

# SUB-NATIONAL ANALYSIS OF SYSTEMATIC DIFFERENCES IN HEALTH STATUS AND THE ACCESS TO AND FUNDING OF HEALTH SERVICES: AN EXAMPLE FROM COMOROS

DISCUSSION PAPER

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## Health, Nutrition and Population (HNP) Discussion Paper

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# Health, Nutrition and Population (HNP) Discussion Paper

## Sub-national analysis of systemic differences in health status and the access to and funding of health services: *An example from Comoros*

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**Abstract:** This report analyzes the available data to determine if there are systemic differences in the access to and funding of health services in different sub-regions of Comoros, and to link these to variations in the socioeconomic status of residents in these sub-regions. It focuses on a number of key questions that are analyzed at the sub-national level, including: the effect of out-of-pocket payments on household financial well-being; whether out-of-pocket payments for health are progressive or regressive; whether ill health is more concentrated among the poor; whether the poor use health services less than the rich; and the major sources of financing for the health system in Comoros. It introduces a specific analysis of “pockets of poverty” – the five sub-regions with the highest level of poverty headcount (more than 50%) – comparing their characteristics to those of the remaining sub-regions. These “pockets of poverty” appear to have generally lower utilization of health services, poorer health outcomes in some areas (although not on aggregate measures which bears further analysis), and lower levels of health spending, especially from the public sector. Aside from the conclusions and potential policy implications for Comoros, it may be useful to apply this type of analysis in other countries.

**Keywords:** Poverty, Health Services, Health Financing, Health Status, Sub-national

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## ABBREVIATIONS AND ACRONYMS

<b>ARI</b>	Acute Respiratory Infections
<b>ADePT</b>	Automated Development Economics and Poverty Tables
<b>ANC</b>	Antenatal Care
<b>KMF</b>	Comorian Franc
<b>DHS</b>	Demographic Health Survey
<b>HNP</b>	Health, Nutrition and Population
<b>HBS</b>	Household Budget/Consumption Survey (HBS)
<b>IMR</b>	Infant Mortality Rate
<b>ITN</b>	Insecticide Treated Net or Insecticide Treated Bed-Nets
<b>MCH</b>	Maternal and Child Health
<b>MMR</b>	Maternal Mortality Ratio
<b>MPO</b>	Mean Positive Overshoot
<b>NHA</b>	National Health Accounts
<b>NHIS</b>	National Health Information System
<b>NCDs</b>	Non-Communicable Disease
<b>OOP</b>	Out-of-Pocket
<b>PER</b>	Public Expenditure Review
<b>SBA</b>	Skilled Birth Attendance
<b>SUN</b>	Scaling up Nutrition
<b>UHC</b>	Universal Health Coverage
<b>WHO</b>	World Health Organization

## EXECUTIVE SUMMARY

This report analyzes the available data to determine if there are systemic differences in the access to and funding of health services in different sub-regions of Comoros, and to link these to variations in the socioeconomic status of residents in these sub-regions. Data are drawn from the 2012 Household Budget/Consumption Survey or “*Enquête sur l’emploi, le secteur informel et la consommation des ménages aux Comores 2014*” (HBS), the 2014 Demographic Health Survey (DHS), and the 2011 National Health Accounts (NHA). Analysis was conducted using specialized World Bank developed software (ADePT), and answers a number of questions.

*What is the effect of out-of-pocket payments on household financial well-being?*

Better-off households spend more on health. Households in urban areas, non-poor households, and households headed by males and by those 55 years old or older spend more on health. However, in terms of proportion, the rural and poor households have higher health spending in relation to their gross consumption. There are significant variations between sub-regions and regions. For example, the Ngazidja region has a higher average level of per capita out-of-pocket health payments compared to the overall level of per capita consumption.

Catastrophic expenditures are found to be highly concentrated among the richest, but are more common among the poor at the highest threshold of 40 percent when using either the total household or non-food measure. Koimbani and Hambou sub-regions in Ngazidja, Nioumachoua and Wanani sub-region in Mwali have two to three times the national average proportion of households allocating 40 percent of the nonfood consumption spending on health. The incidence of catastrophic payments increases with income but lower quintiles have higher incidence of catastrophic payments exceeding the threshold of 40 percent in relation to both total household expenditure and nonfood consumption. The incidence of catastrophic payments is generally higher in Ngazidja, and lower in Ndzouani.

Health spending contributes to impoverishment. Out of pocket payments for health care lead to poverty for 1.7 percent of the population (about 12,826 people a year), increasing overall levels of poverty by 5 percent. In other words, on average, 35 Comorians fall into poverty daily because of catastrophic health payments due to poor health. Many already poor households experience a deepening of poverty as a result of their health expenses, particularly among the households in the third and lower half of quintiles. Out-of-pocket payments are also responsible for a deepening of poverty among the already poor.

There are significant variations of poverty levels, per capita OOP payments for health care and the incidence of catastrophic expenditure between sub-region and regions. Nioumakele sub region has the highest level of poverty in the country with health care spending barely affecting the poverty headcount. Ndzouani has much lower average per capita payments and Ngazidja has the highest incidence of catastrophic expenditure. In Hambou and Mitsamihouli sub-regions in Ngazidja, health spending increases the poverty headcount despite a relatively different levels of poverty. *Are out-of-pocket payments for health progressive or regressive?*

Overall, health care financing through OOP payments in Comoros is progressive, implying that such payments are more concentrated among the better-off. Put differently, a poor household contributes a smaller share of its resources on health care OOP payments than a rich one. Rich households might contribute relatively more to financing government public expenditure through a progressive tax system. However, the average budget share of OOP health payments compared to gross per capita consumption is regressive over the first three quintiles. This means that OOP spending is absorbing a larger share of these poor individuals’ resources than it does for rich individuals.

### *Is ill health more concentrated among the poor?*

Overall, households living in rural areas and those in the lower quintile have a higher prevalence of health problems than those living in urban areas and in the richest quintiles. Health problems decrease with income, except ARIs which are more prevalent among the richest quintiles. For example, the incidence of ARIs is higher in Ndzouani-Domoni, Ndzouani-Mutsamudu, Ngazidja-Tsoudjini, and Ngazidja-Hambou sub regions. Ill health and the under-five mortality rate (U5MR) are concentrated among the poor in Comoros. U1MR and U5MR are quite high in Ngazidja sub-regions such as Dembeni, Foubouni, and Mbeni, and in Ndzouani Domoni sub-region. Sima sub-region in Ndzouani and Hambou sub-region in Ngazidja have a high U5MR but low U1MR. The incidence of diarrhea is over 20 percent in seven sub-regions: in Ndzouani sub-region of Domoni, Mutsamudu, Ouani and Sima; in Ngazidja sub-region of Hambou, Bambao and Tsoudjini. First quintiles (the poorest 20 percent of the population) have higher average prevalence of nutritional issues such as stunting, underweight and particularly wasting. Higher than average levels of moderate stunting and underweight are seen in Ndzouani sub-regions (Domoni, Mutsamudu, Nioumakele, Ouani, and Sima) and in Kiombani and Moroni sub-regions of Ngazidja. However, there is almost no inequality between the lowest and richest quintiles for birthweight and U1MR.

### *Do the poor use health services less than the rich?*

The utilization of health care in Comoros is concentrated among the better-off, increasing the poor's risk for ill health. Most Maternal and child health interventions have significant and positive concentration indices, signifying that utilization of any MCH interventions is higher among the better-off. Antenatal care is considerably below average in the Ndzouani sub-regions of Ouani and Mutsamudu. To tackle these inequalities in health utilization, an analysis of the causes of lower utilization of health care services among the first quintiles should be undertaken. There is higher utilization of health care by richer households reflecting a more pro-rich health service delivery system, except for the tetanus vaccine for pregnant women which is pro-poor. Utilization of delivery services provided by doctors is higher among the rich and in the Ngazidja sub-regions of Dembeni, Hambou, Kiombani and Mbeni. The sub-regions of Mwali-Nioumachoua, Ndzouani-Domoni and Nioumakele have the lowest skilled birth attendant coverage. Coverage of Vitamin A supplementation for children under 5 is higher in the Mwali sub-region of Fomboni and in the Ngazidja sub-regions of Hambou, Koimbani and Tsoudjini. There is little association between income and the utilization of essential maternal health services and diarrhea treatment for children. However, substantial variation exists on the percentage of cases of diarrhea that are treated within the health care system. Lower utilization of this service is shown in the Ngazidja sub-regions of Mitsamihouli, Tsoudjini, Mbeni and Bambao and in the Ndzouani sub-region of Domoni.

Higher vaccination coverage is observed in sub-regions with high levels of ANC and skilled birth attendance (SBA). However, low vitamin A supplementation for pregnant women is observed in sub-regions with high levels of ANC implying that quality of ANC services needs to be improved.

The relationship between utilization and outcome variables is interesting. Nutritional status has a negative correlation with ANC, SBA and ITN use, and Vitamin A supplementation for children, implying that higher use of these services tends to show lower levels of nutrition-related indicators. Similarly, sub-regions with higher levels of vaccination coverage have lower rates of ARI and diarrhea.

### *How is the health system financed in Comoros?*

The majority of health system financing is private. Most of the public financing is directed toward salaries and benefits, while private and donor funds support non-salary expenses. More than half of the non-salary expenditure is directed toward the purchase of services and/or drugs, from the private sector and directly by households. Allocation of funds per capita across sub-regions shows

significant variation. For example, Ngazidja Moroni receives higher funds per capita (KMF20,000) compared to the rest of the sub-region (KMF1,305). However, donor funding targets poorer areas especially subregions with higher levels of poverty headcount. On the contrary, public spending tends to be lower in sub-regions with higher poverty headcount. Overall, out-of-pocket spending increases where other sources of funding are lacking. The relationship between poverty and the use of health services suggests that the poor are facing financial barriers to accessing health services.

*What are “pockets of poverty” and why are they important?*

The five sub-regions with the highest levels of poverty headcount (more than 50 percent) were analyzed by comparing their characteristics to the remaining sub-regions. These poorest regions are: (i) Mbeni (Ngazidja); (ii) Sima (Ndzouani); (iii) Nioumakele (Ndzouani); (iv) Wanani (Mwali); and (v) Nioumachoua (Mwali). This analysis found that the impoverishing effect of health payments is less in the poorer sub-regions, which is reflective of the much lower average health spending and may reflect care being forgone in the poorer regions due to lack of available funding. While it would be expected that the overall level of consumption and health spending in the poorer sub-regions would be less than in the richer ones, the poorest sub-regions actually spend 15 percent less of their income on health compared to the richer regions. Similarly, the impoverishing effect of health payments is also less in these sub-regions: a 2.7 percent increase in poverty on average, compared to a 7.1 percent increase in the other sub-regions. This is reflective of the much lower average health spending and may reflect care being forgone in the poorer regions due to lack of available funding.

With regard to catastrophic health spending, however, a higher proportion of households in poorer sub-regions (16 percent) spent 40 percent or more on health than those in richer sub-regions. Over 40 percent of the households in poorer regions allocate more than 30 or 40 percent of their total spending on health related issues.

Turning to the utilization of health services, the poorer sub-regions have 60 percent fewer doctor assisted deliveries but slightly higher levels of nurse assisted deliveries. As a result, the overall level of professionally assisted deliveries in these sub-regions is around 11 percent less than in the richer regions. There do not seem to be significant differences in the utilization of immunization services, although there does appear to be some issues with respect to follow-up. Both polio-3 and DPT-3 coverage seem to be less in the poorer sub-regions. ITN usage is also almost 13 percent lower in the poorer sub-regions compared to the richer ones, suggesting that some better targeting is needed. The level of treatment for ARI is lower (64.5 percent) in the poorer sub-regions, compared to the reported incidence (44 percent lower). This also suggests some possible access issues in these sub-regions. Similarly, access to vitamin A for children is much lower (21 percent less), although vitamin A coverage for pregnant women is not much different between the two groups. In terms of outcomes, stunting, wasting and underweight rates are all higher for the poorer sub-regions, although the percentage of severe stunting is fairly similar and the percentage of severe underweight is actually 20 percent less in the richer sub-regions. Infant and child mortality are also lower in the poorer sub-regions, which might bear further examination.

Looking at the proportion of total spending by source, it seems that donor funds are well targeted to poorer sub-regions, but other types of funds, especially public funds are more highly concentrated in richer sub-regions. In terms of spending per capita, there is approximately 3.5 times the donor funds going to poorer sub-regions compared to the richer ones, but the richer ones, on average, get almost 15 times the level of public spending compared to the poorer ones. In this regard, private spending is more equitable, since the per capita private spend in the poorer sub-regions is around 6 times that in the richer ones. These issues clearly need further investigation. Poorer sub-regions have a significantly higher proportion of funds going to health centers and health posts, and a much lower proportion going to medical offices and vendors. The

five poorest sub-regions have no spending at all for hospitals, labs, pharmacy and financial institutions.

*What are the policy implications of this analysis?*

This analysis suggests that within Comoros there are significant variations in the level of spending on health, as well as in health utilization and outcomes. The data shows that some of these variations seem to be related to a greater or lesser extent to the level of poverty within the specific geographic area. These “pockets of poverty” appear to have generally lower utilization of health services, poorer health outcomes in some areas (although not on aggregate measures which bears further analysis), and lower levels of health spending, especially from the public sector. In this context, subsidies targeting the poorest to increase their access while containing the welfare impact of OOP payments would be a possible option. This would help to address possible “demand side” constraints. Other policy options may include better targeting of government funding for health or of health infrastructure to improve the “supply side”.

All of this suggests that mechanisms need to be developed to address the various issues. Better information on the availability of government resources in these “pockets of poverty” would also be needed. To allow more granular analysis on the Benefit Incidence Analysis and an in depth analysis of the progressivity of health financing, simple amendments to the health module of future consumption survey questionnaires would be highly recommended.

Beyond the application in Comoros, the approach employed may be considered useful for doing sub-national analyses in other countries that have two or more of the following: Demographic and Health Surveys, Household Budget Surveys and National Health Accounts, where they all have data that can be coded to common administrative sub-divisions below the national level. Although it was not possible to do so for this report, the inclusion of sub-national level administrative data on health facilities, human resources and other characteristics from the national Health Management Information Systems should further enrich such an analysis.

## PART I – BACKGROUND

The Union of Comoros is a “small island nation” consisting of an archipelago of 3 islands off the coasts of Mozambique and Madagascar (see map) structured into three regional states (Ngazidja; Ndzouani and Moheli or Mwali) and 15 sub regions or Prefectures. Moroni is the largest city, capital and headquarters of the government of the Union of the Comoros in Ngazidja. Mutsamudu is the main city of Ndjouani and Fomboni for Mwali. Comoros has a population of around 770,000 people (2014 World Bank estimate) and a GNI per capita (Atlas method) of US\$ 790. Health expenditure is around US\$ 56.80 per capita (6.7 percent of GDP), with 32.9 percent of this coming from public sources. Public financing for health care comprises 8.7 percent of government spending (2014 World Bank estimate) although this varies significantly from year to year.



Source: <https://www.lib.utexas.edu/maps/africa/comoros.gif>

Within each island, the road network covers a total of 834km, 508 km of which approximately (that is, 61 percent) in Ngazidja, 232 km in Ndzouani and 94 km in Mwali.<sup>1</sup> However, the condition of these roads has significantly deteriorated over the last decade, failing funding for required maintenance and investment, makes transport difficult. The three islands are connected by sea and through three ports (Moroni in Ngazidja; Mutsamudu in Ndzouani and Fomboni in Mwali). Despite this potential, the port infrastructure in the archipelago is not up to the minimum requirements, in terms of safety, capacity and activity volume management.<sup>2</sup>

**The health status of Comorians has improved over the past five years, but much remains to be done.** Life expectancy in Comoros is above the average for the Africa region (62 compared to 56). Between 1990 and 2012, the under-five mortality has declined from 124 to 78 per thousand live births, a decrease of 37 percent. The Infant mortality rate or the risk of death between birth and the first birthday is estimated at 36 per thousand. This result was the consequence of the combined reduction in neonatal, post-neonatal and child mortality. Progress was also made towards reducing the maternal mortality ratio (MMR) by three-quarters (from 440 to 280 deaths per 10,000 live births between 1990 and 2010).

The prevalence rate of Malaria sharply decreased from 9 percent in 2012 (WHO Report 2013) to 1 percent in 2014 (MIS 2014) and the prevalence rate of HIV remains low at 0.03 percent. The incidence of tuberculosis (37 cases per 100,000 individuals in 2011) remains significantly lower in Comoros than the recorded average for Sub-Saharan African countries (350 cases per 100,000 individuals in 2009), and has followed a downward trend since 2006 (44 cases per 100,000 individuals in 2006).

**The epidemiological situation is characterized by communicable and non-communicable diseases,** with high prevalence of diarrheal diseases and ARI among children under 5 years old, aggravated by malnutrition (4.4 percent of which were severely underweight and 30 percent being stunted).<sup>3</sup> Comoros faces the emergence of non-communicable diseases (NCDs) such as cardiovascular disease, diabetes and cancer due to changes in lifestyle behavior, and the lack of preventive measures and care. Deaths due to NCDs represent 40 percent of the total death in Comoros compared with the 28 percent in Sub-Saharan Africa.<sup>4</sup>

**The coverage of health services is higher-than-expected in some key areas.** Indeed, one of the preliminary findings of the DHS-MICS II 2012 is the high access to qualified staff during childbirth (76 percent) and to antenatal care (92 percent). Nearly eight out of ten households have at least one mosquito net, whether treated or untreated with insecticide (79 percent),<sup>5</sup> and 59 percent of households own at least one insecticide treated net (ITN). In addition, 70.3 percent of pregnant women aged 15-49 years slept under a mosquito net (impregnated or not with insecticide)<sup>6</sup>.

This high level of coverage is likely responsible for the maternal mortality ratio indicator being on track to meet the MDG goal set for 2015. Full immunization has also increased to 80 percent.<sup>7</sup> An area in which further progress is needed is with regard to health interventions on children if the infant mortality rate and under-five mortality ratio are to substantially improve.

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<sup>1</sup> Source: summary of records of roads, May 2012.

<sup>2</sup> Source: Comoros Policy Notes: Accelerating Economic Development in the Union of Comoros; World Bank; February 2014

<sup>3</sup> DHS-MICS II 2012.

<sup>4</sup> Comoros Policy Notes: Accelerating Economic Development in the Union of Comoros; World Bank; February 2014

<sup>5</sup> Source: DHS-MICS II 2012

<sup>6</sup> *ibid*

<sup>7</sup> Comoros Ministry of Health Immunization services database 2012.

However, critical services such as family planning and nutrition are inadequate. Given the low use of contraception (26 percent) and the current population growth rate of 2.9 percent, the population of Comoros is projected to reach one million in twelve years and to more than double by the year 2050.<sup>8</sup> Nutrition interventions are mainly absent, and early breastfeeding is very low (at 12 percent) and has decreased in the last five years. From the DHS-MICS II 2012 report, treatment for acute respiratory infections (ARI) and fever for children under the age of 5 is very low, at 38.1 percent and 40 percent, respectively. Additionally, although the rate of oral rehydration is increasing, it still remains under 60 percent.

**A large number of government health policy papers and national health plans have been prepared over the past five years.** Policies and strategies containing the key elements relevant to the country are available. These include the revised National Health Policy 2015 – 2024, validated in December 2014, along with the National Health Development Plan 2015-2019 in which the following strategic orientations were identified: (i) expanding and strengthening access to health services and quality nutrition; (ii) strengthening prevention and health promotion systems; (iii) developing leadership and governance; (iv) developing human resources for health; (v) developing infrastructure, equipment and health products; (vi) increasing health financing; (vii) developing the health information system; and (viii) promoting research and knowledge management. Other recent policies and strategies include: a National Pharmaceutical Policy; a Strategic Development Plan for Human Resource for Health 2010 – 2015; a National Strategy for Community Health; a national water and sanitation strategy for the period 2015-2030 to address drinking water needs for all the population; and an Ebola Preparedness Plan. The National Nutrition and Food Policy and its operational plan 2014-2019 is designed to improve the nutritional status of vulnerable groups, including children, women of reproductive age and the particularly disadvantaged. Comoros joined the Scaling up Nutrition (SUN) movement in 2014, and a multi-sectoral nutrition platform has been established.

**The social and financial protection systems are limited in Comoros. People are not protected from the financial consequences of illness and of having to obtain medical care.** Existing social protection schemes cover only a small part of the population. These include: (i) the retirement fund for old-age, disability and death of civil servants and private sector employees covers 10 percent of the population over 65 years old; (ii) the Social Security Fund for the protection of employees against occupational diseases and accidents at work covers less than 6 percent of assets in Ngazidja; (iii) the military retirement fund and mutual for old-age, disability benefits and medical coverage for military personnel and their families covers .....; (iv) and health mutual, which covers only 3.3 percent of the population as of 2012.

The Public Expenditure Review (PER) and other sources have identified a number of challenges in the health system in Comoros, including: (a) low levels of health expenditure financed by the state in general (\$ 3 per inhabitant); (b) high levels of expenditure on the salaries of health workers in relation to operating costs such as medical equipment, medicines and training; (c) heavy reliance on user charges (user fees) to cover the costs of operating deficits resulting from high "out of pocket" fees or direct payments and private expenditure; and (d) differences in the distribution of funds between the central and regional (island) levels and the allocation of financial and human resources between the islands. A crucial question that has not been addressed so far is the extent to which this affects the poor disproportionately.

In FY16, the World Bank allocated funds for a "just-in-time analysis" to get a better picture of the situation on the ground based on the available data and to propose a number of options which could improve the delivery of health services, specifically tailored to their needs. As the study was underway, the team learned that further funding was being made available in FY17 to more fully

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<sup>8</sup> The total fertility rate or the number of children per woman of childbearing age was 5.3% in 2003. Anjouan has the highest rate (at 6.3%), followed by Moheli (at 6.1%) and Ngazidja (at 4.5%).

explore the potential options and conduct policy dialogue with the Government on their implementation.

The overall objective of this study is to assist the Comoros Government in improving the access, cost efficiency, targeting and sustainability of health services. The specific objectives are to utilize the available data to determine if there are systemic differences in the access to and funding of health services in different sub-regions of Comoros, and to link these to variations in the socioeconomic status of residents in these sub-regions. The analysis is particularly important at this stage in the development of the health system in Comoros because of the national goal of Universal Health Coverage (UHC).

The key questions that were to be addressed include:

- (a) What geographic (national and sub-regional) differences exist in health care spending (both by households and within the health system as a whole), utilization and outcomes, and to what extent are these differences related to socioeconomic status?
- (b) Are such differences more pronounced in areas of low socio-economic status?
- (c) To what extent do correlations exist between health care spending, utilization and outcomes; that is, does higher spending appear to result in better utilization and outcomes, or do better outcomes appear to result from higher utilization?

## PART II– METHODOLOGY

### GENERAL

During an initial scoping mission, the available data was explored together with the Ministry of Health and a proposed methodology was developed and agreed upon. Essentially, the approach involved conducting an analysis of secondary data to identify geographic "pockets of poverty" and explore the correlations between the geographic distribution of the poor and their use of health care or health status.

During the initial stages of the review of the data, it was determined that both the Household Budget/ Consumption Survey or "*Enquête sur l'emploi, le secteur informel et la consommation des ménages aux Comores 2014*" (HBS) and Demographic Health Survey (DHS) databases had specific coding by Regional Prefecture. In order to get further detail in the areas around Moroni, the Cantons were used, representing a smaller geographic division than the Prefecture. This was important due to the large size of Moroni, and the need for further detail in this area. This resulted in a total of 17 sub-national divisions, most of which had well over 100 households. The distribution of households in the HBS and DHS databases by these divisions is given in Table 1 below.

#### Box 1. Data used and limitations

The main elements of the analysis included data from: (a) the 2014 Household Budget/Consumptions Survey (HBS); (b) the 2012 Demographic and Health Survey (DHS), and (c) the 2011 National Health Accounts (NHA). Annex 1 contains more detail on the various databases and related methodology.

While originally it was envisioned that data from the National Health Information System (NHIS) would also be included in the analysis, this data was not made available during the course of the project, so could not be included. This represented a major constraint to the resulting analysis, since much of the background data on the number of facilities and staff in different sub-regions was not available.

It was felt that the dates of the various datasets were close enough together that this should not present a time-based problem with the comparability of the data. Further, although HBS wealth quintiles were calculated based on per capita household consumption (ordering the per capita consumption from lowest to highest and allocating 20 percent of the households to each quintile) and the wealth quintile measure was constructed using the standard DHS-Measure methodology, a high degree of overlap between the two measures was likely.

In addition, the composition of revenues and expenditures were analyzed to identify differences between health centers in areas with pockets of poverty and those without.

**Table 1 – Distribution of Households and Population  
by Sub-Region**

	HBS	DHS	Estimated Population
Mwali-Fomboni	408	340	26,982
Mwali-Nioumachoua	188	144	11,920
Mwali-Wanani	138	93	10,197
Subtotal	734	577	49,099
Ndzouani-Domoni	110	201	55,100
Ndzouani-Mutsamudu	191	256	61,086
Ndzouani-Nioumakele	133	276	63,020
Ndzouani-Ouani	208	370	85,558
Ndzouani-Sima	78	217	48,941
Subtotal	720	1,320	313,706
Ngazidja-Bambao	294	147	52,513
Ngazidja-Hambou	69	65	11,521
Ngazidja-Moroni	580	563	62,140
Subtotal	943	775	126,175
Rest Nga-Dembeni	48	105	10,502
Rest Nga-Foumbouni	125	153	52,271
Rest Nga-Koimbani	75	95	34,897
Rest Nga-Mbeni	122	221	43,080
Rest Nga-Mitsamihouli	178	210	64,846
Rest Nga-Tsoudjini	186	136	59,905
Subtotal	734	920	265,500
Total Comoros	3,131	3,592	754,479

Source: Authors calculations using DHS and HBS datasets

#### **SOFTWARE AND PROCESSING**

The initial analysis was generated by using a World Bank developed software package called ADePT. The advantage of this package is that it requires users to have only a limited knowledge of Stata and/or SPSS, so that they only need to be able to prepare the data set in the prescribed format, but do not need to know how to program Stata to undertake the often complex analysis that ADePT performs. It also ensures that the processing of the data is always done in a consistent and appropriate manner. Thus ADePT frees up time and resources which can be used for data preparation, interpretation of results, and thinking about the policy implications of results.

The software has been used to produce “Health Equity and Financial Protection” data sheets for roughly 100 countries, and is an important resource in determining progress in achieving the World Bank’s twin goals (ending extreme poverty and promoting shared prosperity) in health. ADePT generates standard tables and figures which summarize the results of distributional analyses of household survey data. ADePT has two health modules: one covers inequality and equity in health, and health care utilization, while the second addresses health financing and financial protection. The first module utilizes data from the DHS, while the second uses HBS data. Both datasets use calculated poverty quintiles from the respective surveys.

Using the DHS variables specified (see Annex 1 for details), the software was able to calculate national level health outcomes by various household characteristics (urban rural, sub-region and wealth quintile), as well as indicators of health inequality and concentration curves; for both utilization and outcome variables. The HBS variables allowed the calculation of (a) health spending as a percent of total consumption by various characteristics (urban-rural, sub-region, gender of HH head, age of HH head, consumption quintile); (b) incidence and intensity of catastrophic health payments (both compared to total and non-food consumption, with different levels of catastrophic payments); (c) poverty headcount with and without health payments to provide an indication of the poverty-inducing impact of health payments; and (d) the redistributive impact of health spending.

The data included in the HBS was limited, and did not include either utilization or unit cost information. As such, it was not possible to conduct a formal Benefit-Incidence Analysis, which could have proved to be very useful to show whether and how far government health expenditure benefits the poor.

The ADePT software generated national level indicators, as well as summary statistics at the sub-regional level. Using the same techniques, additional sub-regional level indicators were calculated by the project team.

It is worth noting, that the results presented are largely descriptive. This report made use of the available data to determine if there are systemic differences in the access to and funding of health services in different sub-regions of Comoros, and to link these to variations in the socioeconomic status of residents in these sub-regions. The inequality analysis and causal relationships between wealth and health will be further elaborated upon in future follow-on analytical work.

## PART III – RESULTS

### NATIONAL-LEVEL HEALTH FINANCING RESULTS<sup>9</sup>

The proportion of health spending is higher for household in rural areas, poor households, households headed by males and by people over 55 years of age, and among the fourth and fifth richest quintiles.

Table 2, presents the relation between average household consumption per family member, average health related spending per family member and household characteristics. There are two household characteristics: the area of residence (rural, urban and the region) and the poverty status of the household (poor and non-poor), defined as poverty in relation to an absolute amount of household expenditure per capita per year which is KMF 295,105 per capita (KMF 276,380 in Ngazidja; KMF 224,765 in Ndzouani; and KMF 274,490 in Mwali). Households in urban areas of residence are richer with KMF 634,614.6 gross consumption per capita than the rural ones at KMF 481,660.6 which are even lower than the overall national level (KMF 542,453.3). With KMF 807,918.1 gross consumption per capita, Dembeni sub region in Ngazidja is richer than the other sub regions, and the Nioumachoua sub region in Mwali is the poorest at KMF 277,321.8.

**The amount of health spending seems to be higher for the urban and non-poor but in terms of proportion, rural and poor households have higher health spending.** According to the Comoros Public Expenditure and fiscal management review in 2015, island budget allocations are the primary resource for public schools and health centers. These allocations are low. On average, the islands allocated USD 5 per person to non-salary spending on education, and a total of USD 3 to both salary and non-salary spending for health. Thus, the latter rely on fees and charges, effectively transferring the cost burden to families and the community. According to Table 2, household health spending at national level is KMF21, 606.6. The urban and non-poor households are spending above the national level on health, KMF 23, 518 and KMF 29, 244.6 respectively. In the 2014 HBS survey, health spending consists of several items (medical equipment and materials; outpatient care; paramedical services; and hospital services) for a recall period of 12 and three months.

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<sup>9</sup> The source for all of the tables and graphs in this section is the HBS dataset, as processed by the ADePT software.

**Table 2: Total and Health Related Spending (in KMF) by Household Characteristics**

	Per capita consumption, gross	Per capita Health payments	Per capita consumption, net of payments	Health as percent of total consumption
<b>Area of residence</b>				
Urban	634,614.6	23,518.0	611,096.6	3.71%
Rural	481,660.6	20,345.9	461,314.8	4.22%
Mwali-Fomboni	445,464.2	12,014.2	433,450.0	2.70%
Mwali-Nioumachoua	277,321.8	9,254.9	268,066.8	3.34%
Mwali-Wanani	290,524.3	12,828.3	277,695.9	4.42%
Ndzouani-Domoni	424,806.0	11,629.2	413,176.8	2.74%
Ndzouani-Mutsamudu	681,088.2	15,470.7	665,617.6	2.27%
Ndzouani-Nioumakele	285,217.7	7,749.3	277,468.4	2.72%
Ndzouani-Ouani	768,855.9	15,289.6	753,566.3	1.99%
Ndzouani-Sima	359,619.7	8,454.6	351,165.1	2.35%
Ngazidja-Bambao	625,815.6	23,718.4	602,097.2	3.79%
Ngazidja-Hambou	481,727.8	22,433.7	459,294.1	4.66%
Ngazidja-Moroni	562,204.3	19,723.8	542,480.5	3.51%
Rest Nga-Dembeni	807,918.1	28,203.2	779,714.9	3.49%
Rest Nga-Foumbouni	624,917.6	35,026.1	589,891.5	5.60%
Rest Nga-Koimbani	503,856.7	39,937.2	463,919.6	7.93%
Rest Nga-Mbeni	344,699.6	17,882.8	326,816.8	5.19%
Rest Nga-Mitsamihouli	548,383.2	27,281.1	521,102.1	4.97%
Rest Nga-Tsoudjini	703,148.4	52,593.1	650,555.4	7.48%
<b>Poverty Status</b>				
Poor	193,745.2	8,016.7	185,728.6	4.14%
Non poor	738,436.4	29,244.6	709,191.8	3.96%
Total	542,453.3	21,606.6	520,846.7	3.98%

Source: Household Budget Survey, calculations from ADePT software

Table 3 presents the relation between the source of health financing and individual characteristics. **Households headed by males have a higher share of health spending (4.18 percent), than those headed by females, which is higher than the national level at 3.98 percent.** Households headed by people over 55 years of age have a health spending per capita of more than five percent on average with a maximum of 6.17 percent among the age groups of 55-59 years.

**While quintiles 1 and 2 have the same share of health spending per capita in terms of the percentage of consumption, quintile 2 spends almost double in absolute terms (KMF11,136.3 compared to KMF5,735.9 for the first quintile).** The fourth and fifth richest quintiles spend more on health on average, 3.95 percent and 4.49 percent respectively.

**Table 3: Sources of Finance by Individual Characteristics**

	<b>Per capita consumption, gross</b>	<b>Per capita Health payments</b>	<b>Per capita consumption, net of payments</b>	<b>Health as percent of total consumption</b>
<b>Gender of the household head</b>				
Male	541,283.1	22,644.9	518,638.2	4.18%
Female	545,929.0	18,523.1	527,405.9	3.39%
<b>Household head's age</b>				
15-19	743,702.5	15,867.1	727,835.4	2.13%
20-24	566,321.7	11,925.5	554,396.2	2.11%
25-29	594,974.6	16,817.3	578,157.3	2.83%
30-34	535,821.5	20,759.8	515,061.7	3.87%
35-39	517,016.8	16,908.8	500,108.0	3.27%
40-44	473,582.2	17,695.9	455,886.4	3.74%
45-49	509,656.3	17,625.9	492,030.4	3.46%
50-54	595,511.1	19,860.3	575,650.8	3.33%
55-59	636,672.3	39,306.4	597,365.9	6.17%
60-64	494,621.9	25,328.2	469,293.8	5.12%
65+	596,438.5	30,467.1	565,971.4	5.11%
<b>quintile</b>				
1	165,719.6	5,735.9	159,983.7	3.46%
2	321,973.5	11,136.3	310,837.2	3.46%
3	494,765.4	17,935.5	476,829.9	3.63%
4	735,111.1	29,043.0	706,068.1	3.95%
5	1,509,461.8	67,712.1	1,441,749.6	4.49%
Total	542,453.3	21,606.6	520,846.7	3.98%

Source: Household Budget Survey, calculations from ADePT software

### **FINANCIAL PROTECTION**

The most important finding emerging from this section is the fact that there is a concentration of out-of-pocket and of catastrophic payments among those who are better off. This implies that these groups are paying higher share of their consumption on health and might be forced to sacrifice other basic needs due to health care spending.

Households without full health insurance coverage face a risk of incurring large expenditures for medical care should they fall ill. This uninsured risk reduces welfare. Further, should a household member fall ill, the out-of-pocket purchase of medical care would disrupt the material living standards of the household. If the health care expenses are large relative to the resources available to the household, this disruption to living standards may be considered catastrophic. One conception of fairness in health finance is that households should be protected against such catastrophic medical expenses (World Health Organization 2000).

A household is classified as having catastrophic out-of-pocket health spending if it exceeds a certain fraction of consumption as a share of total (or non-food) expenditure. The percentage of the population being so classified is likely, of course, to depend on the threshold chosen. Since there is no established international benchmark for “catastrophic” a range of thresholds are given so that the reader can compare the impact at various levels. ADePT reports the percentage of the population experiencing catastrophic health spending for different thresholds; this is termed “the head count”.

In Table 4, columns provide different thresholds, between five percent and 40 percent, according to which the share of spending allocated by the household to health is considered to be catastrophic. This table provides more detailed analysis of the catastrophic impact of out-of-pocket payments. The first section of the table shows the catastrophic payments head count (H), which represents the proportion of households with a health payment share greater than the given thresholds; the severity of these payments, is measured by the Overshoot (O), which represents the average excess of health payment budget share in the whole population and the Mean positive overshoot (MPO), which represents the average excess of health payment budget share of those households with catastrophic payments.<sup>10</sup> Put in a simple way, the overshoot counts all dollars spent on health care in excess of the threshold. The intensity of catastrophic expenditure is measured by the payment in excess of the threshold. Averaged over all households exceeding that threshold, **24.4 percent of individual in the richest quintiles have a share of health spending exceeding the thresholds of five percent compared to the total household expenditure.** This table also shows that when the threshold of budget share increased from five percent to 40 percent, the estimation of the incidence of catastrophic payments decreased from 21.4 percent to 0.4 percent at national level, and the mean overshoot drops from 1.6 percent to only 0.1 percent. This implies that only few proportion of households allocate 40 percent of the total household consumption spending on health. The lowest quintile have higher incidence of catastrophic payments exceeding the threshold of 40 percent (1.3 percent) compared to the national average and the highest quintile. Unlike the head count and the overshoot, the mean positive overshoot among those exceeding the threshold (MPO) has not declined as the threshold is raised from five to 40 percent (6.5 percent to 11.6 percent). Those spending more than 5 percent of total expenditure on health care, on average spent 11.5 percent (5 percent + 6.5 percent). Those spending more than 40 percent of the household budget on health care, on average spent 51.6 percent.

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<sup>10</sup> Automated development Economics and Poverty Tables (ADePT) Health Financing; Technical Notes 12 in Chapter 13

**Table 4: Incidence and Intensity of Catastrophic Health Payments**

	Threshold budget share					
	5%	10%	15%	25%	30%	40%
<b>Headcount (H)</b>						
Lowest quintile	17.8	8.3	4.4	1.5	1.4	1.3
2	22.3	7.8	3.7	0.5	0.2	0.2
3	19.9	6.2	3.1	0.7	0.3	0.2
4	22.5	10.4	5.6	2.2	1.6	0.1
Highest quintile	24.4	9.0	5.1	1.3	0.7	0.4
Total	<b>21.4</b>	<b>8.3</b>	<b>4.4</b>	<b>1.2</b>	<b>0.8</b>	<b>0.4</b>
<b>Overshoot (O)</b>						
Lowest quintile	1.5	0.9	0.6	0.4	0.3	0.2
2	1.2	0.5	0.2	0.1	0.0	0.0
3	0.9	0.4	0.2	0.0	0.0	0.0
4	1.7	0.9	0.5	0.2	0.1	0.0
Highest quintile	1.6	0.9	0.5	0.2	0.1	0.1
Total	<b>1.4</b>	<b>0.7</b>	<b>0.4</b>	<b>0.2</b>	<b>0.1</b>	<b>0.0</b>
<b>Mean positive overshoot (MPO)</b>						
Lowest quintile	8.7	11.0	13.3	23.9	21.1	12.4
2	5.3	6.5	6.3	10.7	17.5	11.6
3	4.7	6.3	6.2	7.3	10.2	1.4
4	7.4	8.9	9.5	8.3	5.8	7.8
Highest quintile	6.6	9.7	10.3	13.4	15.0	<b>15.9</b>
Total	<b>6.5</b>	<b>8.6</b>	<b>9.5</b>	<b>13.3</b>	<b>13.3</b>	<b>11.6</b>

Source: Household Budget Survey, calculations from ADePT software

Overall, more than half (54.9 percent) of households allocate 5 percent or more of the non-food consumption spending on health (Table 5). When the threshold increased from 5 percent to 40 percent, of non-food consumption, the estimated incidence of catastrophic payments decreased from 54.9 percent to 3.3 percent, and the mean overshoot drops from 6.7 percent to only 0.6 percent, this implies that only few proportion of households allocate 40 percent of the non-food consumption spending on health. However, the proportion is still higher among the lowest quintile (4.8 percent) compared to the richest quintile (3.0 percent). The MPO increased from 12.2 to 17.4 percent, which implies that those spending more than 5 percent of nonfood expenditure on health care, on average spent 17.2 percent (5 percent + 12.2 percent). Those spending more than 40 percent of the nonfood household budget on health care, on average spent 57.4 percent.

**Table 5: Incidence and Intensity of Catastrophic Health Payments, Using Nonfood**

	Threshold budget share					
	5%	10%	15%	25%	30%	40%
<b>Headcount (H)</b>						
Lowest quintile	48.7	33.9	22.7	11.2	7.7	4.8
2	52.2	32.1	22.8	12.2	7.3	2.3
3	59.1	33.9	21.5	8.8	5.4	2.3
4	58.3	35.6	23.2	9.6	6.1	4.2
Highest quintile	56.2	36.8	25.6	12.9	9.3	3.0
Total	54.9	34.5	23.1	11.0	7.2	3.3
<b>Overshoot (O)</b>						
Lowest quintile	7.1	5.0	3.7	2.1	1.6	1.0
2	6.4	4.3	2.9	1.3	0.8	0.3
3	6.2	3.9	2.6	1.1	0.8	0.4
4	6.8	4.5	3.1	1.6	1.2	0.7
Highest quintile	7.1	4.8	3.3	1.5	1.0	0.4
Total	6.7	4.5	3.1	1.5	1.1	0.6
<b>Mean positive overshoot (MPO)</b>						
Lowest quintile	14.5	14.8	16.1	18.5	21.1	20.4
2	12.2	13.4	12.8	10.2	10.2	14.8
3	10.6	11.5	11.9	12.8	14.3	18.7
4	11.7	12.8	13.6	16.4	19.9	16.6
Highest quintile	12.6	13.1	13.0	11.8	10.6	14.6
Total	12.2	13.1	13.5	13.8	14.9	17.4

Source: Household Budget Survey, calculations from ADePT software

#### DISTRIBUTION SENSITIVE MEASURES OF CATASTROPHIC PAYMENTS

The distribution of catastrophic payments in relation to income could be measured by concentration indexes ( $C_E$  and  $C_O$ )<sup>11</sup>. A concentration index measures the extent to which

<sup>11</sup> The first line of the tables shows the concentration index of the incidence of catastrophic payments ( $C_E$ ). A positive value of  $C_E$  indicates a greater tendency for the better off to exceed the payment threshold, whereas a negative value indicates a greater tendency for the worse off to exceed it. The concentration index of payment overshoot ( $C_O$ ) is a very similar measure. This indicates whether the average payment exceeding the threshold is greater among the better off ( $C_O > 0$ ) or among the poor ( $C_O < 0$ ).  $H_W$  and  $H_O$  adjust the catastrophic payment head count ( $H$ ) and overshoot ( $O$ ), respectively, in order to make these measures sensitive to the distribution of income. (Wagstaff, A. et al, *Health Equity and Financial Protection*, World Bank, 2011, p. 127).

this distribution is concentrated in the better off (positive value) or the poor (negative value) For example, in Table 6, which utilizes total household spending, the threshold concentration value of 40 percent share of health spending in relation to the income is negative (C\_E: -0.298 and C\_O: -0.310), **implying that the poor are more likely to incur catastrophic expenditures at that threshold level. On the other hand, those who are well off are more likely to hit the spending threshold at lower threshold levels.**

**Table 6: Distribution-sensitive Catastrophic Payments Measures**

	Threshold budget share					
	5%	10%	15%	25%	30%	40%
Concentration index, C_E	0.045	0.041	0.049	0.118	0.074	<b>-0.298</b>
Rank-weighted headcount, H_W	20.419	8.009	4.176	1.083	0.781	0.556
Concentration index, C_O	0.039	0.047	0.055	<b>-0.076</b>	<b>-0.168</b>	<b>-0.310</b>
Rank-weighted overshoot, O_W	1.335	0.688	0.392	0.176	0.131	0.065

Source: Household Budget Survey, calculations from ADePT software

The same situation is reflected in the 40 percent threshold concentration value on health spending in relation to the non-food expenditure (Table 7), where the concentration index is negative. This implies that catastrophic expenditures are concentrated among the poorest.

**Table 7: Distribution-sensitive Catastrophic Payments Measures, Using Nonfood**

	Threshold budget share					
	5%	10%	15%	25%	30%	40%
Concentration index, C_E	0.029	0.019	0.017	0.000	0.025	<b>-0.041</b>
Rank-weighted headcount, H_W	53.335	33.788	22.761	10.958	6.974	3.453
Concentration index, C_O	0.003	<b>-0.005</b>	<b>-0.014</b>	<b>-0.039</b>	<b>-0.057</b>	<b>-0.098</b>
Rank-weighted overshoot, O_W	6.695	4.544	3.163	1.569	1.129	0.633

Source: Household Budget Survey, calculations from ADePT software

### MEASURE OF POVERTY BASED ON CONSUMPTION

Table 8 presents poverty measures corresponding to household expenditure both gross and net of health payments. Comparison of gross and net measures is indicative of the scale of impoverishment due to health payments. On the basis of total household consumption, 34.3 percent of the population is estimated to be in poverty. If out-of-pocket payments for health care are netted out of household consumption, this percentage rises to 36 percent. **So 1.7 percent of the population would not be counted as living in poverty if the resources devoted to health were consumed otherwise.** In other words, **the poverty rate increased by 1.7 percentage points or 5.0 percent due to out-of-pocket payments made due to poor health which diverted household expenditure from general consumption to health spending.** The poverty gap increases from 12.5 percent of the poverty line to 13.3 percent when health payments are netted out of household consumption, but the normalized mean positive poverty gap increases slightly (from 36.4 to 37.1). This suggests that the rise in the poverty gap is due mainly to more households being brought into poverty, because copayments are too high for the poorest, and not to a deepening of the poverty of the already poor.

**Table 8: Measures of Poverty Based on Consumption Gross and Net of Spending on Health Care**

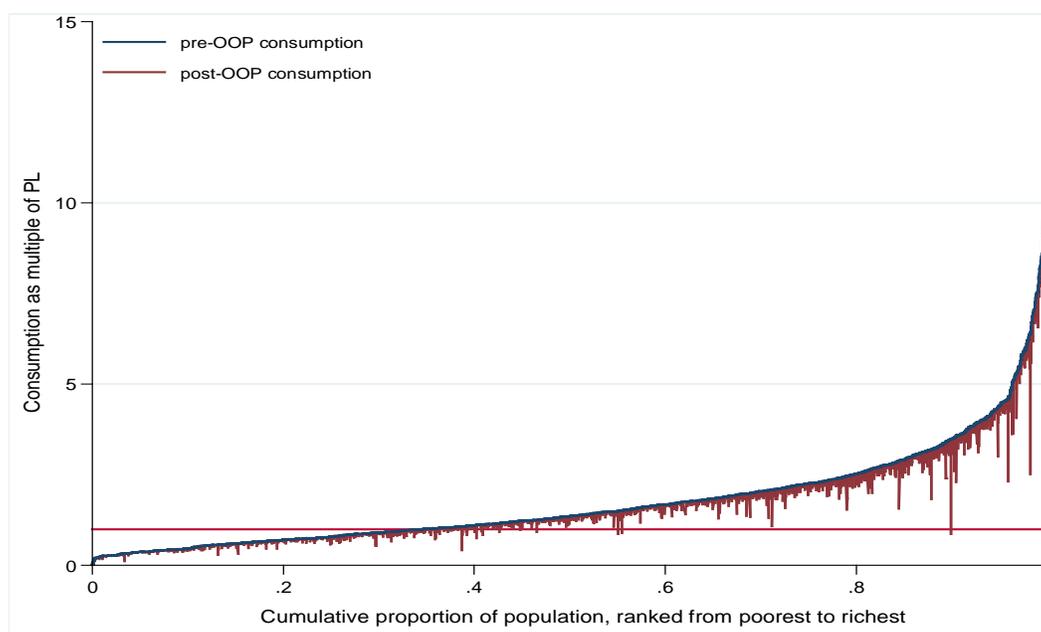
	Gross of health payments	Net of health payments	Difference	Percent Difference
<b>Poverty line = KMF 295,105 per capita</b>				
Poverty headcount	34.3	36.0	1.7	5.0%
Poverty gap	36,857.3	39,354.3	2,497	6.8%
Normalized poverty gap	12.5	13.3	0.8	6.8%
Normalized mean positive poverty gap	36.4	37.1	0.6	1.7%

Source: Household Budget Survey, calculations from ADePT software

### HEALTH PAYMENTS AND HOUSEHOLD CONSUMPTION

Figure 1 below shows the effect of health payments on the household consumption and poverty through "Pen's parade". Households are ranked in ascending order of their consumption, including health payments. For each household, the vertical bar, or "paint drip" shows the extent to which health payments reduce consumption (on food, education, clothing...). If a bar crosses the poverty line, then a household is not poor on the basis of gross consumption, but is poor on the basis of net consumption. In other words, the household gets impoverished by health payments. The Figure shows that **health payments are largest at higher values of total consumption, but it is the households in the third quintiles of distribution that are brought below the poverty line by health payments**. This graph equally indicates that many already poor households are experiencing a deepening poverty because of their health expenses.

**Figure 1: Effect of Health Payments on Pen's Parade of the Household Consumption**



Source: Household Budget/Consumptions Survey (HBS) 2014

## PROGRESSIVITY OF HEALTH CARE FINANCING THROUGH OUT-OF-POCKET PAYMENTS

The analysis done in this report can only conclude that out-of-pocket payments are progressive in the sense that they are more concentrated amongst the rich. The report could not look at the distribution of other sources of financing and could not therefore say anything about the progressivity of overall health financing in the country.

There is a general consensus that payments for health care ought to be at least proportional to households' ability to pay, if not progressive (meaning a poor household contributes a smaller share of its resources than a rich one). Table 9 gives the average consumption and financing share, by quintile. The poorest quintile consumes 5.2 percent of total consumption, while the richest quintile consumes 47.3 percent of the total. Looking at health related payments, the richest quintile contributes 51.7 percent of the total which is more than ten times as much as the poorest quintile at 4.7 percent. **Average consumption and health payments shares are ten times greater among the richest quintile than the poorest quintile.**

The Kakwani indexes measures financing progressivity as the difference between the concentration index and the gross consumption Gini index. Kakwani indexes for out-of-pocket payments is positive (0.0563), indicating progressivity, **which means that financing is more concentrated among the rich and it increases with income, implying that the highest quintile spent a larger fraction of their consumption on health care than the poorest.** However, as indicated in Tables 6 and 7, the impact in terms of catastrophic spending is more pronounced for the poor at the higher threshold levels.

**Table 9: Shares of Total Financing**

	Per capita consumption, gross	Total Health Payments	Per capita consumption, net of payments
<b>Quintiles of per capita consumption, gross</b>			
Lowest quintile	5.2	4.7	5.3
2	9.8	8.3	9.9
3	15.0	12.1	15.2
4	22.6	23.2	22.6
Highest quintile	47.3	51.7	47.1
Total	100.0	100.0	100.0
Gini coefficient	0.4173		0.4162
Concentration Index		0.4736	
Kakwani index		0.0563	

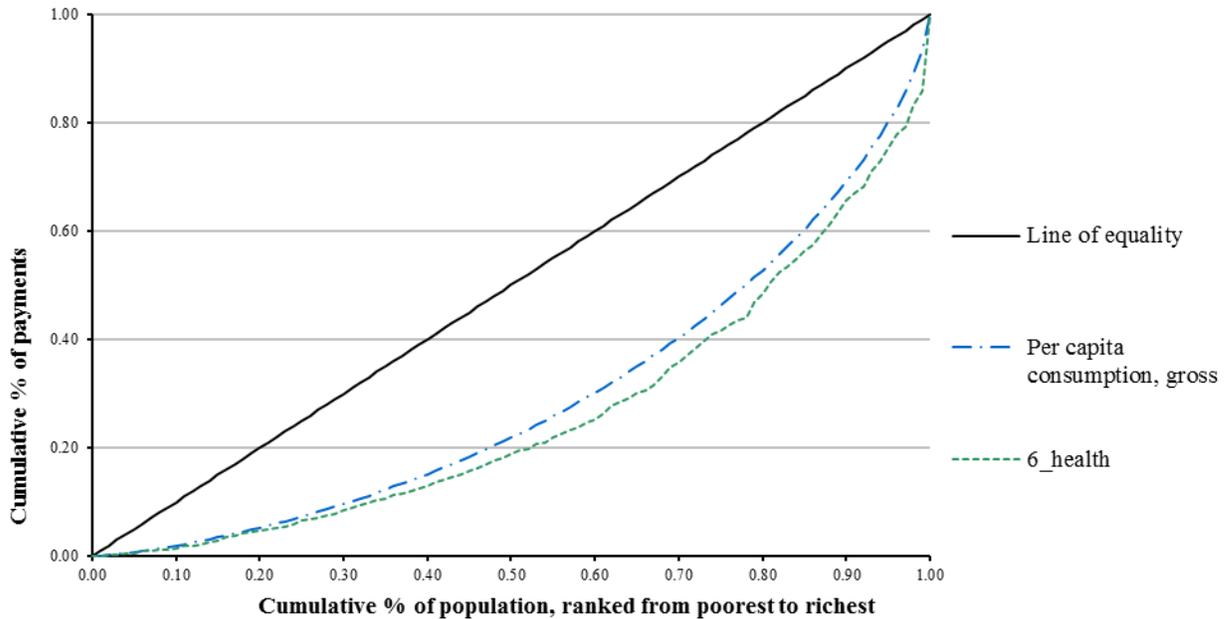
Source: Household Budget/Consumptions Survey (HBS) 2014

## CONCENTRATION CURVES

Figure 2 present the Lorenz curve for household total expenditure gross of health payments along with the concentration curve for each source of household health financing. This curve provide us with a visual representation of household inequality: the farther the curve is from the line of equality, the greater is the inequality. Figure 2 shows that the **concentration curve for out-of-**

pocket payments lies outside the Lorenz curve, suggesting progressivity. This means that out-of-pocket payments are more concentrated among the rich and increase with income.

Figure 2: Concentration Curves for Health Payments, Total Consumption



Source: Household Budget/Consumptions Survey (HBS) 2014

### INEQUALITIES IN HEALTH OUTCOMES<sup>12</sup>

Households living in rural areas have more health problems. Health outcomes are relatively equally distributed, except for undernutrition outcomes which are concentrated among the worse-off and particularly the first quintile.

Table 10 presents the relation between health outcomes and household characteristics. Health outcome variables are used to analyze inequalities in health. Health and health care are integral to people's capability to function – their ability to flourish as human beings. Health is among the most important conditions of human life and critically significant constituent of human capabilities which we have reason to value (Sen 2002). This table shows that in general, **households living in rural areas have more health problems than those living in urban areas**. However, households in urban areas have a higher prevalence of Acute Respiratory Infection (10.5%) and child wasting (low weight-for-height) (13.7%) compared to those in rural areas (ARI at 6 percent and wasting at 10.7 percent). This table also shows that **health outcomes are relatively equally distributed**, except for undernutrition outcomes, which are concentrated among the worse-off. Details of the results by health region are examined below.

<sup>12</sup> Unless otherwise indicated, the source for all of the tables and graphs in this section is the DHS dataset, processed by the ADePT software.

**Table 10: Health Outcomes by Household Characteristics**

	Milieu		Wealth Quintiles					Total
	Urban	Rural	Lowest	2	3	4	Highest	
IMR *	20	47	36	46	46	36	35	40
U5MR *	34	66	52	71	62	61	33	57
ARI	0.105	0.060	0.062	0.039	0.093	0.081	0.090	0.072
Birthweight **	3100	3062	3165	3023	3089	3102	3012	3074
Diarrhea	0.163	0.172	0.148	0.204	0.194	0.161	0.146	0.170
Stunted	0.258	0.312	0.370	0.336	0.238	0.270	0.250	0.297
Stunted severe	0.129	0.165	0.192	0.184	0.114	0.149	0.124	0.155
Underweight	0.147	0.176	0.212	0.213	0.123	0.148	0.129	0.168
Underweight severe	0.047	0.078	0.094	0.088	0.043	0.067	0.045	0.069
Wasted	0.137	0.107	0.133	0.124	0.117	0.091	0.103	0.115
Wasted severe	0.046	0.045	0.065	0.059	0.036	0.038	0.024	0.046

Notes: \* per 1000 live births

\*\* grams

Source : Demographic and Health Survey (DHS)2012

Table 11 shows the income-related inequality in 11 health status variables. The concentration index is a measure of how health status is related to income. A positive value indicates that the health variable is more concentrated among richer individuals. A negative value indicates the opposite, whereas a concentration index not very different from 0 reflects no relationship between income and health status. The concentration index is negative for all the health problems, but the ARI, which reflects the decrease in health problems with income. In contrast, the concentration index for ARI is clearly positive (0.1403) as a result of the increase in prevalence with income. The concentration index for birthweight and U1MR are close to 0 (-0.0048 and -0.0058 respectively), which indicates that inequality between lowest and richest quintiles is less pronounced. The concentration index aversion to inequality is increased, thus the weight of the first quintiles is increased relative to the richest quintiles. That is, the **first quintiles have a higher prevalence of health problems (U5MR and nutritional status)**, thus, the corresponding extended concentration index is negative.

The last three columns of the table display the achievement index which is a measure of average health, taking health inequality into account: the greater the health inequality, the smaller is the achievement index. The achievement index aversion to inequality is increased for birthweight, stunted, underweight and wasted, which reflects a higher average prevalence of these health problems among the first quintiles.

**Table 11: Health Outcomes Inequality, Unstandardized**

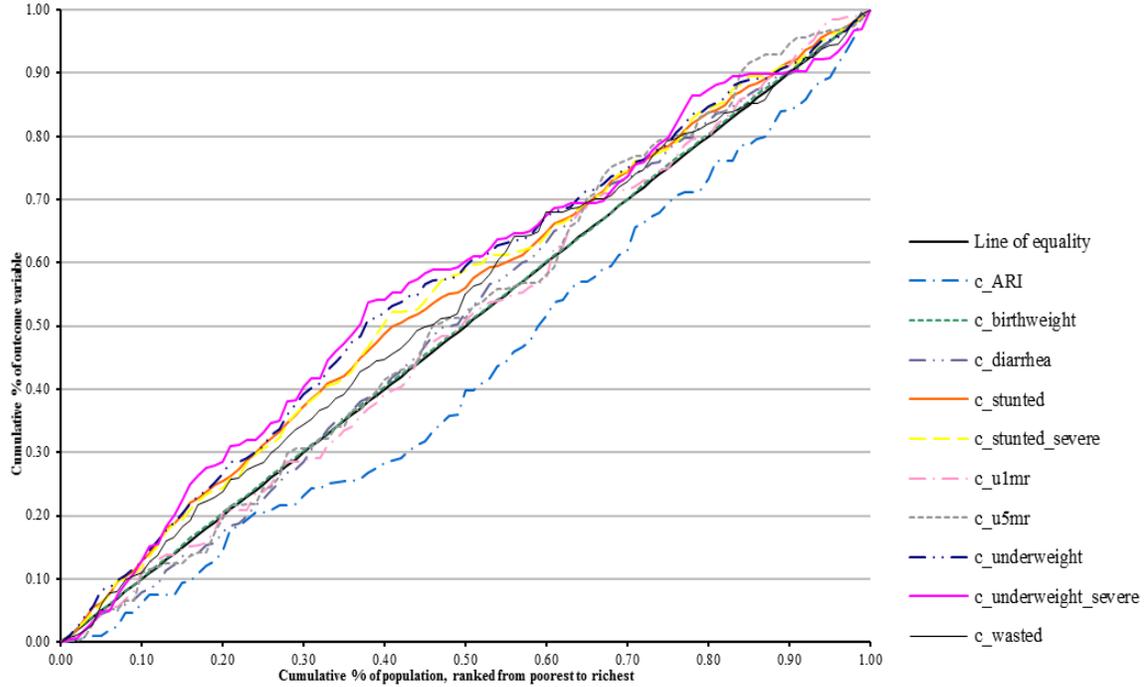
	Standard concentration index (CI)	CI with inequality-aversion parameter = 3	CI with inequality-aversion parameter = 4	Standard achievement index (AI)	AI with inequality-aversion parameter = 3	AI with inequality-aversion parameter = 4
IMR	-0.0058	0.0075	0.0194	0.0400	0.0395	0.0390
U5MR	-0.0274	-0.0105	0.0108	0.0584	0.0574	0.0562
ARI	0.1403	0.2045	0.2465	0.0620	0.0574	0.0543
Birthweight	-0.0048	-0.0071	-0.0091	3089	3096	3102
Diarrhea	-0.0139	0.0000	0.0231	0.1720	0.1697	0.1657
Stunted	-0.0900	-0.1477	-0.1872	0.3241	0.3413	0.3530
Stunted severe	-0.0947	-0.1518	-0.1872	0.1699	0.1787	0.1842
Underweight	-0.1158	-0.1899	-0.2367	0.1874	0.1998	0.2077
Underweight severe	-0.1262	-0.2109	-0.2606	0.0779	0.0837	0.0872
Wasted	-0.0618	-0.1012	-0.1228	0.1218	0.1263	0.1288
Wasted severe	-0.1649	-0.2490	-0.2906	0.0532	0.0571	0.0590

Source: Demographic and Health Survey (DHS) 2012

### CONCENTRATION OF HEALTH OUTCOMES

Figure 3 shows the income-related inequality in several health outcomes. These curves show how health outcomes vary according to consumption: the farther a curve is above the 45° line, the more the corresponding health variable is concentrated among the poorest households. The concentration curve for most health outcomes, particularly wasted prevalence, lies above the 45° line, which confirms **that these health problems are more prevalent among the poor. By contrast, the concentration curve for ARI lies below the 45° line, which means that this health problem is more concentrated among the rich.** Birthweight and U1MR concentration curve is very close to the 45° line, which indicates very little association between these health outcomes and income, the values of which are confirmed in table 11 above.

**Figure 3: Concentration Curves for Health Outcomes**



Source: Demographic and Health Survey (DHS) 2012

### INEQUALITIES IN HEALTH UTILIZATION

Health service utilization is concentrated among the better-off which reflects a more pro-rich health services delivery system in Comoros. By contrast, worse-off households underutilize health services, particularly the first quintiles, except for tetanus vaccine.

Table 12 shows the income-related inequality in the utilization of health care. The health care utilization is increasing with income, the household in the richest quintile have higher coverage of health care use, except for pregnant women receiving tetanus vaccine where the coverage is higher among the household in the lowest quintile (65.8 percent) compared to the richest quintile (56.8 percent).

**Table 12: Health Service Utilization by Household Characteristics**

	Milieu		Lowest quintile	Wealth Quintiles				Total
	Urban	Rural		2	3	4	Highest quintile	
ANC	0.564	0.548	0.394	0.488	0.597	0.610	0.695	0.553
ANC-5Y	0.607	0.566	0.421	0.520	0.643	0.611	0.708	0.577
ANC Skilled	0.953	0.914	0.874	0.909	0.948	0.953	0.944	0.926
Tetanus Mother	0.531	0.604	0.658	0.560	0.569	0.552	0.568	0.584
Vit A Mother	0.424	0.313	0.305	0.317	0.327	0.393	0.384	0.345
Birth doctor	0.171	0.128	0.038	0.114	0.132	0.196	0.238	0.140
Birth nurse	0.754	0.667	0.634	0.665	0.748	0.734	0.686	0.691
Birth Skilled total	0.925	0.795	0.672	0.778	0.880	0.930	0.924	0.831
Vit A	0.460	0.462	0.385	0.479	0.438	0.456	0.566	0.461
BCG	0.882	0.848	0.744	0.843	0.920	0.886	0.899	0.858
DTP1	0.845	0.829	0.760	0.792	0.888	0.877	0.852	0.834
DTP2	0.828	0.802	0.686	0.777	0.857	0.869	0.859	0.810
DTP3	0.764	0.737	0.579	0.704	0.781	0.834	0.830	0.745
Measles	0.755	0.767	0.637	0.712	0.834	0.833	0.798	0.763
Polio 3	0.696	0.721	0.537	0.681	0.745	0.805	0.809	0.714
ITN	0.383	0.422	0.351	0.364	0.472	0.432	0.454	0.411
Treat ARI	0.394	0.354	0.358	0.368	0.166	0.485	0.465	0.370
Treat Diarrhea	0.695	0.583	0.591	0.573	0.617	0.700	0.588	0.613

Source: Demographic and Health Survey (DHS) 2012

The same trend is reflected in the corresponding concentration index where the number is negative (-0.030), revealing higher utilization of tetanus vaccine services by poorer households (Table 13). The concentration indexes for all the other health care utilization are clearly positive, indicating higher utilization by richer households. **Aversion inequality is higher and positive for most of the health care utilization, which shows a greater concentration of utilization among the rich.** Thus, utilization of health care services becomes even more pro-rich. Finally, the aversion to inequality of achievement index has lower value than the standard achievement index, which reflects a lower average utilization of these health care services among the first quintiles, except for tetanus vaccine. The same trend is revealed in low-income countries, where the lack of health insurance and purchasing power among the poor typically mean that their utilization of health care is less than that of the better off despite their greater need (Gwatkin 2003; O'Donnell and others 2007).

**Table 13: Inequality in Health Care Utilization, Unstandardized**

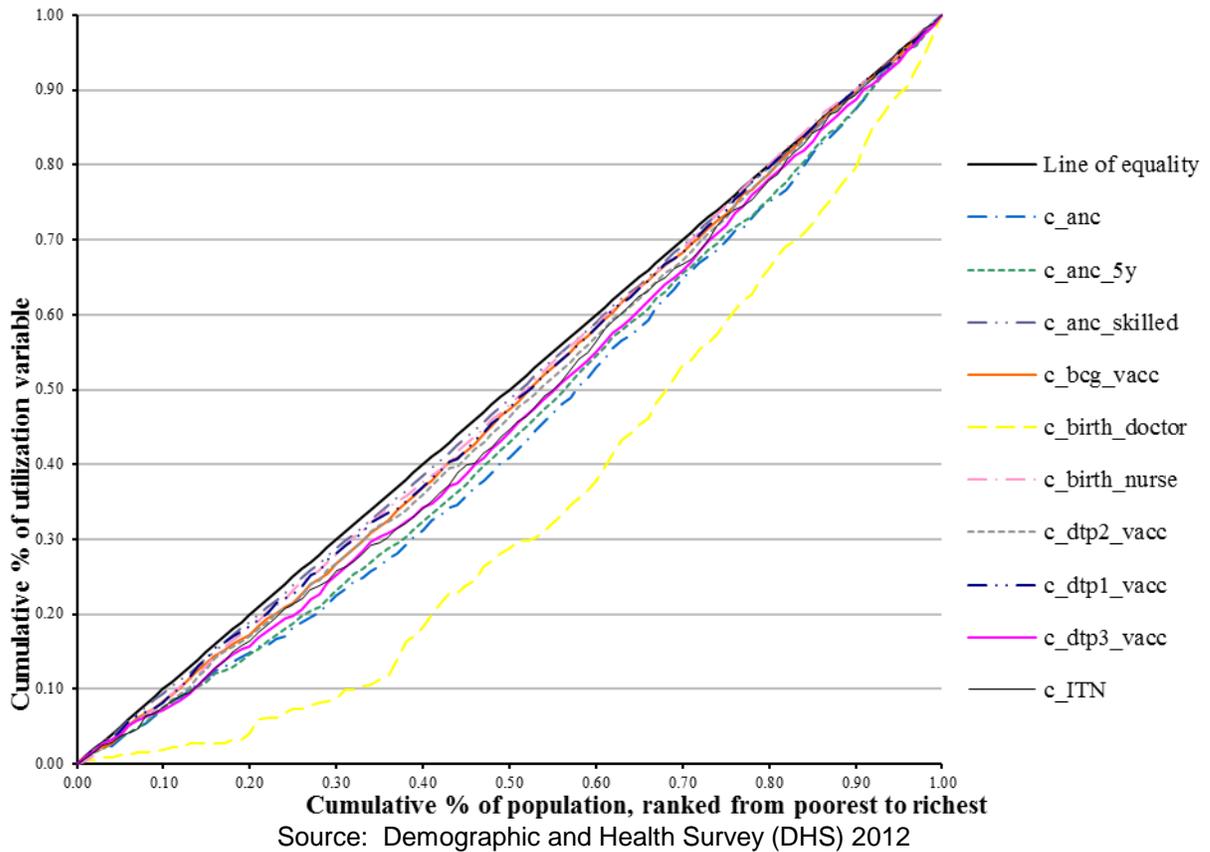
	Standard concentration index (CI)	CI with inequality-aversion parameter = 3	CI with inequality-aversion parameter = 4	Standard achievement index (AI)	AI with inequality-aversion parameter = 3	AI with inequality-aversion parameter = 4
ANC	0.108	0.167	0.202	0.493	0.460	0.441
ANC-5Y	0.093	0.146	0.181	0.524	0.493	0.473
ANC Skilled	0.016	0.026	0.033	0.911	0.901	0.895
Tetanus Mother	-0.030	-0.056	-0.077	0.602	0.617	0.629
Vit A Mother	0.060	0.094	0.116	0.325	0.313	0.305
Birth doctor	0.306	0.460	0.556	0.097	0.075	0.062
Birth nurse	0.023	0.045	0.062	0.675	0.660	0.648
Birth Skilled total	0.027	0.047	0.061	0.811	0.795	0.783
Vit A	0.059	0.088	0.107	0.434	0.421	0.412
BCG	0.035	0.062	0.081	0.828	0.805	0.789
DTP1	0.027	0.047	0.061	0.811	0.795	0.783
DTP2	0.046	0.077	0.098	0.772	0.747	0.730
DTP3	0.071	0.114	0.142	0.692	0.660	0.639
Measles	0.050	0.085	0.109	0.726	0.699	0.680
Polio 3	0.077	0.124	0.156	0.659	0.625	0.603
ITN	0.061	0.103	0.132	0.386	0.369	0.357
Treat ARI	0.120	0.144	0.149	0.325	0.317	0.315
Treat Diarrhea	0.020	0.030	0.033	0.600	0.594	0.592

Source: Demographic and Health Survey (DHS) 2012

### CONCENTRATION OF HEALTH UTILIZATION

The Figure 4 shows the income-related inequality health care utilization. These curves show how utilization vary according to consumption: the farther a curve is above the 45° line, the more the corresponding health variable is concentrated among the poorest households. The concentration curve for most of the health care utilization, particularly births attended by a doctor, lies below the 45° line, which confirms that utilization is more prevalent among the rich. By contrast, the concentration curve for the tetanus vaccine lies above the 45° line, which means that this health service is more concentrated among the poor. Antenatal Care with skilled health providers, delivery with nurse, Vitamin A supplementation for pregnant women, diarrhea treatment and tetanus vaccine concentration curves are very close to the 45° line. This indicates very little association between the use of these health care services and income, the values of which are confirmed in Table 12 above.

**Figure 4: Concentration Curves of Utilization**



**SUB-REGIONAL LEVEL HEALTH FINANCING, UTILIZATION AND OUTCOMES RESULTS**

The impoverishing effect of health payments is actually less in the poorer sub-regions, except in in Hambou and Mitsamihouli where health spending boosts the poverty headcount by close to 12 percent. Looking at the relationships between utilization and outcome variables, sub-regions that had high rates of ANC, skilled birth attendance, insecticide treated bed-nets (ITN) use and Vitamin A coverage for children fared better in all of the nutrition-related indicators.

Table 14 shows the average level of per capita out-of-pocket payments on health compared to the overall level of per capita consumption. This data shows that while the overall level of payments is quite modest, at 4 percent, there are significant variations between sub-regions and regions. For example, Ngazidja excluding the Moroni area has an overall level of 6.1 percent, with very high levels of 7.5 to 7.9 percent in Kiombani and Tsoudjini. On the other end of the spectrum, Ndzouani has much lower average per capita payments with an average of 2.3 percent and under 2.0 percent in Ouani.

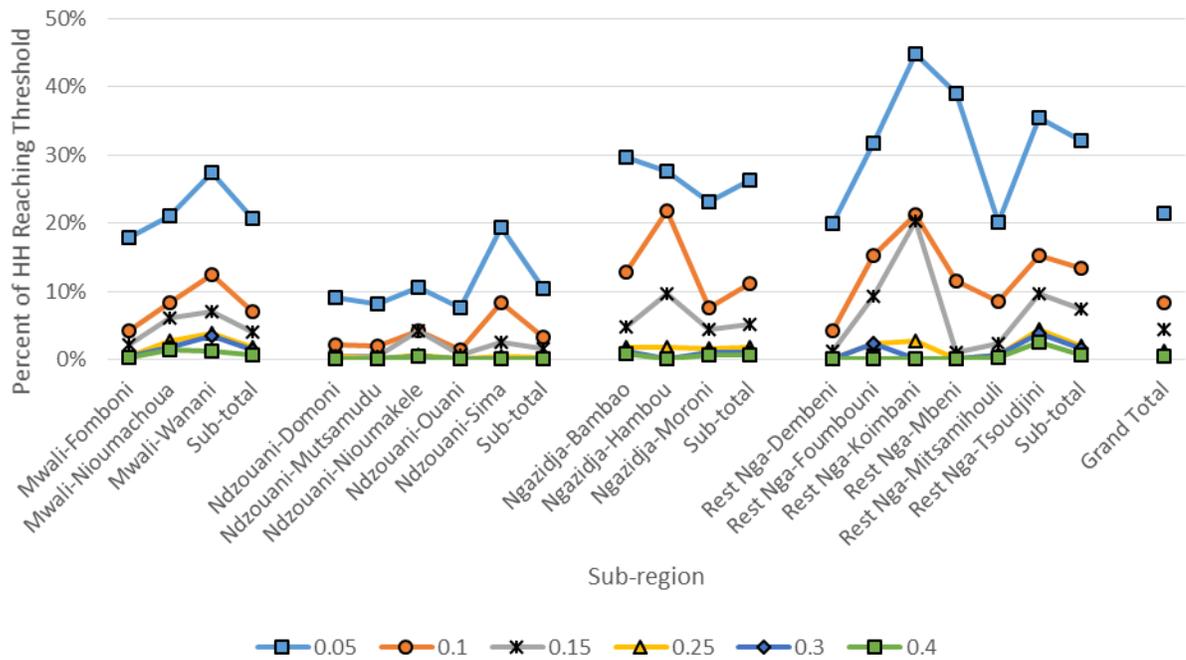
**Table 14: Sources of Finance by Sub-region**

	Per capita consumption, gross	Per capita Health payments	Per capita consumption, net of payments	Health as % total
<b>Area of residence</b>				
Mwali-Fomboni	445,464	12,014	433,450	2.7%
Mwali-Nioumachoua	277,322	9,255	268,067	3.3%
Mwali-Wanani	290,524	12,828	277,696	4.4%
Subtotal	372,466	11,513	360,953	3.1%
Ndzouani-Domoni	424,806	11,629	413,177	2.7%
Ndzouani-Mutsamudu	681,088	15,471	665,618	2.3%
Ndzouani-Nioumakele	285,218	7,749	277,468	2.7%
Ndzouani-Ouani	768,856	15,290	753,566	2.0%
Ndzouani-Sima	359,620	8,455	351,165	2.4%
Subtotal	530,333	12,101	518,232	2.3%
Ngazidja-Bambao	625,816	23,718	602,097	3.8%
Ngazidja-Hambou	481,728	22,434	459,294	4.7%
Ngazidja-Moroni	562,204	19,724	542,480	3.5%
Subtotal	581,330	21,634	559,697	3.7%
Rest Nga-Dembeni	807,918	28,203	779,715	3.5%
Rest Nga-Foumbouni	624,918	35,026	589,892	5.6%
Rest Nga-Koimbani	503,857	39,937	463,920	7.9%
Rest Nga-Mbeni	344,700	17,883	326,817	5.2%
Rest Nga-Mitsamihouli	548,383	27,281	521,102	5.0%
Rest Nga-Tsoudjini	703,148	52,593	650,555	7.5%
Subtotal	569,734	34,692	535,042	6.1%
Total	542,453	21,607	520,847	4.0%

Source: Household Budget/Consumptions Survey (HBS) 2014

These trends are also reflected in the incidence of catastrophic expenditure by sub-region, where the levels of such expenditure are generally higher in Ngazidja, and lower in Ndzouani, as shown in Figure 5 below. The legend at the bottom shows the different health expenditure thresholds, ranging from 5 percent (0.05) to 40 percent (0.40). While a range of thresholds are given, the most common threshold used in the literature for total expenditure is 10 percent. **A threshold of 5 percent of total income spent on health affected roughly 45 percent of the households in Koimbani and close to 40 percent in Mbeni, but just 7.6 percent in Ouani and 8.1 percent in Mutsamudu. Increasing the threshold results in a proportionately smaller percentage of households being affected, although the impact still seems to be greater in Ngazidja than in either Mwali or Ndzouani.**

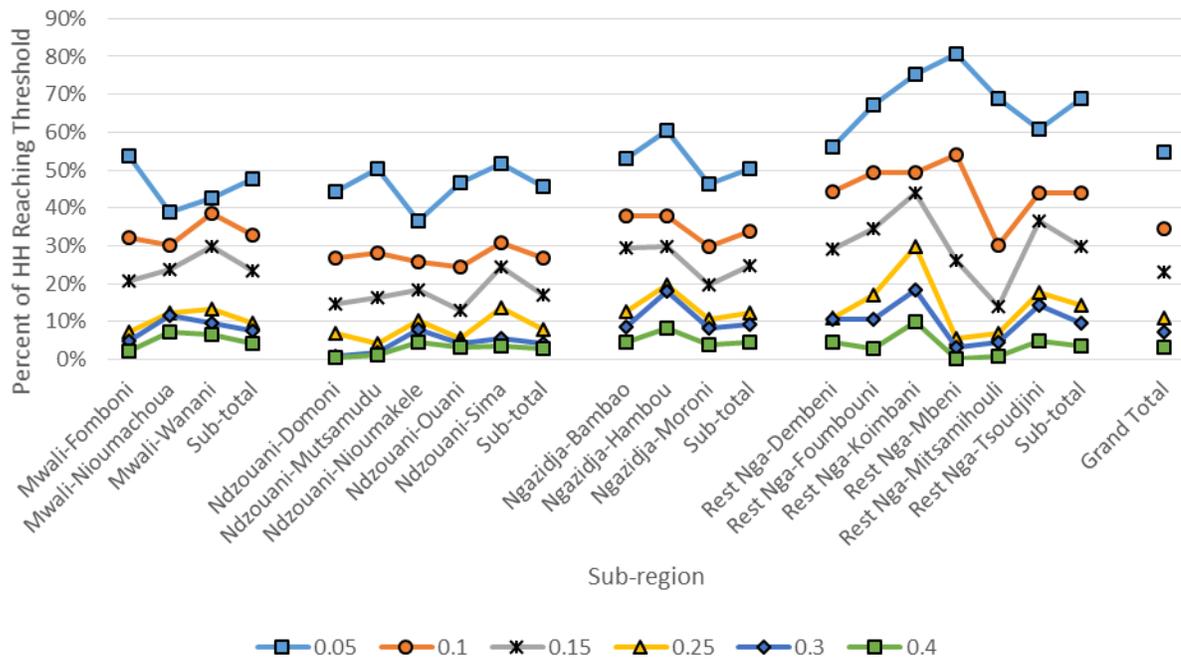
Figure 5 - Catastrophic Expenditure Total



Source: Household Budget/Consumptions Survey (HBS) 2014

Figure 6 shows the same information but calculates health expenditure as a percentage of non-food consumption spending. Non-food spending is used because most food related expenditure is not discretionary, so using non-food spending as the denominator is viewed as providing a better measure of “capacity to pay”. The same general trends exist, although the proportion of families spending 5 percent or more in Mwali and Ndzouani are much more similar.

Figure 6 - Catastrophic Expenditure Non-food



Source: Household Budget/Consumptions Survey (HBS) 2014

**Overall, 55 percent of families allocate 5 percent or more of the non-food consumption spending on health, with this declining to just over a third at the 10 percent level, almost a quarter at the 15 percent level and one-tenth at the 25 percent level. Roughly 7 and 3.3 percent of families spend 30 and 40 percent respectively of their non-food budget on health.** At the 40 percent level, there are also some significant differences, with Koimbani having three times the national average proportion of households spending this level, and between 2 and 3 times the percentage of households in Nioumachoua, Wanani and Hambou allocating this level or more.

Table 15 shows the poverty impact of health expenditure by sub-region. The first column shows the poverty headcount including health spending while the second shows the headcount without such spending. The last column is the percentage change in the overall level of poverty due to spending on health services. Overall, the poverty headcount is calculated at 36.0 percent with health spending and 34.3 percent without, for a net impact of 5.0 percent. However, this impact is not equal across sub-regions.

**Table 15: Poverty Impact of Health Expenditures by Sub-Region**

Sub-region	Poverty Headcount (%) Gross of Health Payments	Poverty Headcount (%) Net of Health Payments	Percent change due to Health Payments
Mwali-Fomboni	38.0%	34.8%	9.3%
Mwali-Nioumachoua	72.8%	70.6%	3.0%
Mwali-Wanani	70.3%	69.1%	1.7%
Subtotal	53.2%	50.6%	5.0%
Ndzouani-Domoni	42.3%	42.3%	0.0%
Ndzouani-Mutsamudu	20.9%	19.4%	7.8%
Ndzouani-Nioumakele	65.4%	65.0%	0.6%
Ndzouani-Ouani	20.6%	19.4%	6.5%
Ndzouani-Sima	51.0%	49.7%	2.6%
Subtotal	38.2%	37.3%	2.5%
Ngazidja-Bambao	26.3%	24.1%	9.1%
Ngazidja-Hambou	49.1%	44.0%	11.7%
Ngazidja-Moroni	31.0%	29.1%	6.7%
Subtotal	30.7%	28.4%	8.2%
Rest Nga-Dembeni	21.3%	20.1%	6.2%
Rest Nga-Foumbouni	37.8%	35.0%	7.9%
Rest Nga-Koimbani	27.5%	27.5%	0.0%
Rest Nga-Mbeni	54.4%	51.6%	5.4%
Rest Nga-Mitsamihouli	28.5%	25.5%	11.8%
Rest Nga-Tsoudjini	22.0%	20.3%	8.6%
Subtotal	32.7%	30.5%	7.1%
Grand Total	36.0%	34.3%	5.0%

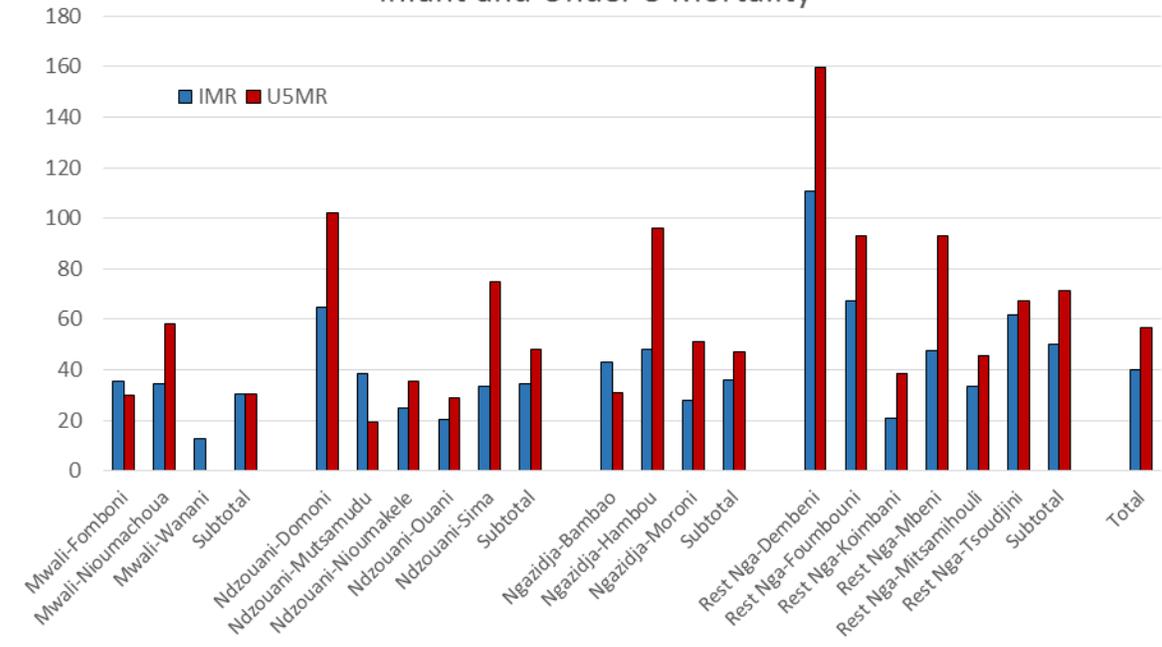
Source: Household Budget/Consumptions Survey (HBS) 2014

For example, while the overall level of poverty in Nioumakele is among the highest in the country, spending for health services barely affects the poverty headcount, and in Domoni there is no impact. On the other hand, **in Hambou and Mitsamihouli health spending boosts the poverty headcount by close to 12 percent**, even though the former has a relatively higher level of poverty than average and the latter is below the national average.

The analysis now turns from the financial impact to outcomes and utilization. First with respect to outcomes, Figure 7 shows the infant (IMR) and under-5 (U5MR) mortality by sub-region, based on the DHS data. This data shows that there are several areas with quite high IMR (over 60 per 1,000 live births) and U5MR (over 80 per 1,000 live births), including Dembeni, Domoni, Foumbouni and Mbeni.

Several others, such as Sima and Hambou have high U5MR, but lower IMR, suggesting issues with mortality in the 1-5 year age range. There are several sub-regions that show higher IMR than U5MR, which is technically not possible, but is likely a function of data issues.

Figure 7 - Health Outcomes by Sub-region  
Infant and Under 5 Mortality



Source: Demographic and Health Survey (DHS) 2012

Figure 8 shows the reported incidence of acute respiratory infection (ARI) and diarrhea for children under 5 years of age by sub-region. This Figure shows substantially higher incidence of ARI (10 percent or more) in Domoni and Tsoudjini, with very high incidence (over 18 percent) in Mutsamudu and Hambou. On the other hand, five sub-regions have an incidence of diarrhea of over 20 percent (Domoni, Mutsamudu, Ouani, Sima and Bambao), while Hambou and Tsoudjini have incidence over 25 percent.

Finally on the outcomes side, Figure 9 shows the nutrition outcomes by sub-region, including moderate and severe stunting, underweight and wasting. With respect to moderate stunting, higher than average levels are seen in Mutsamudu, Nioumakele, Kiombani, Ouani, and Domoni, while Kiombani and Mutsamudu and Nioumakele have higher levels of severe stunting. Ndzouani as a whole has worse nutritional outcomes based on this measure, as well as for underweight. The results for wasting are more dispersed, with Kiombani, Moroni, Wanani and Mutsamudu having higher moderate levels, while Wanani, Kiombani, Foumbouni and Moroni having higher severe levels.

Figure 8 - Health Outcomes by Sub-region  
Incidence of ARI and Diarrhea

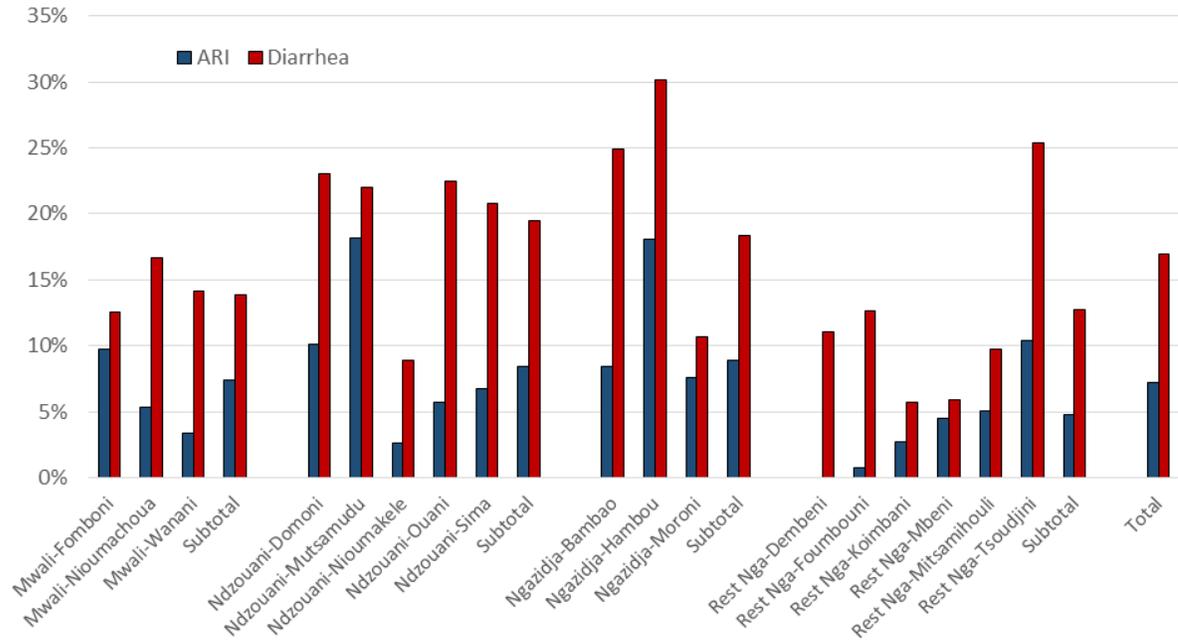
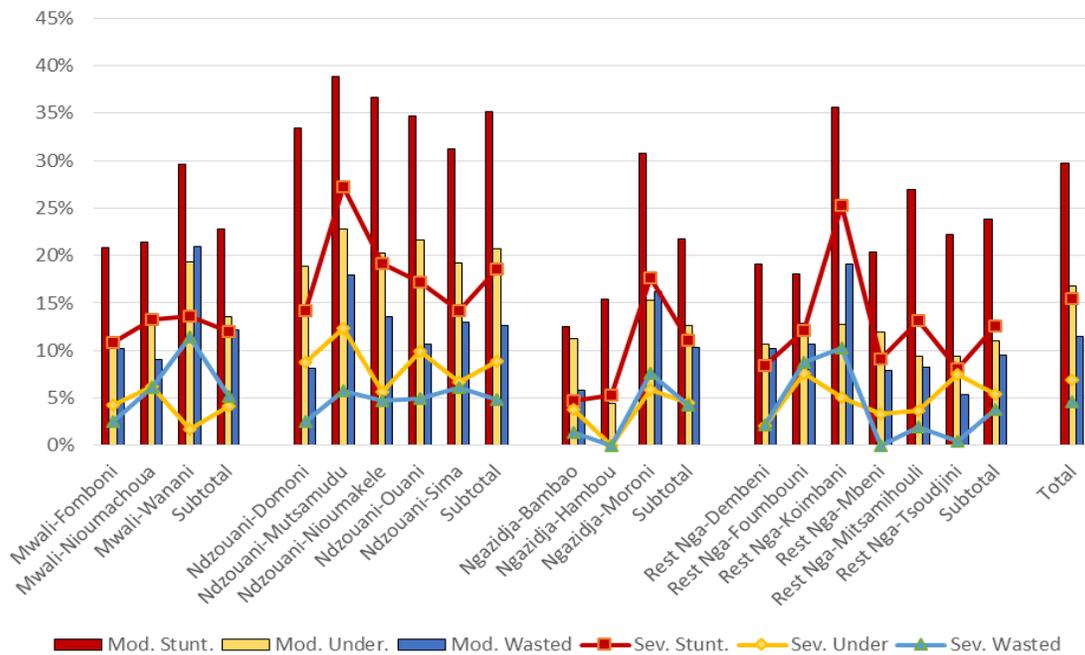


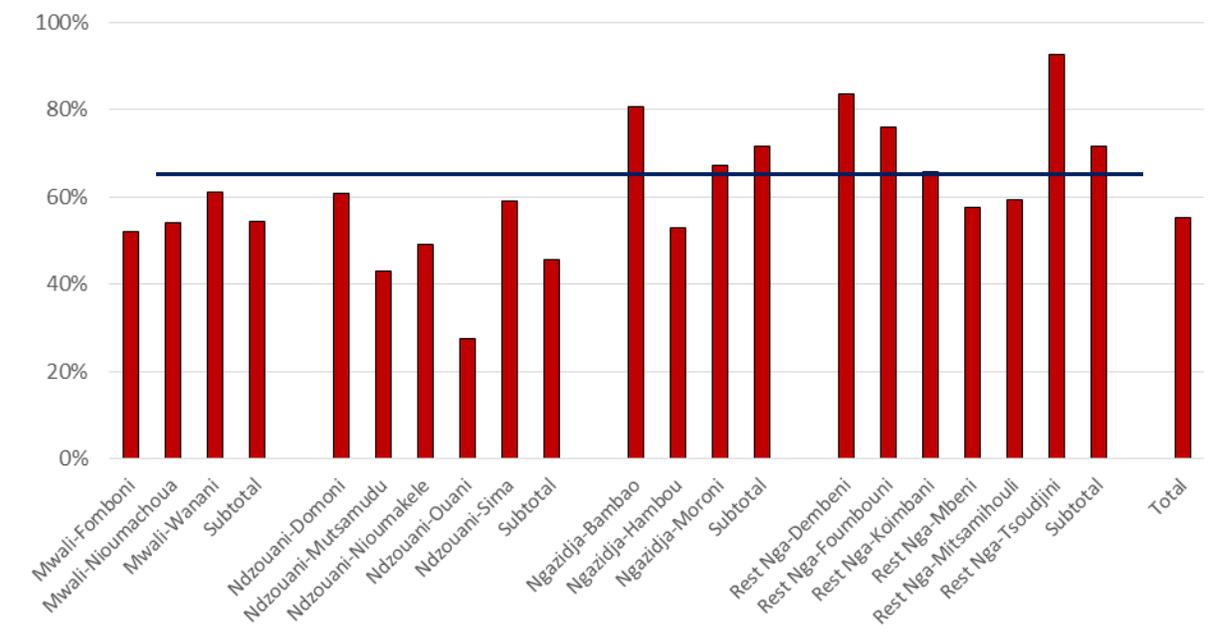
Figure 9 - Nutrition Outcomes by Sub-region



Source: Demographic and Health Survey (DHS) 2012

Turning to utilization of services, a number of areas are covered by the DHS. Specific results are shown below in the areas of the use of antenatal care<sup>13</sup>, skilled birth attendance (doctors and nurses), Vitamin A coverage, and treatment of diarrhea (compared to incidence). Figure 10 shows that the use of antenatal care ranges from a low of less than 30 percent in Ouani to a high of over 90 percent in Tsoudjini. The national average is 56 percent. Ouani and Mutsamudu are considerably below the average, while Bambao, Moroni, Dembeni, Foubouni, and Tsoudjini are quite a bit above the average.

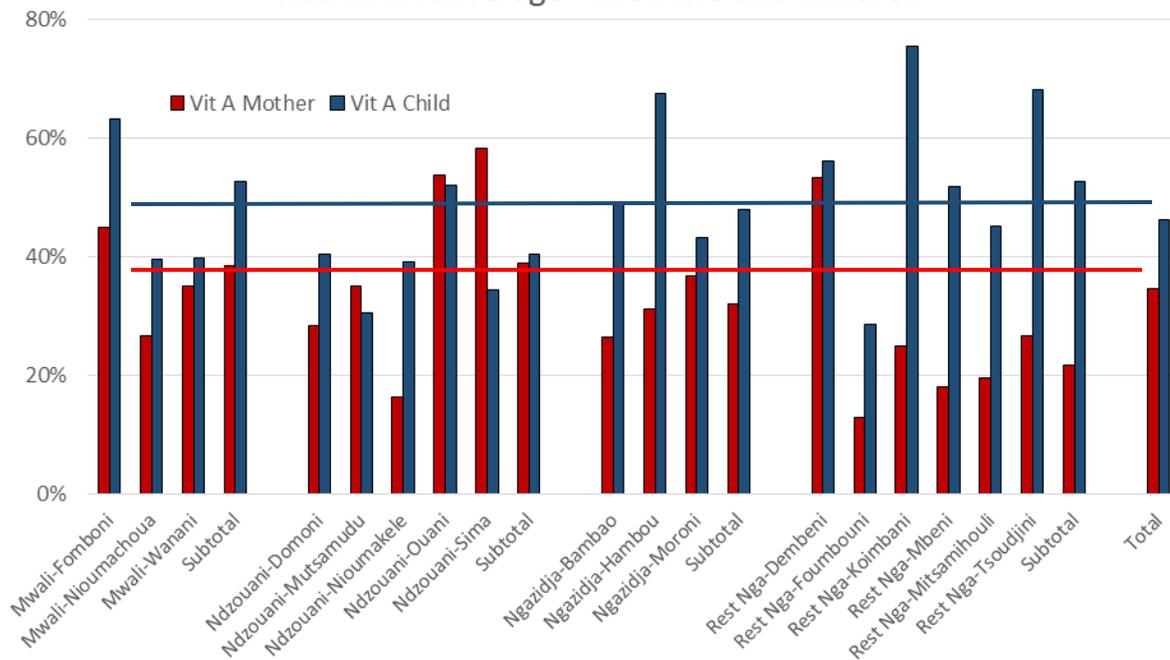
Figure 10 - Health Services Use by Sub-region  
Antenatal Care



Source: Demographic and Health Survey (DHS) 2012

<sup>13</sup> Antenatal care is defined as mother aged 15 to 49 who had at least one antenatal care during pregnancy from any skilled personnel (doctor, nurse/midwife, auxiliary midwife, feldsher, family nurse or trained birth attendant)

Figure 11 - Health Services Use by Sub-region  
Vitamin A Coverage - Mothers and Children

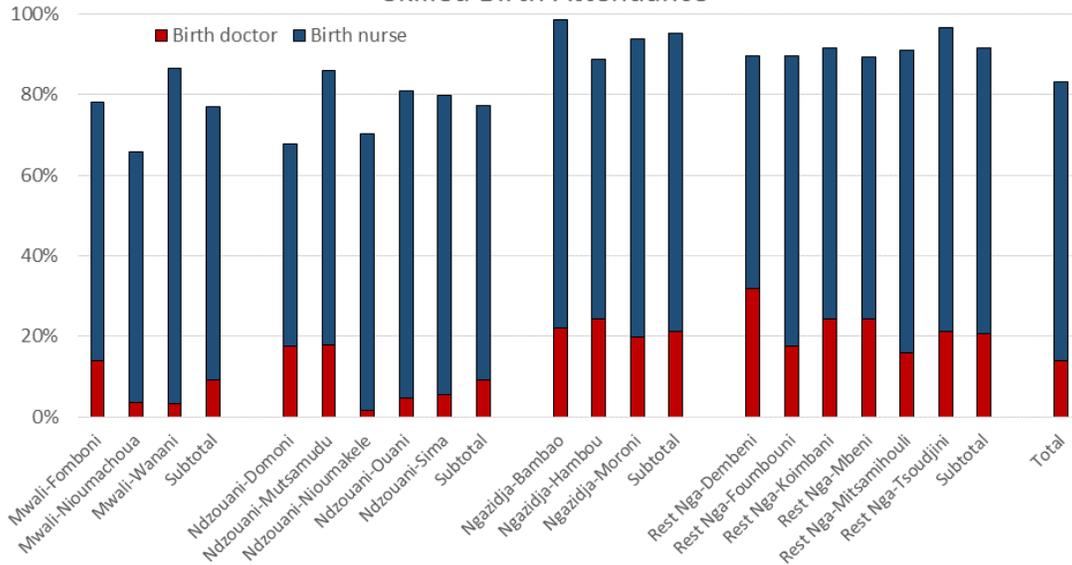


Source: Demographic and Health Survey (DHS) 2012

Figure 11, above, shows the coverage of Vitamin A supplementation for pregnant women and for children by sub-region. It is interesting to note that there is no correlation between the level of coverage for mothers and for children (correlation coefficient 0.052). The sub-regions of Fomboni, Ouani, Sima and Dembeni have higher-than average (more than 40 percent) coverage of mothers, while Fomboni, Hambou, Koimbani and Tsoudjini have higher (more than 60 percent) coverage of children under 5.

Figure 12 shows the use of skilled birth attendants by sub-region, subdivided into the percentage of total births delivered by doctors and by nurses. While there is generally limited variability in overall skilled birth attendant coverage (with the exceptions of Bambao on the high side, and Nioumachoua, Domoni and Nioumakele on the low side), the variation with respect to the use of physicians versus nurses is much more pronounced. The sub-regions of Nioumachoua, Wanani, Nioumakele, Ouani and Sima have a much lower percentage of births attended by doctors, while Dembeni, Hambou, Kiombani and Mbeni have a higher percentage of doctor-assisted births.

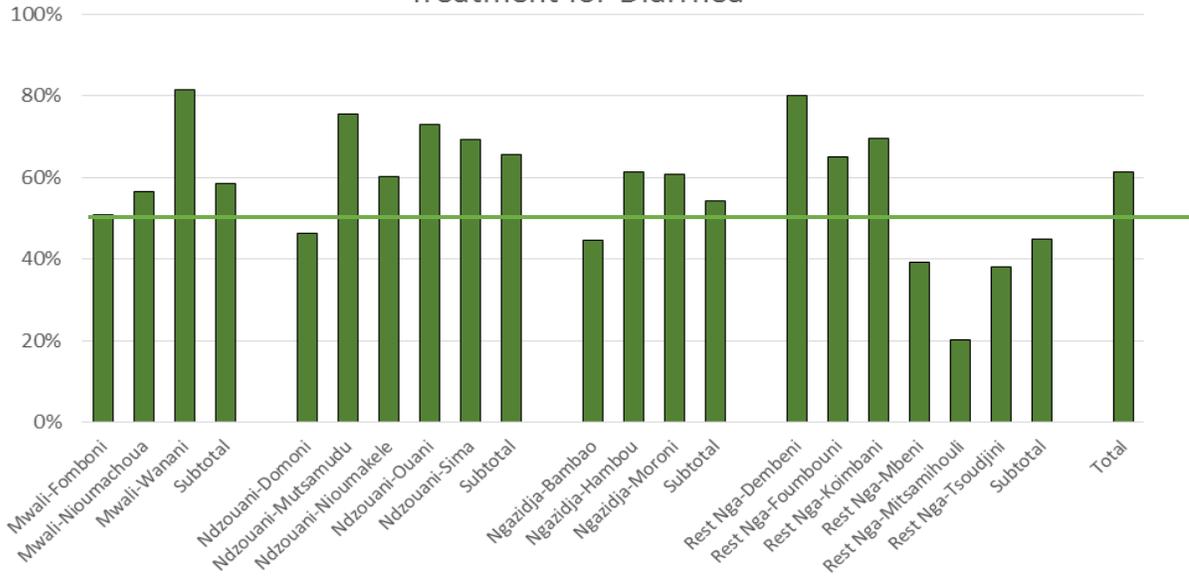
Figure 12 - Health Services Use by Sub-region  
Skilled Birth Attendance



Source: Demographic and Health Survey (DHS) 2012

Finally, Figure 13 shows the percentage of cases of diarrhea that are treated within the health care system. Again, substantial variation exists, with Mitsamihouli, Tsoudjini, Mbeni, Domoni, and Bambao showing lower use of health services for this condition, while Wanani, Dembeni and Mutsamudu showing higher use of health services.

Figure 13 - Health Services Use by Sub-region  
Treatment for Diarrhea



Source: Demographic and Health Survey (DHS) 2012

The use of some health services is highly correlated with others. For example, high levels of vaccination coverage is observed in sub-regions that have high levels of antenatal care and

skilled birth attendance, and there is also a high level of correlation between ANC and SBA (0.60). Interestingly, ANC is negatively correlated with Vitamin A coverage for pregnant women, suggesting that work may be needed in improving the quality of ANC services. There is also no correlation between ANC coverage and tetanus coverage for pregnant women. On the outcomes side, there are high negative correlations between most nutrition indicators and both U5MR and IMR, suggesting that there is a paradox, with sub-regions suffering from highest childhood undernutrition despite comparatively lowest U5MR and IMR. There is a high positive correlation between the incidence of diarrhea and the incidence of ARI.

**Looking at the relationships between utilization and outcome variables, sub-regions that had high rates of ANC tended to have lower levels of moderate and severe stunting and moderate underweight, and those that had higher overall rates of skilled birth attendance had lower rates of moderate stunting and underweight. Similarly, sub-regions with higher use of insecticide treated bed-nets (ITN) fared better in all of the nutrition-related indicators, and those that had increased coverage of Vitamin A for children also had lower rates of moderate and severe underweight and wasting. Finally, sub-regions with higher levels of immunization coverage had lower rates of ARI and diarrhea.**

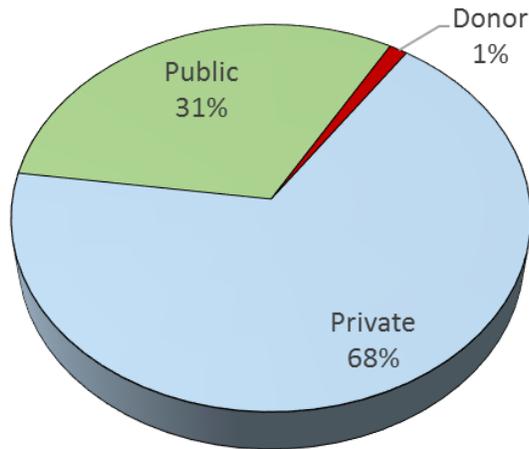
The next area to be examined is the expenditure data contained in the latest National Health Accounts (NHA).

#### **NATIONAL AND SUB-REGIONAL NHA RESULTS**

The majority of total health expenditure is private. Most of the public funds (84 percent) are directed toward salaries and benefits, while most private and donor funds go towards non-salary expenses such as purchase of services and/or drugs. There is a significant variation in the allocation of public funds across sub-region. Those where the funding primarily goes to health posts and health centers tend to have lower funding, while those with hospitals tend to have higher funding. In terms of relationships between poverty headcount and health expenditure variables, we saw a high positive relationship between poverty and the percent of donor funding, suggesting that donor funding may be well targeted to poorer areas. On the other hand, the percent of public spending tends to be lower in areas with higher poverty headcount, both total and non-salary, implying that there may be room for better targeting of public spending.

The National Health Accounts data represents a rich source of information for expenditure patterns across a number of dimensions. As shown in Figure 14, one dimension is the source of financing, which shows that the **vast majority of total health expenditure is private (68 percent) with just 31 percent coming from the public sector and one percent from donors.**

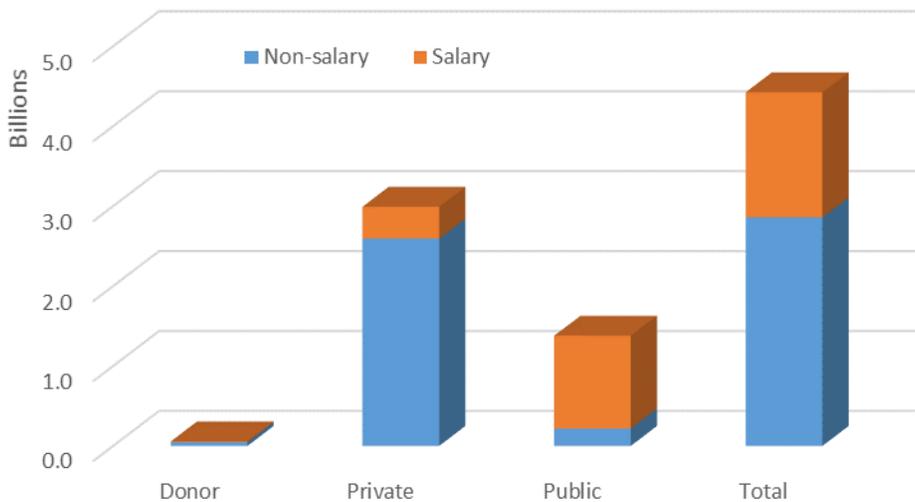
Figure 14 - Total NHA Spending by Source



Source: National Health Accounts (NHA) 2011

Drilling down further to the nature of expenditure financed through each source, Figure 15 shows that most of the public funds (84 percent) are directed toward salaries and benefits, while most private and donor funds go towards non-salary expenses. Overall, about one third of total expenses are for salaries and two-thirds are for non-salary items

Figure 15 - Expenditures by Source and Nature

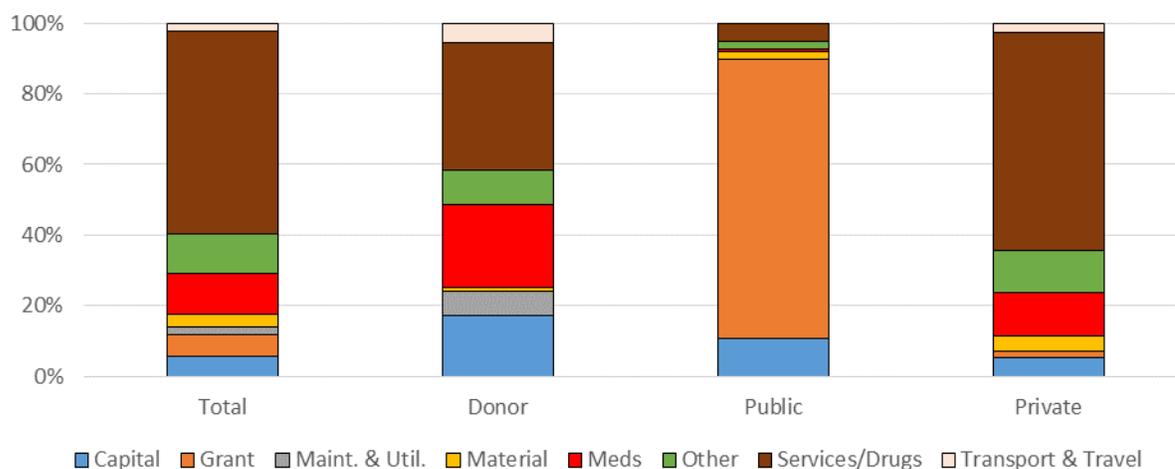


Source: National Health Accounts (NHA) 2011

Finally, Figure 16 looks at the national composition of non-salary expenses. The categorization by type required a detailed examination of the individual expenditure descriptions (403 in all) in order to assign each expenditure to one of eight spending types. In future iterations of the NHA, it would be useful to utilize standard expenditure classifications to ensure consistency.

More than half of the non-salary expenditure (57 percent) is for the purchase of services and/or drugs, primarily from the private sector and primarily directly by households. Direct purchase of medications is the next largest type of expenditure, accounting for 12 percent of total non-salary spending. Aside from “other” expenditure, grants and capital are the next largest at 6 percent each. Grants are only made from public funds, while the bulk of capital spending is in the private sector (about 81 percent of the total), with 5 percent coming from donations and 14 percent from the public sector. Other types of spending account for relatively minor shares of the total. Looking at the breakdown by the type of funding, different patterns emerge. Donor funds show a higher proportion going to capital items and medications and a lower proportion going to health services and drugs. On the other hand public funds go mostly to grants and capital items, while private funds more closely mirror the overall total.

Figure 16 - Non-salary Spending by Type



Source: National Health Accounts (NHA) 2011

Turning to the sub-regional data, the NHA database shows **significant variation in the allocation of funds across sub-regions**. Figure 17 shows the per capita (KMF) funding by source and Figure 18 shows the per capita funding by the nature of expenditure. The population figures were calculated based on the sum of the household weightings in the Household Budget Survey for each sub-region. These figures show very large variations both across sub-regions and also across regions. For example, the Moroni area of Ngazidja receives over KMF 20,000 in total health funding per capita, about two-thirds of which are private. On the other hand, the rest of Ngazidja gets only KMF 1,305 per capita, virtually all of which is private. **Grants (donations) are concentrated in just five sub-regions (Fomboni and Nioumachoua in Mwali, and Mutsamudu, Nioumakele and Ouani in Ndzouani). Together these account for 95 percent of the total grants reported.**

Figure 17 - NHA Funding by Source and Sub-region (per capita)

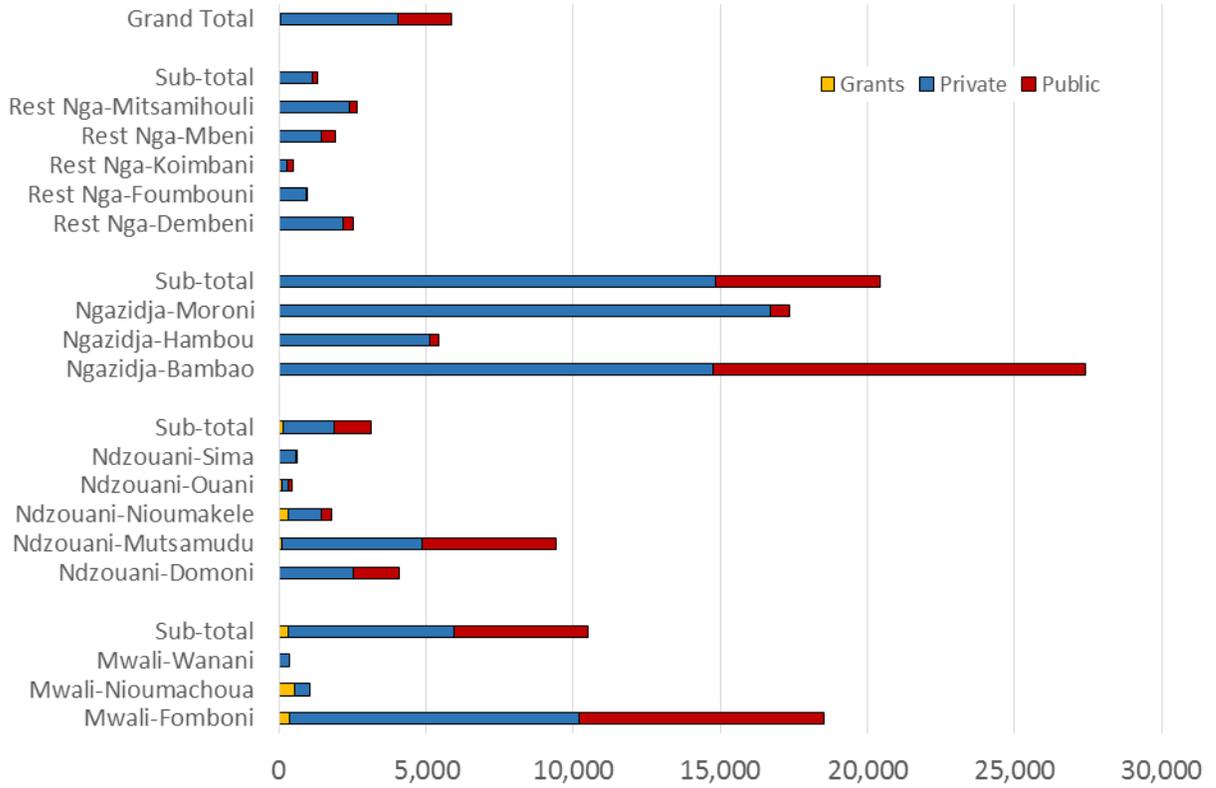
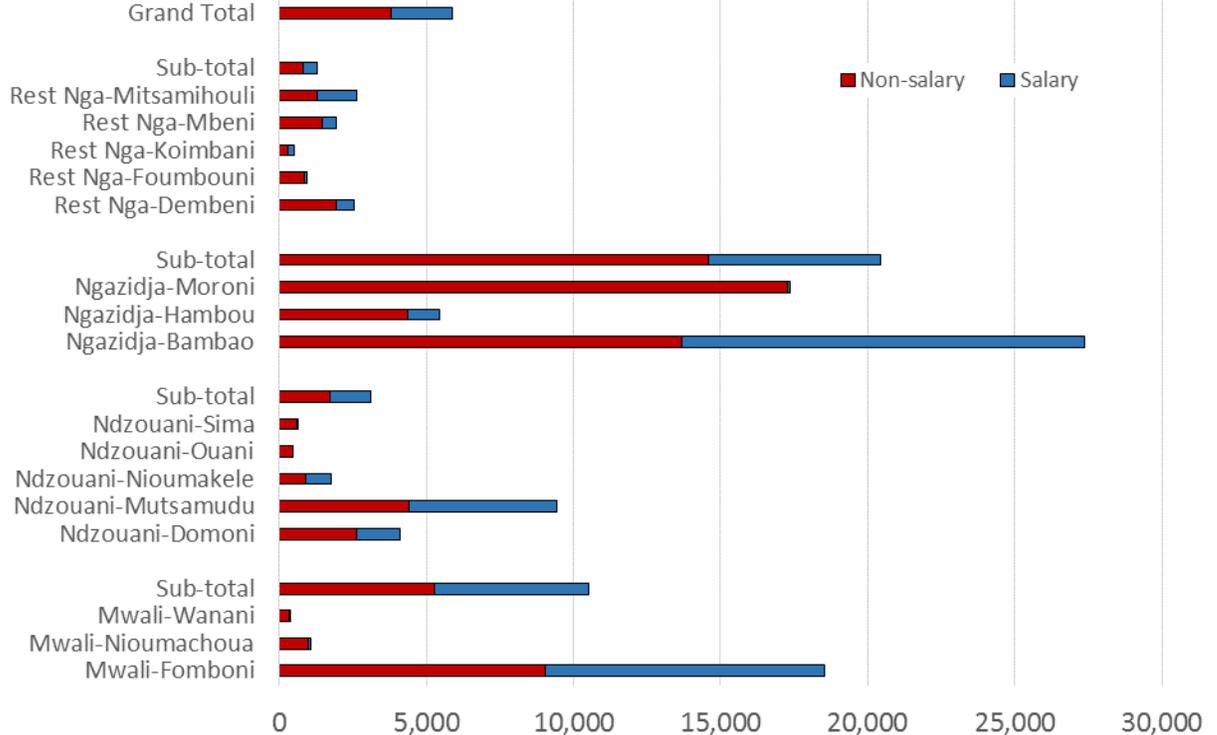
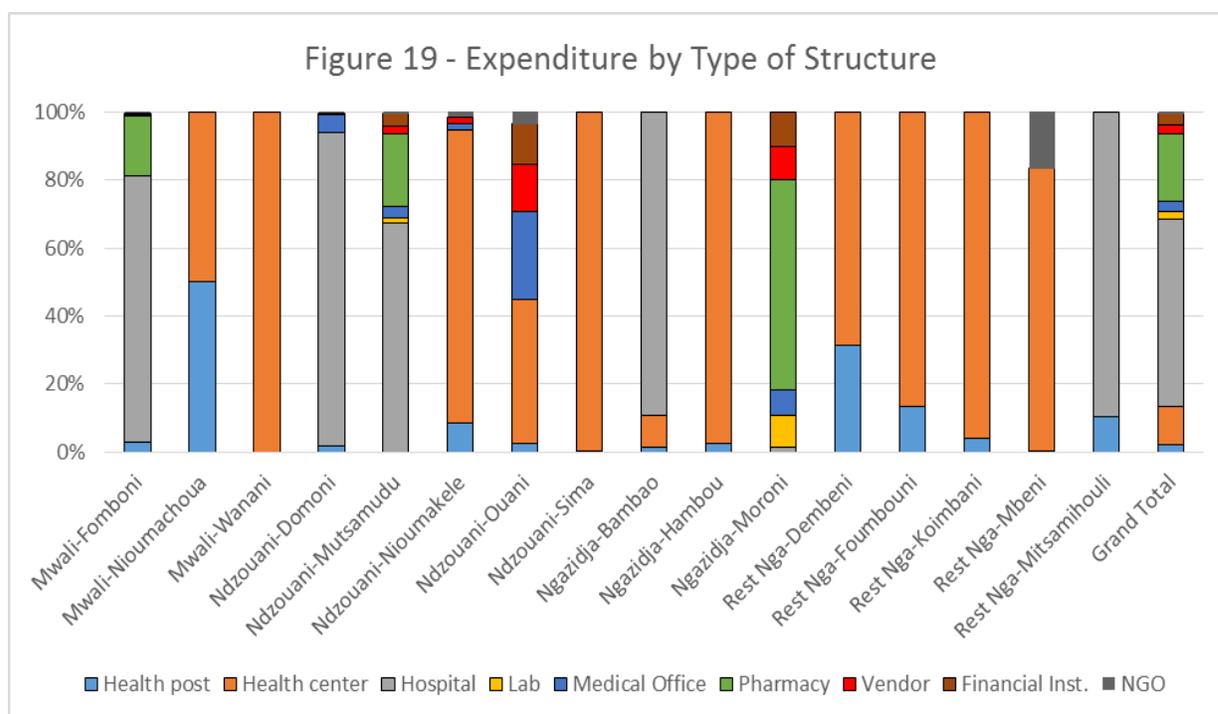


Figure 18 - NHA Funding by Nature and Sub-region (per capita)



Source: National Health Accounts (NHA) 2011

Figure 18 shows similar variations for the nature of expenditure, with some sub-regions, such as Moroni, Dembeni, Sima and Nioumachoua showing a much smaller proportion of salary related expenses. Figure 19 provides some clues to the reasons behind this funding allocation by showing the allocation of funding by type of structure that received the funds. **Sub-regions where the funding primarily goes to health posts and health centers tend to have lower funding, while those with hospitals tend to have higher funding.**



Source: National Health Accounts (NHA) 2011

### STATISTICAL ANALYSIS

This section looks at some of the statistical relationships inherent in these datasets. Simple correlations were calculated looking primarily at the relationship between poverty and other variables at the sub-region level, but also measures of consumption and relationships between utilization and outcome variables and between health expenditure and other variables.

In terms of the relationship between poverty and the use of health services, there were high negative correlations ( $< -0.30$ ) with delivery by a physician and overall levels of assisted delivery (-0.553 and -0.584 respectively), as well as Polio-3 immunization (-0.396) and treatment of acute respiratory infections (-0.423). **These relationships suggest that the poor are facing real financial barriers to accessing health services.** There is an unexplained positive relationship between the poverty headcount and tetanus immunization status for pregnant women (0.690).

In terms of poverty and outcome variables, the highest negative correlations were with infant mortality (-0.332) and severe underweight (-0.323).

**Turning to the relationships between poverty headcount and health expenditure variables from the NHA, we see a high positive relationship between poverty and the percentage of**

donor funding (0.444), suggesting that donor funding may be well targeted to poorer areas. On the other hand, the percentage of public spending tends to be lower in areas with higher poverty headcount, both total (-0.319) and non-salary (-0.358), suggesting there may be room for better targeting of public spending.

Looking at the relationship between out-of-pocket spending on health and other sources of health spending, the data suggests a negative relationship between donor and household spending (-0.390), as well as with overall levels of non-salary and total health spending (-0.424 and -0.613 respectively). This suggests that out-of-pocket spending increases in the absence of other sources of funding, either from the government or from donors.

### ANALYSIS OF “POCKETS OF POVERTY”

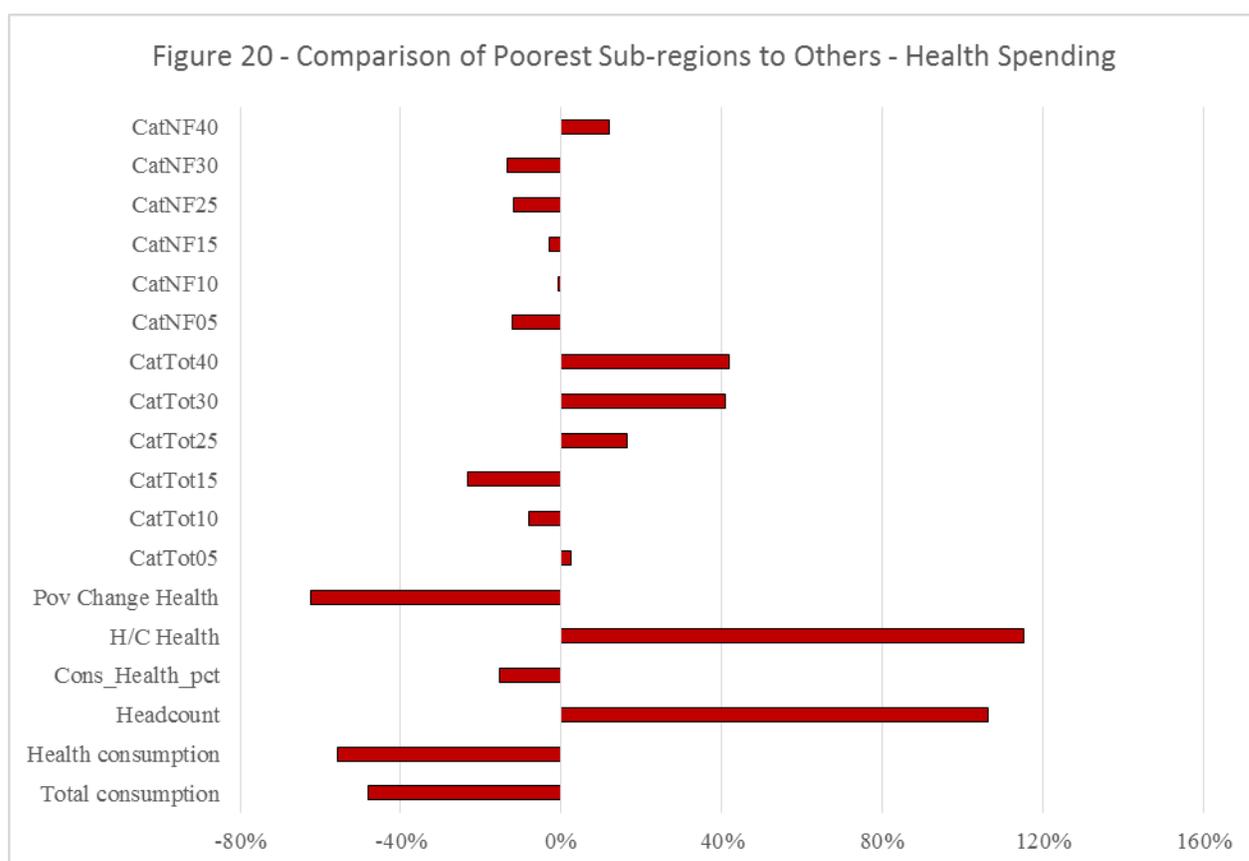
The following five sub-regions with the highest level of poverty headcount (more than 50%) and common characteristics were identified: (i) Mbeni (Ngazidja); (ii) Sima (Ndzouani); (iii) Nioumakele (Ndzouani); (iv) Wanani (Mwali); and (v) Nioumachoua (Mwali). However, the impoverishing effect of health payments is less in the poorer sub-regions. This is reflective of the much lower average health spending and may reflect care being forgone in the poorer regions due to lack of available funding.



Source: <https://www.lib.utexas.edu/maps/africa/comoros.gif> and author's calculations

While the statistical analysis showed some correlations between poverty levels and other variables, this section examines the sub-regions with the highest level of poverty as a group, to determine if they have any common characteristics. As shown in Figure 21 through 24 below, this appears to be the case with respect to many of the variables included in this analysis. In each

case, the bar represents the percentage difference between the average value for the 5 poorest sub-regions and the average value for the remaining 12 sub-regions for that particular indicator. For example, as shown in Figure 20, while it is expected that the overall level of consumption and health spending in the poorer sub-regions would be less than in the richer ones, it is interesting to note that the poorest sub-regions spend 15 percent **less** of their income on health compared to the richer regions. Similarly, while as expected the average poverty headcount is more than double that of the remaining sub-regions and the headcount net of health payments is even higher (115 percent), **the impoverishing effect of health payments is actually less in the poorer sub-regions: 2.7 percent increase in poverty on average, compared to a 7.1 percent increase in the other sub-regions.** This is reflective of the much lower average health spending and may reflect care being forgone in the poorer regions due to lack of available funding. This issue may need to be explored further.

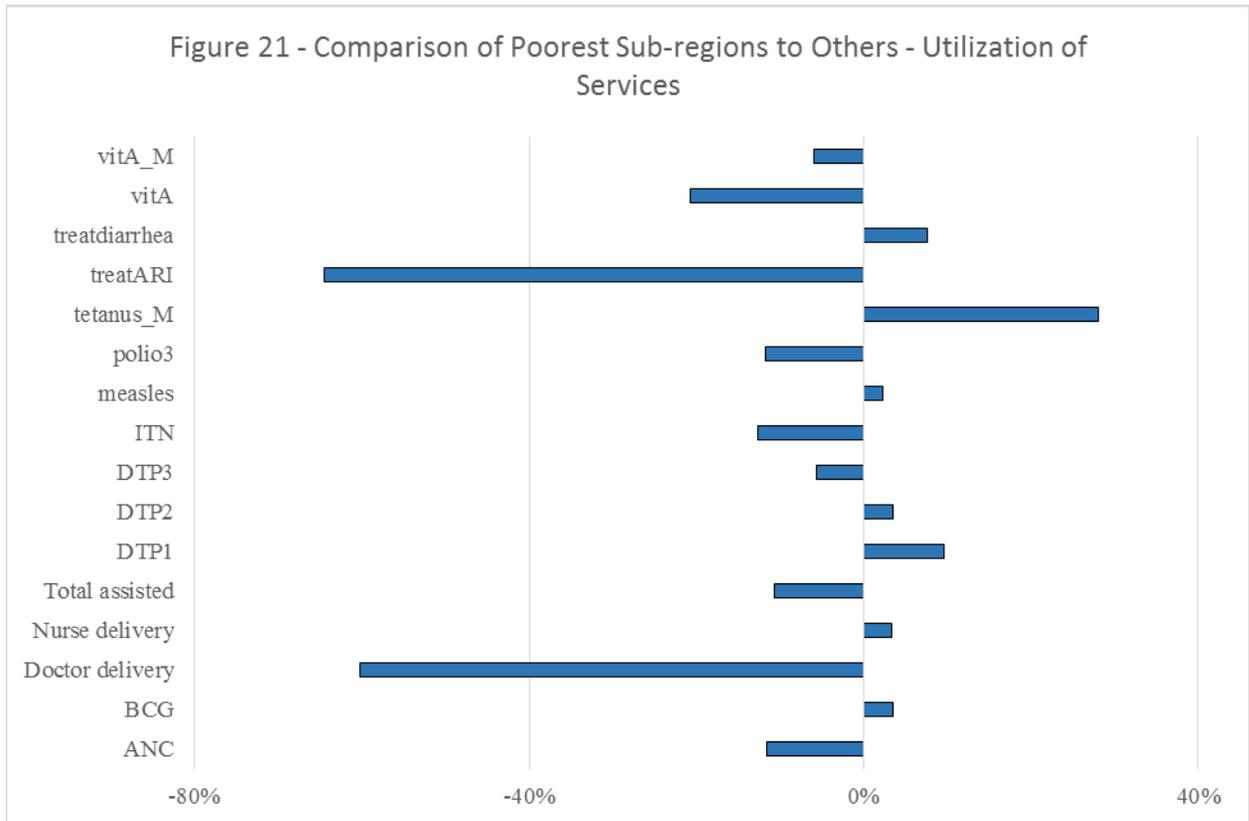


Source: Household Budget/Consumptions Survey (HBS) 2014

With regard to catastrophic health spending, however, a higher proportion of households in poorer sub-regions (16 percent) spend 40 percent or more on health than those in richer sub-regions. Over 40 percent of the households in poorer regions allocate more than 30 or 40 percent of their total spending on health related issues.

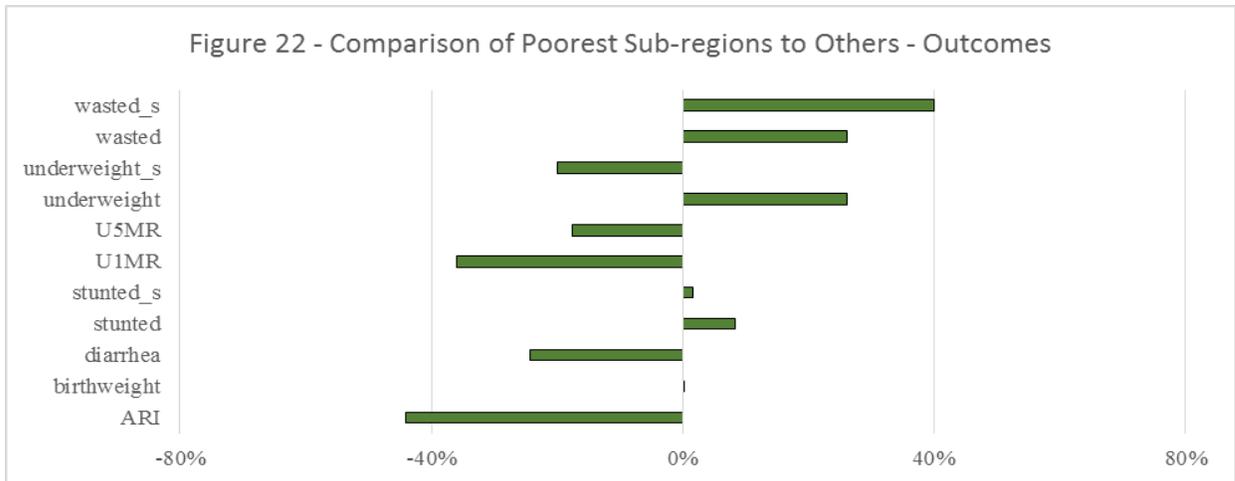
Turning to the utilization of health services (Figure 21), the poorer sub-regions have 60 percent fewer doctor assisted deliveries but slightly higher levels of nurse assisted deliveries, with the result that the overall level of professionally assisted deliveries in these sub-regions is around 11 percent less than in the richer regions. There do not seem to be significant differences in the utilization of immunization services, although there does appear to be some issues with respect to follow-up. Both polio-3 and DPT-3 coverage seem to be less in the poorer sub-regions. ITN

usage is also almost 13 percent lower in the poorer sub-regions compared to the richer ones, suggesting that some better targeting is needed. The level of treatment for ARI is quite a bit lower (64.5 percent) in the poorer sub-regions, compared to the reported incidence (44 percent lower). This also suggests some possible access issues in these sub-regions. Similarly, access to vitamin A for children is much lower (21 percent less), although vitamin A coverage for pregnant women is not much different between the two groups.



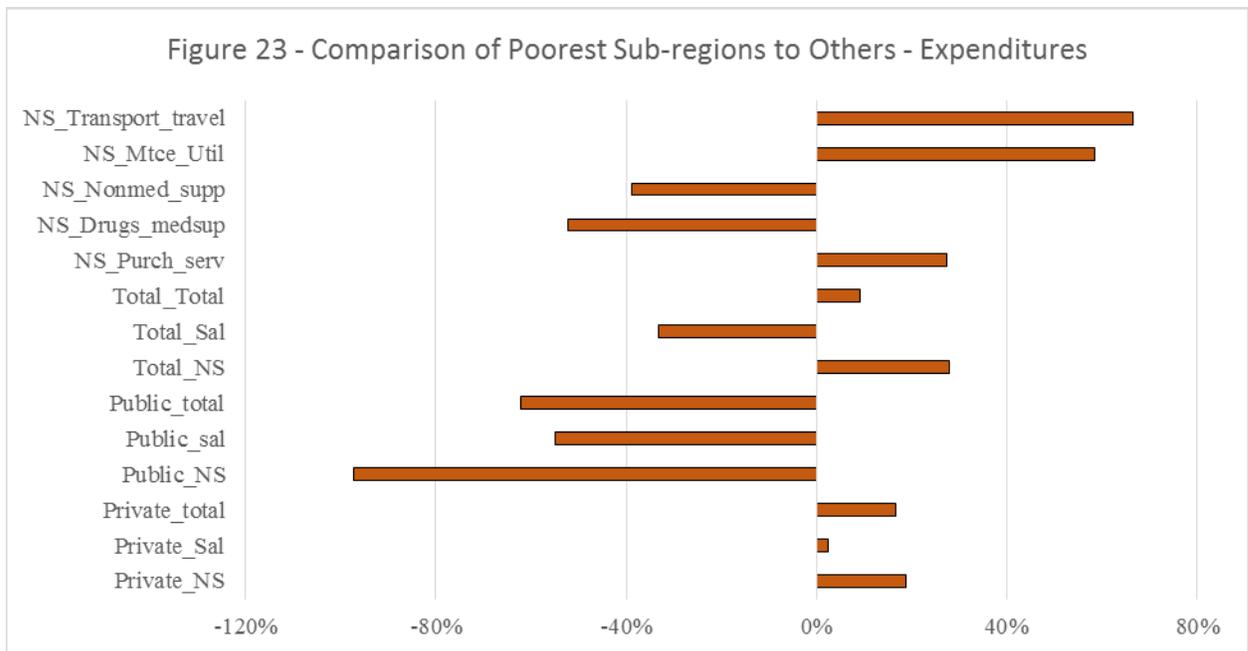
Source: Demographic and Health Survey (DHS) 2012

In terms of outcomes (Figure 22), stunting, wasting and underweight rates are all higher for the poorer sub-regions, although the percentage of severe stunting is fairly similar and the percentage of severe underweight is actually 20 percent less in the richer sub-regions. Infant and child mortality are also lower in the poorer sub-regions, which might bear further examination.



Source: Demographic and Health Survey (DHS) 2012

**Looking at sub-region level spending (Figure 23), the proportion of total spending by source seems to suggest that donor funds are targeted to poorer sub-regions, but other types of funds, especially public funds are more concentrated in richer sub-regions.** In terms of spending per capita, there is approximately 3.5 times the donor funds going to poorer sub-regions compared to the richer ones, but the richer ones, on average, get almost 15 times the level of public spending compared to the poorer ones. In this regard, private spending is more equitable, since the per capita private spend in the poorer sub-regions is around 6 times that in the richer ones. These issues clearly need further investigation.



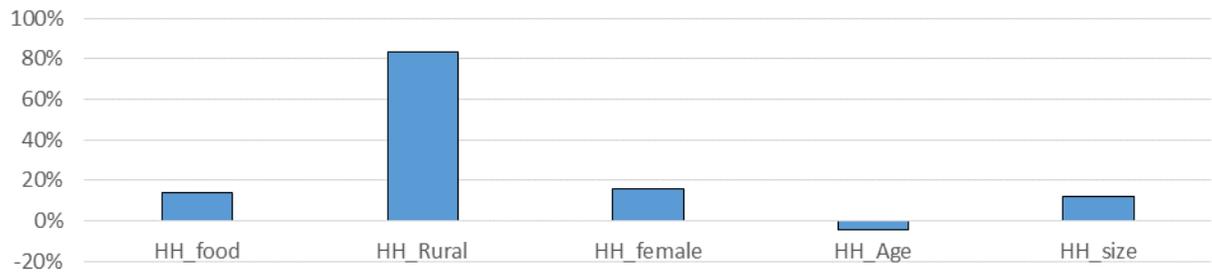
Source: National Health Accounts (NHA) 2011

Related data on the funding by type of structure shows that the poorer sub-regions have a significantly higher proportion of funds going to health centers and health posts, and a much lower

proportion going to medical offices and vendors. The five poorest sub-regions have no spending at all for hospitals, lab, pharmacy and financial institutions.

Finally, as shown in Figure 24, a review of the household characteristics in the poorer sub-regions shows no major differences in the proportion of total expenditures on food, household size, or the age and gender of the household head. They are more predominantly rural, however.

Figure 24 - Comparison of Household Characteristics



Source: Household Budget/Consumptions Survey (HBS) 2014

## PART IV – CONCLUSIONS

### EFFECT OF OUT-OF-POCKET PAYMENTS ON HOUSEHOLD FINANCIAL WELL-BEING

Better-off households spend more on health. Households in urban areas, non-poor households, and households headed by males and by those 55 years old or older spend more on health. However, in terms of proportion, the rural and poor households have higher health spending in relation to their gross consumption. There are significant variations between sub-regions and regions where Ngazidja has a higher average level of per capita out-of-pocket payments on health compared to the overall level of per capita consumption.

Catastrophic expenditures are found to be highly concentrated among the richest, but are more common among the poor at the highest threshold of 40 percent when using either the total household or non-food measure. Koimbani and Hambou sub-regions in Ngazidja, Nioumachoua and Wanani sub-region in Mwali have two to three times the national average proportion of households allocating 40 percent of the nonfood consumption spending on health. The incidence of catastrophic payments increases with income but lower quintile have a higher incidence of catastrophic payments exceeding the threshold of 40 percent in relation to both total household expenditure and nonfood consumption. The level of incidence of catastrophic payments is generally higher in Ngazidja, and lower in Ndzouani.

**Health spending contributes to impoverishment. Out of pocket payments for health care affect 1.7 percent of the population. About 12,826 people a year are brought into poverty due to poor health. In other words, on average, 35 Comorians fall into poverty daily because of catastrophic health payments.** Many already poor households are experiencing a deepening of poverty as a result of their health expenses, particularly among the households in the third and lower half of quintiles. Out-of-pocket payments are responsible for an increase in the incidence of poverty, and a deepening of poverty among the already poor. Put another way, if out-of-pocket spending on health had been eliminated and Comorians households had spent the money on things directly contributing to their welfare, poverty in Comoros would have fallen.

There is a significant variations of poverty level, per capita OOP payments on health and incidence of catastrophic expenditure between sub-regions and regions. Nioumakele sub region has the highest level of poverty in the country with spending for health care barely affecting the poverty headcount. Ndzouani has much lower average per capita payments and Ngazidja has the highest incidence of catastrophic expenditure. In Hambou and Mitsamihouli sub-regions in Ngazidja, health spending increases the poverty headcount despite a relatively different levels of poverty.

### PROGRESSIVITY OR REGRESSIVITY OF HEALTH FINANCING THROUGH OUT-OF-POCKET PAYMENTS

Overall, health care financing through OOP in Comoros is progressive, implying that such expenditure is more concentrated among the better-off. Put differently, a poor household contributes a smaller share of its resources on health care OOP than a rich one. Rich households might contribute relatively more to financing government public expenditure through a progressive tax system. However, the average budget share of OOP health payments compared to gross per capita consumption are regressive over the first three quintiles, meaning that OOP spending is absorbing a larger share of the resources of poor individuals than of the rich.

## CONCENTRATION OF ILL HEALTH AMONG THE POOR OR THE RICH

Overall, households living in rural areas and in the lower quintile have higher prevalence of health problems than those living in urban areas and in the richest quintiles. Health problems decrease with income, except the ARI which is more prevalent among the richest quintiles and the incidence is higher in Ndzouani-Domoni, Ndzouani-Mutsamudu, Ngazidja-Tsoudjini, and Ngazidja-Hambou. Ill health and U5MR is concentrated among the poor in Comoros. U1MR and U5MR are quite high in the Ngazidja sub-regions of Dembeni, Foubouni, and Mbeni, and in Ndzouani Domoni sub-region. Sima sub-region in Ndzouani and Hambou sub-region in Ngazidja have issues with 1-5 year age mortality (U5MR high but low U1MR). The incidence of diarrhea is over 20 percent in seven sub-regions: Ndzouani sub-regions of Domoni, Mutsamudu, Ouani and Sima; and the Ngazidja sub-regions of Hambou, Bambao and Tsoudjini. First quintiles have a higher average prevalence of nutrition related conditions such as stunting, underweight and particularly wasting. Higher than average levels of moderate stunting and underweight are seen in Ndzouani sub-regions (Domoni, Mutsamudu, Nioumakele, Ouani, and Sima) and in Kiombani and Moroni sub-regions of Ngazidja. However, there is almost no inequality between lowest and richest quintiles for birthweight and U1MR.

## INEQUALITIES IN HEALTH UTILIZATION

The utilization of health care in Comoros is concentrated among the better-off, increasing the poor's risk for ill health. Most MCH interventions have significant and positive concentration indices, signifying that utilization of any MCH interventions is higher among the better-off. Antenatal care is considerably below the average in Ndzouani sub-regions of Ouani and Mutsamudu. To tackle these inequalities in health utilization, an analysis of the causes of lower utilization of health care services among the first quintiles should be undertaken.

There is a higher utilization of health care by richer households implying that health care services are more pro-rich, except for the tetanus vaccine for pregnant women which is pro-poor. Utilization of delivery services provided by doctors is higher among the rich and higher in the Ngazidja sub-regions of Dembeni, Hambou, Kiombani and Mbeni. The sub-regions of Mwali-Nioumachoua, Ndzouani-Domoni and Nioumakele have the lowest skilled birth attendant coverage. Coverage of Vitamin A supplementation for children under 5 is higher in the Mwali sub-region of Fomboni and in the Ngazidja sub-regions of Hambou, Koimbani and Tsoudjini. There is very little association between the use of essential maternal health (Antenatal care with skilled health providers, delivery with nurse, tetanus vaccine and Vitamin A supplementation) and diarrhea treatment for children. However, substantial variation exists in the percentage of cases of diarrhea that are treated within the health care system. Lower use of this service is shown in the Ngazidja sub-regions of Mitsamihouli, Tsoudjini, Mbeni and Bambao and in the Ndzouani sub-region of Domoni.

There are high levels of vaccination coverage observed in sub-regions with high coverage of ANC and SBA. However, low vitamin A supplementation for pregnant women is observed in sub-regions with high levels of ANC, implying that quality of ANC services needs to be improved. The relationship between utilization and outcome variables is interesting as the nutritional status has a negative correlation with ANC, SBA ITN use, and Vitamin A supplementation for children. This implies that higher use of these services tends to show lower levels of nutrition-related indicators. Similarly, sub-regions with higher levels of vaccination coverage have lower rates of ARI and diarrhea.

## SOURCES OF HEALTH SYSTEM FINANCING

The vast majority of health system financing is private. Most of the public sources are directed toward salaries and benefits, while the private and donor funds support non-salary expenses. More than half of the non-salary expenditure is directed toward the purchase of services and/or drugs, from the private sector and directly by households. Allocation of funds per capita across sub-regions shows significant variation. Ngazidja Moroni receives higher funds per capita (KMF20,000) and the rest of the sub-region a smaller amount (KMF1,305). However, donor funding targets poorer areas especially sub-regions with higher levels of poverty headcount. In the contrary, public spending tends to be lower in sub-regions with higher poverty headcount. The relationship between out-of-pocket spending on health and other sources of health spending shows that out-of-pocket spending increases where other sources of funding are lacking.

Relationships between poverty and the use of health services suggest that the poor are facing financial barriers to accessing health services.

## **PART V – POLICY IMPLICATIONS**

This analysis suggests that within Comoros there are significant variations in the level of spending on health, as well as in health utilization and outcomes. The data shows that some of these variations seem to be related to a greater or lesser extent to the level of poverty within the specific geographic area.

These “pockets of poverty” appear to have generally lower utilization of health services, poorer health outcomes in some areas (although not on aggregate measures which bears further analysis), and lower levels of health spending, especially from the public sector.

In this context, targeted subsidies towards the poorest to increase their access while containing the welfare impact of OOP payments would be a possible option. This would help to address possible “demand side” constraints. Other policy options may include better targeting of government funding for health or of health infrastructure to improve the “supply side”.

All of this suggests that mechanisms need to be developed which address these various issues. Better information on the availability of government resources in these “pockets of poverty” would also be needed. This will be the subject of further analysis in the coming year.

To allow for more granular Benefit Incidence Analysis and an in depth analysis of the progressivity of health financing, simple amendments to the health module of future consumption survey questionnaires would be highly recommended.

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## Annex 1 – Methodology

The following databases were included in the analysis:

a) **Household Budget/Consumption Survey (HBS) Analysis** – The HBS was done in 2014 and the dataset consists of detailed expenditure data by category (10 categories, with 1 for health), for a random sample of 3,131 households. The sampling frames included weights which allowed the results by sub-region to be generalized to the overall population of Comoros. Expenditure data was also adjusted based on regional cost of living factors, and poverty status was based on the average cost-of-living adjusted expenditures per household member. Wealth quintiles were calculated based on this per capita consumption, ordering the per capita consumption from lowest to highest and allocating 20 percent of the households to each quintile. In addition to the expenditure data, this dataset included the age and gender of the household head, the family size, and whether the household was in an urban versus rural area.

With micro-data from this survey, health-related expenditures were analyzed. The data was also aggregated by income quintile, and the impact of health expenditures on poverty status was analyzed. The geographic coding inherent in the dataset allowed the identification of "pockets of poverty" on a geographical basis. The data included in the HBS was limited, and did not include either utilization or unit cost information. As such, it was not possible to conduct a formal Benefit-Incidence Analysis, which could have proved to be very useful.

b) **Demographic and Health Survey (DHS) Analysis** – The Comoros DHS was last done in 2012 and consists of data for 3,592 households, with specific data on a variety of household variables, utilization of health services, health and nutrition status and various other variables related to special topics such as HIV/AIDS, gender-based violence. The wealth quintile measure was constructed using the standard DHS-Measure methodology<sup>14</sup>. Thus while the quintiles used in the DHS and HBS datasets are not the same, it is highly likely that there would be high degree of overlap between the two measures. Also, while the two surveys do not cover the same time period, they were done just two years apart, and it is unlikely that there would have been extensive changes in the underlying conditions over the intervening period.

With the micro-DHS data, similar analysis with respect to the use of health services and health conditions (nutrition, diseases, etc.) by quintiles and geographic area was developed. This helped to highlight areas where access to basic services and health outcomes were problematic.

c) **Analysis of the National Health Accounts (NHA)** – The NHA database consists of 784 expenditure records, including both public, private and donor funds. Data is also broken down into the broad category of expenditure (salary and non-salary), and then further disaggregated by a specific expenditure type. Unfortunately, these types are not consistently used, so the grouping of expenditures within the larger salary and non-salary grouping was not a trivial exercise, since there were 427 different expenditure descriptions that were used (for example, "vente de medicaments", and "vente des medicaments"), and these had to be manually allocated to a particular expenditure grouping.

The database therefore offers a rich source of information to analyze revenues and expenses by source and type. Different types of analysis were performed, including by looking at the profiles of similar expenses in different geographic areas (for example, the "pockets of poverty" areas versus others). The results were also compared with the results of the (a) and (b) above, to see if any similarities trends emerge among the various data sources. The potential substitution between public and private services were also considered.

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<sup>14</sup> For more information see: <http://www.dhsprogram.com/topics/wealth-index/Index.cfm>

d) **Analysis National Health Information System (NHIS)** – data from the NHIS database was not made available in electronic format during the course of the project, so could not be included in the analysis. This represented a major constraint to the resulting analysis, since much of the background data on the number of facilities and staff in different sub-regions was not available.

The steps of the analysis were as follows:

- (a) Get databases - HBS, DHS, NHA - in electronic format;
- (b) Determine the lowest geographical divisions of each database, and arrive at the lowest common division;
- (c) Make the connections between divisions for each common database;
- (d) analysis of HBS and identify geographic pockets of poverty;
- (e) DHS analysis and NHA (individual and structural respectively), and NHIS in terms of poverty pockets;
- (f) Analyze the common factors between the pockets of poverty;
- (g) To the extent possible, map of all relevant data;
- (h) Identify conclusions and recommendations, with particular emphasis on their implications for UHC;
- (i) Hold an internal review of the World Bank to ensure quality control of the analysis;
- (j) Hold a validation workshop with key stakeholders from the government and the technical and financial partners;
- (k) Finalize the analysis report with the findings of steps (i) and (j), and send to the Ministry of Health;
- (l) Complete documentation of the process of this analysis for replication in other countries.

The following data elements were included in the ADePT analysis of the DHS data:

**Identification variables**

hh_id	household identifier
hh_quintile_cat	household wealth quintile
Region_new	sub-region (see Table 1)

**Utilization variables**

c_anc	used antenatal care (ANC)
c_anc_5y	used ANC - last 5 years
c_anc_skilled	used skilled ANC
c_birth_doctor	delivery by doctor
c_birth_nurse	delivery by nurse
c_birth_total	delivery by doctor or nurse
c_treatARI	treatment for acute respiratory infection
c_treatdiarrhea	treatment for diarrhea
c_vitA	child received vitamin A
c_vitA_mother	mother received vitamin A
c_tetanus_vacc_m	mother received tetanus vaccine
c_ITN	slept under bed net
c_bcg_vacc	received BCG vaccine
c_dtp1_vacc	received DTP1 vaccine

c_dtp2_vacc	received DTP2 vaccine
c_dtp3_vacc	received DTP3 vaccine
c_measles_vacc	received measles vaccine
c_polio0_vacc	received polio-0 vaccine
c_polio1_vacc	received polio-1 vaccine
c_polio2_vacc	received polio-2 vaccine
c_polio3_vacc	received polio-3 vaccine

**Outcome variables**

c_u1mr	infant death
c_u5mr	under 5 death
c_ARI	diagnosed with ARI
c_diarrhea	diagnosed with diarrhea
c_birthweight	birthweight
c_stunted	child stunted
c_stunted_severe	child severely stunted
c_underweight	child underweight
c_underweight_severe	child severely underweight
c_wasted	child wasted
c_wasted_severe	child severely wasted

The ADePT module on financial protection used the following variables:

**Identification variables**

IDMEN	household (HH) identifier
Region	sub-region (see Table 1)
Milieu	urban vs rural flag
TAILLE	family side
PONDP3	household weighting
pondind	individual weighting
sexecm	gender of HH head
agecm	age of HH head

**Per capita consumption variables**

1_food	spending on food
2_alc_tobacco	spending on alcohol and tobacco
3_clothes	spending on clothes
4_rent_utilities	spending on rent and utilities
5_furniture	spending on furniture
6_health	spending on health
7_transport	spending on transport

8_communications	spending on communications
9_culture	spending on culture
10_education	spending on education
11_restaurant	spending on restaurant
12_other	spending on other
food	total food spending
nfood	total non-food spending
deptot	total consumption spending

**Poverty related variables**

pdeflateur	regional spending deflator
Seuil2014_povline	poverty line per capita
pauvre	HH poverty flag
quintile	HH consumption quintile





This report analyzes the available data to determine if there are systemic differences in the access to and funding of health services in different sub-regions of Comoros, and to link these to variations in the socioeconomic status of residents in these sub-regions. It focuses on a number of key questions that are analyzed at the sub-national level, including: the effect of out-of-pocket payments on household financial well-being; whether out-of-pocket payments for health are progressive or regressive; whether ill health is more concentrated among the poor; whether the poor use health services less than the rich; and the major sources of financing for the health system in Comoros. It introduces a specific analysis of “pockets of poverty” – the five sub-regions with the highest level of poverty headcount (more than 50%) – comparing their characteristics to those of the remaining sub-regions. These “pockets of poverty” appear to have generally lower utilization of health services, poorer health outcomes in some areas (although not on aggregate measures which bears further analysis), and lower levels of health spending, especially from the public sector. Aside from the conclusions and potential policy implications for Comoros, it may be useful to apply this type of analysis in other countries.

## ABOUT THIS SERIES:

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