REPUBLIC OF DJIBOUTI

COMMISSIONER OF CHARGE PLAN OF STATISTICS

MANAGEMENT STATISTICS AND POPULATION STUDIES

DISED

RESULTS OF THE FOURTH SURVEY FROM DJIBOUTI FOR HOUSEHOLD SOCIAL INDICATORS (EDAM4-IS)

June 2018

WORLD BANK GROUP
Poverty & Equity

Foreword

This report describes the results from EDAM4-IS data conducted by the Department of Statistics and Demographic Studies (DISED) under the supervision of the Planning Commission in charge of Statistics. The EDAM4-IS was funded by the Trust Fund *Trust Fund for Statistical Capacity Building (*TFA4568) of the World Bank (WB) and benefited in its implementation of the technical assistance of the Poverty and Equity Unit of the institution. It was conducted in two phases. The first phase of data collection was conducted in May 2017 and ended before the period of Ramadan. The second phase of data collection was implemented in November and December 2017.

The analytical work of the data was conducted by DISED and the team of Poverty and Equity WB. The teams have worked closely in the preparation of micro data collected in the implementation of the systematic review of the quality control process and preparation of the welfare analysis. This report is the first in a series of publications that will aim popularizing results EDAM4 on topics relevant to the planning of development programs and policy dialogue in Djibouti.

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Introduction

The Republic of Djibouti is located east in the Horn of Africa. It shares borders with Ethiopia in Northwest Somalia and Eritrea in the southeast and the Gulf of Aden to the east. Its area is 23,200 km². Djibouti is divided into six regions: five interior regions (Ali Sabieh, Dikhil, Tadjourah, Obock Arta) and the city of Djibouti (Djibouti City), the capital city with a special status. Djibouti city has three communes (Rasdika, Boualos and Balbala) divided into five boroughs.

GDP per capita was US $ 1,415[1] in 2013. The economy of the country was dominated 70.5% by the tertiary sector (services, transport, communications), most of which is located in Djibouti city. The primary and secondary sectors accounted for only 16.9% and 1.8% of GDP[2]. According to the report of the UNDP Human Development 2016, Djibouti ranks 172th place in a ranking of 188 countries with a low HDI of 0.473.

The new Vision 2035 adopted by the Government of Djibouti (GD) is considering the country's strategy to improve the living conditions of Djibouti over the next two decades. To assist the Government of Djibouti to achieve this goal, the Djibouti Household Survey conducted in 2017 (hereinafter referred EDAM4-IS 2017 or EDAM4) should become the cornerstone of the production of evidence that informs the dialogue on the country's policies. This survey will provide essential information on demography, education of individuals, housing characteristics, household consumption, spending and welfare indicators to calculate poverty and inequality in the country.

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Presentation of the survey in 2017 EDAM

The EDAM4 was designed to have the most recent data on the consumption and living conditions of households for tracking needs and evaluation of social development policies and programs and the fight against poverty and the achievement of progress sustainable development Goals (SDGs). Other objectives of the survey are to update the profile of poverty and well-being;

[1] Source: DISED

[2] Decomposition of GDP calculated by DISED

provide information for national accounts; updating the weights and the basket of the price index (CPI); and strengthen the capacity of analysis of the national statistical system.

To position itself as a central reference point in the production of indicators related to the living conditions of Djiboutian households, EDAM4 incorporates several themes. The EDAM 2017 questionnaire and covers the following modules: Member of household characteristics (demographic and nationality); education; health; employment; migration; characteristics of the housing; possession of bines; food expenses (eaten at home, and meals outside); non-food expenditures; income sources (private and public transfers); shock and survival mechanisms; perceptions of poverty; governance ; access to services and income from farming and livestock.

The sampling strategy EDAM4 designed to produce indicators on several representative levels: national, urban, rural, by regions and districts in Djibouti city. The last level of representation was a specific request of the State Secretariat for National Solidarity (SEAS) and the Agency for Social Development (ADDS), because they require specific information on some areas of the capital to better design the targeting of social programs. The strategy has received full approval from the External Finance Department and the Djibouti Agency for Social Development (ADDS).

The EDAM4 conducted in May 2017 and November / December 2017, focused on ordinary sedentary households in the country and nomads. Details of the estimated 2017 population is in Annex I. The sample EDAM4 includes 376 enumeration areas (251 urban, 125 rural). A total of 4,474 households was interviewed.[3] The decomposition of the total size of the sample is given in Table 1.

Table 1: Di stribution of the sample governed we

Region	interviewed households
Djibouti city	2035
Ali Sabieh	495
Dikhil	496
Tadjourah	493
Obock	475
Arta	480
Djibouti country	4474

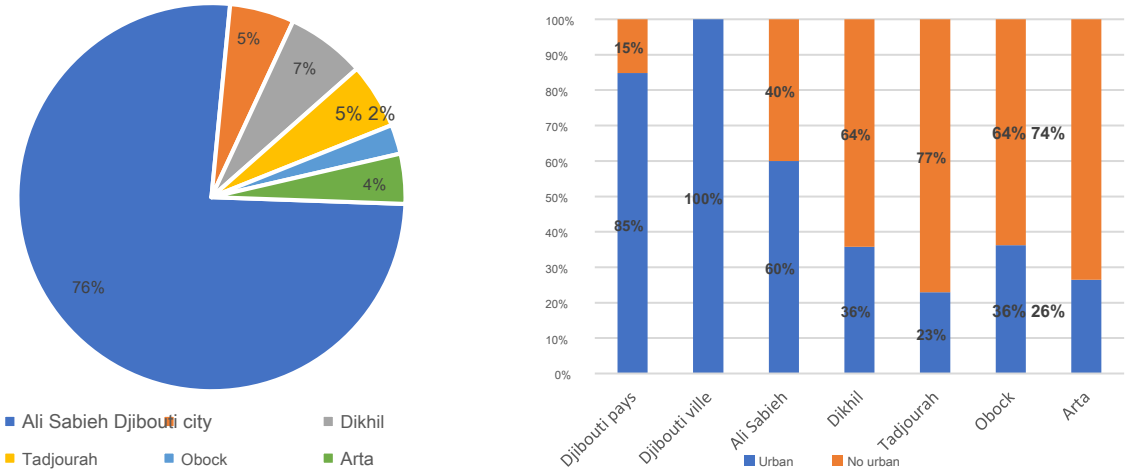
Source: Calculations EDAM4.

The sample weights were obtained from the sampling approach in two stages and correcting non-response. Details on the sampling and the calculation of sample weights are in Appendix II. Thus EDAM4 covered a population spread throughout the country: approximately three quarters of the population lives in the capital and, therefore, almost 85% live in urban areas (

Graphic *1).* There are differences in the share of the rural population from one region to another. Tadjourah has the majority of the population living in rural areas, followed closely by Dikhil and Obock. This spatial distribution of the population will influence monetary and non-monetary indicators because, as the results will show, the urban environment is more affluent than rural areas.

[3] The final rate of effective responses is 89.1%.

Figure 1. Population of Djibouti, by region and environment



Source: Calculations EDAM4.

Enhancements EDAM4 from previous surveys EDAM

The EDAM4's love is the result of the pooling conventional EDAM questionnaires and the consumer budget survey (EBC). It aims to deepen the measurement and analysis of poverty and well-being. The revisions were included in the questionnaire EDAM4 include: i) collecting a list of 100 foods that represent the majority of the basket of products Djiboutian household consumption; ii) information on transfers from public and private sources in more detail; iii) information on the purchase and the present value of durable goods collected to reflect the flow of services; iv) specific modules for revenue of economic activities; v) the information on nationality and migration; and vi) information on education, health and spending on housing better placed in the questionnaire to improve the conduct of the interview. A complete module on water and sanitation services has been integrated with the direct request of the National Office of Water and Sanitation in Djibouti (ONEAD).

Compared to collecting data on food consumption, according to the analysis of certain parameters in older surveys and considering the experiences of other countries, the methodology has been revised to reduce the period of recall expenses of everyday products consumption in a short period of 7 days to have a very good quality statements household spending. Also, expenses, purchases and donations of food outside the home were recorded for all household members ages 5 and up. Specific questions on the consumption of tobacco and other similar products have also been introduced in the questionnaire.

The flow of services for a set of durable goods could be included in the aggregate welfare of the revisions of the section of possession of household goods. To better understand the welfare derived from these goods, the flow of services, from the current market value of each property, was estimated and the estimated depreciation rates for each durable good was done. The estimates are possible from the responses of households on assets they own, the values at the time of purchase, the time from the purchase and the current estimated values of these assets. This estimate is seen as more reliable

other approaches such as the use of the purchase value of durable goods purchased by the household during the reference year.
The aggregate welfare incorporates an assessment of housing services based on a hedonic model (Deaton and Zaidi, 2002). Separate models for Djibouti City and regions resulted in the seizure of different dynamics in the rental market. In addition to a range of demographic and residential characteristics of the household, a series of binary variables are included in the model to account for the different types of occupancy.

Finally, unlike previous surveys EDAM and EBC, coverage of EDAM4 spread to nomadic households.

Chapter 1: Results for the country

The data collected by the EDAM4 can estimate several indicators related to the living conditions of the population by 2017. The indicators presented in this report do not exploit exhaustively the wealth of data captured in EDAM4. Instead, the report focuses on nonmonétaires and monetary indicators of well-being of households. The results are presented at the national level, in Djibouti City by middle and regions. The indicators at the household such as consumption, access to services and housing characteristics will first be presented. They will be followed by results at the individual level, such as employment and education. At the end, indicators on poverty and inequality and a profile of poor households in Djibouti will be presented.

household-level indicators: consumption and access to services

Computing the wellness of households in the EDAM4 is based on the addition of several components of the household consumption (measured by the associated expenses). The components of well-being includes food expenses, expenses related to housing, such as water and electricity services, transport and communications, clothing purchases, hotel and food purchases, the buying items for households, khat, tobacco and alcohol purchases, education, health, leisure spending and general services. To better understand the welfare derived from durable goods, the flow is estimated services from the current market value of each property, and the estimated depreciation rates for each durable good. Finally, a hedonic model was defined at the regional level to impute a rental value of housing of owner households. The expenses for ceremonies or investments are not included in the aggregate estimate of wellbeing.[4]

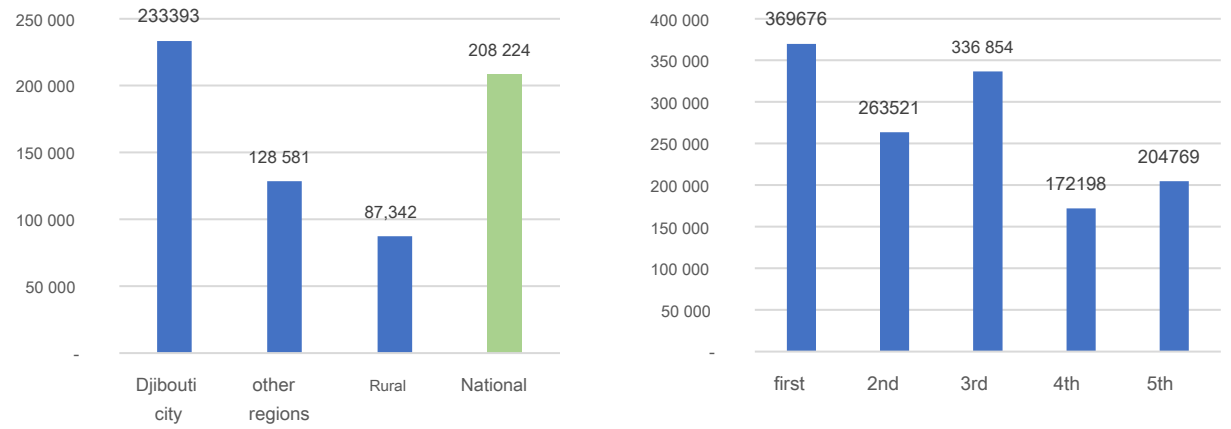
The estimated per capita consumption at the national level is 208 224 FD per person per annum for the year 2017. In line with previous studies, Djibouti City is a relatively rich area with an estimated per capita consumption of 233 393 FD per person per year (Chart 2). In contrast, the average per capita consumption of "other regions" is estimated at 128 581 FD. In the regions, per capita consumption in urban areas is very close to the average amount spent in Djibouti city is 199 631 FD (Table 2), while per capita consumption in rural areas is low. In the five boroughs of Djibouti city, it is obvious that the 4th and 5th

districts have the lowest per capita consumption.

[4] The aggregate welfare records all food expenditures and non-food stored in the EDAM4. Food expenditures, entered for the previous reporting week, multiplied by 52 to get an annualized amount. Non-food expenditures are adjusted depending on several factors according to the reference period (that is to say the sections for which the recall period was 6 months are multiplied by

2).

Figure 2. Annual consumption per capita, for medium and district of Djibouti city (FD)



Source: Calculations EDAM4.

Note: All amounts are Djibouti Franc (FD).

Djiboutian households as a whole spend about 40% of their spending to food. This percentage is even higher for households in the interior regions and in rural areas while the city of Djibouti is 39%. Non-food consumption expenditure per capita are twice as high in Djibouti city (61%) than in the interior regions (52%) and rural areas in the regions (44%), mainly due to rents and electricity and water costs.

Table 2. Annual consumption per capit at by broad gro u pes outbuil not its (FD)

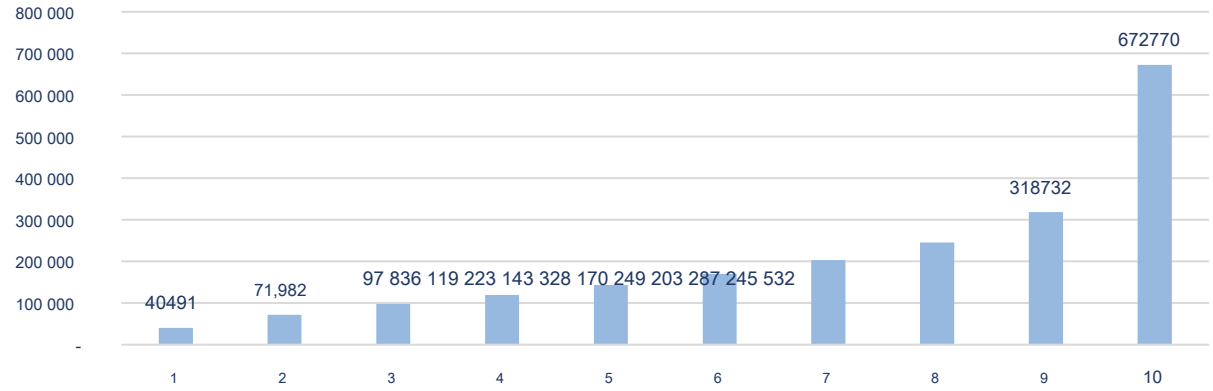
	national Djibouti	city	other regions	other urban	Rural
Consumption per head	208224233393		128 581	199631	87,342
Expenditure per head for large groups					
Food	75790	81,311	58,320	75064	48602
External taken at meal	7680	9189	2906	6806	643
Food and meals outside	83,471	90500	61 226	81,869	49,245
Health	1310	1405	1010	1804	550
Education	7662	9236	2680	5263	1181
Rent	62173	73,838	25,260	43877	14455
Housing (water / electricity)	21917	26744	6642	16210	1088
narcotics	12115	11650	13588	20842	9377
including Khat	10762	10362	12029	18,111	8499
Set of non-food expenditure	124 754 142 893		67355	117762	38097

Source: Calculations EDAM4.

Note: All amounts are in Djiboutian franc (DJF). Non-food expenditure includes spending on electricity, water, education, health, rent, durable, drugs, fuel, transportation, communication, welfare, housing repair, clothing and footwear, and services.

There are some differences in the levels of welfare of Djiboutian households. Chart 3 shows the annual per capita consumption decile [5]. Households in the poorest decile have a level of per capita consumption estimated at 40,491 FD per year, whereas in households in the richest decile's annual per capita consumption is estimated at 672 770 FD, more than 16 times average household consumption in the first decile. In addition, the most affluent decile consumption twice as high per capita as 9th decile (672,770 versus 318,732 FD FD).

Figure 3. Annual consumption per capita by decile (FD)



Source: Calculations EDAM4.

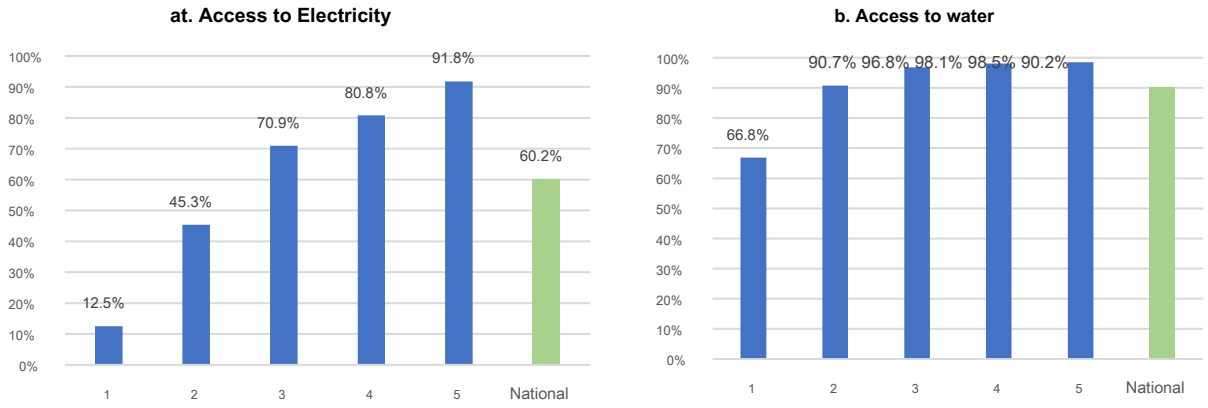
Note: deciles are calculated based on per capita consumption

Some non-monetary indicators in relation to access to services are presented below to give an idea of the living conditions of Djiboutian households. The monetary disparities described above are found when observed indicators of access to services. The graphic **4**
combines information on access to electricity and water by quintiles. The levels of access to electricity and water gradually increases with the level of wealth, with almost universal access to water in the two richest quintiles. In the poorest quintile, only 12% have access to electricity and 67% have access to water.

There are considerable differences in non-monetary indicators between regions, as shown in Figure 5. The Tadjourah region appears to have the least access to services, followed by the regions of Obock and Dikhil. Only a fifth of the population has access to electricity in the regions of Tadjourah, Dikhil, Obock and Arta. In Djibouti city, access to water is nearly universal and population percentages who reported having access to water in the regions Ali Sabieh and Arta are also high. Members of about 69% of households in the Tadjourah region pissing in nature; it is the same for members of 59% of households in the region of Obock and 48% of the Dikhil region.

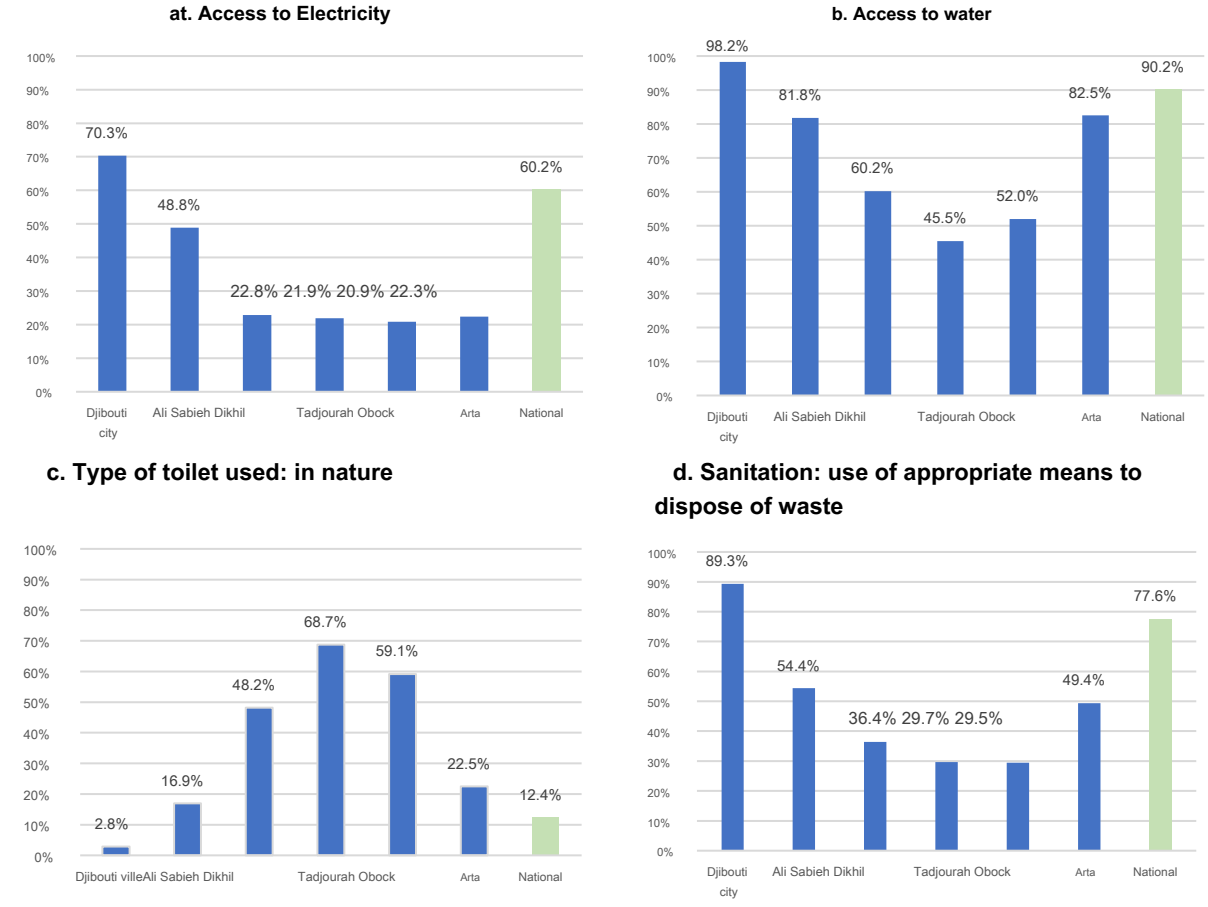
Figure 4. Access to services-by consumption quintile (% of population)

[5] Decile of poverty: if the population is cut by $ 10 depending on the level of per capita consumption expenditure decile is the value of expenditures between each 10% to 10%. Once in ascending order, Figure 3 shows for households in the first decile (see 10% of the poorest population) the average of the per capita consumption expenditure (40 491 FD). Among households in the second decile, the average per capita expenditure is 71 982 FD, and so on. A similar definition would quintiles (5 slices) and percentiles (100 units).



Source: Calculations -EDAM4. Note: Access to electricity is defined as the use of electricity as the main source of lighting. Access to water is defined as the availability of water in the household in the form of running water (inner connection ONEAD) direct connection from a drilling, external connection ONEAD by pipe, public fountain and drilling (with a pump). Quintiles are calculated based on per capita consumption

Figure 5. Percentage of population with access to services- by region



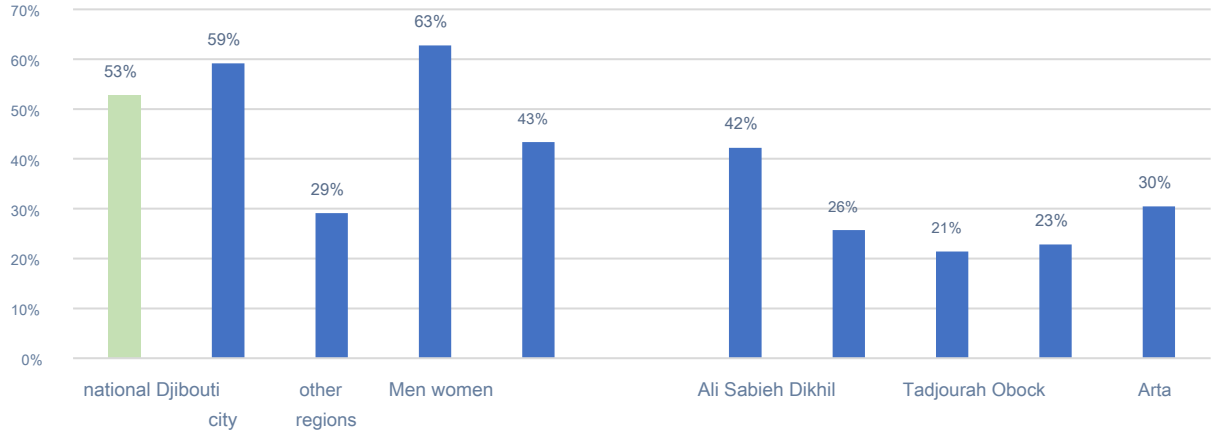
Source: Calculations -EDAM4. Note: Access to electricity reflects the use of electricity as the main source of lighting. Access to water reflect the availability of water in the form of running water (inner connection ONEAD) direct connection from a drilling, external connection ONEAD by pipe, public fountain and drilling (with a pump). the débarrassement

of appropriate waste is defined as garbage collector - OVD (public dump), garbage collector - private and deposited in a special place.

Indicators at individual level: education and employment

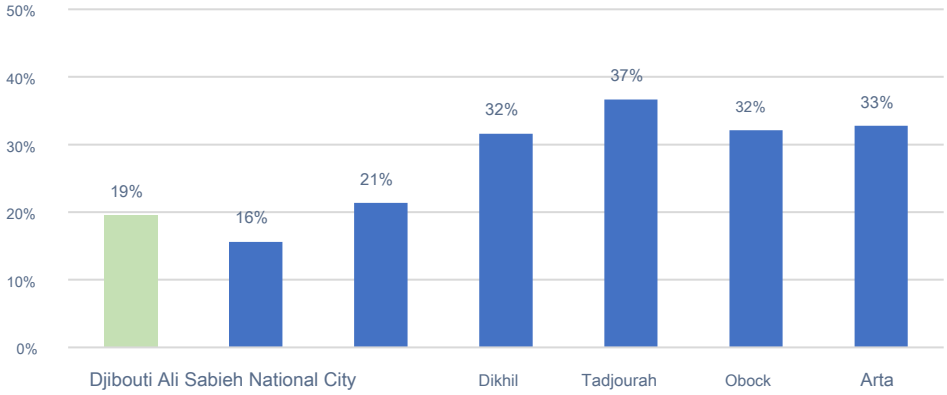
Regarding the human capital indicators, regional differences are highlighted. The adult literacy rate of 15 and over is 52.8% in the country, but it is higher in Djibouti City (59.2%) than in the regions (29.1%). The literacy rate is much higher for men with a difference of 20 points with the percentage of women. Moreover, the differences between the regions literacy rates closely follow the distribution reflected by the level of per capita consumption. The Tadjourah region has the lowest per capita consumption also has the lowest literacy rate (Graph 6) while the region Ali Sabieh has the highest literacy rate among the regions. The indicators on the education of children (Figure 7 and Figure 8) also show some regional disparities. About 16% of children aged 6 to 14 years have never been to school or do not go to school this year. This figure exceeds 30% in four regions of Djibouti. Djibouti City and Ali Sabieh areas and Obock crude rates of the highest school enrollment, while the region of Tadjourah has the lowest rates. The differences are persistent, but less pronounced when looking at the NER.

Figure 6. Literacy rate for people aged 15 and over



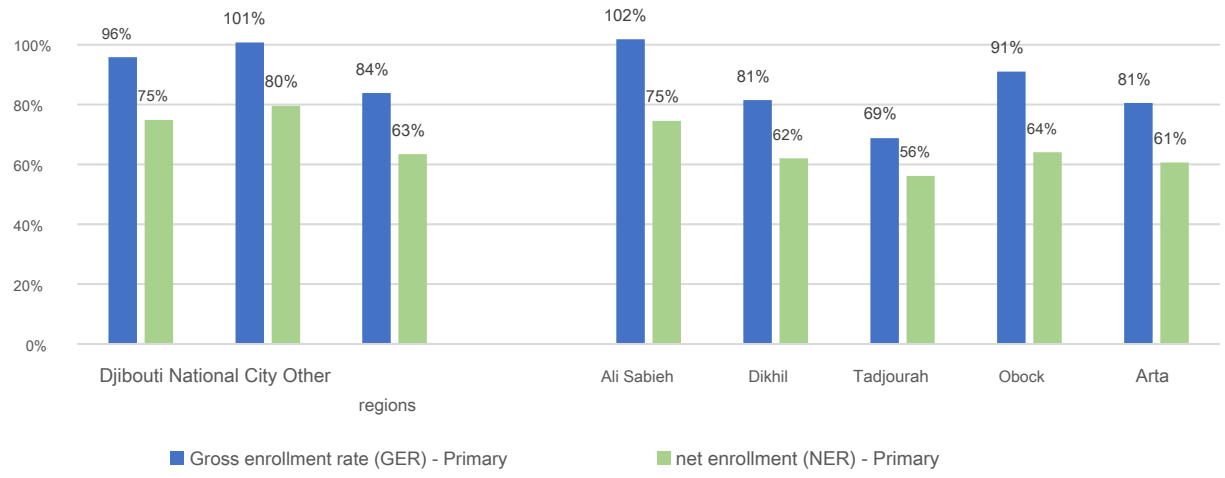
Source: Calculations -EDAM4

Figure 7. Percentage of children (6-14 years) to school dropouts



Source: Calculations - EDAM4.

Figure 8. Gross enrollment rate (GER) and net enrollment rate (NER) at the primary level

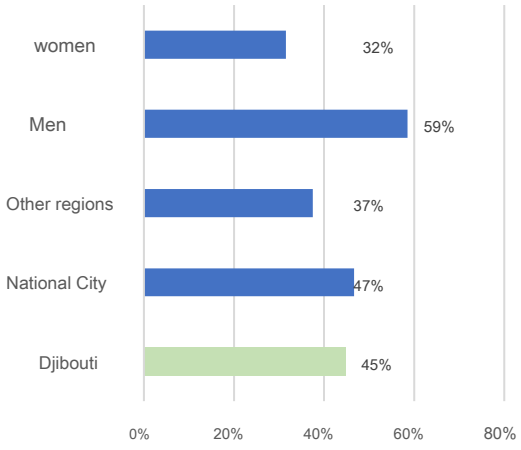


Source: Calculations - EDAM4.

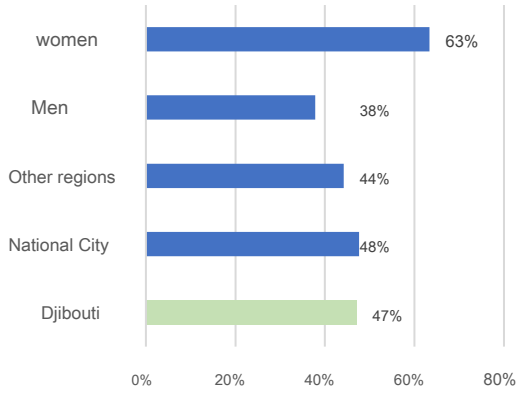
Figure 10 show the ratio of the labor force compared to the working age population and the unemployment rate for those aged 15 and over. The unemployment rate is estimated at 47% nationally. Djibouti City has a similar rate of 47.6%. There are variations between regions of the country, with the regions Ali Sabieh and Dikhil respectively show 36.9% unemployment rate and
37.8%, while the Tadjourah region is one that has the least dynamic labor market: the unemployment rate in the region is 56%.

Figure 9. Participation rate in the labor force and unemployment rate for people 15 and over

at. Participation rate in the labor force



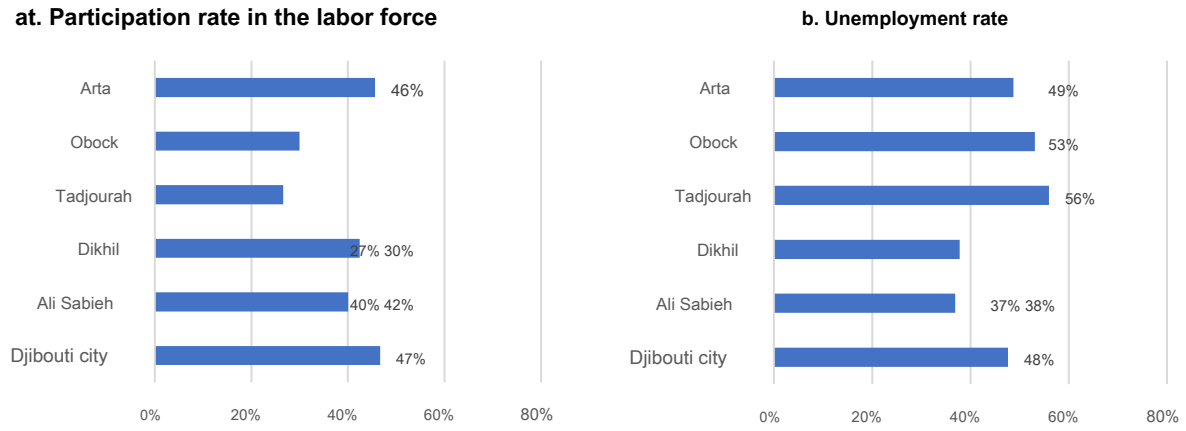
b. Unemployment rate



Source: Calculations - EDAM4.

Note: Participation rate in the labor force is defined as the ratio of the labor force compared to the working age population (15 and more). Unemployment rate is defined for people 15 and over

Figure 10. Participation rate in the labor force and unemployment rate for people 15 and over, by region



Source: Calculations - EDAM4.

Note: Participation rate in the labor force is defined as the ratio of the labor force compared to the working age population (15 and more). Unemployment rate is defined for people 15 and over

Poverty & Inequality

Computing the wellness of households in the EDAM4 is based on the addition of several components of the household consumption (measured by the associated expenses). The components of well-being included food expenses, expenses related to housing, such as water and electricity services, transport and communications, clothing purchases, hotel purchases and food, the buying items for households, khat, tobacco and alcohol purchases, education, health, leisure spending and general services. To better understand the welfare derived from durable goods, we feel the flow of services from the current market value of each property, and the estimated depreciation rates for each durable good. Finally, a hedonic model was defined at the regional level to impute a rental value of housing of owner households. The expenses for ceremonies or investments were not.

Poverty lines are based on a basket of current consumption, and thus reflects a reliable estimate of the minimum cost necessary to cover the needs of Djiboutian households. To estimate the overall poverty line and extreme poverty line approach Ravallion (1998) was used. This is from a food poverty line to build an extreme poverty line and a global poverty line.

Food threshold is thus defined as the product of the minimum calorie intake that should guarantee a market basket of food products by the unit cost of the acquisition of a kilocalorie. This is to estimate the cost of a basket of food items to ensure heat supply essential to the activity of the individual. An approach founded on the cost of basic needs (*Cost of Basic Needs)* the methodology used in 2115 kcal / day for nutritional needs. A representative basket of the middle of the distribution of consumption was used to get the cost per calorie that determines the food poverty line. Adjustments to obtain the structure of household members were based on a similar formula for adults.

Once the food poverty line is set, the approach of Ravallion (1998) to determine a poverty that can be described as extreme. The non-food component of the low threshold is calculated by considering only households whose total consumption corresponds to the food poverty line. On this basis, non-food expenditures of these households is observed. Indeed, although a total consumption equal to the food threshold that would allow them to meet their basic food needs, these households choose to allocate their consumption between food consumption and non-food. It appears therefore that these households consider that part of expenditure on the acquisition of non-food items further enhances their satisfaction. These non-food expenses are then considered indispensable. Thus, the level of non-food expenditure is added to the food line to get the low poverty line. A lower limit to the non-food poverty line was then defined. It also allows to deduce a global poverty line which covers, without sacrifice, all dietary requirements and essential nonalimentaires.

As for the estimation of the poverty line, the main parameters and results are shown in Table 3. Using the data from 2017 EDAM4 investigation and the reference consumption basket which guarantees 2115 kilocalories per day per adult, the extreme poverty line in 2017 amounts to 111 783 FD and overall poverty line[6] is estimated at 151 391 FD. The two lines are expressed in annual adult equivalent terms (see Appendix 3 for calculating the poverty line).

Table 3. Key parameters used in EDAM4

Settings	
caloric needs	2115 Kcal / day
Standardization of households	adult Equivalent
Extreme poverty line (FD)	111 783
Global poverty line (FD)	151391

Source: Calculations - EDAM4.

From the aggregate welfare of households, poverty measures and corresponding inequality were calculated. The results are presented in Table 4. As measured by consumption per adult equivalent, the rate of extreme poverty for individuals across the country is estimated at 21.1% in 2017. According to studies in previous years, there seems have a lasting gap between the well-being of the capital, Djibouti city and other regions. Indeed, in Djibouti City, the extreme poverty rate is estimated at 13.6%, while in other regions, it is almost three times higher than the national rate:

45.0%. Using a global poverty line, the proportion of the population considered poor increases significantly. Across the country 35.8% are not able to cover their food and non-food. Among households in other regions, the rate is even higher with
59.8%. Regarding inequality, the Gini coefficient is estimated at 0.42. This level of inequality is the second highest in the Middle East and North Africa.

Chart 11 shows the spatial differences between levels of well-being of individuals by regions in Djibouti. Per capita consumption in Djibouti City is the highest, as expected. The region of Tadjourah has the lowest per capita consumption, followed by the Dikhil region.

[6] The overall poverty line identifies, unlike the extreme poverty line, households are able to meet their food needs but not all of their non-food basic needs.

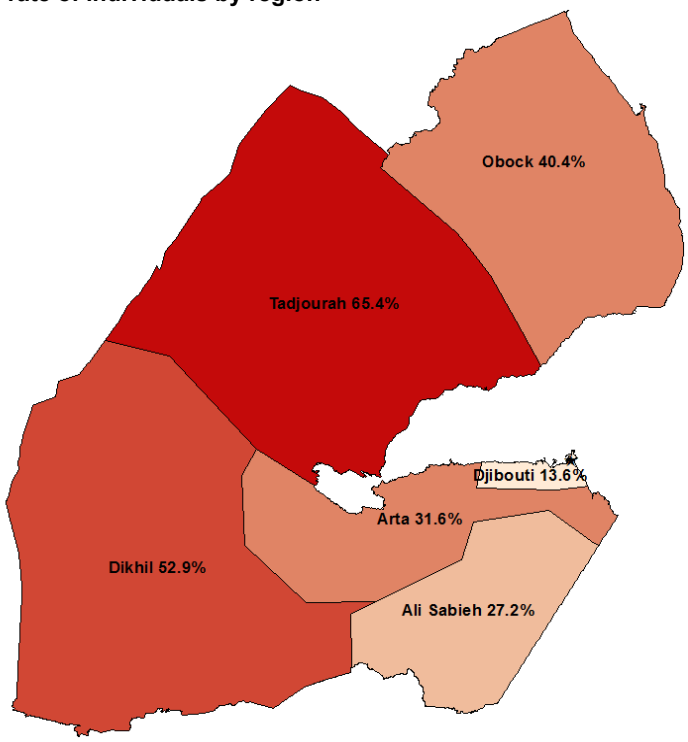
Table 4. Indicators p OVERTY and i not equality Djibo uti 2017

Indicator	Djibouti	National	City	Other regions	Other Urban	Rural
extreme poverty	21 1%	13 6%	45 0%	14 8%	62 6%	
Poverty gap	7 1%	3 5%	18 6%	5 2%	26 4%	
Severity of poverty	3 4%	1 3%	10 1%	2 6%	14 4%	
global poverty	35 8%	28 2%	59 8%	27 6%	78 4%	
Gini (coefficient)	0.42					
p90 / p10	6.60					

Source: Calculations with EDAM4.

Notes: p90 / p10 shows the ratio of per capita consumption of 90 individuals th percentile of 10 individuals th percentile. The percentiles are calculated based on per capita consumption.

Figure 11. Extreme poverty rate of individuals by region



Source: Calculations - EDAM4.

Box 1. Comments on the evolution of the welfare of the aggregate in Djibouti

In 2013, the revised DISED monitoring methodology of poverty. Using data from the EDAMBC 2013, a Basic Needs Cost approach was adopted to define the food poverty thresholds and other thresholds . AT p lmost defining the threshold, it was conducted by conventional price deflation to find poverty lines corresponding to 2002 EDAM and previous EBC and 2013. The estimated extreme poverty rates were: 24.1% for 2002 and 23 % for 2013. for global poverty, the estimated rates were 46% (2002) and 40% (2013) .

Using these figures together with the results in this paper to study the evolution of poverty, however, is not simple. The es previous EDAM had adopted
significant methodological changes. So the consumption aggregate used to measure the well-being is not strictly comparable across surveys. Three key components of the welfare of the aggregate support this note of caution:

at) the food component: over time, data collection efforts on
EDAM the consumer have changed by increasing the level of detail questions. These variations between EDAM limit the temporal comparability. In EDAM2-IS 2002, the food component of the welfare of households has been identified with a single issue. Regarding the EDAM3-IS 2012, a module of 21 questions was defined to improve data on food consumption. In addition, the recall period was set at one week or one month. For Regarding the BC EDAM-2013, a newspaper was used to collect data on consumption instead of the reminder. At the same time , Information on a much more detailed list articles have collected during data collection (it was possible to record more than 200 food items).

b) non-food components: like food aggregate, there were differences
important in the data collection method and level of detail non-food items. For example, in the EDAM2-IS 2002, about ten items were the non-food expenditure of households, while the list of EDAM3-IS 2012 was approximately
90. When BC EDAM-2013, more than 500 Orders No. food we were collected for periods of different spring.

c) housing services: the welfare offered by neighborhoods where households live is one of
key elements to understand their living conditions. Moreover, the share of housing services in the welfare of households becomes more important as countries develop. In the case of Djibouti, the 2002 and 2012 cycles of the EDAM allowed to gather information on the actual rent and imputed rent and taken into account for housing services. For BC EDAM-2013, the approach was very different for dwelling characteristics and household were used to estimate a hedonic model. This model has helped provide housing services for owner households .

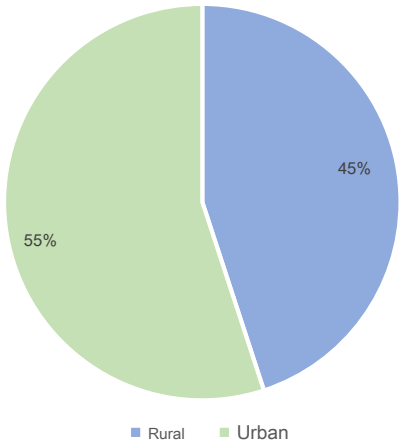
The EDAM4 love incorporates improvements based on current good practice
to better understand food expenditures and non-food household and turn it into a true multi-tool topical. Despite the loss of comparability over time DISED decided to seize the opportunity to survey and estimate the well-being with the latest methodologies. EDAM4 become the baseline for monitoring the evolution of poverty in the country.

Profile of the Poor

Using data from the EDAM4, it is possible to create a detailed profile of the different population groups. Particular interest is given to the least affluent households, the most vulnerable or the poor. We present below the results for the population of the poor, those who are considered extremely poor: 21.1% of the Djiboutian population with a level of consumption below 111,783 annual FD (per adult equivalent) .

Chart 12 shows that the phenomenon of extreme poverty is mainly a rural phenomenon. In all of Djibouti, the rural population is 15%, but almost half of the population considered poor extreme (PE) there.

Figure 12. Distribution of the extreme poor by the middle



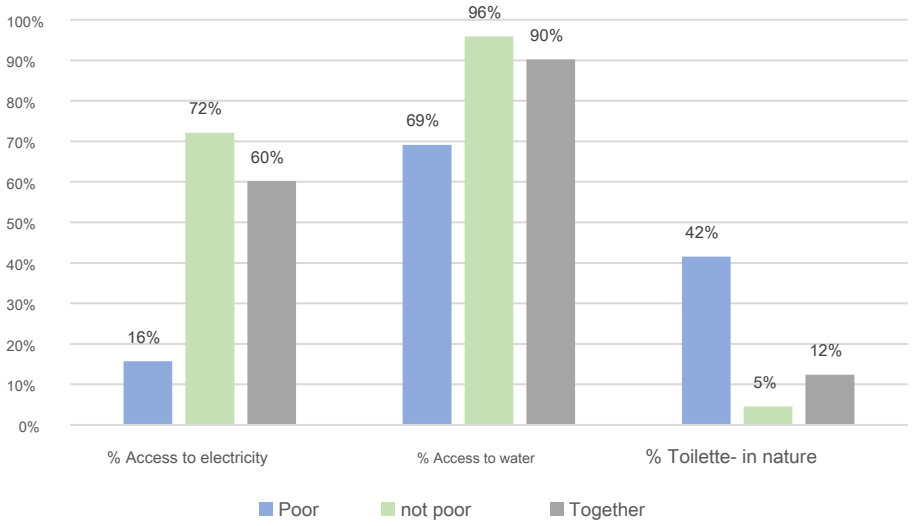
Source: Calculations with EDAM4.

A comparison of access to services between different groups in the population shows that monetary deprivation is correlated with other factors.

Chart 13 shows the differences between the EP and the population that has a sufficient level of consumption to cover its needs. In PE, the percentage of access to electricity is 16%, while for the rest of the population is estimated at 72%. The gap in access to water is less pronounced: 69% PE and 96% for non-poor. Disparities in access to sanitation services are also carried obvious. In the PE population 42% of people pissing in nature against a proportion of only 5% in the non-poor.

In terms of the accumulation of human capital and the ability of individuals to develop economically, the differences between the PE population and the rest of the population exist (Figure
14). About 85% of adults in the PE population have no education, 11% of the population have a primary school education or more and less for the secondary level (2%). At the nonpauvre population, the corresponding percentages were 55%, 23% and 18%.

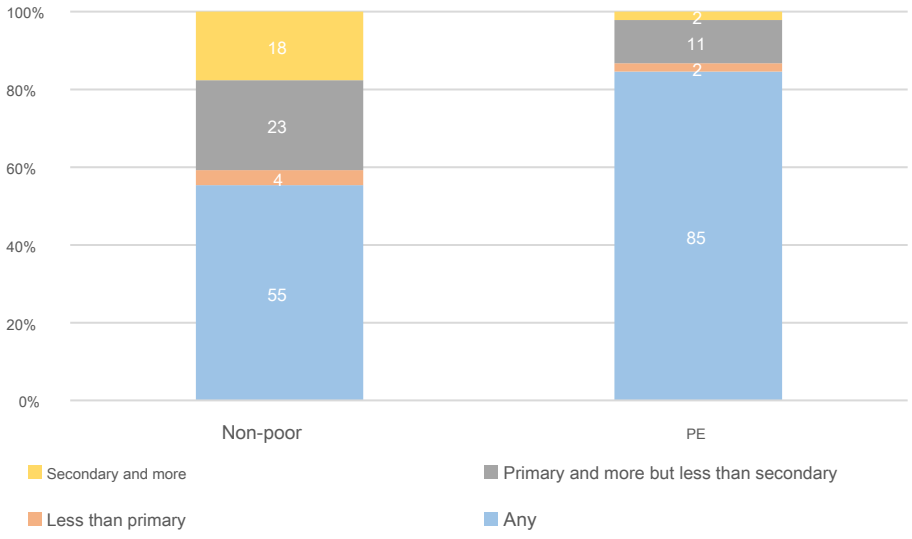
Figure 13. Access to services by population groups: the population considered poor extreme poor and all non-



Source: Calculations -EDAM4.

Note: Access to electricity is defined as the use of electricity as the main source of lighting. Access to water is defined as the availability of water in the household in the form of running water (inner connection ONEAD) direct connection from a drilling, external connection ONEAD by pipe, public fountain and drilling (with a pump).

Figure 14. Education level of adults 25 and older



Source: Calculations -EDAM4.

Note: MOU describes the population considered poor extreme. "Non-poor" includes the rest of the population.

Finally, Table 5 shows the extreme poverty rate of children (0-17 years), men and women (18 and over).[7] There are small differences between the groups analyzed. In particular, children do not seem to have a level stronger than adults deprivation. Excluding Djibouti city, the differences are somewhat larger.

Table 5. the extreme poverty rate by individuals gr o PSU p opulation

	national	Djibouti city	other regions	Rural
Child poverty rate (0-17 years)	23%	14%	48%	67%
Men poverty rate	19%	14%	42%	59%
Women's poverty rate	19%	13%	41%	58%
Entire population	21.1%	13.6%	45.0%	62.6%

Source: Calculations with EDAM4.

[7] The extreme poverty rate are obtained from the classification of poverty at household and consumption per equivalent adult associated. So these rates rather represent the percentage of children living in households PE.

Chapter 2: Results for Djibouti City

In this section, the indicators are presented at Djibouti City, the capital of the country. The demographic importance of Djibouti city (76% of the general population according to updated data) is such that each of its five districts was considered an independent stratum in the sampling plan in order to have more disaggregated and finer results that reflect the varied characteristics of the different components of the population. This is interesting for a thorough analysis of the mapping of poverty and living conditions disparities. The final sample of EDAM4-IS includes for Djibouti City 5 layers of 10 in total; 206 enumeration areas from a total of 376 households and 2042 a total of 4474 households interviewed across the country.

selected non-monetary indicators

Some non-monetary indicators of living conditions of resident households in Djibouti City are presented below. The **average household size in the 1st district is 5.84, while in the 5th, it is larger and is 7.10. Households in 4th and 5th districts** have a higher likelihood of having a leader who is man, who can not read / write, and who is married than in other **boroughs. The percentage of owner households is also greater in the 4th and 5th**

districts in the 1st borough.

Table 6. Indicators Selecti o NNES by ar r ondissement to Djibouti- city

	Djibouti City	*1st arr.*	*2th arr.*	*3th arr.*	*4th arr.*	*5th arr.*
household size	6.68	5.84	6.41	6.31	6.82	7.10
Among heads of households:						
men percent	78%	74%	77%	70%	76%	86%
percentage illiterate	55%	37%	47%	48%	66%	58%
percentage married	76%	69%	73%	73%	76%	82%
Percentage of owners	71%	49%	61%	71%	75%	81%
Percentage of tenants	21%	45%	28%	17%	17%	14%

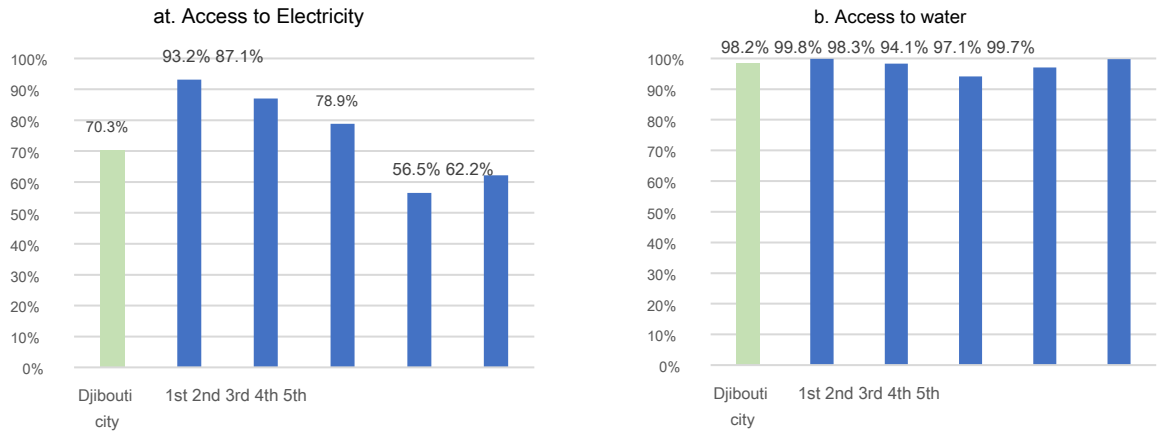
Source: Calculations with EDAM4-IS.

Regarding access to services, there are some differences between households living in Djibouti City (Chart 15): over 90% **of residents of 1era Borough have access to electricity against 87% and 79% respectively in the 2th and 3th boroughs. Within 4th and 5th**

these districts access to electricity percentages are 57% and 62%. By cons, access to water in Djibouti city is almost universal.

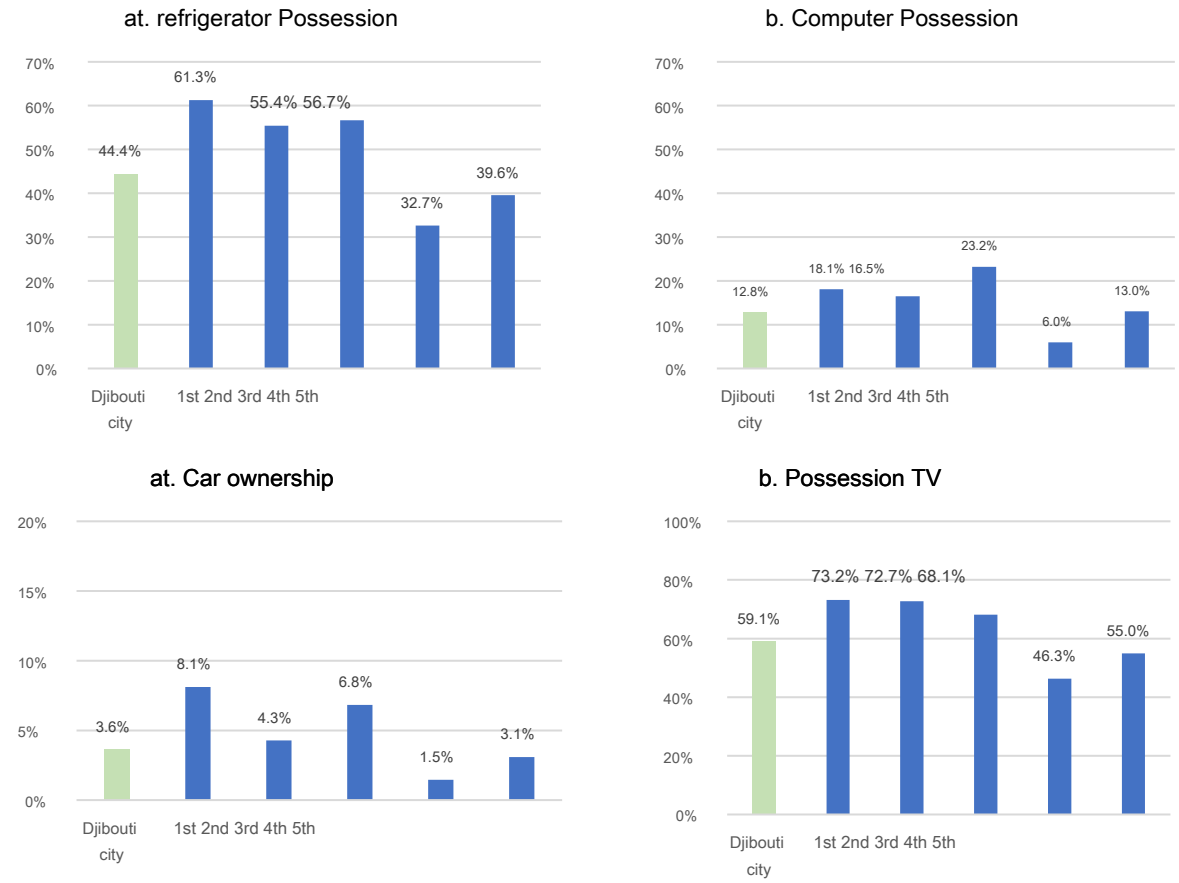
Regarding the possession of certain goods by households, the disparities between districts are even highlighted in Chart 16. Taking all of Djibouti city, the percentage of households with a TV and fridge is high: 59 % and 44% respectively. This percentage is even higher in the first three boroughs. Although car ownership and computer is low in in Djibouti City, the disparities already observed between the boroughs appear at this level also.

Figure 15. Access to services in Djibouti by city-borough



Source: Calculations using the EDAM4-IS. Note: Access to electricity is defined as the use of electricity as the main source of lighting. Access to water is defined as the availability of water in the household in the form of running water (inner connection ONEAD) direct connection from a drilling, external connection ONEAD by pipe, public fountain and drilling (with a pump).

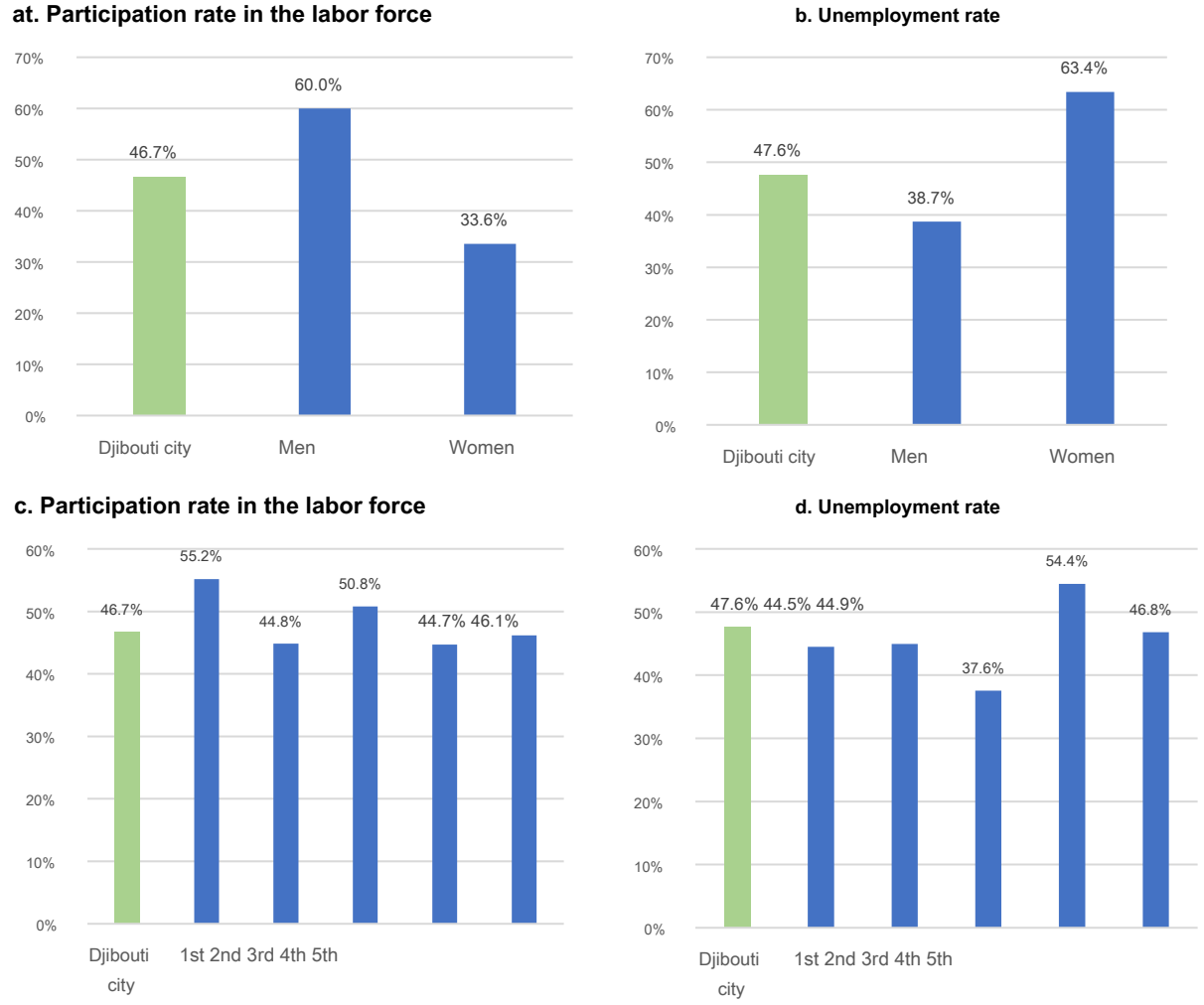
Chart 16. Possession of assets in the population of Djibouti city, by district



Source: Calculations using the EDAM4-IS.

Chart 17 shows the ratio of the working population compared to the population of working age, and the unemployment rate for those aged 15 and over. The unemployment rate is estimated at 48% at Djibouti City. It is higher for women (63%) than men (39%). There are also variations between areas, with the first two districts that show unemployment rates of 45%, while 4th Borough is one that has the least dynamic labor market with 54% unemployment rate.

Figure 17. Participation rate in the labor force and unemployment rate for people 15 and over, by-law, and by district



Source: Calculations - EDAM4-IS.

Note: Participation rate in the labor force is defined as the ratio of the labor force compared to the working age population (15 and more). Unemployment rate is defined for people 15 and over

Selected Monetary Indicators

The estimated per capita consumption in Djibouti City for 2017 is 233 393 FD per person per year (Table 7). The first and third district have the highest consumption levels: 369 676 336 854 FD and FD respectively. In contrast, the average per capita consumption in the fourth arrondissement of only 172 198 FD. Households in Djibouti City devote 39%

their per capita consumption of food, and there are no significant differences between households in different boroughs. Among households of 4th and 5th districts, the rate is a little higher than 40%, while in the 3th district the rate is 35%. Non-food consumption expenditure per capita are highest in 1st and 3th districts than in other districts of the capital, mainly due rent and electricity and water expenses.

Table 7. Consumption per c Apita according e s great g roups spending th No FD

	Djibouti City	*1st arr.*	*2nd arr.*	*3rd arr.*	*4th arr.*	*5th arr.*
Consumption per head	233393	369 676	263 521	336 854	172 198	204 769
Expenditure per head for large groups						
Food	81,311	117 433	91 294	107 447	63 177	74,462
External taken at meal	9189	17775	12,135	10,133	5690	7418
Food and meals taken outside	90500	135 209	103 429	117 580	68 868	81,881
Health	1405	1157	1672	1417	1014	1690
Education	9236	10259	8335	9896	8094	10648
Rent	73,838	124 203	83 325	105 198	57 294	59,664
Housing (water / electricity)	26744	52,443	30494	50311	17349	19704
narcotics	11650	18016	12625	17732	7872	11345
including Khat	10362	15702	11441	15253	7280	9856
spending all nonalimentaires	142 893	234 467	160 092	219 274	103 331	122 889

Source: Calculations with EDAM4-IS. Note: All amounts in Djiboutian franc (FD). Note: non-food expenditures included spending on electricity, water, education, health, rent, durable, drugs, fuel, transportation, communication, welfare, housing repair, clothing and footwear, and services.

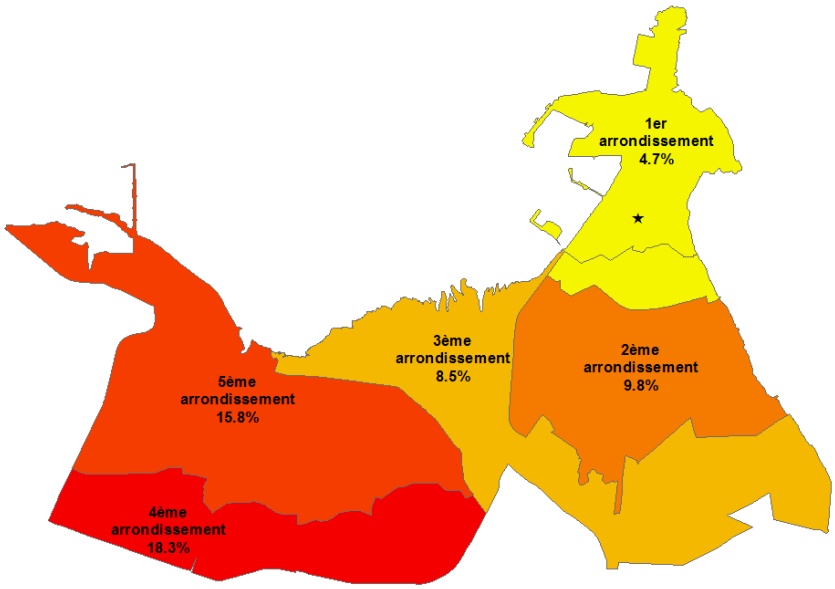
From aggregates welfare of households, indicators of poverty and inequality were calculated and Table 8 shows the corresponding results. There are large disparities in poverty between the districts of Djibouti City (Graphic *18).* Extreme poverty rates are higher in the 4th and 5th boroughs: 18.3% and 15.8% respectively. These districts also have high overall poverty rate.

Table 8. Indicate u rs of poverty and inequality D jibouti city - 2017

	Djibouti City	**1st arr.**	**2th arr.**	**3th arr.**	**4th arr.**	**5th arr.**
extreme poverty	13 6%	4 7%	9 8%	8 5%	18 3%	15 8%
Poverty gap	3 5%	1 0%	2 3%	2 1%	4 8%	4 2%
global poverty	28 2%	13 0%	22 0%	15 4%	35 2%	33 6%
p90 / p10	5.51	6.05	5.52	7.30	4.33	4.91

Source: Calculations with EDAM4-IS.

Figure 18. Extreme poverty rate of individuals in district of Djibouti city

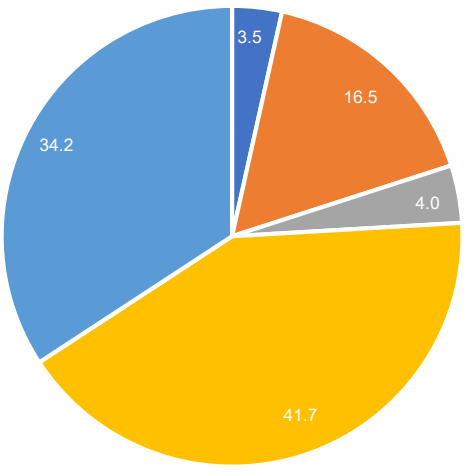


Source: Calculations with EDAM4-IS.

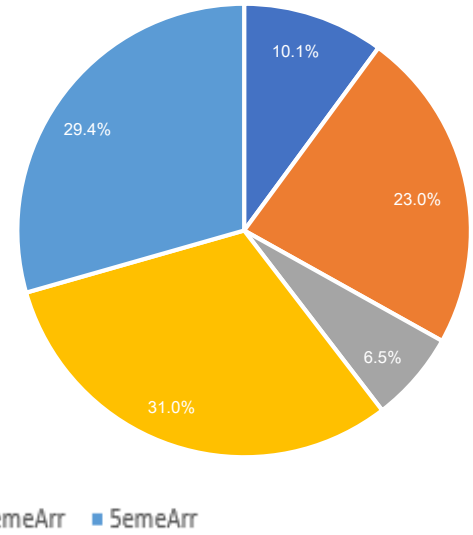
The proportion of the population considered poor extreme (PE) is very high in the 4th and 5th districts of Djibouti city. About a third of the Djibouti City population lives in the 4th district, and over 40% of households PE also resides there (Chart 19). Similarly, almost 30% of the population of Djibouti city lies in the 5th district, but almost 35% of the poor population lives there. Since 76% of the estimated population living in Djibouti city, then it should be noted that more than half (58%) of the Djiboutian population lives in 4th and 5th boroughs.

Figure 19. Distribution of the population by district, according EDAM4-IS

c. considered extreme poor population



d. General population



Source: Calculations with EDAM4-IS.

Conclusion

This report is the culmination of work initiated by DISED with the support of the WB, in 2016. After collecting data in 2017, DISED worked to make available the results on social indicators. These efforts enable a better understanding of current living conditions in Djibouti, as well as promoting the use of evidence in policy dialogue and program design.

Note that enough improvements have been introduced in the EDAM4 questionnaire and in the methodology of calculation of monetary indicators compared to previous surveys EDAM. The EDAM4's love is the result of the pooling of the previous questionnaires to deepen the measurement and analysis of poverty and well-being. The revisions have been incorporated include collecting i) a representative list of food basket of Djiboutian household consumption; ii) public and private transfers; iii) information on the purchase and the present value of durable goods; iv) specific modules for revenue of economic activities; v) information on citizenship and migration and vi) information on education, health and housing expenses. Poverty lines are based on 2017 consumption basket, and thus reflects a reliable estimate of the minimum cost necessary to cover the needs of Djiboutian households.

The estimated per capita consumption at the national level is 208 224 FD per year and Djiboutian households spend about 40% of their spending to food. In the regions, per capita consumption in urban areas is very close to the average amount spent in Djibouti city, while per capita consumption in rural areas is low. Disparities in monetary indicators between regions are evident and are found when observed indicators of access to services. The Tadjourah region appears to have the least access to services, followed by the regions of Obock and Dikhil. Moreover, the differences between the literacy rate and the regional rate of unemployment are closely monitoring the distribution reflected in the per capita consumption level. The Tadjourah region is one that has the least dynamic labor market. The adult literacy rate of 15 and over is 52.8% in the country, but it is higher in Djibouti City (59.2%) than in the regions (29.1%). The literacy rate is much higher for men with a difference of 20 points with the women.

Disparities between urban and rural areas are such that a certain correlation is established between the de facto dominance of rural areas in the sample and the incidence of poverty and the level of non-monetary indicators. Indeed, areas with a high proportion of the population lives in rural areas, the performance of the monetary and non-monetary indicators is low compared to areas with a lower proportion of the population lives in rural areas. This explains the lack of improvement in various indicators in the regions of Tadjourah, Dikhil and Obock.

Part of Djibouti city, the capital of the country which represents 76% of the population covered by EDAM4, sheds inequalities in welfare measures in the five boroughs of the city. We find that there are large disparities in relation to the consumption between 5 boroughs, which also results in differences in poverty rates. The extreme poverty rate is lower in the 1st rounding (4.7%) compared to those of 4th and 5th districts:

18.3% and 15.8% respectively.

The monetary disparities between districts are highlighted and are found in the service access indicators. The 4th district appears to have the lowest rate of access to services and possessions of goods, followed by 5th borough. Moreover, the differences between the districts unemployment rates closely follow the distribution reflected in the per capita consumption level. These results are very important for the country because 58% of the population covered by the survey live in 4th and 5th districts of Djibouti city.

References

Deaton and Zaidi (2002) "Guidelines for Constructing Consumption Aggregates for Welfare Analysis" LSMS Working Paper No. 135, The World Bank DISED (2014) "Poverty and inequality measures" DISED (2017) Statistical Yearbook, 2016.

FAO (2012), "Composition Table West African food"

Ravallion, M. (1998), Poverty Lines in Theory and Practice. LSMS Working Paper 133. The World Bank.

Appendix I. Note on the population in Djibouti

The previous household surveys conducted by DISED such as EDAM3-IS and EDSF / PAPFAM of 2012, the survey on employment and the informal sector in 2015 focused on sedentary ordinary households in the country. That is to say that certain categories of the population, for technical reasons and by their nature, are not covered by these investigations. It's about :

- expatriate populations unassimilated to the local population, that is to say, not living with the local population;
- collective households (barracks, boarding, convents, etc.);
- diplomats and members expatriates cooperation agencies and international institutions;
- nomadic populations;
- population homeless; and
- refugees living in camps.

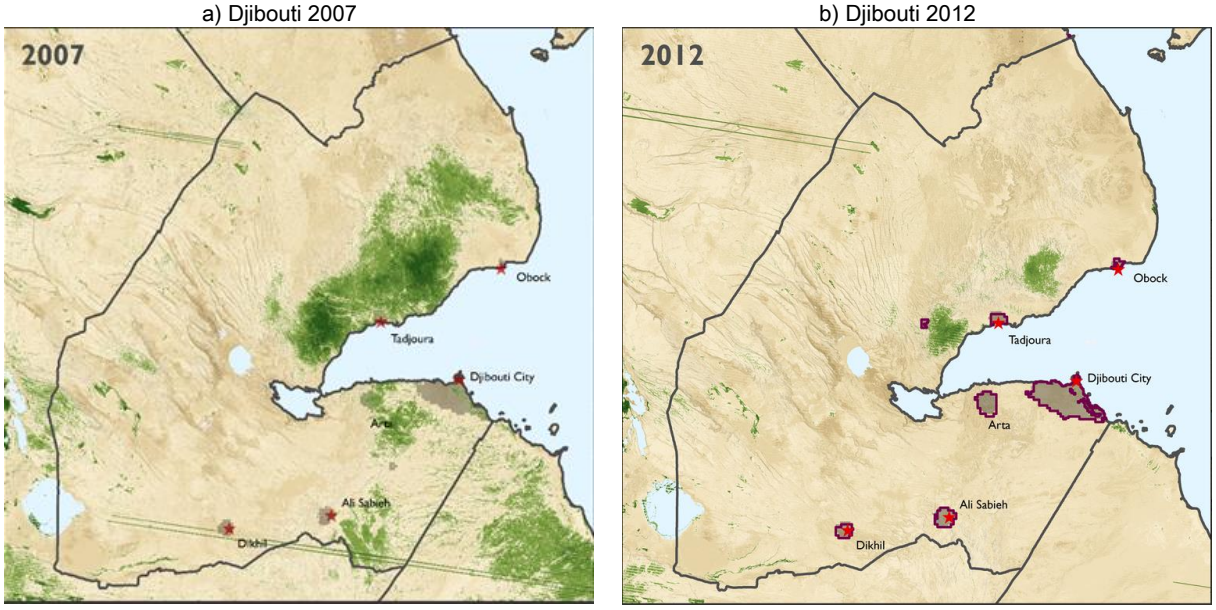
The total sedentary population and covered by EDAM3-IS has been estimated at 428,593 people spread over 76,209 households, and that of the 2015 employment survey was estimated at 507,424 people spread over 94,668 households. This EDAM4 which is in following these household surveys hangs consider these population estimates and sedentary households, especially that 2015 is the last survey.

However unlike other surveys, EDAM4 couvet has also not without difficulties, the nomadic population. Since 2008, Djibouti knows the longer cycles and more frequent droughts which are accompanied by a continuous desertification and substantial losses of livestock and pastures (Figure A1 and A2). This has introduced significant changes in the composition of the population to the son for years, as we have seen through the data collected during the field survey. Already in 2011, the document *National Strategy for Food and Nutrition Security* - volume1 stated that "Under the effect of the drought .... pastoralists are driven to move their animals under transhumance within the country particularly to the high pastures and to other countries in the region in more distant transhumance in areas benefiting from more generous rainfall . A more substantial humanitarian assistance and regular allocated to Ethiopian pastoralists helped set in Ethiopian territory, pastors whose home grazing territories were traditionally in Djibouti. therefore there is a dual hemorrhage rural: Departure to the cities, ..., and settlement or resettlement in neighboring countries ... Many observers fear a definitive marginalization of pastoral livelihoods in Djibouti. "

- migrate to regions, sometimes beyond the borders of the country, where there are abundant pastures;
- or settle around villages or points by abandoning the traditional transhumance in favor of the nearby pastures. This category of nomads, although installed on site as sedentary, live only in the practice of farming. This leads some to consider them as nomads have just changed so practice farming. By cons in the household counts for investigations, DISED registered households in this category of the population as sedentary households.

Figure A1. Map of Djibouti with vegetation and urbanization areas, annually

a) Djibouti 2007 b) Djibouti 2012



Source: Calculations of the World Bank GOST-unit.

Thus, by performing a triangulation of information from sources such as the National Food and Nutritional Security Strategy and operations updates of listings of households DISED, there is a reduction of the nomadic population in the direction chosen by DISED during the general census of population and housing of 2009, that is to say people who frequently practice transhumance with livestock. This decrease was estimated at almost three quarters between 2009 and 2017. This gives an estimated population in 2017 of 40,987 nomadic nomadic individuals distributed among 7647 households. Extrapolating the data is obtained EDAM4 sedentary and nomadic total ordinary population estimated at 558,314 people spread over 104,162 households. *boarding school, orphanage, prison, hospitals, hotels, military and paramilitary camps housing foreign workers, homeless, refugees.*

Appendix II. Note on sampling and extrapolation coefficients of EDAM4

The main database and maps for the compilation of the frame of the EDAM4 is that of General Census of Population and Housing of Djibouti 2009 on population and housing. The sampling frame of enumeration areas (EAs) or primary sampling units (PSUs) census is stratified by region, urban and rural area for most national surveys. Although urban and rural areas of each region are individual sampling strata to improve the efficiency of the sample design, the total results of other urban and rural areas will be limited to the national level.

A sampling model laminate in two stages was used for EDAM4. During the first stage, samples of ZD were selected systematically with probability proportional to size within each stratum (Table A2.1). Ten strata surveys were defined: the five boroughs of Djibouti city and the five regions within the country.

Before drawing sample of households in the second step, an update of the LFA samples listings households was conducted in April 2017. At the second stage, a systematic random sample of 12 households was selected in each ZD sample (or cluster) to Djibouti city and 15 households per ZD for other regions. For samples of the rural sample of 15 households was to include sedentary and nomadic households. Given the large percentage nomadic households in rural areas according to results released from the 2009 Census (over 50%), this sampling procedure would provide an adequate sample of nomadic households for analysis at national level. In total, the sample comprises EDAM4 ZD 376 (251 in urban areas; 125 in rural areas). The Table shows the distribution of the ZD EDAM4.

Table A2.1. enumeration areas (ZD) in selected sampling

Region	Total		Urban	Rural	
	Total Total ZD	ZD	ZD selected	total ZD	ZD selected
Djibouti City					
district 1	74	74	42	-	-
district 2	120	120	42	-	-
district 3	38	38	38	-	-
district 4	156	156	42	-	-
district 5	142	142	42	-	-
Ali Sabieh Region	46	27	16	19	18
region Dikhil	64	20	9	44	25
Tadjourah region	57	12	4	45	30
region Obock	45	8	8	37	26
Arta region	51	10	8	41	26
Total	793	607	251	186	125

Source: Authors' calculations.

So that the estimates of samples from 2017 EDAM4 the data are representative of the population, it will multiply the data by a sampling weight or expansion factor. The basis weight for each sample household is equal to the inverse of its selection probability (calculated by multiplying the probabilities at each sampling step).

Based on the design of the stratified sample in two stages, the overall probability of selection for the sample households in 2017 EDAM can be expressed as follows:

$$p_{hi} = \frac{m_{hi} \cdot M_{hi}}{M_h} \times \frac{m'_{hi}}{M'_{hi}}$$

or:

p_{hi} = overall sampling probability for households selected for EDAM4 in the i-th group of samples in stratum h

not_h = number of sample clusters selected in stratum h for EDAM4

M_{hi} = total number of households in the i-th sample group in stratum h of the sampling frame based on the 2009 census Djibouti (updated part)

M_h = total number of households in stratum h from the frame

m_{hi} = 12 or 15 = number of sample households selected for EDAM4 in the ith group of samples in stratum h

M'_{hi} = total number of households in the new list for the i-th sample group in stratum h

The basis weight for the sample households in EDAM4 is the inverse of the selection probability, expressed as follows:

$$W_{hi} = \frac{1}{p_{hi}} = \frac{M_h \cdot M'_{hi}}{m_h \cdot m_{hi} \cdot M_{hi}},$$

or:

W_{hi} = basis weight for the sample households EDAM4 in the i-th group of samples in stratum h

After collecting the data EDAM4, it will be necessary to adjust the basic weights to account for non-interviews as follows:

$$W'_{hi} = W_{hi} \frac{m_{hi}}{m'_{hi}}$$

or:

W'_{hi} = adjusted household weights EDAM4-samples in the i-th group of samples in stratum h

m'_{hi} = number of sampled households completed interviews in the i-th group sample in stratum h.

Appendix III. Calculation of poverty lines

The poverty line is estimated to represent, according to the norms of a given society, the cost for a household to achieve a level of well-being is considered the minimum necessary and which enable it to meet food and non-food needs . EDAM4 the data were used to determine at what level of consumption (per equivalent adult) we can say that a household is poor. Although a similar exercise was conducted in 2014 by DISED and ADB embedded improvements in the questionnaire EDAM4, changes to the methodology for calculating the consumption of households, and the ability to have more representation the recent Djibouti household consumption basket have contributed to the decision to set a new poverty line (see the poverty line) for 2017.

To construct poverty lines, we used the concept to calculate the absolute poverty line.[8] We followed the Cost of Basic Needs approach (*Cost of Basic Needs* or CBN)[9]
of estimating a food component of the poverty line and a non-food component. The food component is based on setting a threshold food that guarantees a minimum level of energy intake of 2115 kcal / day per equivalent adult.[10] For the construction of the nonalimentaire component, the method Ravallion (1998) was applied to derive two nonalimentaires poverty lines and, thereafter, two poverty:

(1) A non-food poverty line below which, by adding it to food poverty line, we calculated the extreme poverty line.

(2) A non-food poverty line, by adding it to food poverty line, we were able to deduce the poverty, global view.

breadline Estimate

The estimation of absolute poverty thresholds is typically based primarily on an evaluation of a cost of feed energy requirements. Food threshold is defined as the product of the minimum calorie intake that should guarantee a market basket of food products by the unit cost of the acquisition of a kilocalorie. The minimum calorie intake of this consumption basket should enable the conduct of daily activities of an average individual. The steps for calculating the value of the food threshold were:

i) Choose a reference population;
ii) Determine the reference food consumption basket;
iii) Have a food composition table;
iv) Proceed to calculate the price of products of the reference food consumption basket; and
v) Determine the minimum level of caloric intake.

[8] Poverty lines typically follow one of two main approaches. A first approach considers the poverty line is an absolute concept, indicating the level of consumption necessary just to support (food and non-food) minimum. The second approach interprets the poverty line as a relative concept. So poverty is understood as relative deprivation situation. The actual values of relative poverty levels increased with the economic conditions (and social) of the country.

[9] The CBN approach has been used in DISED (2014).

[10] Although below the thresholds used in other African countries, this level was considered appropriate in the current context of Djibouti.

We briefly describe each step below.

i) Reference population

We start by identifying a reference population whose consumption basket is the closest of the population living near the poverty line, but at the same time, the consumer basket is able to achieve adequate nutritional level. Based on price and calories of the food consumed by the reference population, the unit cost of one kilocalorie can be calculated.

Using BC EDAM-2013 DISED (2014) determined the reference population as follows: instead of using the population between the 2nd and 4th decile, which is a common method, the entire population was selected as reference. According to his estimates, the population between the 2nd and 4th decile "consumes a basket of food whose nutritional value, especially protein is low. Therefore, their consumption does not reflect a minimum caloric intake required but rather the weakness of their income does not allow them to buy reasonable quality of foodstuffs. "The approach followed in the current year also took the entire population as a reference. We find that the consumption of 2_e and 4_e deciles are low: this population consumes 15 food products on average, translating to 1444 Kcal per day per equivalent adult. This result suggests that calculate the unit cost of a kilocalorie consumption using the population of the 2nd to 4th decile lead to obtain an average value of the cost that under-represent the actual cost of a basket calorie intake a desirable minimum.

ii) Reference Basket of food consumption

We use the identified reference population consumption basket and this is the basis of calculation of child poverty.

iii) food composition table

We need caloric composition of each food product in EDAM4 covered in Djibouti to calculate the unit cost of a kilocalorie. Since data on caloric composition of foods are not available specifically for Djibouti, we have built a table to Djibouti from the table of the United Nations Food and Agriculture Organization (FAO) developed for countries of West Africa (West African Food Composition table 2012 No ISBN 97892-5-007207-4) and the North African countries (Tunisia national table) [11]. This has been done keeping in mind the food products that are mainly consumed in Djibouti [12].

iv) Price of products of the reference food consumption basket

To calculate the unit cost of a kilocalorie, it was necessary to establish the price of each product. Of 100 food products in EDAM4, we have collected all the necessary information 40 products. We then calculate the price paid (as *proxy* unit cost) depending on the quantity purchased and the amount paid which was seized in the investigation. Moreover, this price can be allocated per kg or liter [13]. Djiboutian households spend 81% of food expenditures for these 44 products. the 56

[11] More information found here: http://www.fao.org/docrep/015/i2698b/i2698b00.pdf

[12] The reliability of the data source has been verified in the calculation of poverty carried out in previous years by DISED.

[13] All the information needed to transform the various acquisition units were collected and analyzed. Using detailed data on products, the presentation and the most common price raised

remaining products were not included because they do not meet at least one of these criteria: i) there is a *mapping* credible between the product and the calorie intake (eg codes for food groups as "cookies, cakes and pastries"); ii) consumption was reported primarily in non-standard units that could not be converted to kilos or liters; and iii) the number of households reporting consumption was low.

v) Determine the minimum level of caloric intake

The calculation of the food poverty line requires to determine the minimum level of caloric intake. DISED considered 2115 kilocalories per day as still being a good reference to the caloric needs of the population.

breadline

With these elements, we determine the level of annual expenditure per capita (see adult equivalent) required to meet the minimum nutritional needs of 2,115 kilocalories using the approach of the "cost of basic needs". The median unit cost of calorie is used to determine the food component of the poverty line. This is given by the following equation:

$$\bullet_{\alpha} = \bullet \bullet\bullet\bullet * 365 * \qquad (1)$$

where K is the minimum calorific intake per day necessary to the food needs of an adult activity (2115 kcal) COST is the median of the unit cost of a kilocalorie (valued at 0.103 FD
2017), and $\bullet_{\alpha}$ is the food poverty line. In 2017, the estimated food poverty line is 79 480 FD.

Extreme poverty line

The extreme poverty line comprises a food component and a non-food component:

- Food component corresponds to the food poverty threshold previously defined.
- The non-food component of the extreme poverty line is calculated by observing the households whose total consumption expenditure is equal to the food poverty line. For households where both are equal, they choose to allocate their consumption between food and non-food. It follows that these households consider that spending on non-food goods impulseront their well-being (and which are "more critical" than to increase their food expenditures). The expenses for these non-food products are therefore considered essential.

To estimate the extreme poverty line, Ravallion (1998) proposes to specify a function type QAIDS Engel, which shows the relation between the budget share of food expenditure ($\bullet_{\alpha}$) consumption per adult equivalent (y) normalized by the food poverty line ($\bullet_{\alpha}$) and household size ($\bullet_{h}$) deviated from the average size:

$$\bullet_{\alpha\bullet} = \alpha + \beta \ln\left(\frac{\bullet\bullet}{\bullet_{\alpha}}\right) + \Gamma\left[\ln\left(\frac{\bullet\bullet}{\bullet_{\alpha}}\right)\right]^{2} + \Delta\left(\bullet_{h} - \bar{\bullet}\right) + \theta_{\alpha\bullet} \qquad (2)$$

by DISED, mapping most units could be made in kilograms or liters. It is key to be able to map the quantities purchased in calories consumed by households.

We use quantile regression approach to estimate the coefficient in equation (2) for the country to calculator food poverty lines and unique non-food for the country. Table A3.2 shows the estimated value of the parameters of the equation (2).

Table A3 .2: Estimation of the coefficients of the curve Engel e n 2017

	Coefficient Standard Deviation		t	P> t
income effect	-0101	0007	-15.33	0
square Income Effect	-0009	0003	-2.98	0003
effect size	-0020	0002	-13.43	0
Constant	0594	0005	120.28	0

Source: Calculations EDAM4.

We find that the budget coefficient is 0.59 or 59.4% for the country. The income effect coefficient describes the elasticity of revenu-- this elasticity is less than 1. This means that spending on food is a spending needs.

When consumption per adult equivalent household is exactly equal to the food poverty line and that household size is equal to the average household size, the portion of the household budget spent on food consumption is given by α (after equation (2)) in light of this, the non-food poverty line can be derived as follows:

$$\bullet \cdot\cdot \cdots = (1 - \alpha) \bullet \alpha \qquad (3)$$

Thus, we can establish a relationship between dietary threshold (• α) and extreme threshold (• ⋯)

$$\bullet \cdots = \bullet \alpha + \bullet \cdot\cdot \qquad \cdots = (2 - \alpha) \bullet \alpha \qquad (4)$$

Finally, we add the non-food poverty line the food poverty line to calculate the extreme poverty line. The extreme poverty line reflects the bare minimum needed for adequate nutritional intake to survive.

Global poverty line

The overall poverty line also includes a food component and a component that nonalimentaire are calculated as follows:

- The food component is the food threshold previously defined.
- For the non-food portion, the idea is to determine the total consumption of households whose food consumption expenditure is equal to the food poverty line. This can be done using the equation regression results (2) (Ravallion, 1998).

This then enables households to reach caloric intake equal to the minimum as defined by the food poverty line without sacrificing consumer non-food products. Of course, keep in mind that these households do not behave exactly the same way given the heterogeneity vis-à-vis preferences of different types of expenditure.

Using the results of the equation of the regression coefficients (2), the overall poverty threshold may be calculated iteratively. We can iterate this threshold using equation (3) • = • h••• and a food budget share equal to • α / • h•••:

$$\bullet h\bullet\bullet\bullet = \alpha + \beta\bullet\bullet \left(\bullet h\bullet\bullet\bullet \frac{\bullet \alpha}{\bullet \alpha}\right) + \Gamma \left[\ln \left(\bullet h\bullet\bullet\bullet \frac{\bullet \alpha}{\bullet \alpha}\right)\right]^2 \quad (5)$$

Finally, we add this global non-food poverty line the food poverty line to calculate the overall poverty line. Using EDAM4 survey of 2017 and the reference consumption basket which guarantees 2115 kilocalories per day per adult, extreme poverty line in 2017 amounts to 111 783 FD and overall poverty line is estimated at 151 391 FD. The two lines are expressed in annual terms of adult equivalent.