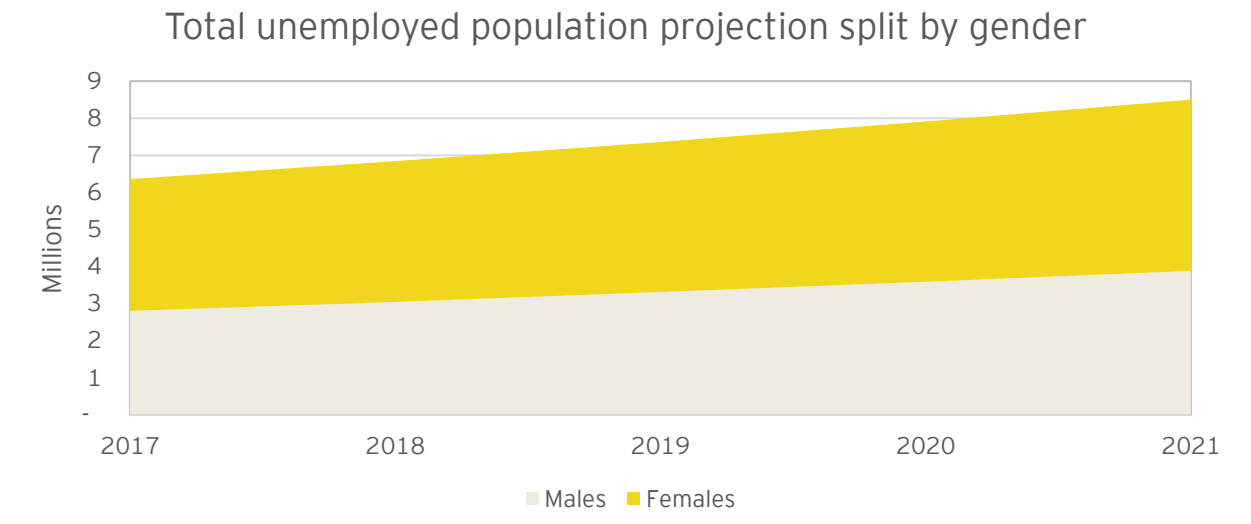
The results of the projected populations by segment are provided below:

	2017	2018	2019	2020	2021
Total population (millions)	51.3	52.7	54.1	55.6	57.1
Employed population (millions)	21.3	21.8	22.3	22.8	23.3
% employment	42%	41%	41%	41%	41%
% unemployed incl. dependants of those employed	58%	59%	59%	59%	59%
% employed in formal sector	5.8%	6.2%	6.7%	7.1%	7.6%
% employed in informal sector	35.7%	35.1%	34.5%	33.8%	33.2%
% employed in formal sector incl. dependants	10.4%	11.1%	11.9%	12.7%	13.6%
% employed in informal sector incl. dependants	77.2%	75.9%	74.5%	73.1%	71.5%
% unemployed incl. dependants	12.4%	13.0%	13.6%	14.2%	14.9%
% of total population that are food poor/near-poor	7.7%	7.3%	7.0%	6.6%	6.3%
% of the unemployed population that are poor/near-poor	76.4%	68.4%	61.9%	56.3%	51.2%
% urban based on BMI/World Bank data	33.0%	33.7%	34.4%	35.1%	35.8%
% rural based on BMI/World Bank data	67.0%	66.3%	65.6%	64.9%	64.2%




Total formal population projection split by gender
Millions
9
8
7
6
5
4
3
2
1
-
2017
2018
2019
2020
2021
Males
Females


Total informal population projection split by gender
Millions
45
40
35
30
25
20
15
10
5
-
2017
2018
2019
2020
2021
Males
Females


Total unemployed population projection split by gender
Millions
9
8
7
6
5
4
3
2
1
-
2017
2018
2019
2020
2021
Males
Females

5.2.4 Estimating the Poor/Near-Poor Population

It is our understanding that only the population deemed as poor/near-poor will be entitled to government subsidies in respect of their membership contribution to the SNHI fund. The entire population will be required to belong to the SNHI, however, the remaining population (not deemed as poor/near-poor) will be required to make a contribution to the SNHI fund, irrespective of whether these populations are employed or not.

In estimating the poor/near-poor populations the following assumptions were set in consultation with HP+:

- The poor/near-poor population is estimated to equal to the estimations of food poor population as indicated in the Household Budget Survey (HBS) 2011/2012 report, which was reported as 9.7% of the total population. This same survey indicated that in 2007 the similar statistic was 11.8%. Applying this rate of decline, we approximated the food-poor populations for 2017-2021. We have assumed that the poor/near-poor population is reflective of this estimated food-poor population with no adjustments. We refer to this population as the poor/near-poor population in the remainder of this document.
- The poor/near-poor population is assumed to be a proportion of the unemployed population derived above. Therefore, we assume no overlaps of poor/near-poor population families between the formal and informal populations. The main limitation with this assumption is that the model assumes that those who are not poor/near-poor are merely unemployed.

The results of the projected poor/near-poor populations are provided below:

	2017	2018	2019	2020	2021
% of total population that are poor/near-poor	7.7%	7.3%	7.0%	6.6%	6.3%
% of the unemployed population that are poor/near-poor	76.4%	68.4%	61.9%	56.3%	51.2%

In the Appendix, a sensitivity is provided whereby an expanded definition of poor/near-poor population is considered. In this sensitivity we demonstrate the feasibility impact should the entire unemployed population and a proportion of the informal sector enrolled require subsidies.

5.2.5 Reasonability Checks on Estimated Population Results

In this section, we compare our results with the results in the various data sources.

Proportion of employed population	Males	Females
ILFS (2014)	49%	51%
EY (2015)	50%	50%
EY (2017)	50%	50%

Employed population (in millions)	Employed population	Employed as % of population
ILFS 2014	20	44%
EY 2015	20	42%
EY 2017	21	42%
EY 2021	23	41%

Proportion of employed population by sector of employment	Formal - Public	Formal -Private	Informal
ILFS (2014)	3.50%	7.90%	88.60%
EY (2015)	3.62%	8.59%	87.79%
EY (2017)	4.17%	9.88%	85.95%
EY (2021)	5.55%	13.09%	81.36%

Based on the information showed in the table above the projections are reasonably in line and consistent with available data sources. The results above are consistent and as expected; the ILFS distributions were used to inform EY's projections.

Family sizes (including the main member)	
Unemployed sector average family size (EY)	4.900
Informal sector average family size (EY)	4.375
Formal sector average family size (EY)	3.700
NHIF data	3.700
iCHF data	4.375
Average Household Size, 2012 Census Data	4.800
Average Household Size, ILFS (2014)	4.400

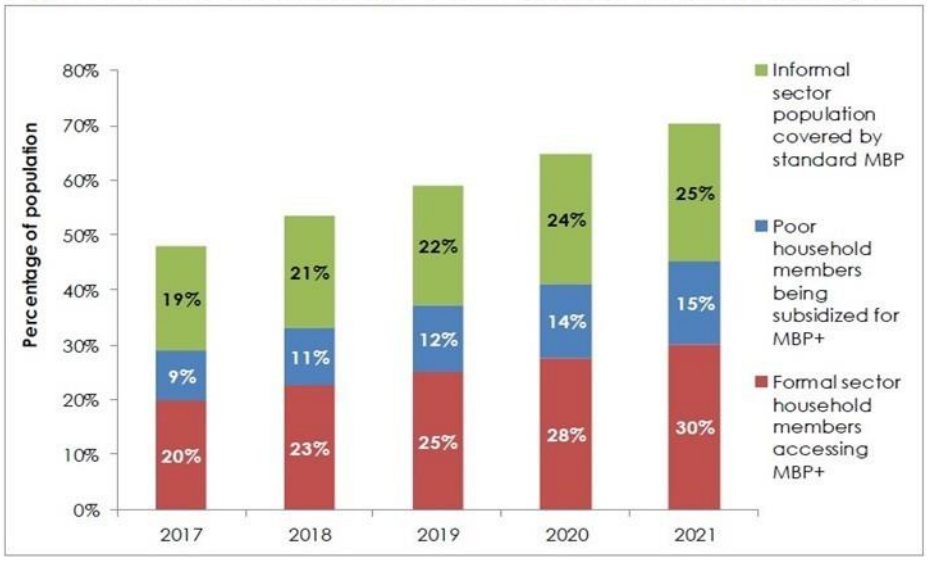
The NHIF and iCHF family sizes were used to inform EY's projections. In addition, the family sizes do not differ significantly from the ILFS average.

5.3 Deriving the Enrolled Population

In order to assess the feasibility of the SNHI fund, it is important to understand the proportions of population segments that will be enrolled over time. This is because each population segment has varying risk characteristics that have an impact on the overall feasibility. It is also important to ensure that feasibility is assessed in light of policy priorities and objectives.

The HFS indicates the following enrolment targets:

Figure 7.1 SNHI rollout as per HFS implementation plan by fiscal year



In the table below, we compare the enrolled estimations from the HFS with the enrolled estimates produced in the previous section.

		2017	2018	2019	2020	2021
Total population		51.3	52.7	54.1	55.6	57.1
Formal population	% employed (EY)	10.4%	11.1%	11.9%	12.7%	13.6%
	% enrolled (HFS draft)	20%	23%	25%	28%	30%
Informal population	% employed (EY)	77.2%	75.9%	74.5%	73.1%	71.5%
	% enrolled (HFS draft)	19%	21%	22%	24%	25%
Poor/Near-poor population	% unemployed (EY)	12.4%	13.0%	13.6%	14.2%	14.9%
	% poor/near-poor (EY)	7.7%	7.3%	7.0%	6.6%	6.3%
	% enrolled (HFS draft)	9%	11%	12%	14%	15%

From the above it can be seen that in all cases the enrolled percentage that a segment makes up of the population is higher than the actual percentage that the population segment constitutes of the total population. These discrepancies were discussed with HP+ and it was identified that the methodology for estimating the underlying formal sector population in the HFS is the factor underlying these differences.

The HFS methodology to estimate the formally employed population is shown below:

(A)	2014 ILFS formally employed labour force	2 271 946
(B)	ILFS 2014 average family size	4.0
(C)	Formal sector employed labour force growth rate	10% p.a.
(D)	Total population in 2015/2016	47 213 875
(E) = (A)*(B)*(1+C)^2	Total estimated employed population in 2015/2016	11 036 241
(E) / (D)	Total formally employed population incl. dependants as a % of total population in 2015/2016	23%

Extending the above methodology until 2021, the HFS underlying formal sector population is estimated as follows:

	2017	2018	2019	2020	2021
HFS estimated total formally employed population incl. dependants as a % of total population	25%	27%	29%	31%	33%

We were not provided with information regarding how the informal or poor/near-poor populations underlying the HFS were calculated. Therefore, to assess the reasonability of the methodology applied we extended the methodology consistently to estimate the informal population. The following results were produced:

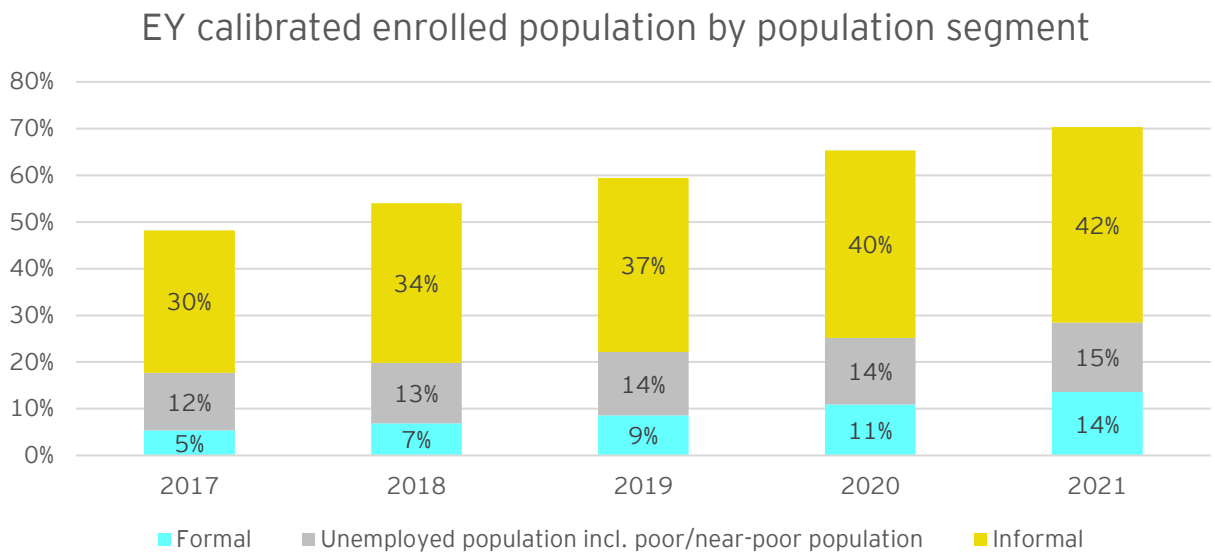
(A)	2014 ILFS informally employed labour force	17 629 724
(B)	ILFS 2014 rural family size	4.5
(C)	Informal sector employed labour force growth rate	Assuming no growth
(D)	Total population in 2015/2016	47 213 875
(E) = (A)*(B)*(1+C)^2	Total estimated employed population in 2015/2016	79 333 758
(E) / (D)	Total informally employed population incl. dependants as a % of total population in 2015/2016	168%

From the above it is clear that the methodology applied to produce the HFS results overestimates the population segments. Therefore the enrolled population is based on a population that far exceeds the true population of Tanzania. Upon discussion with HP+, the main reason for this overestimation, is due to the methodology limitation of assuming that there is only one working person per family in Tanzania. EY's methodology as detailed in the previous section does not make the same assumption, and rather estimates population segments based on assumed dependency ratios. The dependency ratios take into account that there could be multiple employed members in one family. We therefore proceeded to apply the EY derived populations as we deem this to be a more accurate reflection of the population segments in Tanzania. However, the use of our estimations means that we will not reach the HFS enrolled population by segment. Therefore we have calibrated enrolment of the various population segments under SNHI such that the total population enrolled is equal to that stipulated in the HFS, but the enrolled segments vary considerably.

The following assumptions were applied to estimate the enrolled population segments:

- All formal sector employees employed in the public sector, including their dependants will be enrolled in 2017.
- The poor/near-poor population is defined by the population currently in receipt of Tanzania's Productive Social Safety Net (PSSN). The September 22, 2016 version of the PSSN "Findings from the Impact Evaluation Baseline Survey" report states that in August 2015, a coverage of 1,113,137 households was achieved. This calibrates back to an 11% of total population, when dividing by the relevant poor population family size of 4.9 in 2015. This exceeds the poor/near population of 9.7%, however can be seen as a subset of those deemed as basic needs poor (28.2% of the total population). In addition, the unemployed population including dependants equals 12% of our total population calibrated in 2017. We therefore assume that the poor/near-poor population will be fully enrolled in 2017, including the remaining unemployed population not deemed as poor/near-poor. The implication of this assumption is that the unemployed population that is not in receipt of subsidies will also be fully enrolled in 2017, and in subsequent years. This assumption was set in consultation with HP+.
- The enrolment of the remaining formal and informal population was calibrated such that a reasonable progression over time consistent with the HFS strategy was achieved.

The results of the EY calibrated enrolled population by population segment can be seen below:



From the above the following results can be seen:

- The formal employment population is fully enrolled by 2021.
- The unemployed population including the poor/near-poor population in receipt of subsidies is fully enrolled by 2017. This is consistently achieved until 2021.
- The enrolled informal population is significantly higher than that assumed in the HFS. This is due to the methodology variations iterated above. In order for the SNHI to achieve 48% coverage in 2017, it is necessary for the bulk of this coverage to be achieved through the informal sector.

5.4 Estimating Revenue

5.4.1 Estimating Contribution Income

5.4.1.1 Methodology

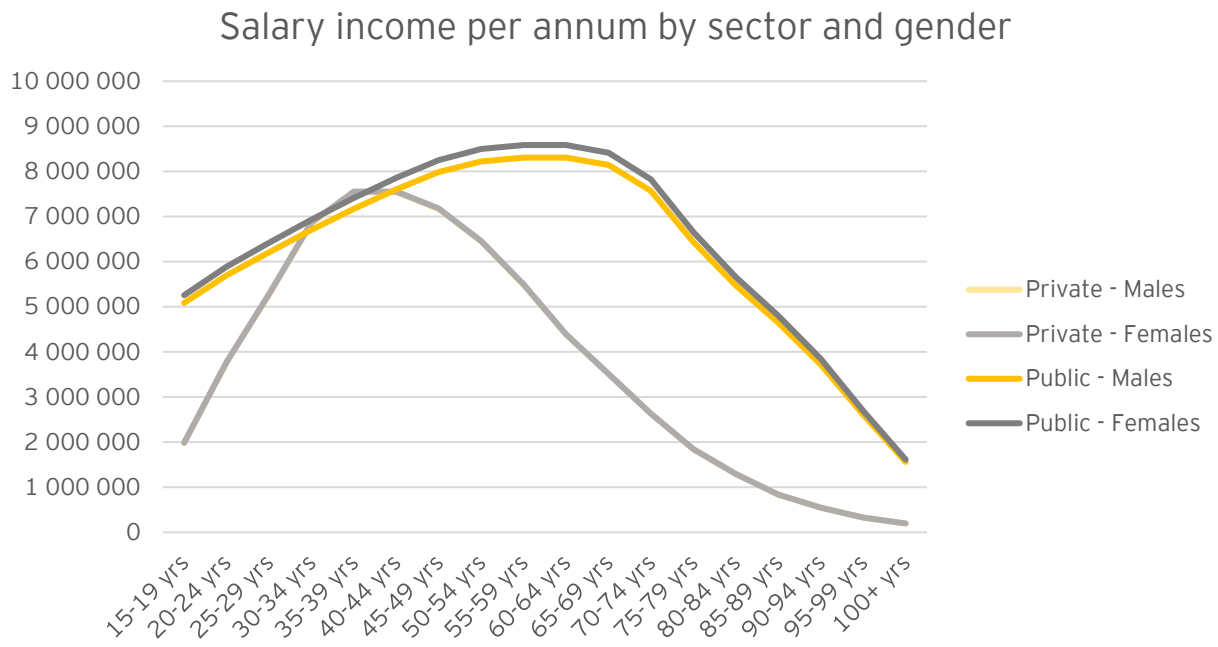
Contribution income is estimated separately for the various population groups. We discuss the methodology per population group separately in this section.

1) Formally employed contribution income:

Contributions are based on a percentage of the members' annual salary. Information from NHIF beneficiary data, the Formal Sector Employment and Earnings Survey for 2014 as well as our own research into age structures of salaries were combined in order to create salary curves by age, gender and employment type (either public-formal or private-formal). The salaries estimated were as at 2014, and have been increased with salary inflation to be comparable to the current period. The assumed salary inflation from 2015-2021 has been assumed to be CPI+2% per annum for all future years. The International Monetary Fund Consumer Price Inflation (CPI) projections have been used as the base for the estimations. The results can be seen below:

	2015	2016	2017	2018	2019	2020	2021
CPI	6.8%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
Salary inflation	8.8%	7.0%	7.0%	7.0%	7.0%	7.0%	7.0%

The following graphs display the average gross annual salaries in TZ Shillings for publicly and privately formally employed individuals as at 2017 after allowing for salary inflation:



From the above it can be seen that salaries in the public sector are higher than those in the private sector. In addition, female salaries are marginally higher than male salaries across every age in the public sector. Furthermore, the male and female private sector salaries do not differ significantly and therefore the graph lines coincide.

We have assumed that contributions will be estimated as a total of 6% of gross annual salary per enrolled member. This includes a 3% employer and 3% employee contribution and is consistent with the contribution policy under NHIF. We also assume that every employed person contributes to the fund, irrespective if there are multiple formally employed members in one family. We also assume that contributions made by the formal sector will be a direct payroll deduction and thus 100% contribution compliance is assumed for the formal sector.

2) Informally employed contribution income:

For the informal sector, contributions are a fixed TZ shillings amount per annum per household. As mentioned above the total informal beneficiary population was divided by the iCHF family size, to arrive at the estimated number of families. We have assumed that the number of households is equivalent to the relevant population divided by the respective family size.

The rural and urban family contribution amounts have been based on the 2016 contribution amounts under iCHF. We have inflated the contribution amounts by CPI for each subsequent year. In addition we have assumed that the total number of families are segmented as rural and urban based on the BMI/World Bank projections of urbanization until 2021.

The various assumptions discussed above are displayed in the table below:

	2016	2017	2018	2019	2020	2021
Urban family contribution p.a.	180 000	189 000	198 450	208 373	218 791	229 731
Rural family contribution p.a.	60 000	61 200	62 424	63 672	64 946	66 245
Urban %		33%	34%	34%	35%	36%
Rural %		67%	66%	66%	65%	64%
Total number of estimated informal families enrolled in SNHI (millions)		3.58	4.11	4.61	5.11	5.46

The collection of these contributions is expected to be largely influenced by the effectiveness of enrolment agents. The impact of re-enrolment rates and impact of anti-selection will be largely impacted by the nature of the method for collecting contributions for informal sector employees combined with their ability to pay. We have not assumed any lapse and re-enrolment into SNHI. It is assumed that once a member is enrolled, they will remain enrolled for all future years projected. This assumption is required as the data provided did not include information relating to lapse rates.

3) Unemployed population contribution income:

Household contribution income from the poor/near poor population will be subsidized by the government. The subsidies have been calculated to be equal to the contribution payable by the informal sector households. The main difference is that a larger family size of 4.9 has been assumed to estimate the number of families. This is based on the PSSN reported family size of PSSN beneficiaries. Further it is assumed that all poor/near-poor populations are based in rural regions.

The remaining unemployed population (not deemed as poor/near-poor) are assumed to contribute to the fund. Their contributions are not expected to be subsidized. The same family size has been assumed as per the poor/near-poor population.

5.4.1.2 Results

The estimated contribution income following the methodology discussed above is detailed below:

	2017	2018	2019	2020	2021
Contribution Income (Billions)	**867**	**1 158**	**1 516**	**2 019**	**2 637**
Formal sector contributions - employees	328	451	606	832	1 117
Formal sector contributions - employers	328	451	606	832	1 117
Informal sector contributions - families	370	446	523	608	682
Unemployed self-paid contributions	51	66	83	103	125

Total contribution income increases over time as a result of the increase in the population and the effect of inflationary adjustments.

5.4.1.3 Reasonability checks

In this section, we compare our results with the information found in various data sources.

1) Formal sector salaries:

	Public		Private	
Per annum in TZ Shillings	**Male**	**Female**	**Male**	**Female**
Average youth salary (EES 2014)	4 877 302	4 853 109	2 405 695	2 372 768
Average adult salary (EES 2014)	6 871 176	7 035 930	5 808 828	5 838 641
Average salary (NHIF)	9 824 738	9 308 613	7 128 780	6 282 819

These are reasonably in line with the public and private sector salaries graphed above.

2) Contribution income:

In the table below we compare the average contribution per member as reported in NHIF 2014 AFS with the derived contribution as per the detailed methodology above.

Source	
Total contribution income received (NHIF AFS 2014)	245 176 068 000
Total number of members reported (NHIF AFS 2014)	602 955
Average contribution per member per annum (NHIF AFS 2014)	**406 624**
Average EY 2017 contribution per member	**431 289**

3) Populations living in rural and urban areas:

	% rural
HBS 2011/2012 report	71%
HBS 2007 report	75%
2002 Census report	77.8%
HBS technical report	72%
2016 BMI/World Bank data applied	68%

Based on the above, the BMI/World Bank rural and urban projections appear reasonable.

4) Salary inflation

The 2013 EES survey indicated that monthly average earnings by sector have increased considerably from 2012 to 2013. The increases range from 2% to as high as 21%. This can be seen below:

2013 EES survey (monthly average earnings by sector)	2012	2013	Growth
Public administration and defence; compulsory social security	659 388	724 280	10%
Education	508 450	556 881	10%
Human health and social work activities	452 366	462 593	2%
Professional, scientific and technical activities	739 469	892 772	21%

Furthermore, we analyzed additional data from Oxford Economics. This can be seen below:

Average household personal disposable income	2009	2010	2011	2012	2013	2014	2015
Thousands: Current prices	2 738	3 066	3 617	4 145	4 817	5 176	5 836
Thousands: Constant 2012 prices	3 771	3 919	4 139	4 145	4 362	4 416	4 683
Thousands: Current prices yearly growth	15.9%	12.0%	18.0%	14.6%	16.2%	7.5%	12.7%
Thousands: Constant 2012 prices yearly growth	2.6%	3.9%	5.6%	0.1%	5.2%	1.2%	6.0%

The above indicates that average household income has been increasing with no significant pattern emerging. This can be seen when comparing the yearly growth in nominal and in real terms.

Oxford Economics has produced future expectations of average household income. These have been provided below:

Average household personal disposable income	2016	2017	2018	2019	2020	2021
Thousands: Current prices	6 445	7 161	7 865	8 672	9 529	10 386
Thousands: Constant 2012 prices	4 827	4 987	5 158	5 360	5 583	5785
Thousands: Current prices yearly growth	10%	11%	10%	10%	10%	9%
Thousands: Constant 2012 prices yearly growth	3%	3%	3%	4%	4%	4%

From the above it can be seen that Oxford Economics estimates that average household disposable income will grow at 3-4% in real terms until 2021.

Based on the above, it is our view that salary inflation will grow at a similar rate to that derived by the Oxford Economics projections. However it is not expected that CPI +3% or CPI + 4% is sustainable in an emerging market in the current global economic environment.

5.4.2 Incorporating Additional Sources of Revenue

As per the HFS strategy, there is a potential of additional sources of revenue being pooled to fund the poor/near-poor contribution subsidies under SNHI. These additional revenues include the following:

- Government of Tanzania (GOT) domestic development budget
- LGA own sourced revenue
- External on-budget resources for health including the following:
  - Health basket fund
  - Non-basket on-budget external funding
- Innovative financing sources for health including the following:
  - Sin taxes.

HP+ provided projections for 2017 to 2021 of the additional sources of revenue under various scenarios. This data was not audited nor verified by EY. We have also not performed any checks on the appropriateness of the underlying projection methodology in respect of these revenue projections, nor have any reasonability assessments been performed. We have accepted the data projections and placed reliability in the accuracy thereof. These additional sources of revenue projections received based on various pooling options are provided below.

Each pooling option demonstrates the funding required to subsidize subsets of the enrolled population, given that the listed sources of revenue are allowed to be used for that subset of the population.

- Pooling option A assumes that subsidies are available for only the poor/near-poor population
- Pooling option B assumes that subsidies are available for the poor/near-poor and the informal population
- Pooling option C assumes that subsidies are available for the entire enrolled population.

At the time of the feasibility assessment, it had not yet been decided whether sin taxes would be available as a source of funding. The impacts of including sin taxes have thus been included in a separate results scenario.

1. Pooling option A: Additional revenue sources only available for pooling to subsidize the poor population

	2017	2018	2019	2020	2021
Additional sources of revenue pooled (Billions)	**49**	**69**	**95**	**127**	**170**
GOT domestic development budget	38	55	77	106	145
LGA own sourced revenue	1	2	4	5	8
External on-budget resources for health	**10**	**12**	**14**	**16**	**17**
Health basket fund	10	12	14	16	17

2. Pooling option B: Additional revenue sources available for pooling to subsidize the poor population and the informal sector

	2017	2018	2019	2020	2021
Additional sources of revenue pooled (Billions)	**128**	**178**	**246**	**336**	**454**
GOT domestic development budget	97	141	201	281	387
LGA own sourced revenue	4	6	9	14	21
External on-budget resources for health	**27**	**31**	**36**	**41**	**46**
Health basket fund	27	31	36	41	46

3. Pooling option C: Additional revenue sources are available for pooling to subsidize the entire SNHI enrolled population

	2017	2018	2019	2020	2021
Additional sources of revenue pooled (Billions)	**238**	**327**	**443**	**596**	**796**
GOT domestic development budget	181	258	361	498	679
LGA own sourced revenue	7	11	17	25	36
External on-budget resources for health	**50**	**58**	**65**	**73**	**81**
Health basket fund	50	58	65	73	81

We will allow for additional sources of revenue to be pooled for subsidizing the various populations in so far as it is required. The impacts of this can be seen in the final feasibility assessment detailed in Section 6.

5.4.3 Estimating Investment Income

5.4.3.1 Data

The asset portfolio for the NHIF was obtained from the Annual Financial Statements for years ending 30 June 2013 and 30 June 2014. The assets under the Fund will reflect the total assets under the consolidated SNHI. The portfolio estimated complies with the investment guidelines issued by the Bank of Tanzania (BOT) and the Social Security Regulatory Authority (SSRA), which sets limits on various permissible areas of investment for the Social Security Sector.

As a percentage of total assets, the permitted limits for a Social Security Schemes are as follows:

Assets	Limit
Government Securities (Bills and Bonds)	20-70%
Direct Loans to Government	10%
Commercial Paper and Corporate Bonds	20%
Real Estate	30%
Ordinary and Preference Shares	20%
Infrastructure	25%
Deposits with Banks and Financial Institutions	35%
Investments in Collective Investment Schemes	30%
Loans to Corporates	10%

The table below reflects the asset composition of the NHIF as at 30 June 2016. The percentage that each asset class comprises of has also been shown.

Asset	Amount of assets (TZS'000)	Percentage of total assets
Cash	77 116 818	10%
Fixed Deposits	262 505 689	32%
Government Bonds	172 762 742	21%
Government Bills	105 186 806	13%
Loans to Government Institutions	114 391 771	14%
Equities	64 609 333	8%
Other Loans Receivable	11 302 732	1%
Trade and Other Receivables	9 486 172	1%
Total	**817 362 063**	**100%**

It must however be noted that the funds attributable to members as at 30 June 2014 was TZS 774 trillion and although the asset composition of these funds was not available, these are assumed to form part of the asset portfolio of the SNHI. Furthermore, under the SSRA regulatory limitations, loans to government institutions may not exceed 10% of the total invested assets. From the above, this asset class represents 14% of the total asset portfolio which is in excess of this limit.

5.4.3.2 Methodology

In order to obtain the amount of the asset portfolio of the NHIF as at 30 June 2016, the assets were projected from the Annual Financial Statements (AFS) as at 30 June 2014 to 30 June 2016. From past experience of the NHIF, the assets have grown by 24.3% and 24.6% for the years of 2013 and 2014 respectively. It was assumed that assets would continue to grow at 24.6% to an amount of TZS 1 200 trillion as at 30 June 2016. The table below shows the forecasted assets.

Year	Amount of assets (TZS'000)	Increase
2012	499 624 031	
2013	621 029 462	24.3%
2014	773 580 753	24.6%
2015	963 605 140	24.6%
2016	1 200 307 610	24.6%

Investment returns are assumed to be 9.8% based on the current asset portfolio. This is consistent with the investment returns stated in the NHIF AFS for 2013 and 2014 of 9.3% and 9.8% respectively.

5.5 Estimating Healthcare Expenditure

It has been proposed that SNHI offer two benefit packages namely, MBP and MBP+. It is our understanding that MBP will be based on the current design of the Improved Community Health Insurance Fund (iCHF) extending to include certain in-hospital costs and MBP+ will be based on design of the National Health Insurance Fund (NHIF). The desired outcome is that these packages will be consolidated into a single offering in the future but for the time being, it is important to understand the claiming behavior of existing beneficiaries and the anticipated behavior of introducing previously uncovered populations to these benefits.

The approach taken in estimating healthcare expenditure for both funds followed a similar methodology. In summary, the below steps were performed:

- Analyzing data received, identifying data limitations including consultation with stakeholders on the understanding of data collected.
- Perform data cleaning, mapping and grouping of benefit categories and service provider facilities. This will also include manipulation of the data into a working format through data processing software. Data was then grouped into homogenous groups which could be identified by age bands and gender but also benefit category and facility servicing the claim.
- Project ultimate claims estimates for the most recent year of data received through actuarial claims estimation techniques.
- Determine the average number of beneficiaries by homogenous groupings or alternatively the number of beneficiaries active for each month in the analysis.
- Calculation of average claims, utilization and various other metrics underlying the claiming behavior of beneficiaries. These will often be represented as curves by age band and gender of beneficiary claiming. Adjustments to the claims curves were also made to allow for limitations in data.
- Claims and utilization curves were smoothed before being applied to the various populations.
- Adjusting curves to allow for changes in claiming behavior of beneficiaries in different population groups.
- Assessment of current and potential capitation agreements.
- Project the expected healthcare claim costs allowing for future demographic and economic assumptions.

At all stages of the methodology, reasonability checks were performed. These reasonability checks are described in more detail throughout this document. Results and findings of the work performed have been included in the relevant sections. The sections below outline the methodology used to estimate the healthcare expenditure for both the MBP+ and the MBP in greater detail.

5.5.1 Estimating Healthcare Expenditure for MBP+

5.5.1.1 Methodology

A similar methodology to that described in the section above was applied in the calculation of healthcare expenditure for both funds. It is envisaged that the MBP+ benefit package will mirror the NHIF benefit package. Therefore, the utilization and cost curves were derived from NHIF data.

5.5.1.1.1 Data Analysis

The NHIF is a long established fund and has grown in membership over the years. For this reason, the databases have also grown in size and the data extraction process can be a time consuming exercise. A data specification document was provided to the NHIF showing what data was required in order to undertake the feasibility study. A meeting was held with the team to discuss the data specification to ensure that there were no misunderstanding or ambiguity. At the meeting further additional fields that were required were identified and added to the data specification. The NHIF assisted by extracting claims information, beneficiary details and contribution collections for the purpose of calculating healthcare expenditure. The data extract covered claims incurred between 1 July 2015 and 30 June 2016 that were paid until 30 June 2016. The remainder of this section details the methodology applied in analyzing the data as well as indicating various data challenges and limitations of the data.

i) **Contribution Collections and Beneficiary Information**

Contribution and beneficiary data was collected in order to calculate exposures of beneficiaries in certain months by age and gender. Exposure is the number of active beneficiaries at a point in time that belong to the fund. The exposure is used to determine the claims utilization. The beneficiary information was received as a consolidated list of all beneficiaries on the fund up until June 2016 and alone did not show the period over which a beneficiary was active and able to claim from the Fund. For instance, the beneficiary information did not include a date of registration or date of leaving the Fund, although this information was available for members. For this reason it was not possible to determine when a beneficiary joined, left the Fund or if they were even alive or passed away during the year.

As NHIF contributions are deducted from payroll, the contribution data was used to show when principal members were active on the Fund but the data excluded dependants.

The contribution data included the following information:

- Membership Number
- Registration Date (member only)
- Date of Birth
- Gender
- Marital Status
- Basic Salary
- Contribution Amount
- Component Type (Employee or Employer)
- Member Category
- Sector
- Contribution Year
- Contribution Month

It must be noted that there were omissions in the data whereby certain members' date of birth were not included and membership numbers of beneficiaries were excluded. These omissions were excluded in the resulting averages and counts. The total contribution income by month was not consistent and contributions were not available for the months of July 2016 and September 2016. Furthermore, there were some principal members who paid contributions in the contribution data but could not be identified in the consolidated beneficiary list.

ii) Claims Information

Due to inconsistencies in the data received the eventual information used from the claims data provided included the following:

- Processed Date
- Attendance Date
- Date of Birth
- Gender
- Ownership of facility
- Item type name
- Amount Claimed
- Amount Paid
- Inpatient indicator

The type of facility that a beneficiary could attend included faith-based ownership, public, non-government and private ownership. The possible benefit categories are listed below:

- Diagnostic Examinations
- Inpatient Charges
- Registration and Consultation Charges
- Medicine and Consumables
- Procedural Charges
- Surgical Charges
- Other Charges

Claims information was only available for the most recent financial year and no historical data was available for claims in previous years. We assume that future claims will continue in line with the most recent financial period.

5.5.1.1.2 Data Cleaning and Homogenous Groupings

Due to the size and history of the NHIF as mentioned previously, data processing software was used to manipulate the data into a workable format in Microsoft Excel. This included assigning age bands and additional columns to the data as well as removing columns that were not found to add sufficient credibility to the analyses. Examples of columns excluded were beneficiary specific details such as membership numbers and geographical location, which were not used in creation of homogenous groupings. More detailed information on the facility type such as facility name and subgroups of claims information were also excluded as this level of granularity was not included in the analysis. Claim totals and claim counts were then used to aggregate multiple lines of information. This reduced the number of lines in the data to be analyzed significantly and were based on the nature of the claim and the demographics of the claimant.

Claims were excluded where it was found that the incurred date was after the date of payment as this was erroneously recorded. These erroneous claims represented less than 0.1% of claims and the removal thereof was deemed insignificant. Claims were categorized into a final list of benefit categories based on the item type name and whether it was an inpatient or outpatient claim. In order to generate estimates of claims that have been Incurred But Not Reported (IBNR) as discussed in Section 5.5.1.1.3 larger groupings were also considered. The table overleaf shows the final considered benefit categories and the respective claims paid.

Final Benefit Category	Claims Paid (TZS'000)	Proportion of claims paid
Medicine and Consumables	67 373 023	43%
Outpatient Diagnostic Examinations	27 060 359	17%
Outpatient Registration/Consultation Charges	20 456 832	13%
Surgical Charges	12 587 692	8%
Inpatient Charges	10 554 688	7%
Inpatient Registration/Consultation Charges	2 206 834	1%
Other Charges	7 260 135	5%
Inpatient Diagnostic Examinations	2 866 527	2%
Outpatient Procedural Charges	5 159 319	3%
Inpatient Procedural Charges	1 430 362	1%
Total	156 955 772	100%

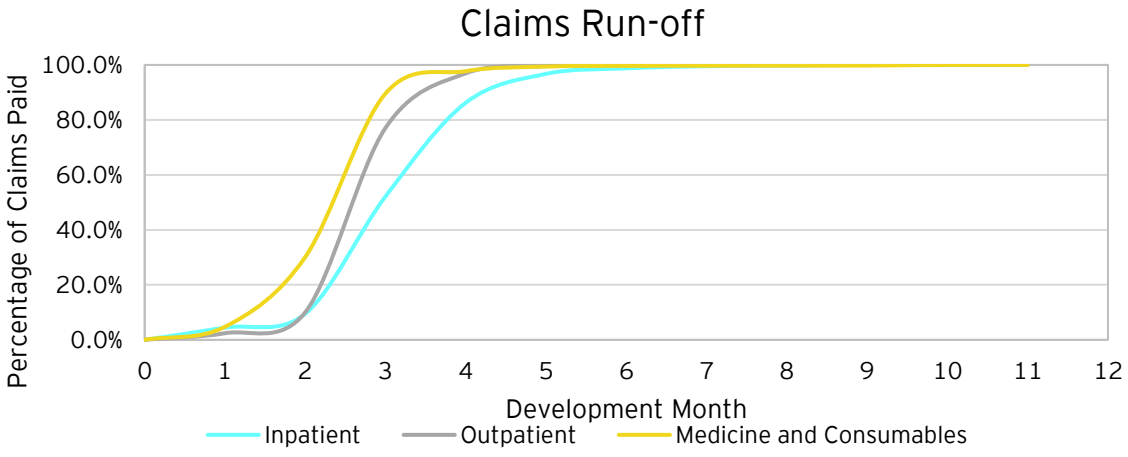
The above claims were further grouped into the type of facility used and the age band and gender of the claimant.

5.5.1.1.3 IBNR Estimation

In order to determine the average claims and claims utilization, we require a fully run-off year of claims information. As mentioned previously, the information received is in respect of claims paid up to 30 June 2016, which will likely exclude IBNR claims as well as outstanding claims. In order to calculate the ultimate claims for the year ending 30 June 2016, the IBNR element of claims is required to be calculated.

The techniques used involve a basic chain ladder method for estimating IBNR. The chain ladder method uses historical claims to determine the development of incurred claims until payment date. These development factors are applied to the current claims to estimate the ultimate claims that will be paid. Given that we do not have more historic data or granular contribution income, it is not possible to use more robust actuarial techniques. As mentioned previously, claims existed that were incurred after the date of processing which were removed from the calculation.

From industry experience, different types of claims run-off quicker than others. For instance, medicine will generally have the quickest run-off whilst inpatient care will take longer to settle. Claims were therefore categorized as either inpatient, outpatient or medicine and consumables. The graph below illustrates the different run-off profile of each category of claims for the months developing after a claim was made.



The analyses showed that there was a general increase in claims from January 2016 until March 2016 across all three categories. Further investigation found these increases to be reasonable given that there was a definite increase in the number of claims for 2016. The estimation of IBNR for the months of April, May and June, were however not reasonable given the volatile nature of run-off experience in earlier months. Furthermore, there were also no inpatient claims paid and incurred in June for which further illustrates the complexity and potential limitations of this estimation. Therefore in order to estimate claims, claims were assumed to be the average of all prior months in the year with an allowance for the average increase in claims for January, February and March.

These estimates generated the percentage of claims outstanding for each month of development and were then allocated to the original benefit category groupings. The resulting claims estimate as at 30 June 2016 are detailed in the table below.

Final Benefit Category	Claims Paid	IBNR	IBNR %	Total Claims	% of Total
Medicine and Consumables	67 373 023	12 280 144	15%	79 653 167	41%
Outpatient Diagnostic Examinations	27 060 359	8 403 837	24%	35 464 196	18%
Outpatient Registration/Consultation Charges	20 456 832	4 285 397	17%	24 742 229	13%
Surgical Charges	12 587 692	3 299 058	21%	15 886 750	8%
Inpatient Charges	10 554 688	3 236 079	23%	13 790 767	7%
Inpatient Registration/Consultation Charges	2 206 834	2 460 022	53%	4 666 855	2%
Other Charges	7 260 135	1 157 390	14%	8 417 526	4%
Inpatient Diagnostic Examinations	2 866 527	1 904 260	40%	4 770 787	2%
Outpatient Procedural Charges	5 159 319	1 122 631	18%	6 281 950	3%
Inpatient Procedural Charges	1 430 362	635 536	31%	2 065 898	1%
Total	156 955 771	38 784 354	20%	195 740 126	100%

As mentioned, there were no inpatient claims incurred and paid for the month of June and as such the IBNR estimate was allocated to benefit categories by age bands, gender and facility type in similar proportions to the previous 11 months.

5.5.1.1.4 Exposure

Contributions for the period from 1 July 2015 to 30 June 2016 were consolidated with the use of data processing software. A distinct list of principal members including the following demographics of each principal or main member was taken from the data:

- The sector in which they were employed (Public or private)
- Gender
- Date of birth
- Average salary over the period.

An exposure variable was created to indicate if the members' membership number was present in a certain month's file. This is regardless of which component (Employee or Employer) of the contribution was paid. It provided an estimation of which members were active in a particular month and in doing so also indicated if their dependants were active. This was only required due to the previously mentioned problems in obtaining accurate exposure data.

In order to create a consolidated list of all beneficiaries, the list of beneficiaries was combined with the list of members and the members' exposures were applied to estimate the dependants. This manipulation assumes that all dependants ever registered under a member will be active for the same period of time as the member. This is not an accurate assumption as dependents will likely leave the fund or not enter the fund at the outset in the case of births and marriages. The lack of beneficiary information is understandable as the contributions are based on a members' salary and is not based on number of dependants. This estimation of the exposure of dependants serves as the best approach based on the available information and will add a level of prudence due to the resulting larger average family sizes. However, it will result in the average claims per beneficiary being understated.

Average ages and appropriate age bands were then added to the consolidated list and the list exported into a manageable format in Microsoft Excel in order to generate appropriate outputs for family sizes, number of beneficiaries, number of members and average salary of members. As before, these outputs were differentiated by appropriate age bands, gender and whether the individual was publically or privately employed.

Reasonability checks were performed on the data processing software at each step of the manipulation. Such checks showed the distribution of the length of membership of certain members during the period and also included spot checks to ensure there were no coding errors or incorrect formatting. As mentioned previously, principal members found to pay contributions in the contribution data could not be identified in the consolidated beneficiary list. This resulted in a lower beneficiary base and was therefore not reliable as an exposure measure. To generate a more reflective membership base, the average family size of identifiable principal members were applied to remaining principal member's dependants based on the age and gender of the principal member. The additional beneficiaries generated in this regard were then allocated in the same proportions as the existing lower beneficiary base, based on age and gender of the base population.

Finally, due to the inconsistencies between months, an average of April, May and June's beneficiaries was used to generate the average number beneficiaries for the year as these months seemed the most consistent and reliable. The resulting average number of beneficiaries for 2016 used in calculating exposure is as per the below table.

Age Band	Males	Females	Age Band	Males	Females
0 - 4 yrs	63 626	61 380	55 - 59 yrs	51 856	55 371
5 - 9 yrs	162 067	171 766	60 - 64 yrs	25 122	27 765
10 - 14 yrs	67 399	66 870	65 - 69 yrs	17 479	20 549
15 - 19 yrs	81 135	82 125	70 - 74 yrs	11 939	14 462
20 - 24 yrs	101 153	109 113	75 - 79 yrs	8 994	10 659
25 - 29 yrs	137 765	144 217	80 - 84 yrs	5 922	5 970
30 - 34 yrs	87 782	87 700	85 - 89 yrs	2 937	2 754
35 - 39 yrs	60 547	59 514	90 - 94 yrs	1 685	1 120
40 - 44 yrs	43 888	51 057	95 - 99 yrs	383	304
45 - 49 yrs	42 426	54 397	100 + yrs	213	148
50 - 54 yrs	43 594	55 898	**Total**	**1 017 912**	**1 083 139**

Similarly, the table below shows the average number of members for 2016.

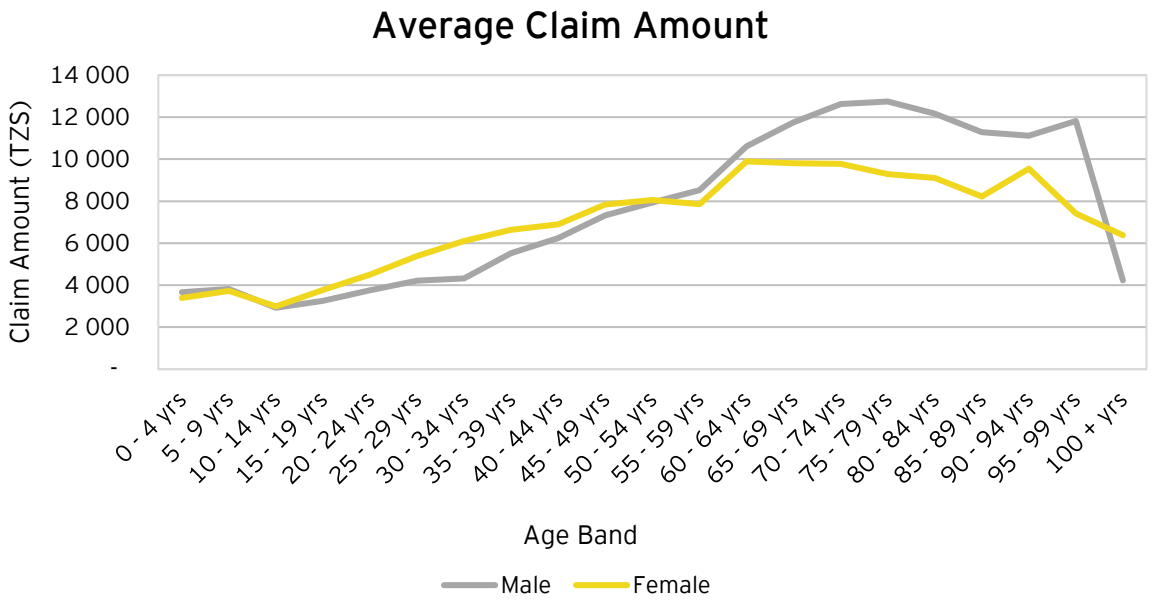
Age Band	Males	Females	Age Band	Males	Females
0 - 4 yrs	330	307	55 - 59 yrs	29 221	21 784
5 - 9 yrs	498	380	60 - 64 yrs	3 705	1 978
10 - 14 yrs	47 656	175	65 - 69 yrs	738	397
15 - 19 yrs	634	484	70 - 74 yrs	1 138	121
20 - 24 yrs	16 422	14 196	75 - 79 yrs	53	25
25 - 29 yrs	67 897	53 895	80 - 84 yrs	25	13
30 - 34 yrs	54 283	39 834	85 - 89 yrs	11	9
35 - 39 yrs	39 182	30 581	90 - 94 yrs	2	4
40 - 44 yrs	28 862	25 221	95 - 99 yrs	116	72
45 - 49 yrs	28 209	20 772	100 + yrs	47	12
50 - 54 yrs	26 368	19 166	**Total**	345 397	229 426

As mentioned above, the data showed inconsistencies which included a high number of male members in the younger age bands. In order to account for this irregularity, we assumed that these members are non-contributing principal members and are potentially orphans that remain in the fund. As orphans, these principal members do not contribute to the fund, but do access benefits in line with their risk profile.

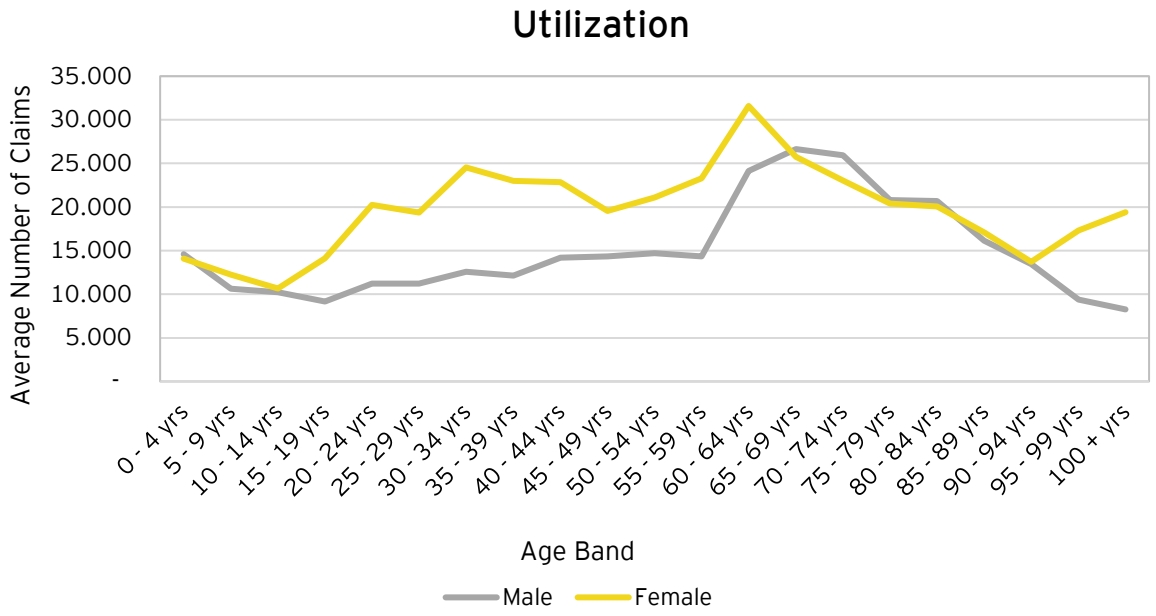
5.5.1.1.5 Claims and Utilization Curves

After the above derivations of the number of claims, amount of claims and an exposure count, we are able to generate average claims and utilization curves. The average claims costs and utilization will be calculated for each age and gender group. The curves will reflect the claiming behavior of beneficiaries for each benefit category as well as the facility from which they claimed.

The graph below reflects the average claim amount for male and female beneficiaries across various ages. It can be seen that as a beneficiary ages, average claims costs will generally also increase.



The graph below reflects the average number of claims by male and female beneficiaries or utilization across various ages. There are common patterns in the utilization of healthcare benefits for Tanzania as is commonly seen internationally. For example, it is expected that female beneficiaries will incur more claims as a young adult. This is primarily linked to claims for maternity benefits. This is evident in the increase in utilization for females after the ages of 15. However, maternity is not the main reason for the increase in claims at the older ages for females. The underlying reason for the difference could not be determined based on the underlying data.



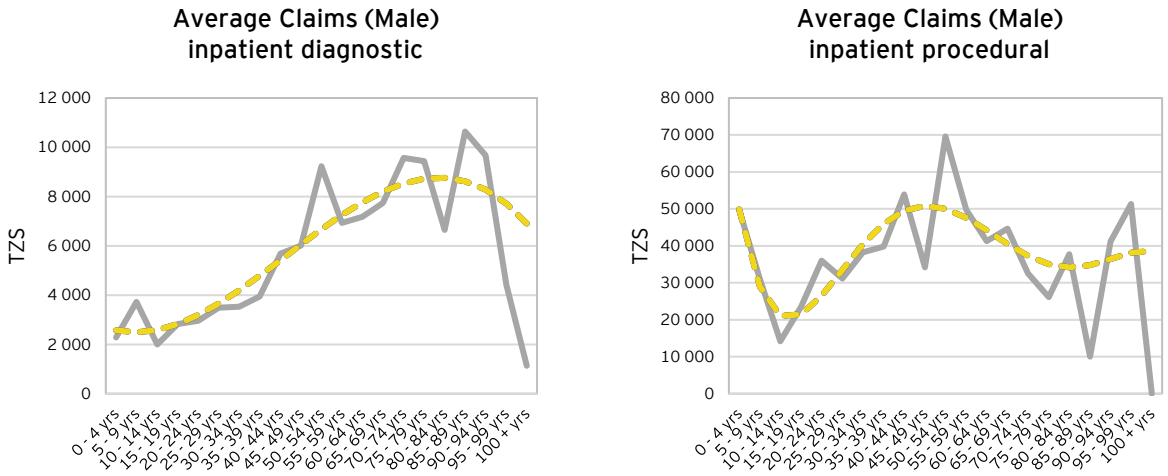
The above claims and utilization curves were also increased uniformly to allow for claims where the gender and age of beneficiaries could not be determined.

Curves were created for a total of 10 benefit categories and 4 facility types. Non-government owned facilities were small and were therefore grouped under privately owned facilities. The respective claims under each facility is shown in the table below.

Ownership	Total Claims (TZS'000)	Proportion of Claims
Faith Based Ownership	57 454 495	29.4%
Private	73 598 644	37.6%
Public	63 143 981	32.3%
Non-Government	1 543 007	0.8%
Total	**195 740 126**	**100.0%**

5.5.1.1.6 Smoothing of Curves

Utilization and claims curves are generally quite irregular in shape and in order to apply these curves to broader populations and allow for adjustments accordingly, these curves are required to be smoothed. An exercise was performed to fit a smoothed curve to each curve under each benefit category, facility type and gender of claimant. The process involved fitting a polynomial curve of varying degrees of power to take into account the unique shape of each curve. Certain benefit categories and gender groups will have a unique pattern of claiming and for this reason, curves will also require unique degrees of power. To illustrate this more accurately, we compare two benefit categories of males. The below graphs show the average claim amount of a male claiming for inpatient diagnostic examinations (on the left) compared to a male claiming for inpatient procedural charges.

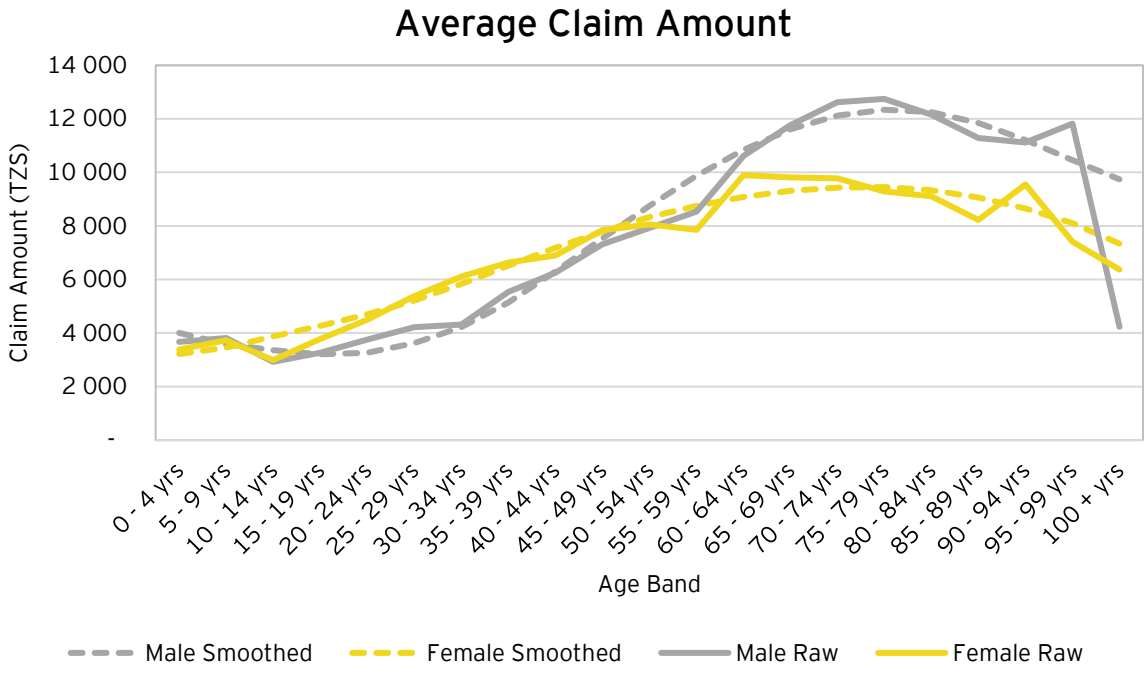


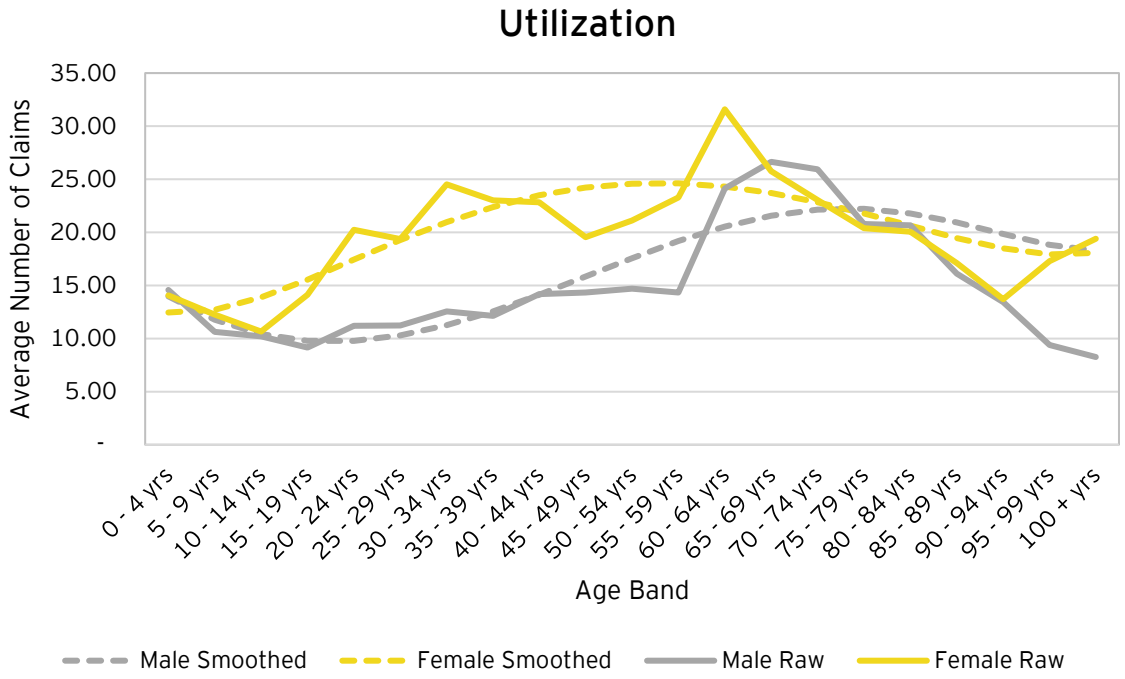
The degrees of the polynomials are 3 and 5 respectively as these curves are more likely to fit the shape of the underlying claims information. A reasonability check has been performed to ensure that the smoothed curves when applied to the current NHIF exposure generate a similar total claims amount as seen previously. The table below shows the difference in total claims for using the smoothed curves and as the overall difference is small, we are comfortable with the smoothing exercise.

Males	Raw Actual Claims (TZS'000)	Smoothed Claims (TZS'000)	Difference
Inpatient Diagnostic Examinations	1 893 861	1 941 096	2.5%
Outpatient Diagnostic Examinations	12 934 724	13 108 154	1.3%
Inpatient Charges	5 121 317	5 239 170	2.3%
Medicine and Consumables	29 799 778	29 967 587	0.6%
Inpatient Procedural Charges	278 205	279 826	0.6%
Outpatient Procedural Charges	2 877 831	2 908 527	1.1%
Inpatient Registration/Consultation Charges	1 739 673	1 795 814	3.2%
Outpatient Registration/Consultation Charges	9 655 216	9 859 554	2.1%
Surgical Charges	5 245 300	5 466 859	4.2%
Other Charges	4 766 267	5 140 175	7.8%
Male Total	**74 312 173**	**75 706 762**	**1.9%**
Females	**Raw Actual Claims (TZS'000)**	**Smoothed Claims (TZS'000)**	**Difference**

Inpatient Diagnostic Examinations	2 876 926	2 835 639	-1.4%
Outpatient Diagnostic Examinations	22 529 471	22 369 389	-0.7%
Inpatient Charges	8 669 450	8 786 239	1.3%
Medicine and Consumables	49 853 389	49 651 121	-0.4%
Inpatient Procedural Charges	1 787 692	1 937 886	8.4%
Outpatient Procedural Charges	3 404 120	3 443 063	1.1%
Inpatient Registration/Consultation Charges	2 927 182	3 055 396	4.4%
Outpatient Registration/Consultation Charges	15 087 013	15 216 019	0.9%
Surgical Charges	10 641 451	10 634 268	-0.1%
Other Charges	3 651 259	4 112 926	12.6%
Female Total	**121 427 953**	**122 041 946**	**0.5%**
Grand Total	**195 740 126**	**197 748 708**	**1.0%**

As a note to the above process, manual adjustments and grouping of ages were performed where data was limited and caused fluctuations in the smoothed curves. The below graphs compare the smoothed and actual raw average claims and utilization curves for the NHIF.





It is important to note that these NHIF claims costs and utilization curves have been applied with no adjustment for the risk profile underlying the total formal sector population covered under MBP+. We discuss this further in Section 5.5.1.1.7.

The table below shows the summary of the NHIF claims information for both genders.

	Inpatient Diagnostic Examinations	Outpatient Diagnostic Examinations	Inpatient Charges	Medicine and Consumables	Inpatient Procedural Charges	Outpatient Procedural Charges	Inpatient Registration/ Consultation Charges	Outpatient Registration/ Consultation Charges	Surgical Charges	Other Charges	Total
Total Claims (TZS'million)	**4 777**	**35 478**	**14 025**	**79 619**	**2 218**	**6 352**	**4 851**	**25 076**	**16 101**	**9 253**	**197 749**
All Private	699	15 589	1 331	36 099	215	3 005	423	9 868	4 017	5 495	76 741
FBO	1 506	11 741	5 609	22 284	802	1 155	725	6 946	6 579	342	57 687
Public	2 572	8 148	7 086	21 236	1 201	2 192	3 703	8 262	5 505	3 416	63 321
Number of Claims	**815**	**8 584**	**414**	**16 514**	**108**	**244**	**374**	**5 986**	**117**	**135**	**33 291**
All Private	132	2 468	47	5 023	5	74	48	1 356	19	46	9 219
FBO	409	3 917	198	6 379	55	72	193	2 445	55	25	13 749
Public	275	2 198	168	5 112	48	98	134	2 185	43	63	10 323
Average Claim (TZS)	**5 860**	**4 133**	**33 897**	**4 821**	**20 498**	**26 058**	**12 955**	**4 189**	**137 292**	**68 775**	**5 940**
All Private	5 298	6 316	28 035	7 187	40 085	40 569	8 786	7 277	210 266	120 317	8 324
FBO	3 686	2 997	28 293	3 493	14 559	16 022	3 761	2 840	119 283	13 406	4 196
Public	9 362	3 707	42 164	4 154	25 146	22 455	27 723	3 781	127 976	53 897	6 134
Utilization	**0.39**	**4.09**	**0.20**	**7.86**	**0.05**	**0.12**	**0.18**	**2.85**	**0.06**	**0.06**	**15.84**
All Private	0.06	1.17	0.02	2.39	0.00	0.04	0.02	0.65	0.01	0.02	4.39
FBO	0.19	1.86	0.09	3.04	0.03	0.03	0.09	1.16	0.03	0.01	6.54
Public	0.13	1.05	0.08	2.43	0.02	0.05	0.06	1.04	0.02	0.03	4.91
Cost per Beneficiary	**2 273**	**16 886**	**6 675**	**37 895**	**1 056**	**3 023**	**2 309**	**11 935**	**7 663**	**4 404**	**94 119**
All Private	333	7 420	633	17 181	102	1 430	202	4 697	1 912	2 616	36 525
FBO	717	5 588	2 670	10 606	382	549	345	3 306	3 131	163	27 456
Public	1 224	3 878	3 372	10 107	572	1 043	1 763	3 932	2 620	1 626	30 138

As is evident in the above table, the type of facility that services a claim will be an important factor to consider for proposing capitation arrangements in the section to follow.

5.5.1.1.7 Capitation for Primary Care

For MBP+, service providers will be reimbursed through a combination of capitated and fee-for-service reimbursement arrangements. At present under NHIF, all reimbursements are covered under a fee-for-service structure and will need to be adjusted to reflect both a capitated and fee-for-service methodology. It is our understanding that certain benefits will be reimbursed under a capitation system. The benefits that will be capitated will be mainly primary care benefits, whilst remaining benefits will be reimbursed on a fee-for-service basis.

Our methodology involved proposing a capitation amount for a family based on the choice of facility being either a faith based owned, publicly or privately owned facility. The proposed capitation structure is aimed to capture the expected cost of a family's primary care benefit. The NHIF data however did not include granular enough information to determine which claims were primary care and which should be non-primary care. The only information available consisted of the broader seven benefit categories and a further split for inpatient and outpatient care. Alone these are not sufficient to determine the proportions of primary and non-primary care as even an outpatient benefit category could have a proportion of both primary and non-primary care (including secondary services).

Benefit schedules were available for 2012 as well as the most recent pricing schedule effective 1 July 2016. The 2016 pricing schedules consisted of the following nine schedules:

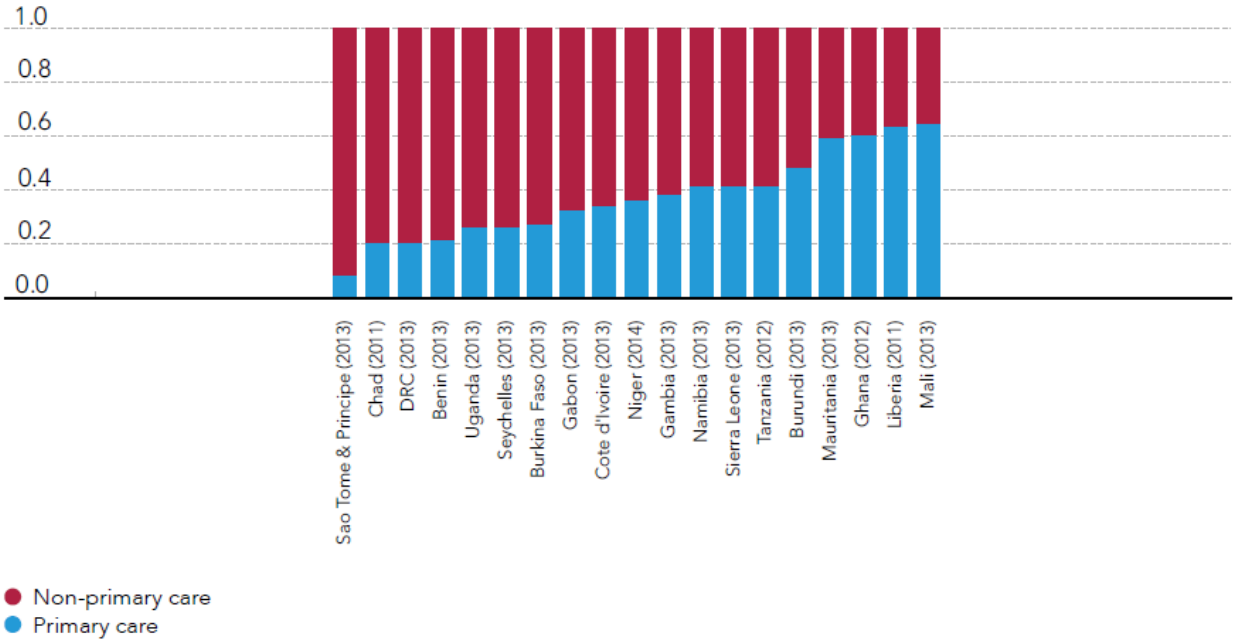
- National super specialized referral hospitals (as well as 3 unique institutions under this category)
- Zonal super specialized referral hospitals
- Regional referral hospitals
- Ophthalmology specialized clinics
- Dental specialized clinics
- Specialized poly clinics.

In order to accurately assess primary care, it is important to understand the facility in which the service is being provided, the nature of the service, the professional providing the service and the reason for the service being provided. This requires a fair amount of detail in the data and in-depth analysis. However the above documents which included all procedures, investigations, formularies and other benefits that were covered in the package but could not be linked to the claims data, because of the level of granularity of claims information. In addition, we were not provided with details as to who performed the relevant procedure. Based on this, we were unable to accurately assess the proportion of claims under NHIF that could be reasonably attributable to primary care.

We thus proceeded to rely on international research regarding healthcare spend on primary and non-primary expenditure. The World Health Organization (WHO) produced a report on health financing towards universal health coverage (WHO, *Public Financing for Health in Africa: from Abuja to the SDGs, 2016)* which provides an indication of primary and non-primary care expenditure, as a share of public expenditure on health services for Tanzania.

The illustration below was sourced from the WHO report and was used to approximate the split of primary and non-primary care for the NHIF.

Figure 3: Primary and non-primary care expenditure, as a share of public expenditure on health services, %[10]



Source: World Health Organization, Public Financing for Health in Africa: from Abuja to the SDGs

The above graph indicates that just above 40% of public health expenditure is deemed to be attributed to primary health care spend in 2012. Given that the above is only a representation of primary care spend in the public system, we cannot simply assume that the full population (including those privately covered) will consume health services in the same manner. In particular, it is expected that those covered by private funders, i.e. the formally employed NHIF members are likely to consume healthcare services differently to those accessing care in the public sector. Industry knowledge indicates that those covered in the private sector are likely to consume more secondary and tertiary services than the rest of the population. The reasons for this include the following:

- In global markets there is a weighting towards secondary and tertiary care for populations with private healthcare funding and access.
- This sector of the population generally earns a higher income. Higher income classes tend to have different disease burdens and hence require different levels of care. Those in lower income classes, with poorer standards of living, are likely to require a higher proportion of primary healthcare services.
- This sector of the population has greater education around the level of benefits they are entitled to and a better understanding of when to seek care.

Therefore we assumed that the poor (under the scenario that this population will be accessing MBP+) may utilize benefits in different proportions to the formal sector. For both populations, all inpatient benefits are assumed to be non-primary care. However, for the categories of outpatient care in the table below we have detailed the proportional split of total number of claims that are attributable to primary care. These assumptions have been iteratively derived such that the ultimate proportions of primary

health spend reflect closely to the WHO information detailed above. Sense checks against the benefit schedules were also performed to ensure reasonability of the applied proportions. The proportions applied have been shown in the table below for the unemployed and poor/near-poor and formally employed population. The unemployed and poor/near-poor proportions are only relevant to the scenario in which we evaluate the cost of this populations accessing MBP+ benefit package.

	% assumed to be primary care for the Poor and Unemployed Population	% assumed to be primary care for the Formally Employed Population
Medicine and Consumables	55%	40%
Outpatient Diagnostic Examinations	55%	40%
Outpatient Registration/Consultation Charges	55%	40%
Surgical Charges	0%	0%
Inpatient Charges	0%	0%
Inpatient Registration/Consultation Charges	0%	0%
Other Charges	55%	40%
Inpatient Diagnostic Examination	0%	0%
Outpatient Procedural Charges	0%	0%
Inpatient Procedural Charges	0%	0%

The impact of the above mentioned proportions result in a different estimate of primary and non-primary costs per beneficiary for the two populations as can be seen in the following table. The total cost (currently the same for both populations) is further adjusted for utilization changes at a later stage.

	Expected Cost Per Beneficiary per year (assuming that utilization is equivalent)			Percentage of Expected Cost Per Beneficiary	
	Primary	Non-Primary	Total	Primary	Non-Primary
Poor and Unemployed Population	39 116	55 003	**94 119**	42%	58%
Formally Employed Population	28 448	65 671	**94 119**	30%	70%

From the above it can be seen that the expected average cost per beneficiary per year for the poor and unemployed population has a higher weighting towards primary care. This is consistent with our view that the formally employed are likely to consume higher levels of non-primary care. In addition, the overall results are not too dissimilar from the WHO reported distribution of public health spend show in Figure 3 above and are in line with our expectation of claiming behaviors in different employment groups. It is important to note that the above table is only a reflection of the NHIF underlying cost apportionment for the two population groups. Differences in utilization for the different care packages will ultimately affect total costs per beneficiary. Section 5.5.1.1.8 explain the adjustments that are made in respect thereof.

Given these allocations, it was possible to calculate the expected cost per beneficiary for primary care depending on the population group. The proposed capitation is calculated as a weighted average of this derived expected primary care cost per family for the enrolled population with MBP+ coverage. Should the poor and unemployed population be covered under MBP, then the capitation should only take account of the formally employed population.

It is important to note that the capitation values are calculated once off based on the NHIF underlying data as at 2016. From 2017 onwards, the 2016 capitation value is merely adjusted for HCCI. No recalculation or risk adjustment is allowed for in future years. Therefore a change to future years'

utilization and claim costs will not have an impact on the year one capitation figure calculated. This is due to the fact that the capitation agreement has not been set independently of this study, and we have based the capitation payment on the average cost derived from current claims information.

This capitation amount calculated is a major limitation to this model. The methodology does not allow for any considerable cost variations to be experienced when comparing to the fee-for-service (FFS) model. In order to avoid this limitation, the capitation agreement should be set independently of this study and in consultation with healthcare providers. Capitation is usually varied according to an individual's personal and social characteristics, using a process known as risk adjustment. Risk adjustment is an actuarial tool used to calibrate payments to health plans or other stakeholders based on the relative health of the at-risk populations. Insurers/funders may be limited in the extent to which premiums can vary by health status or other factors that are associated with health spending. In this regard, risk adjustment can help ensure that health plans are appropriately compensated for the risks they enroll. A well-designed risk-adjustment system is one that properly aligns incentives, limits gaming, and protects risk-bearing entities (e.g. insurers, health plans) (Downs et al. 2010). In most nations, the intention is that the risk-adjusted capitation should represent an unbiased estimate of the expected costs of the citizen to the healthcare plan over the chosen time period (typically one year).

5.5.1.1.8 Adjustments and assumptions

This section of the methodology discusses the various adjustments applied to the NHIF smoothed claims curves and subsequent progression of claims in future years.

The choice of facility type has been assumed as per the below table for all populations under MBP+. This has been derived from the proportion that each facility type contributes to total healthcare expenditure.

Facility ownership	Distribution
Public	32.0%
Private	38.8%
Faith based ownership	29.2%

We have not assumed a change of utilization for the formally employed population. This is due the fact that the NHIF is a long established, large population and is felt to be reflective of the formally employed population. Utilization for covered persons in the formal sector in a mandatory environment usually exhibit underestimated utilization due to top-up cover/parallel cover purchased from private health insurers. Utilization for previously uncovered in the formal sector in a voluntary environment usually exhibit anti-selective behavior resulting in higher claims experience than would normally be achieved in a mandatory environment.

The NHIF fund as we understand it is mandatory for all public sector employees, and voluntary for the private sector. Therefore, in theory one would expect to take into account utilization adjustments in light of the above. However, given that membership under NHIF is mainly driven by public sector, coupled with the small percentage of total population of private formal workers, we believe that the anti-selective and other utilization impacts will be minimal. We therefore have assumed that the entire formal population will claim in line with the patterns derived from the NHIF data received.

However, we have adjusted the previously uncovered populations representing the poor and unemployed populations. The basis for this adjustment was due to research conducted for the Jaminan Kesehatan Nasional (JKN), a scheme in Indonesia that implemented universal health care in 2014. The research compared the utilization of three sub groups of the population based on income. These were the bottom 40%, middle 40% and top 20% and a further separation of the population who was previously covered and those who were not covered were also included.

This research highlighted the relationship of higher income individuals claiming patterns compared to lower income individuals for both inpatient and outpatient benefits. Furthermore, it could be seen that following the first year of implementation, individuals' utilization increased significantly possibly as a result of greater awareness and realized access to benefits. The below table was taken from the analysis with the utilization calculated for the top 60% earning individuals based on the national utilization and bottom 40% earning individuals.

		2012	2013	2014	2015
Outpatient utilization (all)	**National**	**12.90%**	**13.50%**	**15.40%**	**17.00%**
	Top 60%	13.70%	14.37%	16.40%	17.67%
	Bottom 40%	11.70%	12.20%	13.90%	16.00%
Outpatient utilization (private facilities)	**National**	**8.10%**	**8.70%**	**10.40%**	**8.70%**
	Top 60%	9.23%	9.77%	11.67%	9.43%
	Bottom 40%	6.40%	7.10%	8.50%	7.60%
Inpatient utilization (all)	**National**	**1.90%**	**2.30%**	**2.50%**	**3.60%**
	Top 60%	2.30%	2.77%	2.97%	4.27%
	Bottom 40%	1.30%	1.60%	1.80%	2.60%
Inpatient utilization (private facilities)	**National**	**0.80%**	**1.00%**	**1.10%**	**1.70%**
	Top 60%	1.07%	1.33%	1.43%	2.23%
	Bottom 40%	0.40%	0.50%	0.60%	0.90%

It must be noted that the JKN was implemented in 2014 and therefore 2014 and 2015 will be reflective of the potential impacts likely for the SNHI in years following its implementation. From the above, we have determined that utilization for outpatient and inpatient expenditure is 18% and 65% greater for higher earning individuals respectively. The study also showed that following introduction of the JKN, in year 2, utilization increased by approximately 15% and 44% for outpatient and inpatient expenditure respectively. This was specific to the bottom 40% earning individuals.

The table below, based on the research by JKN, summarizes the adjustments made for utilization of the poor and unemployed populations in the two years following being introduced to the MBP+. These adjustments are specifically incorporated into Scenario 1 discussed later in this report. It must be noted that the impacts discussed above have been used as proxies for primary and non-primary care i.e. outpatient utilization has been used to approximate primary care utilization whereas inpatient utilization is used for non-primary care. We consider these approximations as reasonable given that majority of primary care is covered on an outpatient basis and similarly with non-primary care. Utilization is expected to stabilize in years 3-5. Impacts have been shown separately for primary care and non-primary care.

Adjustment for poor and unemployed populations	Year 1	Year2
Primary Care	**(15.0)%**	**15.0%**
Non-Primary Care	**(40.0)%**	**40.0%**

The above yearly adjustments are cumulative. No additional utilization adjustments have been applied from year 3 onwards. This implies that the cumulative year 2 utilization is applied in year 3 onwards.

For both MBP and MBP+, future increases in claim costs will be based on expected healthcare cost inflation derived from past experience and macro-economic data as CPI plus 4%. Various actuarial resources were used in determining the assumption including previous actuarial valuations of the NHIF. The most recent publication by Genesis Medical Scheme indicated that healthcare cost inflation was approximately 4% above CPI and this in line with other literature reviewed.

5.5.2 Estimating Healthcare Expenditure for MBP

5.5.2.1 Methodology

The methodology described previously for MBP+ will be similar for the estimation of healthcare expenditure under MBP. It is our understanding that the MBP package will mirror the current iCHF benefit with some adjustments for in-hospital costs. We have therefore based our cost estimations on the underlying iCHF data. There have been many simplifications in the methodology as the iCHF does not share many of the complexities and data concerns that were experienced with NHIF.

The expected population that will be enrolled on MBP will be the informal sector and the unemployed, poor/near-poor populations.

5.5.2.1.1 Data Analysis

The Improved Community Health Fund (iCHF) was launched in November 2014 with the aim to increase access to quality healthcare for people in the informal sector, especially for lower income individuals. PharmAccess, with the support of the Dutch Ministry of Foreign Affairs, provides actuarial expertise, technical assistance and funding for the Fund and assisted in the extraction of claims and beneficiary information. Claims and beneficiary information were provided by PharmAccess for four out of the six districts in the Kilimanjaro region. The Fund has since enrolled members from the districts of the Manyara region. The four Kilimanjaro districts included in the analysis are listed below.

- Siha (First enrollments from 1 January 2015)
- Moshi Rural (First enrollments from 1 January 2015)
- Hai (First enrollments from 1 May 2015)
- Rombo (First enrollments from 1 June 2016)

PharmAccess provided all available information which included consolidated beneficiary details, claims information shown separately for each month and enrollment reports for the different districts. This section will discuss the methodology applied in analyzing the data as well as indicating various data challenges and limitations experienced in the data.

(1) Beneficiary Information

Similarly to the estimation of healthcare expenditure for the MBP+, beneficiary information will be used to generate exposures of beneficiaries in certain months for the purpose of determining utilization of claims.

For beneficiary information, the data extraction was in the format where a single line of data represented the initial enrollment or re-enrolment of the individual. Information included in the contribution data included the following:

- Membership Number
- Household Number
- Date of Birth
- Gender
- Relationship to Main Member
- Enrolment Clerk
- Registration Date
- Policy Start Date
- Policy End Date
- Geographical Location
- Economic Activities

There were several data omissions that were more severe at early stages of the Fund, when it was first set up, that have since reduced significantly for the most recent dates. Omissions were mainly in respect of dates of births collected for individuals incorrectly calculated ages. As at June 2016 however, of the 42 893 active beneficiaries on the iCHF, only 15 did not have dates of birth.

(2) Claims Information

The information received consisted of all claims incurred in the period 1 January 2015 till 30 April 2016. The Rombo district as indicated previously was first enrolled in June 2016 and therefore excluded from the analyses. Although a data specification was provided, it is understood that the extraction represents all available information for claims. The extraction included the following information of claims which were used for the analyses.

- Membership Number
- Household Number
- Date of Birth
- Gender
- Relationship to Main Member
- Provider Name
- Received Date
- Incurred Date
- Processed Date
- Referral Indicator
- ICD9 Code for Diagnosis Claims
- Number of Nights Stay for Hospital Claims
- Procedure Code
- True Cost of Claim
- Tariff/Capitated Cost of Claim

A facility list was also provided indicating the name of the service provider, the type of facility and whether this was privately or publically owned.

As the Fund was first implemented in 2015, no historic data was available for claims in previous year and all calculations then assume that claims continue as expected for the most recent financial period. The level of granularity of claims information did also not allow a classification further than a diagnosis specific, procedural specific and hospital accommodation costs. For example with diagnosis specific claims, we can identify that the treatment was in respect of general respiratory conditions but are not able to identify the type of provider treating the patient (general practitioner or specialized practitioner), the amount of medication expenditure or any more granular level of information. Given the limited ability to further classify claims categories and the credibility of the data as a result of the small number of claims, we have not distinguished between different diagnoses specific claims.

A portion of benefits under the iCHF include inpatient benefits which reflect significant underutilization. For this reason it was difficult to attribute sufficient credibility to claims experience as a basis for projecting future claims. The methodology to account for this is discussed later in this section.

5.5.2.1.2 Data Cleaning and Homogenous Groupings

Although the iCHF data is much smaller in size than the NHIF, a data processing software was still used to manipulate data into a required format in Microsoft Excel. This included consolidating multiple months of claims and mapping providers to a specific type of facility.

The claims information was structured with multiple lines for a single claim. This was due to the fact that a single claim may include multiple ICD9 codes. The first line however reflected the full cost of the claim and all successive lines of the claim were zero. It was not possible to determine the proportion of the claims cost attributed to each ICD9 code or whether the first line's ICD9 code represented the greatest proportion of the claim. This lead to the decision not use the ICD9 codes to further classify claims categories. For the purpose of the analysis, these additional lines with zero claims expenditure were removed and checks were performed to ensure there were no loss of claims. It was discovered that the Siha district had several claims incurred in the months of August 2015 and September 2015 for which the same claims expenditure reflected on multiple lines of a single claim. These claims reflected less than one percent of Siha's total claims expenditure and due to the fact that this was only in a few instances over the entire claims record, we were comfortable to exclude these claims from the analysis.

Claims for the iCHF are either diagnosis specific claims, costs for stays in hospital or procedure specific claims. For all claims, the true actual cost experienced by the providers is shown as well as the actual cost that is paid to providers on a capitated agreement. From this, we were able to deduce that the capitation amount is dependent on the type of facility used as well as the type of procedure if it is a procedure specific claim. This capitation agreement did also differ between the different districts but a new capitated agreement has been proposed where all healthcare expenditure, with the exception of inpatient expenditure, will be covered under a single fee which will be paid monthly for the full year of cover. This will also differ based on the facility elected by the beneficiary which will either be public or private. For inpatient expenditure, these will be reimbursed on a fee-for-service arrangement. Given that the current reimbursement structure is no longer applicable for future projections, the true costs will be taken into account for modelling purposes.

Information regarding the provider was compared against a facility list provided for the fund to generate a mapping of each facility to the type of facility. The types of facility were either a health clinic, hospital or dispensary. In addition, the facility was also mapped to either privately or publically owned as this would determine the amount of the capitation paid. The naming conventions in the facility list were not consistent with several facilities used in the claims processing. For this reason, manual manipulation was required to generate a simplified list that was consistent with claims details.

The table below shows the final considered benefit categories and the respective claims paid.

Final Benefit Category	Claims Paid (TZS'000)	Proportion
Diagnosis	283 101	86%
Procedure	32 529	10%
Hospital	14 078	4%
Total	329 707	100%

The following was performed for the beneficiary information:

- Beneficiaries were assumed to be active for the full period between date of enrollment and policy end date as it was not possible to determine if they left the fund before this time.
- Average ages were calculated for each point in time (15th of each month) and an appropriate age band, with the choice of age bands being consistent with methodology in all other components of the project.

For reasonability, the movements in beneficiaries between months were compared against enrolment reports provided by PharmAccess. It was often found that these figures were close for some districts but ultimately inconsistent with the total output generated. For the purpose of the projections however, we rely on the beneficiary detailed information but note the discrepancy between the enrolment reports and the figures suggested by the data extraction.

Family sizes and re-enrolment rates were also compared against an actuarial review performed by Diederik van Eck and were found to be consistent with the review.

The various outputs were then in a simple format to interpret in a Microsoft Excel package to generate utilization and average claims tables. These were split by age bands, gender and the type of claim (diagnosis, hospital stay and procedure).

5.5.2.1.3 Exposure

Dates were provided for when the beneficiary registered, for when the policy commenced as well as when the policy expired or is due to expire. Without more granular information for each month, an assumption was made that an individual was active on the fund for the full period between the registration and expiry dates. This period is 12 months. This assumes that the individual did not pass away, their membership status was unchanged and that they remained in their respective districts over this period. The assumption is reasonable with respect to membership status as it is unlikely for a member to voluntarily leave the fund given that contributions are paid in advance at the beginning of the cover and cover is then available for a full year. This methodology allowed for exposure to be determined for each month of the fund.

The resulting number of beneficiaries as at 30 April 2016 has been applied as per the below table. The below figures exclude the Rombo district which was not enrolled as at 30 April 2016.

Age Band	Males	Females	Age Band	Males	Females
0 - 4 yrs	1 691	1 580	55 - 59 yrs	536	616
5 - 9 yrs	2 547	2 572	60 - 64 yrs	480	575
10 - 14 yrs	3 602	4 004	65 - 69 yrs	421	436
15 - 19 yrs	4 353	4 697	70 - 74 yrs	402	360
20 - 24 yrs	975	1 075	75 - 79 yrs	318	278
25 - 29 yrs	343	517	80 - 84 yrs	166	169
30 - 34 yrs	361	565	85 - 89 yrs	98	75
35 - 39 yrs	514	692	90 - 94 yrs	42	45
40 - 44 yrs	581	723	95 - 99 yrs	16	17
45 - 49 yrs	653	803	100 + yrs	13	13
50 - 54 yrs	564	666	**Total**	**18 676**	**19 812**

The resulting number of members as at 30 April 2016 used is as per the below table. The below figures exclude the Rombo district which was not enrolled as at 30 April 2016.

Age Band	Males	Females	Age Band	Males	Females
0 - 4 yrs	9	5	55 - 59 yrs	491	177
5 - 9 yrs	57	48	60 - 64 yrs	446	192
10 - 14 yrs	232	284	65 - 69 yrs	354	148
15 - 19 yrs	475	547	70 - 74 yrs	385	148
20 - 24 yrs	178	138	75 - 79 yrs	256	129
25 - 29 yrs	189	63	80 - 84 yrs	171	109
30 - 34 yrs	344	77	85 - 89 yrs	87	51
35 - 39 yrs	463	131	90 - 94 yrs	39	29
40 - 44 yrs	568	132	95 - 99 yrs	14	14
45 - 49 yrs	573	199	100 + yrs	12	5
50 - 54 yrs	537	160	**Total**	**5 880**	**2 626**

As mentioned above, the data showed inconsistencies which included a high number of male members in the younger age bands. In order to account for this irregularity, we assumed that these members were are orphans and treated consistently with orphans found in NHIF.

5.5.2.1.4 Claims and Utilization Curves

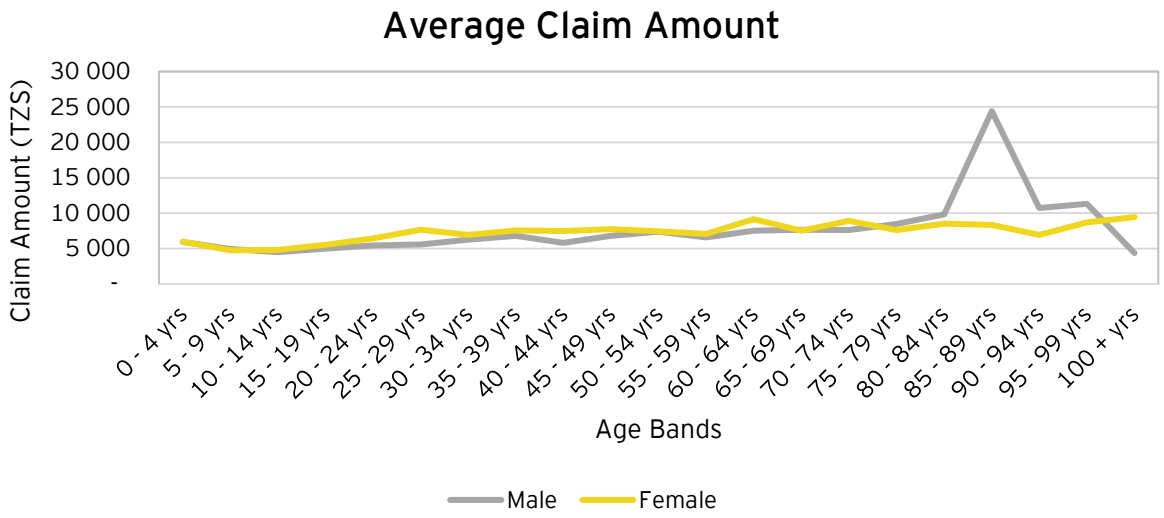
Similarly to beneficiary information, claims information was received separately for the four districts as well as separately for each month. The claims information pertaining to all outpatient services are considered in this section only. This is due to the fact that outpatient services will be capitated under MBP but inpatient services will be paid on a fee-for-service basis. We discuss the methodology for inpatient benefits in Section 5.5.2.1.9.

Since the iCHF uses a capitation system, the outpatient claims costs received were based on the true cost of the services provided. For the purpose of analyzing the average claiming profile of beneficiaries on the iCHF, Rombo was not included in the analysis as information was only available for the month of June 2016 and not credible. In addition, although claims were available until June 2016, claims were only analyzed up until April 2016. It is assumed that all claims are fully run-off as at April 2016 at the point of receiving claims information as a capitation system is used and hence there is unlikely to be a reporting and payment delay. This is further confirmed with an analysis of the claim incurred date and reporting date found in the data. The reporting delays for claims incurred in 2016 are generally shorter than 3-4weeks which implies that IBNR is not applicable to the iCHF data. Therefore the IBNR techniques discussed for MBP+ were not used to estimate ultimate claims as it was assumed that claims were fully run-off at the time of the analysis.

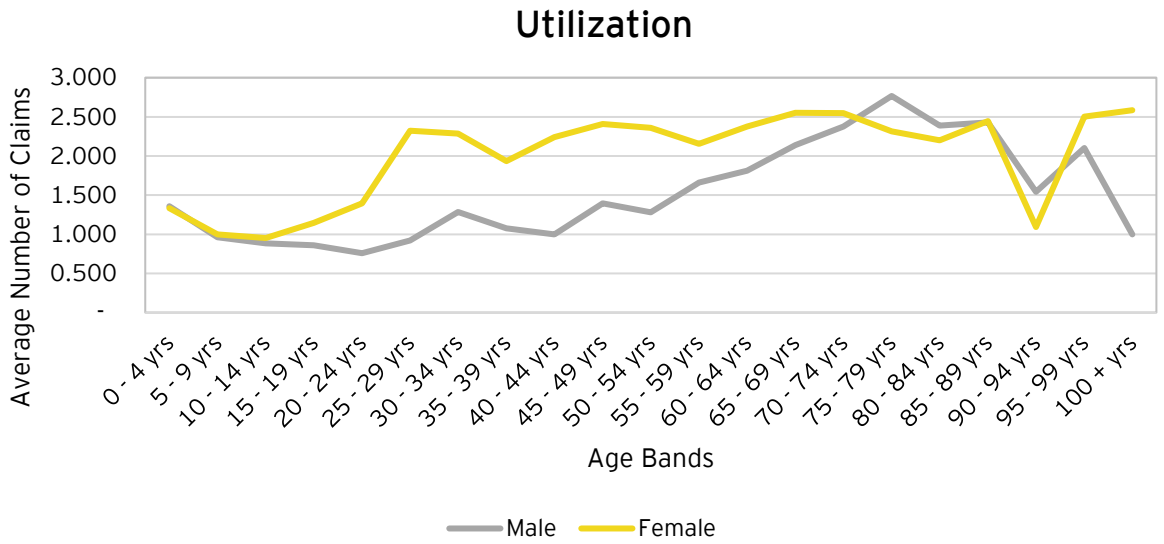
When calculating average claims and utilization, the ownership of the facility was taken into account. It was not possible to determine whether beneficiaries elected public or private facilities and so the distribution of claims between these facilities will serve as the basis for the assumption of which facility beneficiaries elect going forward.

Due to the credibility of claims, public and private facilities were combined for average claims and utilization curves. It was assumed that utilization between these facilities were not significantly different and the same utilization was used irrespective of the type of facility elected. Average claims for diagnosis specific claims were significantly higher for private facilities and an adjustment was allowed in the claims curves to allow for this increase should a beneficiary elect a private facility. The average claim for procedure specific claims was not different and the same average claims curves have been used for both facilities.

The graph below reflects the average claim amount for male and female beneficiaries across various ages.



The graph below reflects the average number of claims per male and female beneficiaries or utilization across various ages. As was seen for MBP+, we generally expect female beneficiaries to incur more claims as a young adult to take into account the increase in claims due to maternity benefits. This is evident in the increase in utilization for females after the ages of 15.



The above claims and utilization curves were also increased uniformly to allow for claims where the gender and age of beneficiaries could not be determined. We expect the claims and utilization curves to show initial high claims for both sexes due to pediatric costs, declining claim cost in early childhood following increasing costs with age. We also expect that at younger ages average female costs are higher, due to childbirth while at later ages male costs are higher due to worse mortality. Our claims analysis has shown this to be the case.

5.5.2.1.5 Smoothing of Curves

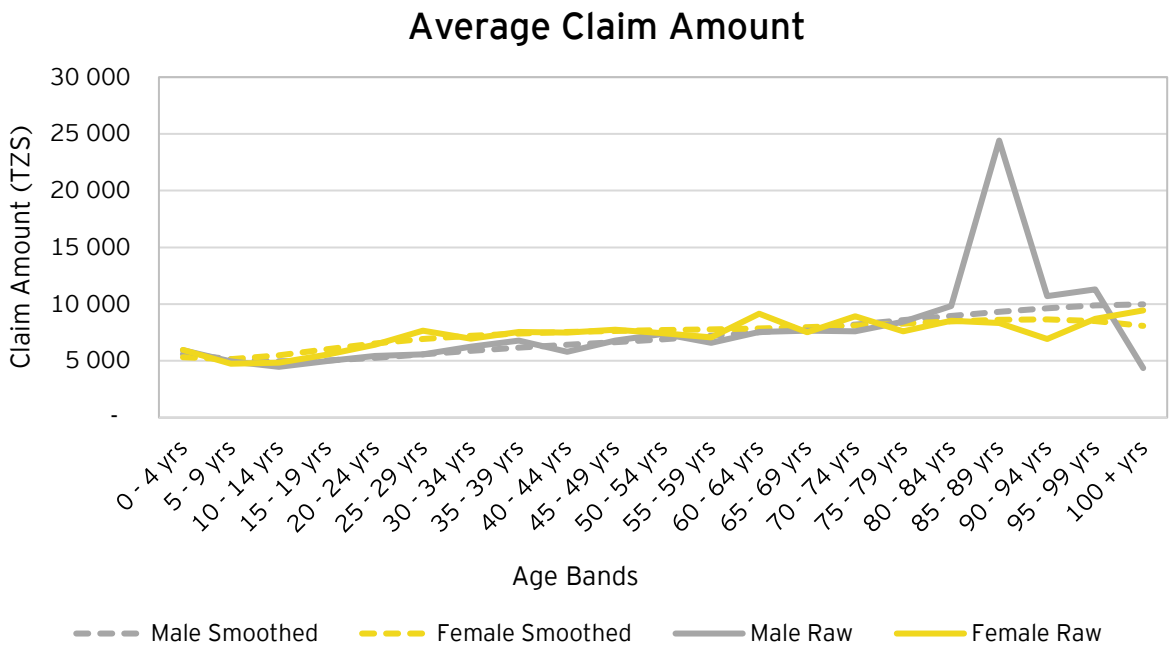
The methodology applied in smoothing average claims and utilization curves for MBP+ remained unchanged for smoothing MBP curves. There were however fewer curves that were required to be smoothed but each curve was individually assigned varying degrees of power to take account of the unique shapes. Furthermore, because of the size of the fund, a greater variation was experienced on the curves and emphasizes the importance of smoothing the curves to a best fit as far as can be achieved.

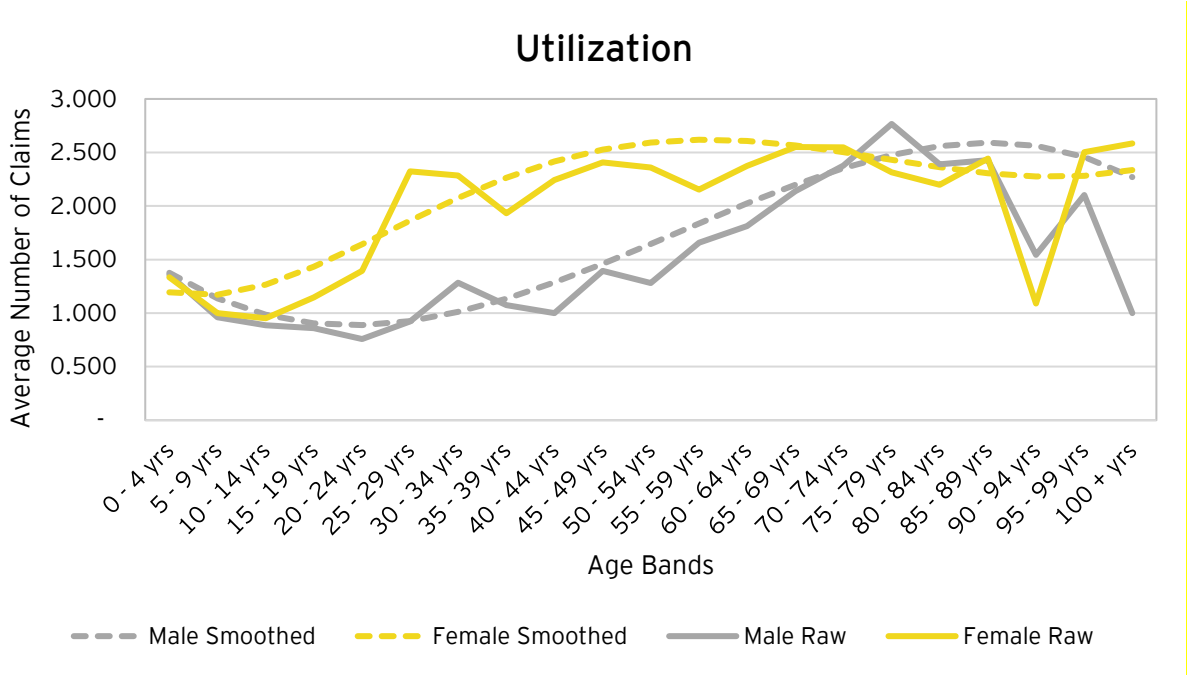
The table below shows the difference in total claims for using the smoothed curves and as the overall difference is small, we are comfortable with the smoothing exercise.

Males	Raw Actual Claims (TZS'000)	Smoothed Claims (TZS'000)	Difference
Diagnosis	113 945	121 051	6.2%
Hospital	11 939	11 926	-0.1%
Procedure	5 364	6 095	13.6%
Male Total	**131 247**	**139 072**	**6.0%**
Females	**Raw Actual Claims (TZS'000)**	**Smoothed Claims (TZS'000)**	**Difference**
Diagnosis	169 156	189 124	11.8%
Hospital	26 427	26 747	1.2%
Procedure	8 714	10 695	22.7%
Female Total	204 298	226 566	10.9%
Grand Total	335 545	365 638	9.0%

The difference between the smoothed and actual claims will act as an implicit margin given the credibility of information available and given that these curves will be applied to the greater informally employed population, we are comfortable with this additional level of prudence.

As a note to the above process, manual adjustments and grouping of ages were performed where data was limited and caused fluctuations in the smoothed curves. Inpatient expenditure was generally lower than would be expected and the methodology for these claims hence differed. This is discussed in more detail in Section 5.5.2.1.9 later. The below graphs compare the smoothed and raw actual average claims and utilization curves for the iCHF. It must be noted that these graphs do not incorporate the additional adjustments discussed later in this section.





As a similar remark for the MBP+, iCHF claims costs and utilization curves have been applied with no adjustment to the informal sector population covered under MBP. Whilst this may not be a fair reflection of the total informal population, in the absence of sufficient information we have no basis for adjusting this assumption. In addition, adjustment to utilization or cost of outpatient services will have minimal impact on ultimate costs. This is due to the fact that the majority of claims under the MBP will reimbursed under a capitation structure. The validity of the capitated reimbursement in light of true claim cost is more important to accurately assess. We discuss the capitation arrangement and the limitations therein in the next section.

5.5.2.1.6 Capitation Structure

For MBP, service providers will be reimbursed partly through a capitated reimbursement arrangement. The remaining inpatient expenditure is covered on a fee-for-service agreement. At present under iCHF, benefits covered under a capitation fee are dependent on the type of facility chosen. The below table provides a summary of this structure.

Type of Facility	Annual Capitation Fee (TZS) paid monthly for a household
Private Facility	40 000
Public Facility	20 000
Medical Referral	9 000

The medical referral fee shown above is for facilities that have elected to be chosen as a medical referral facility where an amount of TZS9 000 for the year is paid to the facility in addition to the capitation fees shown above. The number of private and public facilities that are considered to be applicable for the medical referral fee were calculated as 9.2% and 1.7% respectively. All fees are paid monthly to allow for members to change service providers during the year although this is implicitly taken into account in the methodology as we do not expect the distribution of facility choice to change during the year.

We have based our future projections on this proposed capitation structure. The limitations with this assumption are as follows:

- Capitation amounts that differ by facility type in each region are not accounted for.
- Capitation amounts that differ due to variations in utilization in different regions (driven by diseases and other socio-economic impacts) are not taken into account.
- If the underlying utilization used to derive these capitation amount differs significantly from the actual experienced utilization, it will result in the figures being misestimated.
- The capitation amounts are assumed to require no adjustment for extending coverage to the poor/near-poor populations.

5.5.2.1.7 Adjustments and assumptions

This section of the methodology discusses the various adjustments applied to the iCHF smoothed claims curves and subsequent progression of claims in future years.

The choice of facility type has been assumed as per the below table for all populations under MBP. This has been derived from the proportion that each facility type contributes to total healthcare expenditure.

Facility ownership	Distribution
Public	25%
Private	75%

The table below summarizes the adjustments made for utilization of the poor and unemployed populations as well as the remainder of the informal population in the two years following being introduced to the MBP.

Adjustment	Year 1	Year 2
Primary Care	0%	15.0%
Non-Primary Care	0%	40.0%

The basis for these adjustments were once again based from research conducted for the JKN in Indonesia. Following the first year of implementation, individuals' utilization increased significantly which as indicated previously, is possibly as a result of greater awareness and realized access to benefits. There is no adjustments in year 1 as iCHF is fairly new, and potentially reflective of initial claiming profiles of previously uncovered populations in Tanzania.

As indicated future increases in claims will be based on expected healthcare cost inflation derived from past experience and macro-economic data as CPI plus 4%.

5.5.2.1.8 Analysis of feasibility of the proposed capitation

As the model uses the proposed capitation structure in the calculation of the sustainability of the fund, changes in utilization will not impact the outcome of healthcare expenditure for outpatient claims. This is as a result of the design of capitation agreements which fixes healthcare expenditure for a family regardless of the level of utilization. Inpatient expenditure will however be subject to changes in utilization. To understand the impact of the capitation agreement, the true cost for the informal population and poor and unemployed populations have been compared against the capitated and fee-for-service costs. The table below shows this comparison as well as showing a comparison of the true and capitated costs per household of each population.

			2017	2018	2019	2020	2021
Informal	Total Claims (TZS'000)	Capitated	140 278 183	175 878 527	214 805 762	259 368 537	302 394 978
		True Cost	130 843 412	188 901 331	231 020 009	279 340 359	326 192 173
		Difference	-6.7%	7.4%	7.5%	7.7%	7.9%
	Claims per Household (TZS)	Capitated	39 215	42 744	46 591	50 784	55 355
		True Cost	36 577	45 909	50 108	54 695	59 711
		Difference	-6.7%	7.4%	7.5%	7.7%	7.9%
Unemployed	Total Claims (TZS'000)	Capitated	19 401 050	26 094 340	34 133 503	43 770 859	55 245 663
		True Cost	22 846 361	35 257 456	46 040 140	58 978 043	74 418 076
		Difference	17.8%	35.1%	34.9%	34.7%	34.7%
	Claims per Household (TZS)	Capitated	39 215	42 744	46 591	50 784	55 355
		True Cost	46 179	57 754	62 843	68 428	74 565
		Difference	17.8%	35.1%	34.9%	34.7%	34.7%
Poor	Total Claims (TZS'000)	Capitated	31 475 361	33 578 509	35 827 751	38 233 867	40 808 502
		True Cost	37 064 873	45 369 716	48 325 386	51 517 350	54 970 653
		Difference	17.8%	35.1%	34.9%	34.7%	34.7%
	Claims per Household (TZS)	Capitated	39 215	42 744	46 591	50 784	55 355
		True Cost	46 179	57 754	62 843	68 428	74 565
		Difference	17.8%	35.1%	34.9%	34.7%	34.7%

The difference between true cost and the capitation fee is wider in the poor and unemployed populations, where large family sizes drive up the true cost. The contributing factors to the differences above are as follows:

- The initial setting of the capitation fee has misestimated either the utilization of the iCHF beneficiaries, the average cost of services, the average family size or the proportion of members choosing private facilities has increased.
- The family sizes of the previously uncovered populations are generally larger (4.9 versus 4.375 for the informal sector). We would therefore expect a greater level of claims from the larger families.
- The impact on utilization from an increased level of awareness that is expected the year following implementation. The assumption is that the informal sector as well as the previously uncovered populations will experience an increase in utilization of 15% and 40% for outpatient and inpatient expenditure respectively. This is as indicated in research discussed previously for the Indonesian market.

5.5.2.1.9 Claim cost estimation for inpatient services

In this section we discuss the methodology applied to estimate both utilization and costs for inpatient services under MBP. As discussed earlier, the limited claim experience for inpatient expenditure is not sufficiently credible to project future claiming patterns and as such a revised methodology is required.

An assessment of the current iCHF data yielded the following:

TZS	Inpatient Claims	All Claims	Inpatient claims as a % of All Claims
Total Claims	38 672 909	365 637 779	10.6%
Number of Claims	1 114	57 178	1.9%
Average Claim	34 705	6 395	542.7%
Utilization	0.028	1.460	1.9%
Cost per Beneficiary	987.71	9338.45	10.6%

From the above the following can be seen:

- Inpatient claims are a small proportion (1.9%) of the total number of all claims under the iCHF.
- Due to the average cost of inpatient claims being significantly higher than the average cost of all claims combined, inpatient claims make up 10% of the total cost of claims.

When producing a similar table for NHIF, the following can be seen:

TZS	Inpatient Claims	All Claims	Inpatient claims as a % of All Claims
Total Claims	41 972 193 650	197 748 707 677	21.2%
Number of Claims	1 828 839	33 290 930	5.5%
Average Claim	22 950	5 940	386.4%
Utilization	0.8704	15.84	5.5%
Cost per Beneficiary	19 977	94 119	21.2%

Based on the above the following conclusions have been drawn:

- Utilization of iCHF inpatient costs are likely to be understated when comparing iCHF inpatient utilization and NHIF inpatient utilization. Therefore, we have adjusted utilization of the inpatient services under MBP such that utilization represents 50% of the NHIF inpatient procedural and surgical curves.
- The average cost of an inpatient claim under iCHF is higher than that under NHIF. Therefore no adjustments will be made to the cost of an inpatient claim. This means that under MBP, the cost of an inpatient claim will reflect the true cost currently experienced by iCHF.

The impacts of the above adjustments produces the following results:

TZS	Inpatient Claims	All Claims	Inpatient claims as a % of All Claims
Total Claims	72 369 637	399 334 506	18.1%
Number of Claims	2 084	58 148	3.6%
Average Claim	34 719	6 868	505.6%
Utilization	0.053	1.485	3.6%
Cost per Beneficiary	1 848	10 199	18.1%

The above results have been applied to estimate the costs of inpatient care under MBP. This is estimated separately on a fee-for-service basis.

Should the utilization of inpatient services under MBP deviate from estimations above, the costs of providing this benefit will deviate from that reported in this document.

5.6 Estimating Non-Healthcare Expenditure

In the context of this report, non-health expenditure refers to administration, head-office, marketing and other expenses required to operate the fund. In this section of the report we discuss the data used, and the methodology applied to estimate the non-healthcare expenditure required to operate SNHI.

5.6.1 Data and methodology

A budget for SNHI was provided to us by NHIF. This raw data is listed below without any alterations.

Salaries (excluding enrolment)	**18 273 000 000**
Office of Director General	1 182 000 000
Directorate of Operations	477 000 000
Directorate of Claim Reimbursement	610 200 000
Directorate of marketing and PR	477 000 000
Directorate of finance investment and accountants	811 800 000
Directorate of Member relations	141 000 000
Directorate of HR and admin	477 000 000
Directorate of providers relations	342 600 000
Directorate of planning research and information	1 013 400 000
Drivers/secretaries	1 485 000 000
Regions	11 256 000 000
Other staff costs	**14 300 000 000**
Other staff benefits Expenditure	13 200 000 000
Staff welfare and committee	1 100 000 000
Other expenses	**39 710 000 000**
Advocacy	3 300 000 000
Health providers inspection	2 750 000 000
Fair and exhibition	660 000 000
Health promotion	880 000 000
Health provider equipment loan	4 400 000 000
SSRA levy	2 200 000 000
Grants	660 000 000
Recruitment expenses	1 100 000 000
Office expenses	4 620 000 000
Travelling expenses	2 420 000 000
Repair and other general expenses	2 530 000 000
Rent and other fees	1 650 000 000
Training and committees	3 300 000 000
Advertisement	1 650 000 000

Board meeting and annual fees	2 200 000 000
Gift and donations	440 000 000
Legal and consultant fees	3 300 000 000
Review of policy and fraud investigation	1 650 000 000
Enrolment officer costs (based on 189 officers)'	**7 011 900 000**
Salaries	6 350 400 000
Equipment (Enrolment officers Laptop and computers)	245 700 000
Transport (Motorcycle costs)	415 800 000
Number of enrolment agents (based on 4000 enrolment agents)	**1 600 000 000**
Ward officer enrolment equipment costs	1 600 000 000
Total expenses in 2015 terms	**80 894 900 000**

Upon consultation with the NHIF, the following was confirmed in respect of the above data:

- The budget provided was in respect of only year one of SNHI
- The budget was provided in 2015 terms
- The budget was determined assuming NHIF membership only
- The budget does not allow for any enrolment agent commission expenses. Upon consultation it was further determined that the commission amount per enrolled family was not yet decided by the various stakeholders.

In light of the above, we proceeded to request NHIF to provide us with a view regarding which of the above expenses are fixed and variable. Variable in this context means that the associated expenses will move in line with changes in membership of the fund. Following this request, the NHIF provided the following categorizations of fixed and variable expenses:

Salaries (excluding enrolment)	**Fixed or Variable**
Office of Director General	F
Directorate of Operations	F
Directorate of Claim Reimbursement	F
Directorate of marketing and PR	F
Directorate of finance investment and accountants	F
Directorate of Member relations	F
Directorate of HR and admin	F
Directorate of providers relations	F
Directorate of planning research and information	F
Drivers/secretaries	F
Regions	F
Other staff costs	**Fixed or Variable**
Other staff benefits Expenditure	V
Staff welfare and committee	V

Other expenses	Fixed or Variable
Advocacy	V
Health providers inspection	F
Fair and exhibition	F
Health promotion	V
Health provider equipment loan	F
SSRA levy	F
Grants	F
Recruitment expenses	V
Office expenses	V
Travelling expenses	V
Repair and other general expenses	V
Rent and other fees	F
Training and committees	F
Advertisement	V
Board meeting and annual fees	F
Gift and donations	F
Legal and consultant fees	F
Review of policy and fraud investigation	F
Enrolment officer costs (based on 189 officers)'	**Fixed or Variable**
Salaries	F
Equipment (Enrolment officers Laptop and computers)	F
Transport (Motorcycle costs)	F
Number of enrolment agents (based on 4000 enrolment agents)	**Fixed or Variable**
Ward officer enrolment equipment costs	F

The year one costs (excl. enrolment commission) shown on the previous page have been categorized and summarized and compared to actual expenditure incurred by the NHIF. The results are provided below:

Non-healthcare expenditure (excl. enrolment commission) in billions	2015 data received from NHIF
Salaries (excluding enrolment)	18
Other staff costs	14
Other expenses	40
Enrolment expenses	9
Total	**81**
NHIF 2014 actual expenditure as per the Audited Financial Statements	**50**

A comparison with current NHIF audited 2014 AFS statements showed that the year one costs are unlikely to have taken into account the additional membership that is expected under SNHI. Based on this, we therefore scaled up variable expenses linearly in line with the expected increase in membership. We also allowed for inflation in order to determine the year one costs in 2017 terms. The year one results can be seen in the table below:

Non-healthcare expenditure (excl. enrolment commission) in billions	2015 data received	2017
Salaries (excluding enrolment)	18	21
Other staff costs	14	17
Other expenses	40	245
Enrolment expenses	9	11
Total	**81**	**294**
Estimated growth in expenses after allowing for variable expenses and inflation in year one	263%	
Current NHIF beneficiaries as per data received	2 101 049	
Expected number of beneficiaries for year one under SNHI	24 745 441	
Membership increase from NHIF to SNHI in year one	1 178%	

The main assumption (and limitation) is that we have assumed that the year one budget provided has been set in light of HFS strategy i.e. accounting for increases in number of staff required and changes/adjustments to IT systems, operational systems etc. that are expected in order to operate SNHI. The expense items have not been audited nor verified for accuracy or appropriateness. Therefore if this budget was incorrectly estimated, the above projections will need to be revised. In addition, we have relied on the accuracy of the categorization of variable and fixed expenses provided to us. Should these not be appropriately categorized the projections will need to be revised.

We cannot make any assertions regarding the reasonability of the expense estimates as we have relied on the data provided to us. In order to assess the reasonability thereof, we recommend that the expense information provided to us is reviewed extensively in light of the operational requirements expected for implementation of SNHI. These include but are not limited to the following:

- IT system enhancements
- Increased office space
- Increased marketing expenses including educational campaigns, awareness campaigns etc.
- Increased expenses associated with monitoring and evaluation systems

In Section 7, we discuss the reasonability of non-healthcare expenditure in the context of total expenditure as deemed reasonable based on industry trends.

The above does not account for enrolment commission. We discuss the methodology for estimating enrolment commission in the next section.

5.6.2 Methodology in estimating enrolment agent commission

Enrolment agents will play a crucial role in the calculation of expenditure outgo of the SNHI. In order to accurately assess and project the cost of enrolment commission, it is important to understand the following:

- Which population group will the enrolment agents be responsible for enrolling?

- How many families will one enrolment agent be expected to enroll in year one i.e. what is the assumed productivity of an enrolment agent?
- How many enrolment agents will be employed?
- How will enrolment agents be remunerated?

In respect of the above points the following was confirmed via email with the NHIF and HP+:

- 4000 enrolment agents will be employed in year one.
- Enrolment agents are responsible for enrolling the informal sector families only.
- These 4000 enrolment agents are expected to yield the proportion of informally enrolled populations as derived in the HFS.
- Enrolment commission is likely to be a fixed amount per family enrolled. The nominal value of this amount has not yet been decided.

In light of the above information received, we proceeded to perform the following analyses in order to determine the cost of enrolment commission:

- Deriving enrolment agent productivity
- Estimating the number of enrolment agents required in light of the productivity assessment
- Estimating enrolment commission

Each of the above analyses are discussed in detail below.

Deriving enrolment agent productivity

We calculated year one productivity based on the assumption that 4 000 enrolment agents are expected to enroll 19% of the total population in year one. This assumption equates to 557 informal families enrolled in a year per enrolment agent. The table below describes the underlying calculation in more depth:

Enrolment agent productivity assessment	Results
Number of enrolment agents	4000
19% of the total population will be enrolled in year one	9 752 856
Average family size of informal families	4.375
Total resulting number of informal families that will be enrolled in year one	2 229 224
Number of informal families enrolled per enrolment agent in year one	557
Resulting enrolment agent productivity per annum	**557 informal families**

In consultation with HP+, we then apply a reduction in productivity in each subsequent year. The rationale for this reduction is that we expect that enrolment agents will enroll families that are easily persuaded and are able to afford the contribution required with reasonable ease. In later years, it will be more difficult for enrolment agents to enroll families as these are likely to be the families that refused to be enrolled in the previous year. The productivity decrease assumed per year, as well as the resulting number of families enrolled per enrolment agent is given in the table below:

	2017	2018	2019	2020	2021
Productivity decrease relative to year one	N/A	30%	40%	50%	60%
Number of families enrolled per enrolment agent	557	390	334	279	223

Estimating the number of enrolment agents required in year one in light of the productivity assessment

In light of the productivity assumptions detailed above, we have estimated the number of enrolment agents required in each year in order to meet the target enrolled population as calculated. This can be seen below:

	2017	2018	2019	2020	2021
% of the total population enrolled	48%	54%	59%	65%	70%
% of the total population enrolled that are informally employed	30%	34%	37%	40%	42%
Total number of informal families enrolled	15 650 165	2 351 601	2 168 969	2 173 557	1 555 679
Total number of informal families enrolled in each year	3 577 181	537 509	495 764	496 813	355 584
Number of families enrolled per enrolment agent	557	390	334	279	223
Number of enrolment agents required	6 419	1 378	1 483	1 783	1 595

We understand that it is unlikely that the number of enrolment agents employed by SNHI will reduce over time, i.e. 4 000 enrolment agents will be in employment by the SNHI until 2021. We therefore provide a scenario in Appendix A which we show the impacts on feasibility, enrolment and enrolment commission assuming a constant 4 000 enrolment agents in all 5 years.

Estimating enrolment commission

We estimate enrolment commission simply by multiplying the number of enrolled families by the commission rate. It is our understanding that the commission rate is not yet determined by SNHI and other stakeholders. In the absence of this information, we have assumed that enrolment commission will be similar to that currently earned under iCHF. Enrolment agents under iCHF earn 5% of the member's contribution. The total earnings expected per enrolment agent per annum are shown below:

Total enrolment commission (TZ shillings billions)	11	2	2	2	1
Number of enrolment agents	6 419	1 378	1 483	1 783	1 595
Income per enrolment agent p.a. (TZ shillings millions)	0.85	0.61	0.53	0.45	0.37

In the above estimations, we have further assumed that those currently enrolled on iCHF and CHF will be re-enrolled and agents will receive their respective commission. This is based on our understanding that iCHF members are not currently persistent due to poor service levels. In addition, iCHF accounts for a very small proportion of the population therefore assuming re-enrolment of iCHF has minimal impacts.

The main limitation in this estimation is that the assumed productivity assumption is incorrect, the enrolment commission as well as the coverage levels will differ.

5.6.3 Non-health expenditure projections

In this section we provide a summary of the projected non-healthcare expenditure projections for each year. These projections take the following into account:

- If an item is classified as fixed, it will only increase going forward with inflation.
- Salary related costs increase at salary inflation and other costs increase at CPI
- If an item is classified as variable, it will increase with inflation and with the proportionate increase in the enrolled population from year to year.

The final calibrated non-healthcare results, based on the HFS enrolled population and the NHIF year one baseline data are displayed below:

	2017	2018	2019	2020	2021
Non-healthcare expenditure	**300**	**343**	**400**	**467**	**534**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	17	20	24	28	33
Other expenses	245	292	342	402	463
Enrolment expenses	11	8	9	9	10
Enrolment commission	5	1	1	1	1

6. Feasibility assessment of the Single National Health Insurance Fund

In this section of the report we discuss the overall feasibility of SNHI for Tanzania. In doing this, we bring together each component derived in Section 5 of this report into one income statement view. We also produce financial ratios that indicate the financial health of the fund over time under various scenarios.

Scenario analysis was also used as a tool for testing results. In the scenario testing, a combination of variables were adjusted simultaneously to determine the impact of possible real world scenarios.

Each of the scenario results are compared and discussed in the summary that follows. The income statement and financial health indicators are provided in detail after the summary. Further scenarios and sensitivities have been considered in Appendix A.

6.1 Summary

In this section we discuss the feasibility of the fund under the base scenario including a range of additional likely scenarios. We first begin with an explanation of the changes made in each scenario followed by a summary of results and commentary.

Description of scenarios:

- Base Scenario

  This scenario reflects our view of SNHI feasibility based on our best estimate assumptions. For ease of reference our baseline best estimate results are based on the following critical assumptions:

	2017	2018	2019	2020	2021
Key assumptions:					
% of population enrolled	48%	54%	59%	65%	70%
Number of enrolment agents	6 419	1 378	1 483	1 783	1 595
CPI assumption	5.0%	5.0%	5.0%	5.0%	5.0%
Salary inflation	7.0%	7.0%	7.0%	7.0%	7.0%
Healthcare Cost Inflation (HCCI)	9.0%	9.0%	9.0%	9.0%	9.0%

Benefit package	
Formal sector	MBP+
Informal sector	MBP
Poor/Near-poor	MBP
Unemployed	MBP

- **Scenario 1: Affordability of MBP+ for poor/near-poor population**

A deviation from the baseline scenario is highlighted in red.

Poor/Near-poor	MBP+
Unemployed	MBP+

- **Scenario 2: Healthcare utilization increases over time under a fully FFS MBP+ package**

The base assumptions in the table remain unchanged. In this scenario we demonstrate the impact of assuming an increase in utilization for the MBP+ enrolled formal population of 10% p.a. We have also allowed for the MBP+ package to be fully reimbursed through a FFS model.

- **Scenario 3: Innovative financing sources for health become available**

The base assumptions in the table remain unchanged. In this scenario we demonstrate the impact of sin taxes becoming available for financing of the SNHI fund.

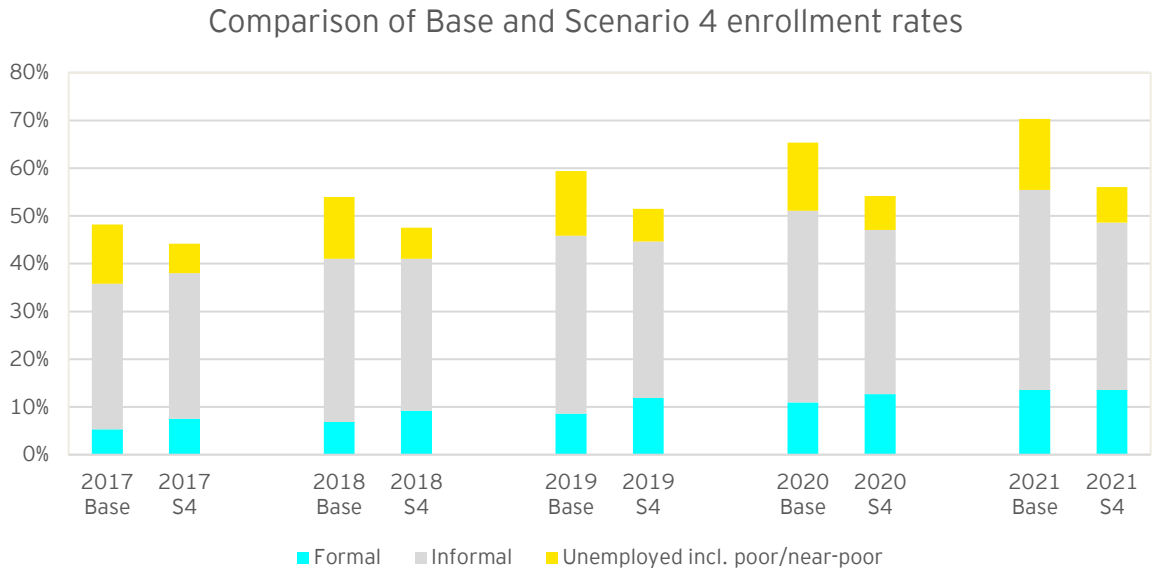
- **Scenario 4: EY best estimate**

EY has prepared a scenario representing our best estimate of the SNHI's feasibility based on the following concerns/risks present in the base scenario

- Low utilization rates
- Capitation rates are insufficient to compensate providers
- Pessimistic low enrolment of the formal sector
- Optimistic high enrolment of the poor/near poor population

To address these issues the following adjustments have been made:

- The utilization curves have been increased by 30% once off in year 1 and 10% yearly in addition from year 2
- Capitation rates have been adjusted to reflect healthcare providers agreeing to a 10% discount as a result of the large volume of work
- Enrolment of the population is assumed to be as follows:



- The entire unemployed population will be unable to pay contributions
- Informal sector contribution compliance will be 65%

Summarized results:

The gross surplus/deficit resulting from the above scenarios are displayed in the table below. Gross surplus/deficit is defined as the end of year surplus/deficit before any investment income earned in that year or any additional sources of revenue have been received.

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Scenario 1: Affordability of MBP+ for poor/near-poor population	-130	-179	-134	-45	71
Scenario 2: Healthcare utilization increases over time under a fully FFS MBP+ package	297	260	353	484	640
Scenario 3: Innovative financing sources for health become available	285	398	543	749	1 002
Scenario 4: EY best estimate	263	16	-109	-207	-347

Commentary

The SNHI fund before any adjustments to the base scenario assumptions demonstrate that the fund is feasible, and the strength of feasibility grows over time. Further to this, it can be seen that the fund is unsustainable when the poor/near-poor populations are offered MBP+ benefit coverage. It can be seen from the detailed scenario results in the sections that follow, that SNHI is only feasible under Scenario 1 should Pooling Option A, B or C be injected into the fund in addition to the subsidized contributions. The feasibility range defined by the net surplus/deficit depends on the extent of subsidies injected.

Sustainability strength increases over time for most scenarios with the exception of 4. These scenarios respectively show that the impact of MBP + benefits for the poor/near-poor populations render the fund unsustainable. Scenario 2 highlights the critical requirements for the utilization assumption to be as

accurate and reasonably reflective of the underlying populations claiming behavior as well as the importance of controlling service provider costs. Should these assumptions be inadequately reflective, the impacts on the sustainability of the fund are significant. It is our view that the base assumption of utilization and healthcare costs derived from the data are underestimated due to the data issues and explanations provided in the methodology discussion in Section 5 of this report. In particular, given the challenges experienced with estimating beneficiaries, i.e. beneficiaries are not removed from the system upon exit from the fund, ultimately overestimating the total number of beneficiaries belonging to the fund, we believe that the average cost per beneficiary is significantly understated. This is because not all the beneficiaries that we assume belong to the fund are actually eligible to make a claim and are therefore not reflected in the claim costs. For iCHF underlying data, this is less relevant given that the benefit package under MBP will be largely capitated on a per family basis.

In addition, the base scenario assumes a fairly high enrolment rate. We believe that given the current performance of both the NHIF, CHF and iCHF, it is unlikely that these coverage levels will be achieved in year one.

It is vital to note that all the above scenarios (excluding Scenario 4) are based on the capitation rates assumed under MBP and those calculated under MBP+ (where relevant) as the average of actual claims experienced by the NHIF population. Should these capitation agreements vary considerably from those derived in our estimations (which is extremely probable), we strongly recommend a re-evaluation of the sustainability. We also strongly recommend that the capitation rates are derived independently and in consultation with the service providers and clinical risk analysts.

As a result of these data challenges, we have produced a Scenario 4 which we deem as a best estimate of the funds expected experience. Under this scenario multiple assumptions are adjusted simultaneously as deemed appropriate and results in significant fund deficits.

<u>Comparison of each scenario with the base:</u>

- Scenario 1

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	**285**	**398**	**543**	**749**	**1 002**
Scenario 1: Affordability of MBP+ for poor/near-poor population	**-130**	**-179**	**-134**	**-45**	**71**

Scenario 1 demonstrates that the impact of providing the poor/non-poor populations with MBP+ benefits will render the fund unsustainable unless the government injects significant sources of revenue. The sustainability however improves over time, largely driven by the capitation agreements in place. Given that these capitation agreements have not been set and are mere rough estimations, the improvement in sustainability is questionable. Service providers are likely to require higher capitation amounts over time due to the influx of claims from poor populations. In addition, these capitation amounts are dependent on the underlying assumptions relating to primary and non-primary care. If a higher proportion of claims are not considered primary, the surplus/deficit of the fund will weaken considerably. In addition, if EY's assessment that the underlying data provided is understating the true average claim cost per beneficiary, the surplus will weaken further.

- Scenario 2

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	**285**	**398**	**543**	**749**	**1 002**

Scenario 2: Healthcare utilization increases over time under a fully FFS MBP+ package	**297**	**260**	**353**	**484**	**640**

Scenario 2 demonstrated that the impact of utilization increases over time is far more severe under a FFS model for MBP+. This due to the fact that utilization volatility is not managed under a capitated primary care reimbursement model.

- Scenario 3

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	**285**	**398**	**543**	**749**	**1 002**
Scenario 3: Sin taxes	**285**	**398**	**543**	**749**	**1 002**

The availability of innovative funding will not change the gross surplus/deficit of the fund, so instead a comparison based on the 3 pooling options is given:

Net Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario – Pooling Option A	526	719	970	1 319	1 762
Base Scenario – Pooling Option B	607	842	1 150	1 576	2 122
Base Scenario – Pooling Option C	723	1 009	1 384	1 899	2 564
Scenario 3 – Innovative financing sources for health become available. Pooling Option A	**805**	**1 059**	**1 380**	**1 810**	**2 348**
Scenario 3 – Innovative financing sources for health become available. Pooling Option B	**886**	**1 182**	**1 560**	**2 067**	**2 708**
Scenario 3 – Innovative financing sources for health become available. Pooling Option C	**1 002**	**1 348**	**1 794**	**2 391**	**3 150**

- Scenario 4

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	**285**	**398**	**543**	**749**	**1 002**
Scenario 4: EY best estimate	**263**	**16**	**-109**	**-207**	**-347**

Scenario 4 demonstrates that the fund will not remain feasible based on EYs best estimate view of assumptions.

6.2 Interpreting the full financial results for each scenario

Key assumptions:

Each set of full results begins with a summary of the scenario specific assumptions, with emphasis on those that have changed from the base scenario.

Contribution income

The contributions are split by population group and generally increase over time as the population increases and as a result of inflation.

Healthcare expenditure

The healthcare expenditure is split by benefit type (MBP+ and MBP), primary and non-primary care and then by the population groups receiving the benefits.

Non-healthcare expenditure

The non-healthcare expenditure has been summarized into 5 components. For a detailed breakdown of these costs, see Section 5.6.

Gross Surplus/ Deficit

This shows the surplus/deficit in the fund as a result of the contributions and expenditure listed above, prior to any other income being received. As a result, these figures show the fund's surplus/deficit prior to the income shown in the purple lines below or from the pooling options.

Supporting the non-contributing unemployed

This shows the value of the contributions subsidized by the government to fund the non-contributing unemployed population.

Surplus/Deficit (Before investment returns)

The assets brought forward and the resulting investment income is listed here.

Net Surplus/Deficit

The net figure shows the surplus/deficit of the fund assuming that the sources of income shown in purple above are sourced, and after including investment income.

Pooling Option A: Subsidy only

These results assume that subsidies are available for only the poor/near-poor population and include the cost of supporting the non-contributing unemployed population shown in purple above

Pooling Option B: Subsidy and informal sector

These results assume that subsidies are available for the poor/near-poor and the informal population and include the cost of supporting the non-contributing unemployed population shown in purple above

Pooling Option C: All SNHI members

These results assume that subsidies are available for the entire enrolled population and include the cost of supporting the non-contributing unemployed population shown in purple above

The remainder of the financial results present various metrics to assess the fund's financial position

6.3 Base Scenario:

This scenario reflects our view of SNHI feasibility based on our best estimate assumption bases. For ease of reference our baseline best estimate results are based on the following critical assumptions:

	2017	2018	2019	2020	2021
Key assumptions:					
% of population enrolled	48%	54%	59%	65%	70%
Number of enrolment agents	6 419	1 378	1 483	1 783	1 595
CPI assumption	5.0%	5.0%	5.0%	5.0%	5.0%
Salary inflation	7.0%	7.0%	7.0%	7.0%	7.0%
Healthcare Cost Inflation (HCCI)	9.0%	9.0%	9.0%	9.0%	9.0%

Benefit package	
Formal sector	MBP+
Informal sector	MBP
Poor/Near-poor	MBP
Unemployed	MBP

Financial results:

	2017	2018	2019	2020	2021
Contribution Income (Billions)	**1 078**	**1 414**	**1 819**	**2 374**	**3 040**
Formal sector contributions - employees	328	451	606	832	1 117
Formal sector contributions - employers	328	451	606	832	1 117
Informal sector contributions - families	370	446	523	608	682
Unemployed self-paid contributions	51	66	83	103	125

Healthcare expenditure	**488**	**671**	**876**	**1 158**	**1 503**
MBP+	**252**	**360**	**499**	**706**	**976**
Primary	**85**	**122**	**171**	**244**	**339**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	85	122	171	244	339
Non-Primary	**167**	**237**	**328**	**462**	**637**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	167	237	328	462	637
MBP	**236**	**312**	**377**	**452**	**527**
Primary	**191**	**236**	**285**	**341**	**398**
Poor and Unemployed Population	51	60	70	82	96
Informally Employed Population	140	176	215	259	302
Non-Primary	44	76	92	110	129

Poor and Unemployed Population	15	24	28	33	39
Informally Employed Population	29	52	63	77	90
Non-healthcare expenditure	**305**	**344**	**401**	**467**	**535**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	17	20	24	28	33
Other expenses	245	292	342	402	463
Enrolment expenses	11	8	9	9	10
Enrolment commission	11	2	2	2	1
Gross Surplus/ Deficit excl. any additional sources of revenue	**285**	**398**	**543**	**749**	**1 002**
Subsidies received are equal to estimated contributions					
Supporting the non-contributing unemployed	**54**	**57**	**60**	**62**	**65**
Surplus/Deficit (Before investment returns)	**339**	**455**	**602**	**811**	**1 067**
Assets brought forward	1 200	1 674	2 315	3 174	4 336
Investment income	134	186	256	351	477
Net Surplus/Deficit	**473**	**642**	**859**	**1 162**	**1 544**
Pooling Option A: Subsidy only					
Other Income (Billions)	**104**	**126**	**154**	**189**	**236**
Surplus/Deficit (Before investment returns)	**389**	**524**	**696**	**938**	**1 237**
Assets brought forward	1 200	1 726	2 445	3 415	4 734
Investment income	137	195	274	381	525
Net Surplus/Deficit	**526**	**719**	**970**	**1 319**	**1 762**
Pooling Option B: Subsidy and informal sector					
Other Income (Billions)	**181**	**235**	**306**	**399**	**519**
Surplus/Deficit (Before investment returns)	**466**	**634**	**849**	**1 147**	**1 521**
Assets brought forward	1 200	1 807	2 649	3 799	5 374
Investment income	140	208	301	428	601
Net Surplus/Deficit	**607**	**842**	**1 150**	**1 576**	**2 122**
Pooling Option C: All SNHI members					
Other Income (Billions)	**292**	**383**	**503**	**659**	**862**

Surplus/Deficit (Before investment returns)	**577**	**782**	**1 046**	**1 407**	**1 863**
Assets brought forward	1 200	1 923	2 932	4 316	6 215
Investment income	146	227	339	492	700
Net Surplus/Deficit	**723**	**1 009**	**1 384**	**1 899**	**2 564**

Financial indicators:

Claims Ratios					
Formal Sector	38.42%	39.85%	41.14%	42.46%	43.69%
Informal Sector	37.93%	39.47%	41.05%	42.67%	44.35%
Poor and Unemployed (incl. subsidised contributions)	48.31%	48.56%	49.04%	49.71%	50.55%
Overall Claims Ratio	**45.26%**	**47.47%**	**48.13%**	**48.78%**	**49.45%**

Expense Ratios					
Salaries (excluding enrolment)	1.97%	1.61%	1.34%	1.10%	0.92%
Other staff costs	1.55%	1.43%	1.32%	1.20%	1.08%
Other expenses	22.72%	20.63%	18.82%	16.94%	15.24%
Enrolment expenses	1.03%	0.57%	0.47%	0.38%	0.32%
Enrolment commission	1.02%	0.12%	0.09%	0.07%	0.04%
Overall Expense Ratio before enrolment commission	26.25%	23.66%	21.48%	19.24%	17.24%
Overall Expense Ratio	28.30%	24.35%	22.04%	19.69%	17.60%

Surplus/ Deficit Ratios					
Gross Surplus/Deficit	26.44%	28.18%	29.83%	31.54%	32.95%
Net Surplus/Deficit					
Subsidies received are equal to estimated contributions	43.92%	45.37%	47.20%	48.94%	50.80%
Subsidy only	48.77%	50.85%	53.32%	55.55%	57.96%
Subsidy and informal sector	56.27%	59.53%	63.21%	66.37%	69.80%
All SNHI members	67.05%	71.32%	76.09%	80.01%	84.34%

Solvency					
Assets as percentage of contribution income					
Subsidies received are equal to estimated contributions	155.29%	163.73%	174.46%	182.63%	193.43%
Subsidy only	160.14%	172.91%	187.71%	199.40%	213.67%
Subsidy and informal sector	167.64%	187.31%	208.81%	226.39%	246.59%
All SNHI members	178.42%	207.32%	237.23%	261.80%	288.79%

6.4 Scenario 1: Affordability of MBP+ for poor/near-poor population

Assumptions:

A deviation from the baseline scenario is highlighted in red.

	2017	2018	2019	2020	2021
Key assumptions:					
% of population enrolled	48%	54%	59%	65%	70%
Number of enrolment agents	6 419	1 378	1 483	1 783	1 595
CPI assumption	5.0%	5.0%	5.0%	5.0%	5.0%
Salary inflation	7.0%	7.0%	7.0%	7.0%	7.0%
Healthcare cost inflation	9.0%	9.0%	9.0%	9.0%	9.0%

Benefit package	
Formal sector	MBP+
Informal sector	MBP
Poor/Near-poor	MBP+
Unemployed	MBP+

Financial results:

	2017	2018	2019	2020	2021
Contribution Income (Billions)	**1 078**	**1 414**	**1 819**	**2 374**	**3 040**
Formal sector contributions - employees	328	451	606	832	1 117
Formal sector contributions - employers	328	451	606	832	1 117
Informal sector contributions - families	370	446	523	608	682
Unemployed self-paid contributions	51	66	83	103	125

Healthcare expenditure	**903**	**1 249**	**1 553**	**1 952**	**2 434**
MBP+	**733**	**1 021**	**1 274**	**1 616**	**2 041**
Primary	**356**	**440**	**544**	**681**	**851**
Poor and Unemployed Population	271	318	373	437	512
Formally Employed Population	85	122	171	244	339
Non-Primary	**377**	**581**	**731**	**935**	**1 191**
Poor and Unemployed Population	210	344	403	472	554
Formally Employed Population	167	237	328	462	637
MBP	**170**	**228**	**278**	**336**	**392**
Primary	**140**	**176**	**215**	**259**	**302**
Poor and Unemployed Population	0	0	0	0	0
Informally Employed Population	140	176	215	259	302

Non-Primary	29	52	63	77	90
Poor and Unemployed Population	0	0	0	0	0
Informally Employed Population	29	52	63	77	90
Non-healthcare expenditure	**305**	**344**	**401**	**467**	**535**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	17	20	24	28	33
Other expenses	245	292	342	402	463
Enrolment expenses	11	8	9	9	10
Enrolment commission	11	2	2	2	1
Gross Surplus/ Deficit excl. any additional sources of revenue	**-130**	**-179**	**-134**	**-45**	**71**
Subsidies received are equal to estimated contributions					
Supporting the non-contributing unemployed	**54**	**57**	**60**	**62**	**65**
Surplus/Deficit (Before investment returns)	**-76**	**-122**	**-75**	**17**	**137**
Assets brought forward	1 200	1 238	1 231	1 273	1 416
Investment income	114	115	117	126	145
Net Surplus/Deficit	**38**	**-7**	**42**	**143**	**282**
Pooling Option A: Subsidy only					
Other Income (Billions)	**104**	**126**	**154**	**189**	**236**
Surplus/Deficit (Before investment returns)	**-26**	**-54**	**19**	**144**	**307**
Assets brought forward	1 200	1 291	1 361	1 514	1 814
Investment income	116	124	134	155	193
Net Surplus/Deficit	**90**	**70**	**153**	**300**	**500**
Pooling Option B: Subsidy and informal sector					
Other Income (Billions)	**181**	**235**	**306**	**399**	**519**
Surplus/Deficit (Before investment returns)	**51**	**56**	**172**	**353**	**590**
Assets brought forward	1 200	1 372	1 565	1 898	2 455
Investment income	120	137	162	203	269
Net Surplus/Deficit	**171**	**193**	**333**	**557**	**860**
Pooling Option C: All SNHI members					
Other Income (Billions)	**292**	**383**	**503**	**659**	**862**

Surplus/Deficit (Before investment returns)	**162**	**204**	**369**	**614**	**933**
Assets brought forward	1 200	1 488	1 848	2 415	3 296
Investment income	126	156	199	267	369
Net Surplus/Deficit	**287**	**360**	**568**	**880**	**1 302**

Financial indicators:

Claims Ratios					
Formal Sector	38.42%	39.85%	41.14%	42.46%	43.69%
Informal Sector	37.93%	39.47%	41.05%	42.67%	44.35%
Poor and Unemployed (incl. subsidised contributions)	456.44%	538.48%	543.62%	551.12%	560.77%
Overall Claims Ratio	**83.76%**	**88.33%**	**85.35%**	**82.22%**	**80.06%**

Expense Ratios					
Salaries (excluding enrolment)	1.97%	1.61%	1.34%	1.10%	0.92%
Other staff costs	1.55%	1.43%	1.32%	1.20%	1.08%
Other expenses	22.72%	20.63%	18.82%	16.94%	15.24%
Enrolment expenses	1.03%	0.57%	0.47%	0.38%	0.32%
Enrolment commission	1.02%	0.12%	0.09%	0.07%	0.04%
Overall Expense Ratio before enrolment commission	26.25%	23.66%	21.48%	19.24%	17.24%
Overall Expense Ratio	28.30%	24.35%	22.04%	19.69%	17.60%

Surplus/ Deficit Ratios					
Gross Surplus/Deficit	-12.06%	-12.68%	-7.39%	-1.91%	2.34%
Net Surplus/Deficit					
Subsidies received are equal to estimated contributions	3.54%	-0.50%	2.31%	6.02%	9.28%
Subsidy only	8.39%	4.97%	8.44%	12.62%	16.43%
Subsidy and informal sector	15.89%	13.66%	18.33%	23.45%	28.28%
All SNHI members	26.67%	25.45%	31.20%	37.08%	42.82%

Solvency					
Assets as percentage of contribution income					
Subsidies received are equal to estimated contributions	114.90%	87.08%	70.00%	59.65%	55.86%
Subsidy only	119.75%	96.25%	83.25%	76.42%	76.11%
Subsidy and informal sector	127.26%	110.66%	104.34%	103.41%	109.03%
All SNHI members	138.04%	130.66%	132.76%	138.82%	151.23%

6.5 Scenario 2: Healthcare utilization increases over time under a fully FFS MBP+ package

Assumptions:

	2017	2018	2019	2020	2021
Key assumptions:					
% of population enrolled	48%	54%	59%	65%	70%
Number of enrolment agents	6 419	1 378	1 483	1 783	1 595
CPI assumption	5.0%	5.0%	5.0%	5.0%	5.0%
Salary inflation	7.0%	7.0%	7.0%	7.0%	7.0%
HCCI	9.0%	9.0%	9.0%	9.0%	9.0%

Benefit package	
Formal sector	MBP+
Informal sector	MBP
Poor/Near-poor	MBP
Unemployed	MBP

The base assumptions in the table remain unchanged. In this scenario we demonstrate the impact of assuming an increase in utilization for the MBP+ enrolled formal population of 10% p.a. We have also allowed for the MBP+ package to be fully reimbursed through a FFS model.

Financial results:

	2017	**2018**	**2019**	**2020**	**2021**
Contribution Income (Billions)	**1 078**	**1 414**	**1 819**	**2 374**	**3 040**
Formal sector contributions - employees	328	451	606	832	1 117
Formal sector contributions - employers	328	451	606	832	1 117
Informal sector contributions - families	370	446	523	608	682
Unemployed self-paid contributions	51	66	83	103	125

Healthcare expenditure	**476**	**810**	**1 065**	**1 422**	**1 865**
MBP+	**240**	**498**	**688**	**971**	**1 337**
Primary	**0**	**0**	**0**	**0**	**0**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	0	0	0	0	0
Non-Primary	**240**	**498**	**688**	**971**	**1 337**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	240	498	688	971	1 337
MBP	**236**	**312**	**377**	**452**	**527**

Primary	**191**	**236**	**285**	**341**	**398**
Poor and Unemployed Population	51	60	70	82	96
Informally Employed Population	140	176	215	259	302
Non-Primary	44	76	92	110	129
Poor and Unemployed Population	15	24	28	33	39
Informally Employed Population	29	52	63	77	90
Non-healthcare expenditure	**305**	**344**	**401**	**467**	**535**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	17	20	24	28	33
Other expenses	245	292	342	402	463
Enrolment expenses	11	8	9	9	10
Enrolment commission	11	2	2	2	1
Gross Surplus/ Deficit	**297**	**260**	**353**	**484**	**640**
Subsidies received are equal to estimated contributions					
Supporting the non-contributing unemployed	**54**	**57**	**60**	**62**	**65**
Surplus/Deficit (Before investment returns)	**351**	**316**	**413**	**547**	**706**
Assets brought forward	1 200	1 686	2 184	2 830	3 681
Investment income	135	181	234	304	395
Net Surplus/Deficit	**486**	**497**	**647**	**851**	**1 101**
Subsidy only					
Other Income (Billions)	**104**	**126**	**154**	**189**	**236**
Surplus/Deficit (Before investment returns)	**401**	**385**	**507**	**674**	**876**
Assets brought forward	1 200	1 739	2 313	3 072	4 079
Investment income	137	189	252	334	443
Net Surplus/Deficit	**538**	**575**	**758**	**1 008**	**1 318**
Subsidy and informal sector					
Other Income (Billions)	**181**	**235**	**306**	**399**	**519**
Surplus/Deficit (Before investment returns)	**478**	**495**	**659**	**883**	**1 159**
Assets brought forward	1 200	1 819	2 517	3 455	4 720
Investment income	141	203	279	382	519
Net Surplus/Deficit	**619**	**698**	**938**	**1 265**	**1 679**

All SNHI members

Other Income (Billions)	292	383	503	659	862

Surplus/Deficit (Before investment returns)	589	643	856	1 143	1 502
Assets brought forward	1 200	1 936	2 800	3 972	5 561
Investment income	146	221	316	445	619
Net Surplus/Deficit	**735**	**864**	**1 172**	**1 588**	**2 121**

Financial indicators:

Claims Ratios					
Formal Sector	36.58%	55.22%	56.77%	58.36%	59.88%
Informal Sector	37.93%	39.47%	41.05%	42.67%	44.35%
Poor and Unemployed (incl. subsidised contributions)	48.31%	48.56%	49.04%	49.71%	50.55%
Overall Claims Ratio	**44.14%**	**57.28%**	**58.55%**	**59.92%**	**61.34%**

Expense Ratios					
Salaries (excluding enrolment)	1.97%	1.61%	1.34%	1.10%	0.92%
Other staff costs	1.55%	1.43%	1.32%	1.20%	1.08%
Other expenses	22.72%	20.63%	18.82%	16.94%	15.24%
Enrolment expenses	1.03%	0.57%	0.47%	0.38%	0.32%
Enrolment commission	1.02%	0.12%	0.09%	0.07%	0.04%
Overall Expense Ratio before enrolment commission	26.25%	23.66%	21.48%	19.24%	17.24%
Overall Expense Ratio	28.30%	24.35%	22.04%	19.69%	17.60%

Surplus/ Deficit Ratios					
Gross Surplus/Deficit	27.56%	18.37%	19.41%	20.40%	21.06%
Net Surplus/Deficit					
Subsidies received are equal to estimated contributions	45.10%	35.17%	35.56%	35.84%	36.22%
Subsidy only	49.95%	40.64%	41.68%	42.44%	43.37%
Subsidy and informal sector	57.45%	49.33%	51.57%	53.27%	55.22%
All SNHI members	68.23%	61.12%	64.44%	66.90%	69.76%

Solvency					
Assets as percentage of contribution income					
Subsidies received are equal to estimated contributions	156.46%	154.43%	155.59%	155.07%	157.31%

Subsidy only	161.31%	163.60%	168.84%	171.83%	177.56%
Subsidy and informal sector	168.82%	178.01%	189.93%	198.82%	210.48%
All SNHI members	179.60%	198.01%	218.35%	234.23%	252.67%

6.6 Scenario 3: Innovative financing sources for health become available

Assumptions:
The base scenario assumptions remain unchanged, except for sin taxes becoming available as a source of funding for the SNHI.

Financial results:

	2017	2018	2019	2020	2021
Contribution Income (Billions)	**1 078**	**1 414**	**1 819**	**2 374**	**3 040**
Formal sector contributions - employees	328	451	606	832	1 117
Formal sector contributions - employers	328	451	606	832	1 117
Informal sector contributions - families	370	446	523	608	682
Unemployed self-paid contributions	51	66	83	103	125
Healthcare expenditure	**488**	**671**	**876**	**1 158**	**1 503**
MBP+	**252**	**360**	**499**	**706**	**976**
Primary	**85**	**122**	**171**	**244**	**339**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	85	122	171	244	339
Non-Primary	**167**	**237**	**328**	**462**	**637**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	167	237	328	462	637
MBP	**236**	**312**	**377**	**452**	**527**
Primary	**191**	**236**	**285**	**341**	**398**
Poor and Unemployed Population	51	60	70	82	96
Informally Employed Population	140	176	215	259	302
Non-Primary	44	76	92	110	129
Poor and Unemployed Population	15	24	28	33	39
Informally Employed Population	29	52	63	77	90
Non-healthcare expenditure	**305**	**344**	**401**	**467**	**535**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	17	20	24	28	33
Other expenses	245	292	342	402	463
Enrolment expenses	11	8	9	9	10
Enrolment commission	11	2	2	2	1
Gross Surplus/ Deficit	**285**	**398**	**543**	**749**	**1 002**

Subsidies received are equal to estimated contributions

Supporting the non-contributing unemployed	54	57	60	62	65
Surplus/Deficit (Before investment returns)	**339**	**455**	**602**	**811**	**1 067**
Assets brought forward	1 200	1 674	2 315	3 174	4 336
Investment income	134	186	256	351	477
Net Surplus/Deficit	**473**	**642**	**859**	**1 162**	**1 544**

Subsidy only

Other Income (Billions)	370	424	487	562	652
Surplus/Deficit (Before investment returns)	**655**	**822**	**1 029**	**1 310**	**1 654**
Assets brought forward	1 200	2 006	3 064	4 444	6 255
Investment income	150	237	351	500	694
Net Surplus/Deficit	**805**	**1 059**	**1 380**	**1 810**	**2 348**

Subsidy and informal sector

Other Income (Billions)	448	533	639	771	935
Surplus/Deficit (Before investment returns)	**733**	**932**	**1 182**	**1 520**	**1 937**
Assets brought forward	1 200	2 086	3 268	4 828	6 895
Investment income	154	250	378	548	771
Net Surplus/Deficit	**886**	**1 182**	**1 560**	**2 067**	**2 708**

All SNHI members

Other Income (Billions)	558	681	836	1 031	1 278
Surplus/Deficit (Before investment returns)	**843**	**1 080**	**1 379**	**1 780**	**2 280**
Assets brought forward	1 200	2 203	3 551	5 345	7 736
Investment income	159	269	416	611	870
Net Surplus/Deficit	**1 002**	**1 348**	**1 794**	**2 391**	**3 150**

Financial indicators:

Claims Ratios					
Formal Sector	38.42%	39.85%	41.14%	42.46%	43.69%
Informal Sector	37.93%	39.47%	41.05%	42.67%	44.35%
Poor and Unemployed (incl. subsidised contributions)	48.31%	48.56%	49.04%	49.71%	50.55%

Overall Claims Ratio	**45.26%**	**47.47%**	**48.13%**	**48.78%**	**49.45%**

Expense Ratios					
Salaries (excluding enrolment)	1.97%	1.61%	1.34%	1.10%	0.92%
Other staff costs	1.55%	1.43%	1.32%	1.20%	1.08%
Other expenses	22.72%	20.63%	18.82%	16.94%	15.24%
Enrolment expenses	1.03%	0.57%	0.47%	0.38%	0.32%
Enrolment commission	1.02%	0.12%	0.09%	0.07%	0.04%
Overall Expense Ratio before enrolment commission	26.25%	23.66%	21.48%	19.24%	17.24%
Overall Expense Ratio	28.30%	24.35%	22.04%	19.69%	17.60%

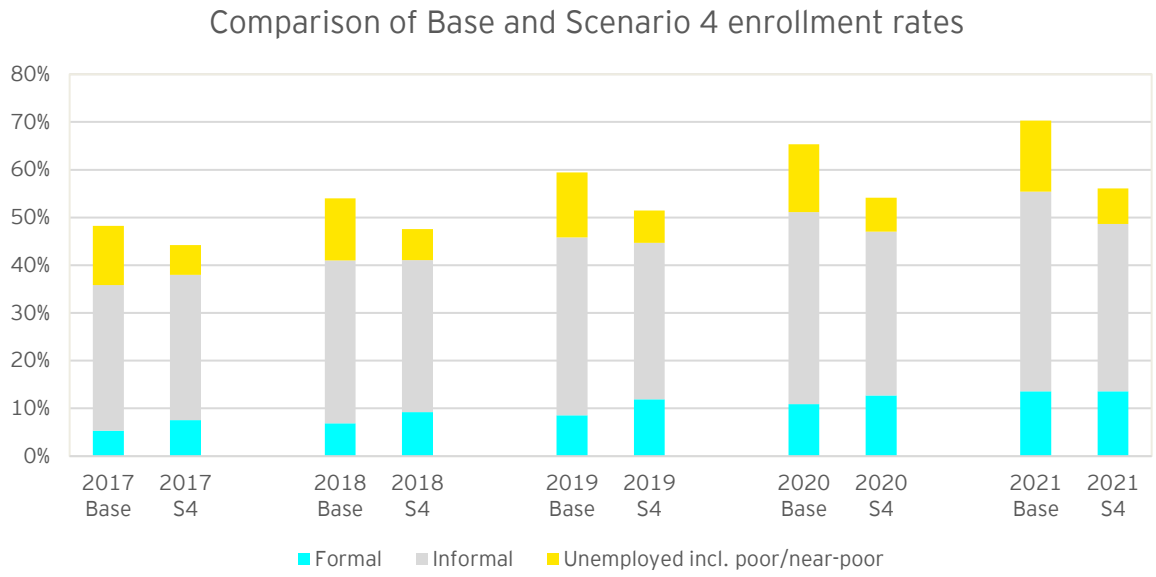
Surplus/ Deficit Ratios					
Gross Surplus/Deficit	26.44%	28.18%	29.83%	31.54%	32.95%
Net Surplus/Deficit					
Subsidies received are equal to estimated contributions	43.92%	45.37%	47.20%	48.94%	50.80%
Subsidy only	74.71%	74.88%	75.86%	76.25%	77.23%
Subsidy and informal sector	82.21%	83.57%	85.75%	87.08%	89.08%
All SNHI members	92.99%	95.36%	98.63%	100.71%	103.61%

Solvency					
Assets as percentage of contribution income					
Subsidies received are equal to estimated contributions	155.29%	163.73%	174.46%	182.63%	193.43%
Subsidy only	186.08%	216.72%	244.31%	263.47%	282.98%
Subsidy and informal sector	193.58%	231.12%	265.40%	290.46%	315.90%
All SNHI members	204.36%	251.13%	293.82%	325.88%	358.10%

6.7 Scenario 4 – EY best estimate

Assumptions:

- The utilization curves have been increased by 30% once off in year 1 and 10% yearly in addition from year 2
- Capitation has been adjusted to reflect healthcare providers agreeing to a 10% discount as a result of the large volume of work
- Enrolment of the population is assumed to be as follows:



- The entire unemployed population will be unable to pay contributions
- Informal sector contribution compliance will be 65%.

Financial results:

	2017	2018	2019	2020	2021
Contribution Income (Billions)	**1 121**	**1 435**	**1 922**	**2 242**	**2 605**
Formal sector contributions - employees	440	582	811	952	1 117
Formal sector contributions - employers	440	582	811	952	1 117
Informal sector contributions - families	240	270	299	338	371
Unemployed self-paid contributions	0	0	0	0	0
Healthcare expenditure	**589**	**1 128**	**1 699**	**2 076**	**2 540**
MBP+	**415**	**824**	**1 181**	**1 412**	**1 691**
Primary	**117**	**233**	**334**	**398**	**479**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	117	233	334	398	479
Non-Primary	**298**	**591**	**847**	**1 013**	**1 212**
Poor and Unemployed Population	0	0	0	0	0
Formally Employed Population	298	591	847	1 013	1 212
MBP	**174**	**304**	**517**	**664**	**849**
Primary	**126**	**190**	**372**	**476**	**611**
Poor and Unemployed Population	19	29	58	74	97
Informally Employed Population	107	161	314	402	514
Non-Primary	48	114	145	188	238
Poor and Unemployed Population	10	17	22	29	37
Informally Employed Population	38	97	123	159	201
Non-healthcare expenditure	**269**	**290**	**332**	**373**	**412**
Salaries (excluding enrolment)	21	23	24	26	28
Other staff costs	15	18	21	24	26
Other expenses	210	241	278	313	347
Enrolment expenses	11	8	9	9	10
Enrolment commission	11	1	1	1	1
Gross Surplus/ Deficit	**263**	**16**	**-109**	**-207**	**-347**
Subsidies received are equal to estimated contributions					
Supporting the non-contributing unemployed	**53**	**28**	**30**	**31**	**33**
Surplus/Deficit (Before investment returns)	**315**	**45**	**-79**	**-175**	**-314**
Assets brought forward	1 200	1 649	1 857	1 957	1 964

Investment income	133	164	178	183	177
Net Surplus/Deficit	**449**	**209**	**99**	**8**	**-137**

Pooling Option A: Subsidy only

Other Income (Billions)	**102**	**97**	**124**	**158**	**203**
Surplus/Deficit (Before investment returns)	**365**	**114**	**15**	**-48**	**-144**
Assets brought forward	1 200	1 701	1 987	2 198	2 362
Investment income	136	172	195	213	224
Net Surplus/Deficit	**501**	**286**	**210**	**165**	**80**

Pooling Option B: Subsidy and informal sector

Other Income (Billions)	**180**	**207**	**276**	**367**	**486**
Surplus/Deficit (Before investment returns)	**442**	**223**	**168**	**161**	**140**
Assets brought forward	1 200	1 782	2 191	2 581	3 003
Investment income	139	186	223	261	301
Net Surplus/Deficit	**582**	**409**	**390**	**422**	**441**

Pooling Option C: All SNHI members

Other Income (Billions)	**290**	**355**	**473**	**628**	**829**
Surplus/Deficit (Before investment returns)	**553**	**371**	**364**	**421**	**482**
Assets brought forward	1 200	1 898	2 474	3 098	3 844
Investment income	145	204	260	324	400
Net Surplus/Deficit	**698**	**576**	**625**	**745**	**883**

Financial indicators:

Claims Ratios					
Formal Sector	47.15%	70.77%	72.80%	74.15%	75.71%
Informal Sector	44.43%	59.39%	104.84%	118.98%	138.39%
Poor and Unemployed (incl. subsidised contributions)	36.79%	102.81%	195.13%	238.14%	297.70%
Overall Claims Ratio	**52.58%**	**78.63%**	**88.38%**	**92.60%**	**97.50%**
Expense Ratios					
Salaries (excluding enrolment)	1.90%	1.59%	1.27%	1.16%	1.07%
Other staff costs	1.37%	1.24%	1.08%	1.05%	1.01%

Other expenses	18.74%	16.78%	14.46%	13.96%	13.33%
Enrolment expenses	1.00%	0.56%	0.45%	0.41%	0.37%
Enrolment commission	0.98%	0.06%	0.04%	0.04%	0.03%
Overall Expense Ratio before enrolment commission	22.00%	19.61%	16.80%	16.17%	15.41%
Overall Expense Ratio	23.98%	20.22%	17.29%	16.62%	15.81%

Surplus/ Deficit Ratios					
Gross Surplus/Deficit	23.45%	1.15%	-5.66%	-9.22%	-13.31%
Net Surplus/Deficit					
Subsidies received are equal to estimated contributions	40.02%	14.54%	5.15%	0.34%	-5.26%
Subsidy only	44.68%	19.94%	10.95%	7.34%	3.09%
Subsidy and informal sector	51.90%	28.50%	20.31%	18.81%	16.92%
All SNHI members	62.27%	40.12%	32.50%	33.25%	33.88%

Solvency					
Assets as percentage of contribution income					
Subsidies received are equal to estimated contributions	147.12%	129.46%	101.79%	87.63%	70.15%
Subsidy only	151.79%	138.50%	114.33%	105.38%	93.78%
Subsidy and informal sector	159.00%	152.69%	134.30%	133.96%	132.21%
All SNHI members	169.37%	172.41%	161.20%	171.47%	181.45%

7. Conclusion and recommendations

In conclusion, should the underlying data and assumptions be an accurate reflection of the fund's risks, SNHI appears to be feasible under majority of the scenarios considered before any subsidies are accounted for. Scenario 4 is a reflection of EY's best estimate view given the data challenges experienced. Under this scenario, the fund is unsustainable. Feasibility strength improves considerably under all scenarios, once we allow for government subsidies and additional sources of revenue.

If actual experience deviates from the assumptions and the costs implied by the underlying data, the feasibility is significantly threatened. Any deviations to the underlying assumptions will present risks to the fund. These risks differ in significance but ultimately threaten the solvency of the fund.

Multiple simplifying assumptions have been applied, mainly due to the lack of clarity and lack of detail inherent in the design phase of the fund. We strongly suggest that the detail underlying the funds design and operations are thoroughly considered and confirmed prior to implementation. The following subsections highlight some of the risks and issues pertaining to the fund:

Feasibility re-evaluation:

Given the data challenges and limitations experienced, we recommend that the fund's feasibility is re-evaluated following a more comprehensive and accurate data collection process. Alternatively, we recommend that following implementation, the fund's experience is closely monitored on a monthly basis to understand deviations in actual experience, significant cost drivers and risks. The fund should have an agreed list of possible healthcare interventions that can be implemented should experience start to indicate a deteriorating position. Furthermore, we recommend that the fund always try to maintain a healthy cash surplus from month to month (and subsequently from year to year), to ensure protection against adverse experience deviations and unexpected events/circumstances not captured in the underlying data.

Expense review:

We recommend that the expense information provided to us is reviewed in detail to ensure accuracy and sufficiency. It is unclear in the data if any large one off expenses that will be required for the implementation of the fund have been accounted for. It is also unrealistic to assume that the list of variable expenses will increase in line with membership increases. Industry experience shows that non-healthcare expenditure usually accounts for 10-15% of total contribution/premium income in the private sector. Deviations to this figure occur depending on whether administration is performed internally of fully-outsourced. In a public sector environment administration expenses are likely to be lower than the percentage achieved in the private sector due to the non-for-profit nature of public sector funds. We acknowledge that the increase in expenses in nominal terms seems too low in comparison to the increase in membership. However, when considering the funds financial indicators, based on industry benchmarks, it is evident that the expenses ratio under all scenarios is much higher. We therefore recommend that the SNHI try to maintain an expense ratio closer to 8% or 10%.

Accurately setting capitation rates:

It is important to note that under all scenarios, a realistic capitation figure is not accounted for. This is because the underlying data is unlikely to be reflective of average experience across the entire population. Capitation is usually varied according to an individual's personal and social characteristics, using a process known as risk adjustment. The choice of reimbursement method is also a fundamental driver of the provider's behavior and can significantly impact both the cost and quality of care provided. Referrals and transfers of cases to higher levels of care, which may not be subject to capitated reimbursement, limit this method's ability to control total healthcare cost. It is therefore strongly recommended that capitation rates are calculated accurately and in consultation with service providers, actuaries and clinical risk analysts in order to ensure that quality of care is not compromised whilst still allowing for a fair reimbursement rate. Capitation rates should also be calculated separately for different regions. We recommend that feasibility is re-assessed once capitation arrangements are agreed upon and are in place. Whether the systems utilizes capitation or fee-for-service it is critical that appropriate monitoring systems are available to identify perverse behavior by providers and ensure quality care.

Supply side challenges:

The focus of the SNHI feasibility assessment has been on the financing aspect of the fund. It is important for policymakers to account for challenges that may arise in a market where the supply of health resources do not match the demand. In creating access and thus creating demand for healthcare services through the implementation of SNHI, the current level of healthcare resources, including number of health facilities, hospitals, nurses, doctors, specialists etc. may not be adequate to meet the needs of the SNHI fund members. Supply will have to be built up progressively if members in semi-urban and rural areas are to have access to adequate health care. Moreover, improving performance through contracting (on the supply side) and through choice of providers (on the demand side) will be compromised without sufficient providers to allow some form of competition.

We recommend that an assessment of resource shortages and supply side challenges are assessed in parallel to the financing feasibility of the fund. The implementation strategy should account for any mismatch in demand created and supply shortages.

Referral systems:

The risk that the supply of healthcare resources being insufficient to service the demand created will be exaggerated if insufficient appropriate clinical care pathways and treatment protocols are not in place. Preventative care interventions are critical to ensure the financial success of the fund and to improve clinical outcomes of the population. In addition, gatekeeping and referral systems are strongly recommended to minimize the financial effect of over-servicing and inappropriate servicing.

It is important to note that throughout this assessment, no adjustments have been made to the cost of healthcare arising from changes to the way in which healthcare is delivered. Therefore, in this assessment we have assumed that healthcare will be delivered in exactly the same manner as it is currently being delivered, thereby preserving any inefficient or inappropriate servicing. Any changes to the clinical protocols will impact the results reported in this document.

Contributions:

There is little clarity in the literature and information provided to us regarding how the NHIF and iCHF contributory structures have been developed. Therefore, we are unable to provide a view as to the efficacy thereof but we do believe that contribution structures should be developed with two points in mind:

- Limit catastrophic spending: Catastrophic spending is defined as 40% or more of a household's effective income, net of subsistence (food) expenditure. Spending can be deemed catastrophic if contributions to an NHI scheme are greater than 40% of a household's income. Better-performing national health funds minimize the percentage of households with catastrophic spending. This is desired as it ensures that prepaid contributions and/or co-payments are affordable to all.
- Set the prepayment ratio to an acceptable level for all target groups: The prepayment ratio remains important as a measure of financial accessibility. However, minimizing the percentage of households with catastrophic spending guarantees the affordability of health care payments, and hence gives a more fundamental measure of the success of a national health fund. Policymakers may choose to vary the prepayment ratio by target group due to:
  (1) Different levels of insurance membership between these groups
  (2) Risk pool fragmentation resulting in different levels of financial risk protection

  It is however important to aim for similar prepayment ratios for all target groups in order to maintain fairness.

A further consideration for the SNHI is how contributions will be collected via informal and poor populations groups. If government fails to collect contributions successfully, they will not be able to cover the claim costs and expenses needed to support the fund. In the Philippines, for example, the Office of the Actuary estimates that for small employers in the formal sector, only 30% of those who should be contributing actually do. In Colombia, estimates indicate that only 65% of potential contributors are actually paying, with evasion decreasing revenues by up to 35%.

Phasing implementation:

It is recommended that a phased approach be used to implement the SNHI. The SNHI can initially begin as a reform of NHIF after which coverage can be extended to the uncovered government employees and finally to all uncovered taxpayers. Once the full formally employed taxpaying population is enrolled, the SNHI can extend membership to the informal sector in a gradual method. This allows the SNHI to fine tune pricing and administration systems prior to being expanded to the full membership base and further limit the level of fragmentation of the risk pool when implementing the SNHI fund.

However implementing the SNHI at its intended membership base level across all population groups from the outset faces many practical problems and leaves little room for error in terms of administration systems, pricing correctly, collecting contributions and ensuring optimal service delivery of benefits. It is therefore recommended that a phased approached be adopted by gradually adding various population sub-groups until the target population is reached and policy objectives are met.

In summary, the government of Tanzania is faced with the delicate challenge of achieving a balance between choosing a benefit package which meets the population's healthcare needs yet is affordable from a financing and contributions point of view. This balance extends to applying this package to a membership group which is consistent with the strategic objectives yet also sound from a design and implementation point of view. The choice of funding method as well as the extent of contribution subsidization will have a direct impact on the success of the SNHI as well as the extent to which the risks identified become a reality.

8. Appendix A - Sensitivities

Sensitivities were performed for the following scenarios:

- **Sensitivity 1: Assuming 4000 enrolment agents for the next five years**

% of population enrolled	37%	51%	64%	74%	83%
Number of enrolment agents	4 000	4 000	4 000	4 000	4 000

- **Sensitivity 2: Healthcare utilization is 20% higher in all years**

The base assumptions in the table remain unchanged. In this scenario we demonstrate the impact of assuming an increase in utilization for the entire enrolled population of 20% per annum (cumulative).

- **Sensitivity 3: Healthcare utilization increases over time**

In this scenario we demonstrate the impact of assuming an increase in utilization for the entire enrolled population of 10 % per annum starting from year 2 (2018).

- **Sensitivity 4: Subsidies are required for the full unemployed population and a portion of the informal population**

The base assumptions in the table remain unchanged. In this scenario we demonstrate the feasibility impact should the entire unemployed population and a proportion of the informal sector enrolled require subsidies.

In the base model, only the poor/near-poor member contributions are subsidized, whereas in this scenario subsidies are required for the entire basic poor population which was 28% of the population in 2012 according the PSN report. This basic needs poor population is assumed to come first from the unemployed sector and then the remainder from the informally employed sector. The assumptions regarding the percentage of the population that is poor are disclosed below:

	2017	2018	2019	2020	2021
Percentage of population in food poverty (receives subsidy in base model)	7.66%	7.30%	6.96%	6.63%	6.33%
Percentage of population in basic needs poverty (receives subsidy in this scenario)	21.67%	20.48%	19.41%	18.45%	17.58%

- **Sensitivity 5: Formal employment growth rate**

At the World Bank's request, the base assumption of 10.2% p.a. for formal employment growth was stressed up and down by 5% and a growth rate of 138% over 5 years was also tested (based on the 138% increase from 2000/01 to 2005/06 stated in the Tanzania Human Development Report 2014.

- **Sensitivity 6: Expense assumptions**

The expenses were stressed up and down by 10%.

- **Sensitivity 7: Enrolment rates**

The assumed enrolment rates, based on the HFS, were stressed up and down by 10%

- **Sensitivity 8: Contribution compliance**

At the World Bank's request, the sensitivity of the gross surplus with regards to contribution compliance was tested. Compliances of 50% and 80% were considered.

- **Sensitivity 9-11: Inflationary stresses**

CPI, healthcare cost inflation and salary inflation have been separately stressed to show the sensitivity of the results to these assumptions

- **Sensitivity 12: Improved expense ratio**

To demonstrate the impact of reducing the expense ratio, a scenario with expenses reduced to 10% of contributions has been presented

Results:

- **Sensitivity 1**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 1: Assuming 4000 enrolment agents	311	452	624	853	1 126

Sensitivity 1 demonstrates the impact of assuming that 4 000 enrolment agents will be employed in all years. We saw in earlier sections that the proportion of enrolled population differs significantly by total and by employment sector. The impacts of a lower enrolment rate improve the feasibility and sustainability of the fund. This is driven by the impact of capitated agreements, stabilizing utilization as well economies of scale achieved in expenditure.

- **Sensitivity 2**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 2: Healthcare utilization is 20% higher in all years	243	12	-12	-58	-138

Sensitivity 2 demonstrates the impact that higher utilization of 20% compounded per annum will have on the sustainability of the fund. The fund's gross surplus reduces substantially over time resulting in a significant deficit in year 2021. This confirms that if utilization has been understated in the underlying assumptions, the sustainability of the fund will be threatened.

- **Sensitivity 3**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 3: Healthcare utilization increases over time	285	281	371	498	646

Sensitivity 3 demonstrates the impact of assuming that the baseline assumptions are borne out in year one, but begin to experience increases over time. This can be realized in practice if members are educated and made aware of their benefits, and if access to benefits is administratively un-complex. The fund remains stable, however, with a level of surplus as expected.

- **Sensitivity 4**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 4: Subsidies are required for the full unemployed population and a portion of the informal population	159	243	354	524	740

It is our view that is unlikely that the unemployed population that doesn't meet the PSSN requirements of food-poor, will be able to afford contributions. We have therefore demonstrated the impact on surplus if contributions are not received by the full unemployed enrolled population. In addition, it is likely that a proportion of the informal sector (deemed as basic poor) will require government subsidies due to unaffordability of contributions. As expected the gross surplus reduced however sustainability is still achieved, if the underlying assumptions are borne out in practice.

- **Sensitivity 5**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 5: Formal employment growth stressed 5% down	236	312	404	529	671
Formal employment growth stressed 5% up	334	489	697	1 003	1 402
Formal employment growth rate of 138% over 5 years	379	575	846	1 260	1 823

As expected, a higher formal sector growth rate increases the gross surplus of the fund due to the higher contributions paid by formal sector employees. Similarly, a lower than expected growth rate will reduce gross surplus.

- **Sensitivity 6**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 6: Expenses are stressed 10% down	307	425	574	786	1045
Expenses stressed 10% up	263	372	511	711	959

As expected, lower expenses increase the gross surplus of the fund whereas higher expenses will reduce gross surplus

- **Sensitivity 7**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 7: Enrolment targets missed by 10%	271	377	510	701	933
Enrolment targets exceeded by 10%	285	403	554	772	972
Enrolment targets missed by 50%	169	236	319	435	574

The enrolment rate to which the surplus is the most sensitive is the formal, public sector, population as this group contributes the most surplus per contribution and subsidizes other population groups. When enrolment targets are not met, the lost surplus from this population group causes gross surplus to decrease. Since the HFS assumes full enrolment of this sector, when enrolment targets are exceeded there is no change on their enrolment rates. The enrolment rates in the other sectors however, which consume surplus, do increase and as a result the gross surplus decreases. This sensitivity test highlights the importance of formal sector enrolment to fund feasibility.

- **Sensitivity 8**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 8: Contribution compliance of 50%	-254	-309	-367	-438	-518
Contribution compliance of 80%	69	116	179	274	394

Lower than expected contribution compliance will have a severely negative effect on gross surplus

- **Sensitivity 9**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 9: CPI stressed 1% down	278	386	522	715	947
CPI stressed 1% up	292	411	564	785	1 060

- **Sensitivity 10**

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 10: healthcare cost inflation stressed 1% down	289	411	567	791	1 069
Healthcare cost inflation stressed 1% up	280	386	518	706	931

- Sensitivity 11

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 11: salary inflation stressed 1% down	266	363	482	650	849
Salary inflation stressed 1% up	304	435	605	852	1 163

- Sensitivity 12

Gross Surplus/Deficit	2017	2018	2019	2020	2021
Base Scenario	285	398	543	749	1 002
Sensitivity 12: Expense ratio of 10%	482	601	762	979	1 233

9. Appendix B – References

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