Social protection coverage – Sudan case study

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ACRONYMS AND ABBREVIATIONS

CBS   Central Bureau of Statistics

FPL   Food poverty line

GPL   Global poverty line

IDP   Internally Displaced Person

IPC-IG   International Policy Centre for Inclusive Growth

N**GO**   Non-governmental organisation

NHBS   National Household Budget and Poverty Survey

NHIF   National Health Insurance Fund

OCHA   United Nations Office for the Coordination of Humanitarian Affairs

SDG   Sudanese Pound

UNDP   United Nations Development Programme

UNICEF   United Nations Children's Fund

WASH   Water, Sanitation and Hygiene

EXECUTIVE SUMMARY

Comprehensive social protection systems are key for mitigating poverty and promoting development. For this reason, the enhancement of social protection coverage is also one of the targets of SDG 1 ('End poverty in all its forms and everywhere'). Moreover, the current COVID-19 pandemic emphasises the importance of building a comprehensive social protection system that mitigates the vulnerability of people and enhances the government's ability to react fast to a myriad of shocks that might affect the national population.

In partnership with the Regional Office for the Near East and North Africa (NENA) of the Food and Agriculture Organization of the United Nations, the International Policy Centre for Inclusive Growth (IPC-IG) has developed a toolkit to calculate the extent to which the population is covered against the risks that affect them throughout their life cycle (Bacil et al. 2020). This methodology focuses on identifying different social groups and the risks to which each of them is vulnerable, defining a coverage function for each risk that enables a calculation of how much an intervention is capable of protecting vulnerable people against said risk. Thus, it goes beyond the usual approaches to measuring social protection coverage, which tend to equate programme participation with social protection coverage.

This research report presents a case study of the application of the proposed methodology to Sudan using data captured by the 2014-2015 National Household Budget and Poverty Survey (NHBS). In addition to an introduction and a conclusion, the case study comprises four sections. The first summarises the main information from the 2014-2015 NHBS, which was conducted by the Sudanese Central Bureau of Statistics (CBS) with the aim of collecting socio-economic information about the population of the country. The sample is comprised of 11,953 households across the 18 Sudanese states, and the results are representative at the national level, urban/rural level and state level (CBS 2017). The main indicators, such as the national poverty lines, are calculated based on the information provided by the NHBS.

The application of the methodology proposed in the toolkit requires the identification of individuals' characteristics to fit them into specific social groups, and the risks to which each of these categories is exposed. This survey enables the identification of different social groups according to the age, gender and place of residence of the respondents, as well as six risks: a child being out of school, food insecurity, unemployment, insufficient earnings, crop failure and livestock issues, and natural disaster. A government report on the National Health Insurance Fund (NHIF) was used to include an additional risk of lack of access to health care. Another key piece of information is on economic transfers and other income sources, which is also covered by the NHBS.

The following part of the report has two subsections. The first summarises the government programmes and some of the humanitarian interventions that existed in Sudan in 2014. The programmes established by the Sudanese State were mapped by analysing government documents, while the data on the latter were provided by a study conducted by the United Nations Office for the Coordination of Humanitarian Affairs, which mapped cash-based interventions in the country. The second subsection presents how the NHBS questionnaire collects data on economic transfers, which it defines "in cash or in-kind transfers received by the household from the Government, Organisations (NGOs) or persons living outside the household" (CBS 2017). This description comprises public and private transfers from diverse institutions through different mechanisms. There are six questions about economic transfers in the questionnaire, focusing on benefits (in-kind or cash) received in the 12 months before from food aid programmes; other government transfers; non-government organisation (NGO)/charity schemes; the Zakat Chamber; individuals outside the household; and other groups. The 2014-2015 NHBS data indicate that the incidence of government schemes (excluding *zakat* benefits) is quite modest in both rural and urban areas, while individuals outside the household are the main source of economic transfers.

Given the six questions, it is noticeable that the NHBS questionnaire does not allow a significant level of separation between the different programmes. Thus, it is not possible to estimate the participation of an individual in specific government schemes, which encompass a great variety of interventions. Additionally, the reliability of the answers

might be compromised, as the recipient might not easily differentiate between the income sources and types of programmes, especially if the household receives benefits from multiple sources and given that the Zakat Chamber's institutions are used to deliver other government programmes. It is also not possible to identify the type of in-kind benefit and the value received by the respondent from each programme (the exception is the Zakat Chamber). Lastly, the order of the questions poses another challenge, since they go from more general to more specific, which might mislead respondents. All these issues add to the known underestimation of the coverage of social protection benefits through household surveys, placing important caveats on estimates of coverage in Sudan.

Keeping in mind these shortcomings with the data, section 4 of the report presents the coverage calculations. To understand the vulnerability of the Sudanese people, the study focuses not only on the **formal provision of social protection** (social protection provided by the Sudanese government) but also other sources of protection that people can use to mitigate their risk exposure. Namely, these include the **informal provision of social protection**, which is provided by communities/extended families and private institutions, and the protection (called **individual coverage** in this report) individually acquired through people's income and access to the credit market, which provides an additional coping mechanism in times of need.

The first step to calculate coverage is by linking the mapped risks to social groups and then to sources of protection, identifying both the vulnerable population and the sources of protection that address each risk. For Sudan, as already mentioned, seven risks were mapped through the NHBS and government documents, while eight sources of protection were identified through the six questions on the economic transfers section of the NHBS questionnaire and income and credit market data gathered by this survey. In this context, the formal provision of social protection comprises economic transfers through government schemes and the Zakat Chamber. Informal social protection encompasses food aid programmes, NGO and charity schemes, and individuals outside the household. Individual coverage, on the other hand, encompasses both own income and access to the credit market.

After linking the mapped components and identifying the sources that should be grouped under the three main categories of protection, it is necessary to assign weights to each risk at the individual level. This weight can represent, for instance, how the society values risk mitigation (for example, a government might prioritise ending hunger, giving it a higher weight) or the importance of a risk to a given group (e.g. if child marriage is more present in rural than in urban environments, the weight could be a higher value for rural children). In this study, equal weights were assigned for every risk. Following this, the next step is to analyse each risk separately and define a coverage function to be applied to calculate the average protection coverage rate by source.

The first risk mapped through the NHBS is that of school-age children being out of school. The study considers that every individual of school age is vulnerable to this risk, but it excludes from the calculations those respondents who indicated on the questionnaire 'lack of schools' as the reason for not being enrolled. To define a coverage function that enables the measurement of risk mitigation, the report builds on a UNICEF (2019) study and additional literature and adopts the premise that there is a negative correlation between a child being out of school and the household's income level. A logit function is then determined, calculating the probability of a child being out of school as a function of the household's per capita income and dummy variables that indicate social characteristics of the individual (age group, gender and place of residence). In summary, the coverage rate indicates how much the risk of a child being out of school decreases due to the amount of income acquired through each specific source. In this case, individual coverage is the main factor that prevents this risk, while private and government transfers (informal and formal social protection, respectively) are each below 1 percent.

The next risk analysed is food insecurity, which is strongly linked to a household's lack of purchasing power to acquire enough food. Therefore, the study considers that this risk can be captured by the value of per capita food consumption relative to the Sudanese global poverty line (GPL). In this sense, individuals whose per capita food consumption level is below the food poverty line are recognised as already suffering from food insecurity, and their coverage is automatically zero, while respondents whose per capita food consumption value is above the GPL are considered

completely covered against this risk. The level of protection of people with per capita food consumption between these two values ranges from 0 to 1 and is determined by the share of the gap between per capita food consumption and the GPL that is covered by the individual transfer. The exception is the protection acquired by the individual through their own income and the credit market, which considers solely the value of per capita food consumption and is equal to the share of the GPL covered by it. Individual coverage has an average protection rate of 69.77 percent, compared to 1.27 percent for informal social protection and 0.31 percent for formal social protection.

The third risk is unemployment, which affects paid workers. The lack of an unemployment insurance scheme or other similar programme means that the coverage rate against this risk is equal to zero for every source of protection in this case.

The risk of insufficient earnings affects everyone whose net income per capita is below the GPL. Even though this risk is usually higher for informal workers and is impacted by the regulations in place for different sectors, the NHBS does not adequately differentiate between informal and formal workers; thus, the study treats all employees equally. Given that the risk occurs if the amount of earned income is too low, individual coverage only considers access to the credit market in this case. The coverage function considers the difference between the GPL and the household's net income per capita, and the protection coverage rate indicates the share of this gap that is covered by each source of economic transfer. Again, individual coverage has the highest average protection coverage rate, at 9.91 percent, while informal social protection amounts to 2.22 percent, and formal social protection 0.61 percent.

There are two risks exclusive to farmers in this study: crop failure and livestock issues, which include the risk of crop diseases or pests and the death or theft of livestock, and natural disaster, encompassing droughts and floods/rain. They are captured in the NHBS through a question that asks about shocks that happened in the five years prior to the interview and provides information on how those who suffered such shocks managed their consequences. The average coverage rate is then given by the answers provided by the respondents. For crop failure and livestock issues, the average protection coverage rates are 34.16 percent for individual coverage, 2.52 percent for informal social protection and 0.21 percent for formal social protection. For natural disaster, these values are 46.65 percent, 4.92 percent and 0.88 percent, respectively. Considering all the risks that affect farmers, the highest overall protection rate is through individual protection (29.9 percent), followed by informal social protection (1.1 percent) and, lastly, formal social protection schemes (0.3 percent).

Considering all these risks together, protection individually acquired has the highest average coverage rate (42.4 percent), while government provision of formal social protection makes the smallest contribution to mitigating risks (0.4 percent). The average coverage rate of informal social protection is 1.3 percent. Regarding individual coverage specifically, personal income is the most important source: while the credit market only protects against 2.1 percent of the risks, this proportion rises to 40.3 percent for personal income. The same pattern is observed when contrasting different social groups—for example, differentiating by age group, place of residence and disability status.

Additionally, this study considers a seventh risk (lack of access to health care), captured not through the NHBS but by using government data that show the share of the population that benefited from the NHIF in 2014. As it is a state programme, the only source of protection here is formal social protection, and the coverage rate is equal to participation in the scheme (34.8 percent). This results in a significant increase in the average overall protection rate provided by the government (11.9 percent), while the protection rate from other sources decreases (26.5 percent for individual coverage and 0.9 percent for informal social protection).

The report provides a comparison between the new methodology and the coverage measured by participation in the Zakat Chamber's programme that offers,benefits to poor and needy people. It shows that the coverage rate of the Sudanese formal social protection system is low regardless of the methodology used to measure it. If participation in a scheme is deemed enough to consider a person protected, government programmes reach less than 3 percent of women and men in rural and urban areas.

In conclusion, this study indicates a significant social protection coverage gap in Sudan. In other words, the benefits currently provided by the government are insufficient to address the risks that affect the population throughout the life cycle, hampering people's livelihoods and the country's development.

In this sense, even though the expansion of participation in social protection programmes is crucial to enhance coverage in Sudan, it is important to keep in mind that this is not the only relevant aspect. The type and level of benefits need to be capable of addressing the risks that the different groups face. Therefore, it is essential to comprehend the risks that affect each section of the population and design interventions suited to mitigate them.

The availability of reliable data is essential to enable an accurate measurement of the coverage rate and guide evidence-based policymaking. Therefore, it is important to overcome current NHBS limitations. Foremost, the questionnaire should include detailed questions on economic transfers, disaggregating their sources and enquiring about the value and frequency of the transfers. The text and order of questions also need to be examined, as the way they are framed interferes with respondents' answers. The supporting documentation should also provide more information, allowing the application of statistical inference. Another important improvement would be the inclusion of questions that provide more detail on social groups, such as the identification of respondents' employment sector (formal and informal).

1. INTRODUCTION

This report aims to estimate the social protection coverage offered by the Sudanese government to the country's population, applying the risk methodology proposed by the toolkit that accompanies this document (Bacil et al. 2020). The current COVID-19 pandemic[1] emphasises the importance of building a comprehensive social protection system that mitigates people's vulnerability and enhances the government's ability to react fast to a myriad of shocks that might affect the national population.

However, this report considers not only the formal provision of social protection but also the protection individually acquired by individuals through their own income and economic transfers provided by other members outside the household. By doing this, it is possible to understand the role played by the national government in providing protection against a list of risks and fully understand the level of vulnerability of the Sudanese population.

As explained in the toolkit (Bacil et al. 2020), the exercise of estimating the coverage of social protection relies heavily on the quality of the information available. First, it is critical that each social protection scheme clearly defines its features, such as type and level of benefit, target groups, enrolment criteria and specific objectives. Additionally, it is also important to have information on the country's population so that the number of potential beneficiaries of each programme can be estimated.

Household surveys are a powerful way to do this, and they have been fulfilling this role since the late 18th century. A household survey with a large enough sample provides updated information on the population and is able to capture data on participation in different social protection programmes. In other words, unlike other types of surveys, they have the unique advantage of collecting both information on social protection benefits and the socio-economic characteristics of the share of the population that is covered or not. Therefore, it is possible to estimate their effects and identify the ratio between the population in need and the number of individuals who are receiving the assistance. Household surveys allow the analysis of the gap between the size of the eligible population and the number participating in social protection schemes, as well as the impact of the schemes. Nevertheless, the survey has to capture detailed data on the existing programmes to make this possible (Yemtsov et al. 2018).

The Sudanese Central Bureau of Statistics (CBS) and international partners conducted the National Household Budget and Poverty Survey (NHBS) in 2009 and repeated it in 2014. It collects data on the characteristics of household members, their educational level, work and marital status, housing characteristics, the household's livelihoods and assets, the economic transfers received by the unit, if they have experienced any shocks, their purchases and consumption, agriculture and, lastly, income. The section on economic transfers comprises questions about cash and in-kind benefits received by the household from food-aid programmes, the government, charity schemes, the Zakat Fund, individuals outside the household and other groups (CBS 2017). Therefore, it provides relevant data on the characteristics of the Sudanese population, such as the vulnerabilities to which citizens are exposed, allowing the identification of risk groups, and a very basic level of information on social protection benefits.

Household surveys can have several problems, such as misreporting and the tendency to underreport the transfers received by the family, which has motivated studies to try to understand and estimate this issue.[2] These shortcomings might have important consequences such as the understatement of programme uptake (Meyer, Mok, and Sullivan 2009). Furthermore, they provide data aggregated at the household level, which may have more than one member entitled to a specific benefit.

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1. According to the Corona Tracker <https://www.coronatracker.com/country/sudan/>, by 24 May 2020, there were 3,628 cases and 146 fatalities in the country.

2. For instance, see Meyer et al. (2009).

Besides these general issues, the NHBS has certain specific features that hamper the estimation of the coverage rate of the social protection programmes in Sudan. First, the section on this topic contains only six questions, dividing the sources of benefits into food-aid programmes, government programmes, charity schemes, the Zakat Chamber, individuals outside the household and other groups (for more information, see the section 'Social protection programmes included in the NHBS 2014-2015' below). Therefore, although it is possible to separate social protection to a certain extent into private (charity schemes and individuals outside the household) and public provision (government and the Zakat Chamber), the only programme that can be readily identified is the Zakat Fund. Even in this case, the order of the questions and the linkage between the *zakat* institutions and other government programmes that are delivered through local *zakat* institutions affect the accuracy of these data, since the respondent might answer positively to one of the general questions (seeing *zakat*[3] as either a government or a charity scheme), as they are asked first. Moreover, the structure of the questions does not allow the types of in-kind benefits received, the amount received through each programme or the frequency of the transfers to be identified. Furthermore, the data available do not allow the criteria used to identify the population targeted by the Zakat Chamber and other government benefit programmes to be recreated.[4]

Thus, this current study has some limitations due to the data available, which shape the social groups, risks and programmes that could be analysed. The report considers two methods to calculate the coverage rate of the Sudanese social protection system: (1) the alternative approach presented in the toolkit; and (2) equating coverage with participation. However, given the above-mentioned issues, the comparison of the coverage rate using each method is only possible in the case of the benefits provided by the Zakat Chamber to poor and needy households.

The remainder of this report is divided into six parts. The first outlines the NHBS, summarising the areas covered by it, the sample characteristics, the vulnerable groups that can be identified by it and the estimation of relevant indicators—namely, the Sudanese poverty lines (food, extreme and global poverty lines), average income and unemployment rate for rural and urban populations. Next, some of the government and humanitarian programmes that were in place in 2014 are presented. It is important to highlight though that information is not available on all of the programmes in place in that year; thus, not all of them are covered. The third part is about the economic transfer section in the NHBS, examining the questions and their issues, while the fourth part reports the estimation of the social protection coverage rate. In the fifth section, the two methods of calculating coverage—the approach proposed in the toolkit and taking participation as coverage—are compared, based on the Zakat Chamber's benefits for poor and needy households. Lastly, some conclusions are presented.

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3. *Zakat* is a form of alms-giving treated in Islam as a religious obligation or tax. As one of the Five Pillars of Islam, *zakat* is a religious duty for all Muslims who meet the necessary wealth criteria.

4. To be eligible for the Zakat Chamber's benefits for poor and needy households, they must fulfil at least one of 10 criteria and be classified as poor or extremely poor according to a system of points based on 12 questions in the poverty inventory (or poverty census). However, neither the 10 criteria nor the poverty inventory questions are easily recreated using the NHBS database. Thus, while in some cases it was necessary to adopt proxies, some criteria could not be recreated. Appendix 3 provides more detail on the questions and proxies adopted.

2. THE NATIONAL HOUSEHOLD BUDGET AND POVERTY SURVEY 2014-2015

The NHBS 2014-2015 was conducted by the Sudanese CBS, aiming to collect socio-economic information about the population that could be used to guide the design and implementation of economic and social policies. The survey had three rounds of data collection, and the sample comprised 11,953 households across the 18 states in the country. Each household was visited three times (in December 2014 and March and August 2015) to collect updated information on food and non-food consumption, covering variations in household consumption patterns and household composition over the year.

The survey encompasses personal identification questions and 11 additional sections: (1) characteristics of the household members; (2) education of household members who are 6 years old or above; (3) work (for household members who are at least 10 years old); (4) marital status (12 years old or above); (5) housing characteristics; (6) livelihoods and assets of the household; (7) economic transfers received by the household; (8) cash, credit, savings and shocks; (9) purchases and consumption; (10) agriculture; and (11) income.

According to the estimations based on the 2014-2015 NHBS, the Sudanese population comprises 34,574,848 people living in 6,001,018 households. The average household comprises 5.8 members. Most of the population still live in rural areas: 22,487,254 individuals in 3,916,955 households, compared to 12,087,594 individuals in 2,084,063 households in urban areas. Most of the households have a man as the head: only 829,208 households are headed by a woman. Considering the whole population, Sudanese households have an average per capita income of SDG (Sudanese Pound) 4,026 per year. According to the CBS (2017), annual per capita consumption[5] was SDG6,082 in Sudan (SDG7,149 in urban areas and SDG5,509 in rural areas). Food represents the largest share (60 percent) of total consumption, though this share varies significantly between urban (53 percent) and rural (64 percent) areas (ECST 2018).

The measurements of poverty developed by the NHBS analysis are based on consumption. In particular, per capita consumption was chosen as the welfare indicator, and the national poverty line was estimated based on current consumption patterns. As defined by the CBS (2017, 56), a poverty line is a monetary value that indicates a minimum level of consumption below which the person is considered poor in the sense of being deprived of a decent standard of living and not being able to meet their basic needs. Sudan adopts the Cost of Basic Needs Approach, which estimates the monetary cost for a person to achieve a reference level of welfare. In the Sudanese case, this is equal to the amount of money needed to purchase the equivalent of 2,110 calories[6] of typical food per person per day plus an allowance for non-food consumption.

The cost of the kilocalories is estimated using the cost of the average food basket of the poorest 60 percent of the population. This calculation defines the **food poverty line** (**FPL**). Basic non-food needs are taken as the average non-food consumption of households that have a level of food spending similar to that determined by the FPL. The **extreme (lower) poverty line** corresponds to the FPL plus the average non-food consumption of households in which the total per capita consumption is close to the FPL. The **higher (global) poverty line** (**GPL**) is equal to the sum of the FPL and non-food consumption of households whose food consumption per capita is at the same level as the FPL. In other words, a household at the GPL is meant to be able to afford its basic food needs. Using the microdata made available, the IPC-IG team recreated the calculations of the three poverty lines, following the separation between rural and urban households, and arrived at the same values expressed in the report by the CBS. Table 1 shows the per capita poverty lines in Sudan.

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5. Calculated as the monetary value of goods and services from purchases, gifts or own production/stocks consumed per person during the period surveyed, plus the value of services provided by durable products.

6. This level was chosen because it represents the minimum required number of calories to have good health and maintain normal activity levels (p. 5).

The IPC-IG's calculations estimated that 36.1 percent of the Sudanese population live below the GPL and that 25.2 percent of the population live below the extreme poverty line. Annual average per capita food consumption is SDG3,636.32, and 39.3 percent of the population face food insecurity.[7] Furthermore, 10.9 percent of the economically active population are unemployed,[8] although in the sample, this indicator is higher in urban areas (14.5 percent) than in rural areas (8.9 percent).

Table 1. Poverty lines (in SDG)

	Food poverty line	Extreme poverty line	Global poverty line
Urban	2,966	4,124	5,110
Rural	2,698	3,605	4,044

Source: Authors' elaboration and CBS (2017, 57).

The African Development Bank (AfDB) provided an estimation of poverty incidence according to the labour market status of the head of the household (ECST 2018). Table 2 contrasts the calculations of the AfDB and the IPC-IG, which found similar results.[9] The discrepancies are probably due to the adoption of different calculation models.

Table 2. Poverty incidence according to the labour market status of the head of the household

Labour market status of the head of the household	Percentage of poor households (IPG-IG)	Percentage of people living in poor households (IPC-IG)	Percentage of people living in poor households (AfDB)
Own account worker	33	41	40
Paid employee	25	33	33
Economically inactive	24	33	30
Unemployed	37	49	51
Retired	12	18	18
Employer	27	34	33
Unpaid family worker	55	55	60

Source: IPC calculations and CBS (2017, 57).

The NHBS questionnaire enables the identification of some groups of interest for the application of the coverage rate estimation model developed in the toolkit. The vulnerable groups that are not captured by the survey include pregnant women, refugees, asylum-seekers and internally displaced persons (IDPs). Thus, the study focuses on the following sectors of the society: age groups (early childhood, school age, youth, working age and old age), gender, region (urban and rural) and farmers. Furthermore, it mapped the following risks: a child being out of school, food insecurity, unemployment, insufficient earnings, lack of access to health care, crop failure and livestock issues (crop diseases or pests and livestock death or theft), and natural disaster (drought and floods/rains). The next step is to identify which Sudanese social protection schemes offer protection for those groups against the risks.

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7. Calculated as the share of the population whose household level of food consumption per capita is below the Sudanese food poverty line.

8. For further information regarding the estimation of unemployment by the IPC-IG through the available microdata, please refer to Appendix 3 of this document.

9. For more detail about the definition and calculation of each labour market status and unemployment rate, please see Appendix 3, section A.

3. GOVERNMENT AND HUMANITARIAN SOCIAL PROTECTION PROGRAMMES IN SUDAN IN 2014

Government programmes

The Sudanese definition of social protection encompasses a variety of programmes and mechanisms. This section provides the information available on some of the main government and humanitarian programmes that were running in 2014, regarding, in particular, the number of beneficiaries and the level of support they offered. For a more detailed description of Sudan's social protection programmes please see, the *background document* accompanying this coverage estimation document.

The Zakat Fund was already one of the most important governmental programmes in 2014, providing a diversified range of benefits, both in-kind and cash, to the eight target population groups. Poor and needy households received most of the resources: planning for the Zakat Fund projected that 71 percent of the funds collected should be used to help this category, as shown in Table 3 (MoSSD n.d.). In 2014, the total amount of *zakat* collected reached SDG1,555,347,921, while the total expenditure was SDG1,420,808,861, benefiting 1,920,920 households. Poor and needy households received SDG951,990,458 of the total (Zakat Fund 2014).

Table 3. Planned *zakat* allocation in 2014

Category	Percentage of the *zakat* collected
Poor and needy people	71.0
Indebted persons	4.0
Wayfarers	0.5
Advocacy	3.0
In the cause of Allah	2.0
Zakat workers	15.0
Administrative costs	4.5

Source: MoSSD (n.d.).

Meanwhile, the **cash transfer programme** had assisted 410,000 households by September 2014, and its target was to reach 500,000 families by the end of that year. The cash transfer scheme was supposed to provide SDG100 each month. However, the frequency and period of the payments actually made are not clear (IMF 2014).

In the health sector, the **National Health Insurance Fund** (NHIF) covered 34.8 percent of the Sudanese population and 38.9 percent of all poor individuals in the country in 2014 (MoSSD 2018). It comprised a variety of medical services, and its National List of Essential Medicines included 500 drugs (Public Health Institute 2014; MoSSD 2018).

Pension funds[10] provided insurance for 566,827 employees in the government sector in 2014, and there were 30,112 beneficiaries of social welfare projects funded by the government, at a cost of SDG9.3 million. In the same year, 7,600 social projects for retired people were implemented, incurring a cost of SDG38 million (NPSIF 2019).

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10. Until 2016, there were two separate pension funds: the National Pension Fund for the government sector and the Social Insurance Fund for the private/public sector. In 2016, they were merged into the National Pension and Social Insurance Fund.

Humanitarian programmes

There were multiple humanitarian programmes in Sudan in 2014, but the exact number is not known. It is possible, however, to map some of the initiatives present in the country in that year. The effort made by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA 2018) to map most of the cash-based initiatives in the country between 2016 and 2017 resulted in the identification of 73 schemes promoted by 19 different institutions, covering a total of 350,256 people across 12 states. Based on this work, it is possible to confirm that at least 13 of the organisations listed were already present in Sudan in 2014. Several of these initiatives, however, focus on IDPs and refugees, which are not covered by the NHBS. The 13 organisations are listed and summarised below.

- The **Saeker Voluntary Organisation**,[11] a local non-governmental organisation (NGO) founded in 2000, offers relief assistance and protection programmes for IDPs, people fleeing religious or ethnic prosecution and those displaced by violence.

- **Welthungerhilfe**[12] is one of the largest private aid organisations in Germany. It was created in 1962 under the umbrella of the Food and Agriculture Organization of the United Nations, with the aim of contributing to eradicate poverty and hunger. It started operating in Sudan in 1998 and is currently a major humanitarian partner for the World Food Programme's general food distribution in North Darfur. Its target groups include IDPs, rural communities, agri-pastoralists, fishing groups and women. It implemented 12 projects in Sudan in 2014, costing EUR25.54 million.

- The **Zulfa Development and Peace Organization**,[13] provides primary health care services to conflict-affected IDPs and host communities, among others.

- **World Vision International**[14] is a Christian humanitarian organisation that conducted programmes in Sudan from 1983 to 1988, resuming in 2004 as a response to the Darfur crisis. In 2014, World Vision Sudan reached 1,520,481 beneficiaries through five programmes working with communities in South Darfur, Blue Nile and Khartoum states. They worked with the Sudanese government and other partners to meet the basic needs of people living in camps in Darfur, including through water, sanitation and hygiene (WASH), health and emergency food assistance programmes, among others. It started operating in Sudan in 2004.

- **Mercy Corps**[15] has been in Sudan since 2004, offering programmes to vulnerable host communities, displaced people and refugees.

- The **Danish Refugee Council**[16] is Denmark's largest international NGO. It works on humanitarian, development and peacebuilding activities targeting refugees and displaced people through the provision of emergency cash grants, food and food vouchers, vocational training, microloans, savings groups and school feeding programmes, among others.

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11. For more information, see: <http://www.saeker.org/index.php/en/>.

12. For more information, see: <https://www.welthungerhilfe.org/our-work/countries/sudan/>.

13. For more information, see: <https://ops.unocha.org/ViewReport.aspx>.

14. For more information, see: <https://bit.ly/2NbL40j>.

15. For more information, see: <https://www.mercycorps.org/countries/sudan?page=1>.

16. For more information, see: <https://drc.ngo/where-we-work/north-africa/sudan>.

- **ZOA Sudan**[17] works with refugees, IDPs, host communities and returnees, especially farmers and pastoralist communities, youth and schoolchildren in the fields of livelihoods and food security, social cohesion, basic education and WASH. Its expenditures amounted EUR2,968,305 in Sudan in 2014.

- **Save the Children**[18] started operating in Sudan in 1984 to help children affected by conflict, displacement, extreme poverty, hunger and a lack of basic services.

- **Catholic Relief Services**[19] was founded in 1943 by Catholic bishops in the United States and began operating programmes in Sudan in 2004, providing assistance to address the needs of the most vulnerable people in conflict-affected and natural disaster-prone areas. The organisation has programmes in the fields of agriculture, emergency response and recovery, food security and livelihoods, health, nutrition, education and microfinance.

- **Triangle Génération Humanitaire**[20] is an international solidarity organisation that implements emergency, rehabilitation and development programmes in the fields of WASH, civil engineering, food security and rural development, and social-educational and psychosocial assistance. This NGO conducted eight different programmes in Sudan in 2014.

- **Islamic Relief Worldwide**[21] is a humanitarian and development organisation that has been active since 1984. Its first intervention in Sudan was in 1984.

- The **Sudanese Red Crescent Society**[22] is a non-profit organisation established in 1956.

- **Cooperazione Internazionale**[23] has been active in Sudan since 2004. It operated seven projects in 2014, directly beneficiating 98,583 people. It works in the fields of humanitarian aid, health, water and sanitation, food security, socio-economic services, governance and human rights, education, migration, energy and education for development.

OCHA (2014) also mapped the presence of more than 100 national NGOs in the country as of 31st January 2014 in the fields of education, food security and livelihoods, health, mine action, non-food items and emergency shelter, nutrition, protection, return and early reintegration, and WASH.

Social protection programmes included in the NHBS 2014-2015

The NHBS questionnaire has one specific section about economic transfers, defined as "in cash or in-kind transfers received by the household from the Government, Organisations (NGOs) or persons living outside the household" (CBS 2017). This definition encompasses public and private transfers from diverse institutions through different mechanisms.

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17. For more information, see: <https://www.zoa-international.com/files/sudan/>.

18. For more information, see: <https://drc.ngo/where-we-work/north-africa/sudan>.

19. For more information, see: <https://www.crs.org/our-work-overseas/where-we-work/sudan>.

20. For more information, see: <https://bit.ly/3110YDg>.

21. For more information, see: <https://www.islamic-relief.org/annual-reports/>.

22. For more information, see: <https://bit.ly/2Y0RvfH>.

23. For more information, see: <https://www.coopi.org/uploads/home/15b3e2461ad43c.pdf>.

The section comprises six questions, which are listed below. Each question allows 'yes' or 'no' answers and has a follow-up question to specify the value received[24] in the case of a positive reply.

- K1. Has the household received cash or goods from food-aid programmes in the last 12 months?

- K2. Has the household received cash or goods from other government (social support) programmes in the last 12 months?

- K3. Has the household received cash or goods from other NGO/charity schemes in the last 12 months?

- K4. Has the household received cash or goods from the Zakat Chamber in the last 12 months?

- K5. Has the household received cash or goods from other individuals outside the household in the last 12 months?

- K6. Has the household received cash or goods from other groups in the last 12 months?

While questions K2 and K4 can be used to analyse the reach of social protection programmes offered by the State, K3 and K5 allow the study of social protection schemes provided by the private sector. However, there are some issues in the questionnaire that hinder the estimation of coverage.

As can be seen, the questionnaire does not allow a significant level of differentiation between the programmes. Hence, it is not possible to estimate the participation of individuals in each of a wide range of government schemes. Another issue is that it is not clear whether the respondent received sufficient explanation about the meaning of the questions—for instance, how they should identify a food-aid programme or the difference between a food-aid programme and other social protection programmes that might also provide cash or food (the Zakat Fund, for example, provides both). Therefore, the reliability of the answers might be compromised, as it might not be easy for the recipient to differentiate between the sources and types of programmes, especially if the household receives benefits from multiple sources. One factor that makes this more difficult is that, given its level of institutionalisation, the Zakat Chamber is used to deliver other government programmes—namely, the cash transfer scheme is paid through the local Zakat Committees in some states. Additionally, the questionnaire does not allow the respondent to specify the type of in-kind benefit or the periodicity and number of cash payments received by the household through each programme, as it only considers the total amount of the benefit received.

Furthermore, the order of the questions poses another challenge, since they go from more general to more specific. The question about the Zakat Chamber comes after the question about government and charity schemes, which might mislead the respondent, as he or she might be a recipient of *zakat* benefits but might answer instead that he or she receives either a government or a charity benefit. Additionally, the fact that the NHBS is a household survey also has some limitations, as the amount received through social protection programmes is measured at the household and not the individual level. Thus, it is not possible to identify the exact household member who receives assistance in the case of schemes that do not use the family as the unit of coverage.

Figure 1 illustrates the incidence of economic transfers by source as indicated by the NHBS sample according to the respondent's place of residence. Economic transfers from individuals outside the household are the most common in both rural and urban areas, while the Zakat Chamber is the second and third most important provider of transfers for

24. For cash transfers, the individual should declare the amount received. In the case of in-kind transfer, the indicated value should be equal to the amount that would be paid to purchase a similar good at the market.

urban and rural populations, respectively. Other government schemes account for a modest proportion of transfers in both areas. The difference between sources and areas is, however, very low. Thus, it is not possible to verify that the same variation applies to the whole population or is restricted to the sample.

Figure 1. Incidence and source of economic transfers to households in rural and urban areas (as a percentage of all households)
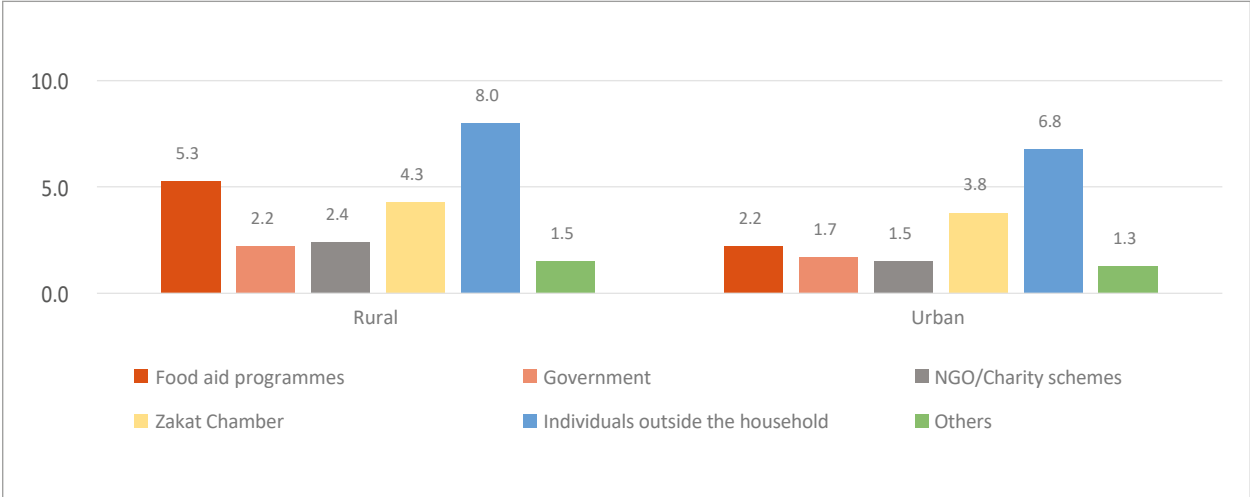
Source: Authors' elaboration based on the NHBS.

4. SOCIAL PROTECTION COVERAGE IN SUDAN

The new methodology: social protection coverage by risk

A total of 1,099,474 households were estimated to receive at least one of the six types of economic transfers covered by the 2014-2015 NHBS questionnaire, corresponding to 18 percent of all households in Sudan. This amounts to 6,405,377 people (19 percent of the population) living in households assisted by at least one social protection scheme. As Table 4 shows, the informal provision of social protection—by individuals outside the household—is significant in the country regarding both the number of recipients (households) and the level of benefits, while the provision of government benefits remains relatively low.

Table 4. Benefits and beneficiaries by source of social protection

Source of social protection provision	Beneficiaries (number of households)	Beneficiaries (share of total households)	Percentage of beneficiaries (share of the beneficiaries)	Average benefit (cash, 2014 SDG)	Average benefit (in-kind, 2014 SDG)	Average benefit (cash and in-kind, 2014 SDG)
Food aid programmes	253,674	4.2	23.1	55	275	330
Government	122,553	2.0	11.1	355	84	438
NGO/Charity	124,199	2.1	11.3	152	155	307
Zakat Chamber	249,015	4.1	22.6	628	128	756
People outside the household	454,099	7.6	41.3	4,529	881	5,410
Other	84,640	1.4	7.7	1,188	228	1,416

Source: Authors' elaboration based on the NHBS.

Figure 2. Incidence of economic transfers (as a percentage of all households) by poverty condition (based on national poverty lines)
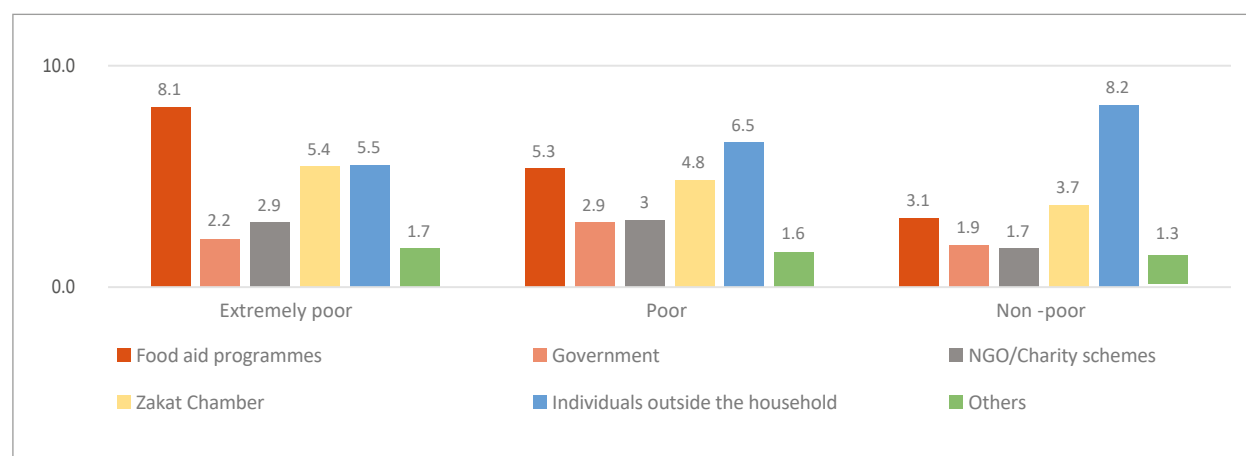
Source: Authors' elaboration based on the NHBS.

Based on the national definition of poverty (see Figure 2), 21.8 percent of people living in extreme poverty receive some kind of economic support, while this proportion falls to 19.7 percent for those living in poverty and 17.2 percent for those who are not classed as poor. Similar numbers are found when considering the definition of poverty determined by the Zakat Chamber[25] (see Figure 3), which is used to determine the population targeted

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25. The criteria used by the Zakat Chamber to identify those who are poor and needy were recreated using the NHBS database. For more detail about the criteria and the procedure adopted, please refer to Appendix 3 of this report.

by government schemes. In this case, the NHBS indicates that 20.3 percent of poor households receive some kind of economic transfer, while 15.9 percent of non-poor households also benefit. Most of the beneficiaries are concentrated in rural areas: 20.1 percent of households in the sample in rural areas receive economic assistance, compared to 14.9 percent of urban families.

Figure 3. Incidence of economic transfers (as a percentage of all households) by poverty condition (based on the Zakat Chamber's definition of poverty)
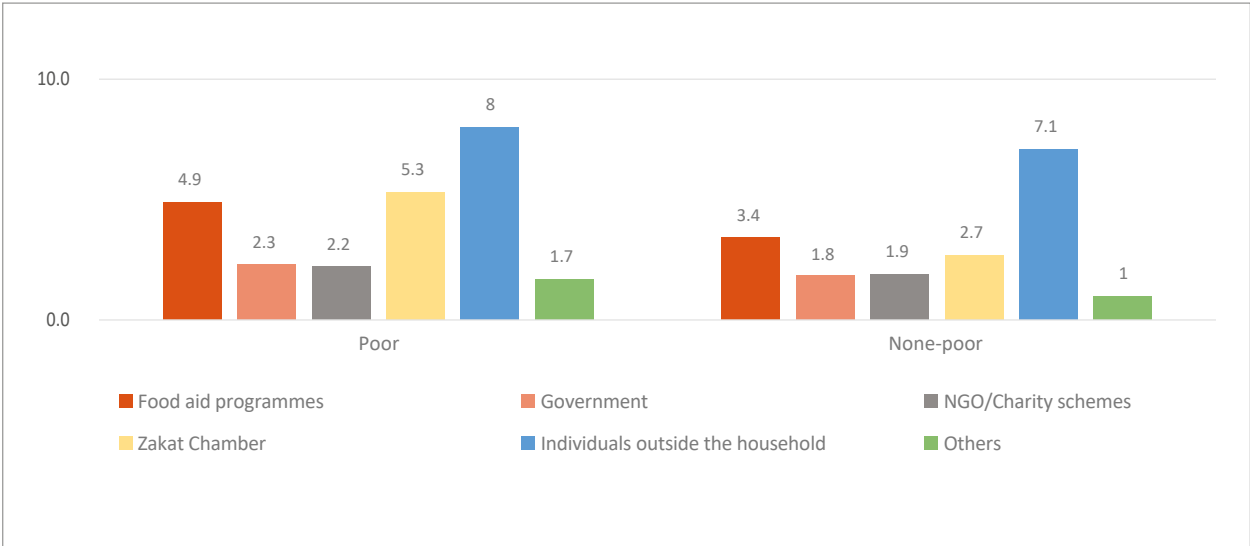
Source: Authors' elaboration based on the NHBS.

As shown in the toolkit, there are multiple possible ways to calculate the coverage rate of social protection programmes. The model proposed in the document is unique, however, since it emphasises the risks to which social groups are vulnerable. In other words, the focus is placed on the factors that should be mitigated by the available sources of protection.

The list below shows the social groups that can be identified based on the NHBS:

- Age groups:

  - Early childhood (0–5 years old)

  - School age (6–11 years old)

  - Youth (12–17 years old)

  - Working age (18–60 years old)

  - Old age (above 60 years old)

- Gender

  - Women

  - Men

- Region of residence

  - Urban

  - Rural

- Farmers[26]

Six risks that may affect these groups were also identified:

- Out of school

- Food insecurity

- Unemployment[27]

- Insufficient earnings

- Crop failure or livestock problems (crop disease or pests and/or death or theft of livestock)

- Natural disaster (droughts or floods/rain).

Additionally, government reports on the coverage of the NHIF were used to identify the risk of lack of health care.

The sum of risks of the individual is determined by the groups he or she is part of and, consequently, the total number of risks to which he or she is vulnerable. Table 5 shows the mapped risks that each social group faces in Sudan.

Table 5. Social groups and risks

	Out of school	Food insecurity	Unemployment	Insufficient earnings	Lack of access to health care	Crop/livestock issues	Natural disaster
Early childhood	x	x			x		
School age	x	x			x		
Youth	x	x			x		
Working age		x	x	x	x		
Old age		x	x	x	x		
Women		x	x	x	x		
Men		x	x	x	x		
Rural		x	x	x	x		
Urban		x	x	x	x		
Farmers		x	x	x	x	x	x

Source: Authors' elaboration based on the NHBS.

Table 6 illustrates the social protection schemes and other sources of protection in Sudan that could offer security against these risks in 2014. It is important to highlight that the list would be different if the exercise were conducted with data collected today—for instance, the *Shamil* scheme encompasses irrigation projects, which offers protection against droughts.

26. The respondent is considered a farmer if he or she indicates that their work is either a crop farming or animal husbandry activity (question D13).

27. This indicator is the same as was used in the identification of poor and needy people eligible for the Zakat Fund. For more information, please see Appendix 3 of this report.

Table 6. Risks and sources of protection

	K1		K2			K3	K4	K5	K6	'K7'[28]	
	Food aid	Cash transfer	NHIF	NPSIF	NSWF	NGOs/ charity	Zakat	Individuals outside the household	Other groups[29]	Own income	Access to credit
Out of school		x			x	x	x	x		x	x
Food insecurity	x	x				x	x	x		x	x
Unemployment											
Insufficient earnings		x					x	x			x
Lack of access to health care			x								
Crop failure/ livestock problems		x		x		x	x	x		x	x
Natural disaster		x		x		x	x	x		x	x

Source: Authors' elaboration.

The analysis focuses on the protection against these risks provided by three aggregated sources: individual, informal social protection (private provision) and formal social protection (through government or public provision):

- **Individual** coverage comprises the categories 'own income' and 'access to credit'. Own income refers to the pre-benefit per capita income of each household. Meanwhile, access to credit encompasses more than the formal credit market, including loans made by family and other individuals, banks and government agencies, NGOs, microfinance institutions and employers or landlords. These categories were aggregated due to the design of the question on this topic.

- **Informal social protection** includes provision by food-aid programmes, NGO and charity schemes, and individuals outside the household.

- **Formal social protection**, on the other hand, comprises government programmes (which cannot be separated, as they are covered by question K2) and the *zakat* scheme.

The proposed methodology establishes that each risk has a weight (at the individual level, varying for different people in the population) determined by the society that expresses how much the country values minimising that risk. In this case, the IPC-IG decided to give every risk the same weight, since assigning different weights would be an arbitrary choice that was not validated by partners from Sudan. Therefore, the weight of each risk is equal to $\frac{1}{SR_i}$', where SR_i expresses the number of risks faced by a specific person. The different risks and the sources of protection that can respond to them are described in more detail below.

Out of school

Several reasons could lead to a child being removed from school. The NHBS covers seven: (i) lack of money to pay for school costs; (ii) the need to support the family; (iii) own disability/illness; (iv) illness/disability of the head of the household; (v) lack of school near the home; (vi) cultural reasons; and (vii) other. The study considers every individual of school age to be vulnerable to this risk.

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28. The information on this topic is available in question L5 of the NHBS.

29. It is not possible to determine which risks this protection category should cover.

According to the United Nations Children's Fund (UNICEF 2019), the costs associated with education are an important reason for school drop-out, and interventions that positively impact the household's income, such as cash transfers, contribute to decreasing this risk. Other relevant social protection programmes in the area of education include fee waivers and school meals. Therefore, programmes and sources of protection that have a focus on education (such as the programmes implemented by NGOs) or transfer money to the household can offer protection against a child being out of school in Sudan, as shown in Table 7. However, such measures cannot prevent a child from not being able to attend school due to the lack of institutions near their home; therefore, those who marked this option as the reason for being out of school were excluded from the calculations.

Based on UNICEF's insights, the study supposes there is a correlation between the risk of a child being out of school and the household's level of income; in particular, it is supposed that as the latter decreases, the former increases.[30] Therefore, a logit function was estimated, calculating the probability of a child being out of school as a function of the household's per capita income and dummy variables[31] indicating the social characteristics of the individual (age group, gender and place of residence). The coverage function was defined as follows:

- The difference between the probability of the risk occurring when per capita income is equal to zero and the household's net per capita income[32] indicates the **coverage due to personal income** (individual coverage).

- The difference between the probability of the risk occurring when considering the net per capita income and the income after adding the value of a transfer from a specific source (for instance, the government) gives the coverage due to some of the other sources (**transfer coverage**).

In other words, the coverage rate indicates how much the risk of a child being out of school decreases as a result of the income acquired through each specific source.

Table 7 shows the average level of protection provided by each source. As can be seen, individual coverage (access to credit and the household's net income) is the main factor that prevents this risk, while private and government transfers (informal and formal social protection, respectively) are each below 1 percent.

Table 7. Average protection coverage rate (as a percentage) against a child being out of school by aggregate source

	Out of school
Individual coverage	8.56
Informal social protection	0.73
Formal social protection	0.67

Source: Authors' elaboration based on the NHBS.

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30. It is important to highlight, however, that this does not mean that the main cause of children being out of school is necessarily the household's lack of income. There are other factors (for example, the parents' educational level) that also play an important role, and the impact of each of them varies according to the context. For information on factors that impact children's education, see, for instance, Inoue et al. (2015) and Capuno and Javier (2015). Works covering the impact of economic transfers on schooling include Killburn et al. (2017), Natali (2017) and Mostert and Castello (2020).

31. Variables that take the values of 0 or 1.

32. Discounting the value of economic transfers.

Food insecurity

Food security can be defined as "access by all people at all times to enough food for an active, healthy life, and at a minimum includes the following: 1) the ready availability of nutritionally adequate and safe foods and 2) the assured ability to acquire personally acceptable foods in a socially acceptable way" (Campbell 1991, 408). So, as stated by the World Bank (1986), the problem of food insecurity is mostly a consequence of a lack of purchasing power of households and nations.

Since there is no indicator of nutritional status in the NHBS, it focuses on the link between food insecurity and the lack of income to purchase food. Therefore, it considers that this risk can be captured by the value of per capita food consumption in the Sudanese GPL.[33] Thus, the benefits that mitigate this risk in Sudan are either cash or in-kind (food) transfers.

Individuals whose per capita food consumption is below the FPL are, therefore, considered to already be suffering from food insecurity. Thus, their coverage is automatically zero. On the other hand, respondents whose value of per capita food consumption is above the GPL are considered completely covered against this risk. The level of protection of people with per capita food consumption between these two values ranges from 0 to 1 and is determined by the share of the gap between per capita food consumption and the GPL that is covered by the individual transfer. The exception is the protection acquired by the individual through their own income and the credit market, which considers solely the value of per capita food consumption and is equal to the share of the GPL covered by it. Table 8 shows the average protection coverage rate against malnutrition food insecurity.

Table 8. Average protection coverage rate (as a percentage) against malnutrition food insecurity by aggregate source

	Food insecurity
Individual coverage	69.77
Informal social protection	1.27
Formal social protection	0.31

Source: Authors' elaboration based on the NHBS.

Unemployment

Everyone who is a paid employee is vulnerable to the risk of unemployment. However, the lack of an unemployment insurance scheme or other similar programme means that the coverage against this risk is equal to zero.

The absence of programmes to address this risk does not mean, however, that it cannot be included in the coverage rate calculation. In particular, given that this analysis indicates that the main source of protection against social risks in Sudan is acquired by the individual through his or her income, the risk of unemployment becomes even more relevant and should not be excluded from the calculation of social protection coverage rates.

Therefore, this risk is calculated by considering all paid workers vulnerable to unemployment and assigning them a coverage rate equal to zero (see Table 9).

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33. The global poverty line was chosen instead of the food poverty line so that there would be a margin between the food consumption level and the household's per capita income in the case of a shock.

Table 9. Average protection coverage rate (as a percentage) against unemployment by aggregate source

	Unemployment
Individual coverage	0.00
Informal social protection	0.00
Formal social protection	0.00

Source: Authors' elaboration based on the NHBS.

Insufficient earnings

Except for those whose net income per capita is above the GPL, the entire population is considered vulnerable to insufficient earnings in this study. Even though this risk is usually higher for informal workers and is affected by the regulations in place for different sectors, the NHBS does not allow workers to be adequately separate by sector. Therefore, the study treats all workers equally, assuming that everyone is vulnerable to this risk, which equates to an income per capita below the value that avoids poverty. Thus, individual coverage considers only access to credit in this case, as the amount of income earned is what defines insufficient earnings.

The coverage function considers the difference between the GPL and the household's net income per capita. The protection coverage rate indicates the share of this gap that is covered by each source of economic transfers (see Table 10).

Table 10. Average protection coverage rate (as a percentage) against insufficient earnings by aggregate source

	Insufficient earnings
Individual coverage	9.91
Informal social protection	2.22
Formal social protection	0.61

Source: Authors' elaboration based on the NHBS.

Crop failure or livestock issues

Crop failure and livestock issues include the risk of crop diseases or pests and the death or theft of livestock to which farmers are vulnerable.

The survey enquires about shocks that happened in the five years prior to the interview and provides information on how those who suffered these shocks managed their consequences. Therefore, the treatment of this risk (and the risk of natural disaster, explained below) was different from that given to the other risks. Instead of considering all farmers, who comprise the vulnerable population, and trying to establish a coverage function for them, the analysis focuses on those who suffered the risk and what they declared they did to cope with the consequences. This is the case for 4,942 individuals (2,262 households) in the sample, which would correspond to 1.88 million people (0.86 million households) given the sample weights (see Table 11).

Table 11. Average protection coverage rate (as a percentage) against crop failure and livestock issues by aggregate source

	Crop failure and livestock issues
Individual coverage	34.16
Informal social protection	2.52
Formal social protection	0.21

Source: Authors' elaboration based on the NHBS.

Natural disaster

Farmers are also vulnerable to the occurrence of natural disaster, which refers to episodes of droughts and floods/ rain. These shocks are treated in a similar way to crop failure and livestock issues for the reasons mentioned above. In other words, the coverage rate is calculated by considering what the people who suffered a shock due to natural disaster in the five years prior to the survey did to cope. The sample comprises 2,227 people in 1,073 households in this situation. This would correspond to 0.94 million people or 0.46 million households given the sample weights (see Table 12).

Table 12. Average protection coverage rate (as a percentage) against natural disaster by aggregated source

	Natural disaster
Individual coverage	46.65
Informal social protection	4.92
Formal social protection	0.88

Source: Authors' elaboration based on the NHBS.

Considering all the risks that affect farmers, their highest overall protection rate is acquired individually (29.9 percent), followed by informal social protection provided by private transfers (1.1 percent) and, lastly, formal social protection schemes offered by the government (0.3 percent).

Coverage by risk and source

Table 13 summarises the average coverage rate of each of the categories of risk identified in the NHBS.[34] With the exception of the credit market, K4 (individuals outside the household) provides the highest coverage of the six factors, followed by the Zakat Chamber.

As shown in Table 14, considering all risks together, protection individually acquired is the main factor that covers the Sudanese population, while government provision of formal social protection makes the smallest contribution to mitigating risks. Regarding individual coverage against the selected risks, personal income is the most important source: while the credit market only protects against 2.1 percent of the risks, the coverage rate for personal income is 40.3 percent.

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34. K1: Food aid programmes; K2: government transfers; K3: NGOs/charity schemes; K4: Zakat Chamber; K5: individuals outside the household; K6: other groups; K7: access to the credit market.

Table 13. Average coverage function value (as a percentage) by risk and source

	Food aid schemes	Government	NGO/ charity scheme	Zakat Chamber	People outside the HH	Other groups	Personal income	Credit market
Out of school	-	0.004	0.003	0.017	0.086	0.011	8.389	0.011
Food insecurity	0.156	0.093	0.058	0.224	1.069	0.065	69.77	0.065
Unemployment	-	-	-	-	-	-	-	-
Insufficient earnings	-	0.216	-	0.390	2.224	0.162	-	9.91
Crop failure and livestock issues	-	0.173	0.026	0.034	2.510	-	30.773	4.060
Natural disaster	-	0.535	0.806	0.345	4.116	-	41.895	5.352

Source: Authors' elaboration based on the NHBS.

Table 14. Average protection coverage rate (as a percentage) by aggregate source

	Protection coverage rate
Individual coverage	42.4
Informal social protection	1.3
Formal social protection	0.4

Source: Authors' elaboration based on the NHBS.

Coverage by group

In general, there are few significant differences in coverage between the different groups. Individual protection is always the most significant source of risk mitigation, while the coverage provided by government programmes (formal social protection) remains very low. As Figure 4 and Table 15 show, individual coverage is the main source of protection for all age groups and genders, both in urban and in rural areas, while government and private provision (formal and informal social protection, respectively) remain extremely low. Individual coverage is even more important for people with disabilities, as illustrated in Figure 5.

Figure 4. Overall protection coverage rate (as a percentage) by age group, place of residence and aggregate source
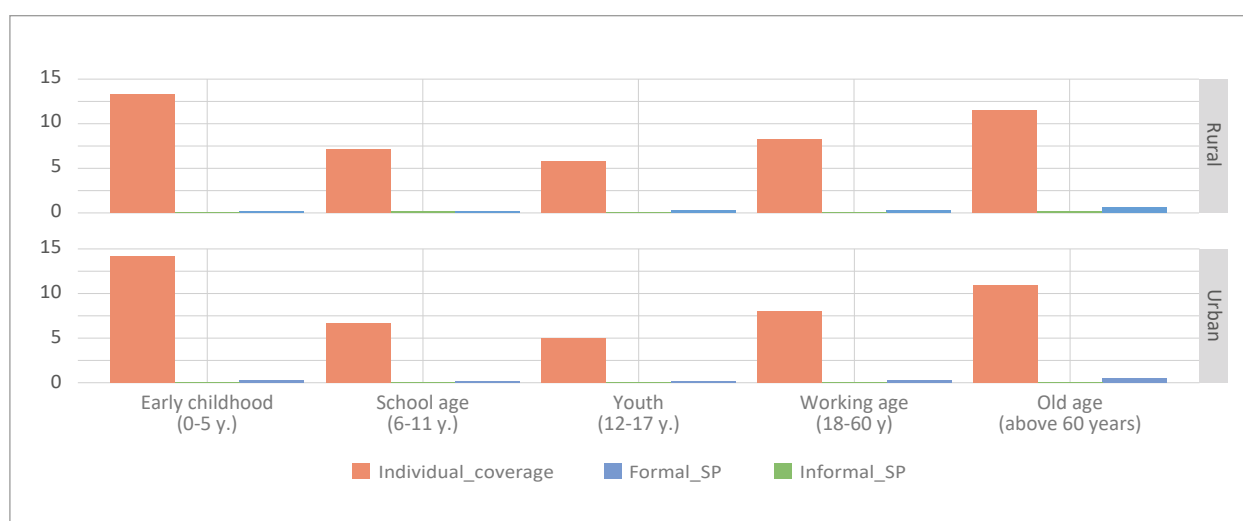
Source: Authors' elaboration based on the NHBS.

Table 15. Protection coverage rate (as a percentage) by age group, place of residence and aggregate source

		Individual coverage	Informal social protection	Formal social protection
Urban	Men	39.21	1.06	0.42
	Women	42.86	1.46	0.39
Rural	Men	41.03	1.17	0.34
	Women	44.4	1.51	0.44

Source: Authors' elaboration based on the NHBS.

Figure 5. Overall protection coverage rate (as a percentage) by disability status, place of residence and aggregate source
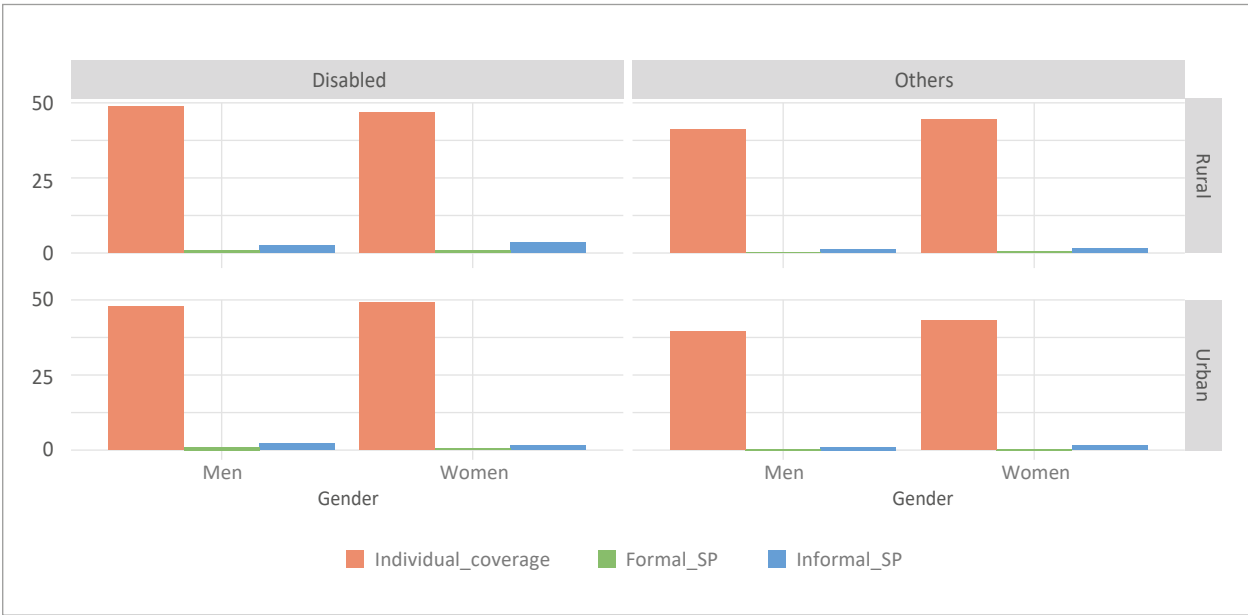
Source: Authors' elaboration based on the NHBS.

Lack of access to health care

In addition to the risks listed above, for which it was possible to define a coverage function through the survey data, it might be interesting to add others that exist in society but are not covered by the survey. One example in the Sudanese case is the risk of a lack of access to health care, which is not easily captured by the NHBS data. In this case, external data regarding the coverage in 2014 can be used to calculate coverage.

The programme that addresses this risk in Sudan is the NHIF, which reached 34.8 percent of the national population and 38.9 percent of poor individuals in 2014.[35] Since this is the information available, coverage is considered equal to participation for this risk. Hence, the government is the only provider of protection, and the social protection coverage rate is equal to the share of the population that is covered by the NHIF (see Table 16).

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35. Note that the coverage increased to 67.7 percent of the population in 2019 (NHIF 2019). The NHIF has increased coverage of poor people significantly, reaching 16,586,351 subscribers by the end of 2018 (or 88.7 percent of poor families) (MoSSD 2018).

Table 16. Average protection coverage rate (as a percentage) against lack of access to health care by aggregate source

	Lack of access to health care
Individual coverage	0.00
Informal social protection	0.00
Formal social protection	34.8

Source: Authors' elaboration based on the NHBS.

Since the coverage function of this risk is simply equal to participation, it causes a significant increase in the overall social protection rate provided by the government and decreases the protection rate from other sources, as can be seen in Table 17.

Table 17. Average protection coverage rate (as a percentage) with and without the risk of lack of access to health care by aggregate source

	Protection coverage rate *with* lack of access to health care	Protection coverage rate *without* lack of access to health care
Individual coverage	26.5	42.1
Informal social protection	0.9	1.3
Formal social protection	11.9	0.4

Source: Authors' elaboration based on the NHBS.

A comparison between the two approaches: the estimation of the Zakat Fund's coverage of poor and needy households

This section of the report focuses on the benefits provided by the Zakat Chamber to poor and needy households, contrasting the coverage calculated using participation as coverage and the risk methodology proposed in the toolkit. The Zakat Fund targets eight groups[36] of the population, but it is not possible to identify all of them through the NHBS. It can be argued, however, that poor and needy households are the most important group to prioritise with coverage. Therefore, the analysis uses the criteria defined by the Zakat Fund to identify those who are poor and needy in the NHBS database and estimates the coverage rate both through the proposed methodology and by taking coverage as participation.

Even so, it is not possible to directly recreate the criteria used by the Zakat Fund to identify poor people or the scoring system implemented in the Poverty Inventory, which are the instruments used to determine the Zakat Fund's target population. Therefore, it was necessary to use proxies to recreate or, in some cases, omit some of the criteria to define the population eligible for the Zakat Fund using the NHBS data. Appendix 3 carefully explains the procedures adopted. It is also necessary to highlight that the data available do not enable the calculation of confidence intervals. Thus, it is important to keep in mind that observed differences might be due to the selected sample and not verified in the total population in the cases in which the discrepancies are small.

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36. The eight categories that can claim the right to zakat according to the Quran are those who are poor and needy, people employed to administer the Zakat Fund, new converts to Islam, individuals in bondage, persons in debt, those committed to some act of service or devotion, and wayfarers (Hasan 2006).

Figure 6. Poverty score by Zakat Chamber's poverty classification
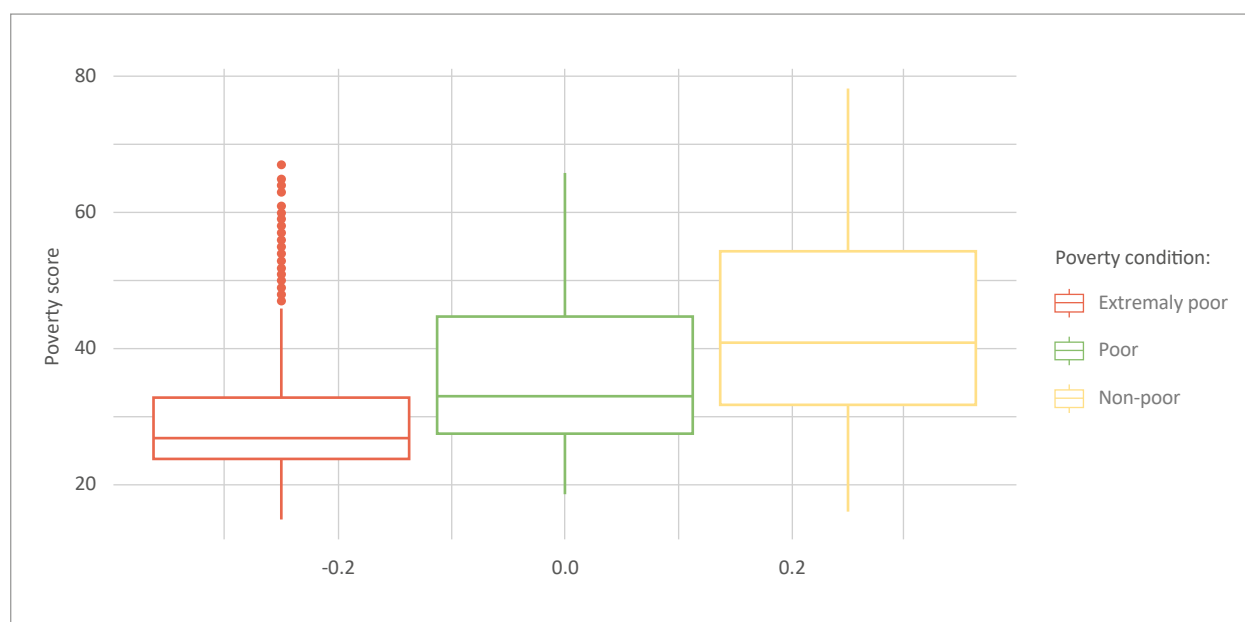
Source: Authors' elaboration based on the NHBS.

Using the NHBS data and considering the assigned weights, 3,314,727 Sudanese households are classified as poor by the Zakat Chamber's definition. The application of the Poverty Inventory scoring system leads to a number of 2,568,906 poor families eligible to receive assistance from this programme, which corresponds to 77 percent of the households that fulfil the Zakat Chamber's poverty conditions and 43 percent of all Sudanese households. In addition, 1,501,412 households would be considered eligible by the poverty lines, but they do not meet any of the 10 conditions imposed by the Zakat Chamber to define poverty and, consequently, are not entitled to receive the benefits provided by the scheme.

Figure 6 illustrates the scores obtained by households in the three groups (extremely poor, poor and non-poor) as classified by the scoring system. It shows that the poorest households tend to have lower scores, but there is an overlap between the groups.

Table 18 shows the estimates of population size, number of households, poor households (according to the Zakat Fund's criteria) and the three groups (extremely poor, poor and not poor) calculated using the scoring system. The same indicators for the 2011 Poverty Inventory are shown for comparison.

Table 18. Population and group sizes 2011–2014

	NHBS (2014-2015)	2011 Poverty Inventory
Sudanese population	34,574,848	33,975,594
Sudanese households	6,001,018	5,662,600
Number of poor families (according to Zakat Chamber's classification)	3,314,727	2,291,789
The scoring system		
Group I (the poorest)	440,356	330,703
Group II	2,128,550	1,729,449
Group III	598,058	231,637

Source: Authors' elaboration based on the 2014-2015 NHBS and the Poverty Inventory.

There might be some issues with the estimates made using the 2014-2015 NHBS data. While the population grew by 2 percent between 2011 and 2014, the number of poor families grew by 33 percent: group I (the poorest) grew 33 percent, while group II and group III grew by 23 percent and 158 percent, respectively. The lack of correspondence between the 2014 NHBS and the Poverty Inventory questionnaires is an important issue that hampers the estimation of social protection coverage in Sudan, since it is difficult—sometimes even impossible—to apply the same targeting criteria.

Only groups I and II are eligible to receive Zakat Chamber benefits, in addition to being targeted by other government programmes. Based on the NHBS data, 16,057,288 people are classified by the Zakat Chamber as being poor and needy, which represents 46 percent of the Sudanese population. According to the NHBS, 249,015 families were supported by the Zakat Chamber in 2014. This is equivalent to 4.1 percent of all Sudanese households and 5.7 percent of poor eligible households. In terms of the number of individuals, 1,517,688 people lived in households assisted by the Zakat Chamber, which is 4.4 percent of the entire population and 5.7 percent of eligible poor individuals.[37]

There is a considerable discrepancy between the 1,920,920 households receiving *zakat* assistance reported by the Zakat Chamber in 2014 (Zakat Fund 2014) and the 249,015 families estimated using the NHBS data. This discrepancy could be the result of several factors. First, as already mentioned, economic transfers tend to be underreported in household surveys. Moreover, the NHBS questionnaire is not ideally designed in the sense that its questions do not favour the capture of information on Sudanese social protection programmes. In particular, the questions should be more specific, to make it easy to identify each type and amount of benefit received by household members and the programme providing it. Importantly, the person applying the questionnaire should ensure that the respondent understands the question and is able to correctly determine the source of the benefit the household receives. Additionally, the NHBS and the Poverty Inventory questionnaires should be better aligned—the need to use proxies to recreate the conditions is another obstacle that hampers the exact estimation of the coverage of social protection programmes.

Considering coverage as the share of eligible people who effectively receive the Zakat Chamber benefit, the rate of coverage of this scheme, which is the main government social protection programme in Sudan, remains quite low. However, coverage is even lower when it is calculated through the proposed methodology, which focuses on how effective the benefit is at protecting the vulnerable population against the risks they face.

Figure 7. Zakat Chamber coverage (as a percentage) by gender, place of residence and methodology
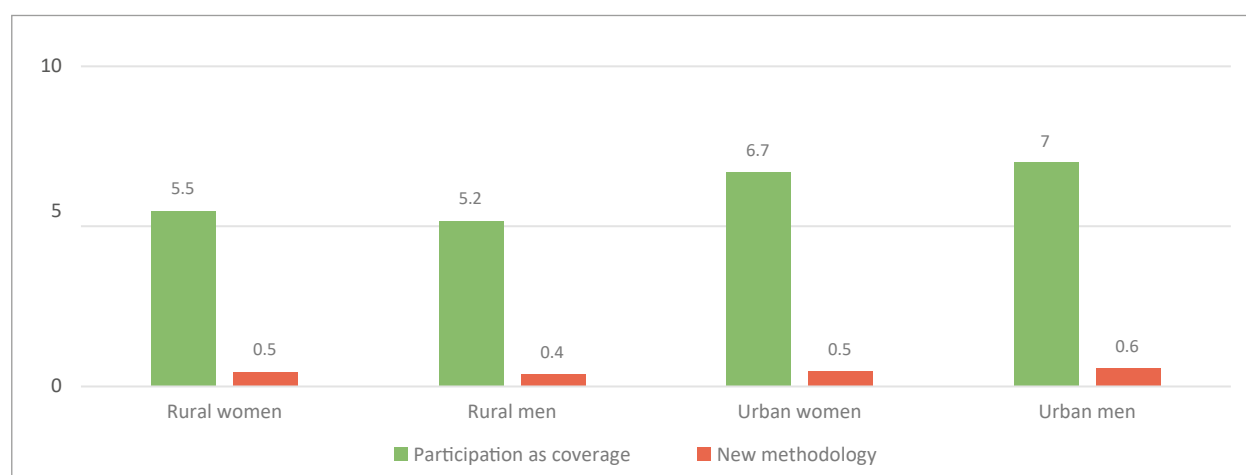
Source: Authors' elaboration based on the NHBS.

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37. It is important to remember that this exercise captures only one (those who are poor and needy) of the eight groups eligible to receive *zakat* benefits.

Figure 8. Zakat Chamber coverage (as a percentage) by age group and methodology
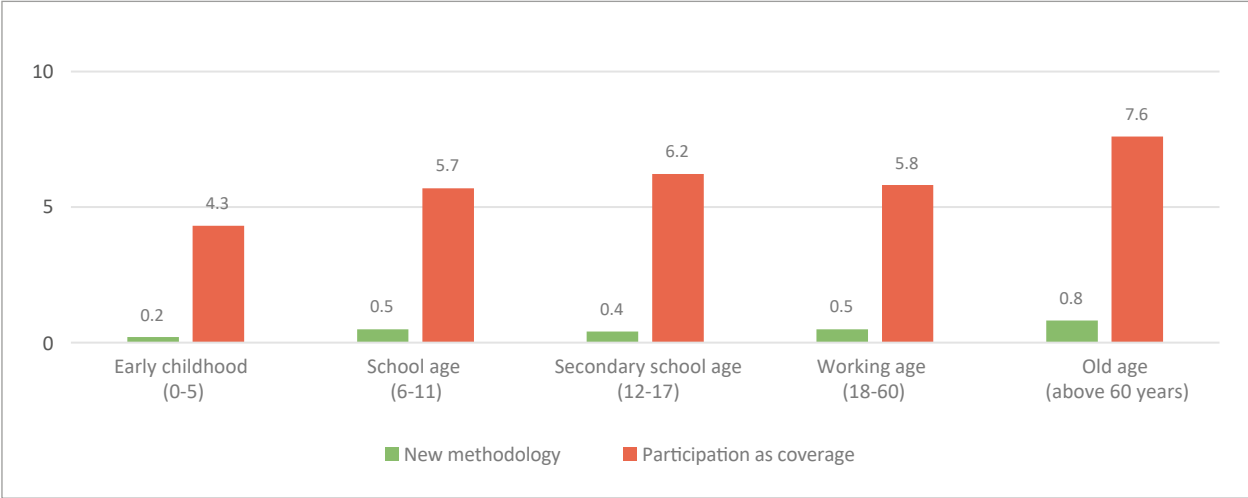
Source: Authors' elaboration based on the NHBS.

Figures 7, 8 and 9 compare the coverage rates calculated by each of these methods. Even though the proposed methodology adds the transfer values of the benefits provided by the Zakat Chamber to those of other government programmes, the coverage rate is still consistently lower than if only participation is considered. Therefore, the proposed methodology is better suited to assess whether the needs of the target population are indeed being met. In other words, the proposed methodology allows us to analyse whether the programme is able to protect beneficiaries against the risk they face.

Importantly, the same is valid for the calculation of overall social protection coverage provided by the government. In other words, the coverage estimated by this proposed methodology is also lower than that estimated by adopting participation as coverage. Figure 8 illustrates the level of participation by gender and place of residence in government programmes covered by question K2 of the NHBS, calculated using participation as coverage and the new methodology. Even though the participation value is also low, it is higher than that found by the alternative methodology, even though the latter also includes the protection provided by the Zakat Chamber in its calculation.

Figure 9. Coverage rate (as a percentage) of government transfers by gender, place of residence and methodology
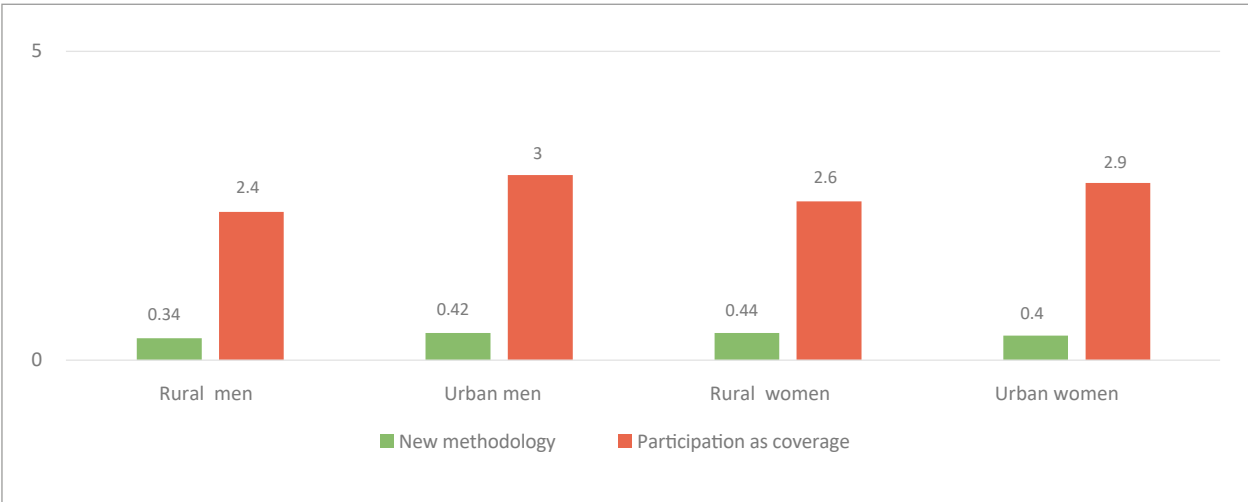
Source: Authors' elaboration based on the NHBS.

5. CONCLUSION

The study focused on measuring the rate of social protection coverage in Sudan. Therefore, it conducted an analysis of the social groups, risks and programmes in place in the country in 2014, identifying the risks that affected each group and the schemes that addressed them. The coverage rate was then estimated using two approaches: one that considers only participation, and the new methodology proposed in the toolkit. The latter considers the importance of each risk for the vulnerable social groups and the level of protection actually offered by the benefit or source against the risk. In addition, the adoption of an individual weight system allows people's different degrees of vulnerability to a specific risk to be taken into consideration.

The main findings indicate that the level of government (or formal) social protection coverage in Sudan is low, both considering coverage as a synonym for participation and by taking into account the level of protection the transfers provide for each specific risk. On this basis, the second approach indicates that formal and informal social provision of protection are low, and that the individual is their own main source of protection against socio-economic risks, acquiring protection through either personal income or access to credit. The approach proposed by the toolkit also emphasises the lack of protection for some risks, such as unemployment. This is especially troubling considering that the labour market has as important role to play in the protection of the Sudanese people given their high reliance on personal income to mitigate their exposure to risks.

Regarding place of residence, it can be observed that the differences in coverage between urban and rural areas are fairly minimal. The provision of social protection through individuals outside the household remains the most important source in both areas, and the Zakat Chamber is the second and third most important provider of economic transfers for urban and rural populations, respectively, as indicated by the NHBS sample. Other government schemes represent a modest share of economic transfers by incidence in both areas. However, it is not possible to be sure that the difference is also true for the whole population without applying statistical inference. Additionally, farmers acquire most of their protection against risks through individual resources, while formal social protection provision by the government plays a smaller role. This same pattern is also observed when the whole population is considered.

Occurrences such as the COVID-19 crisis highlight the importance of constructing a strong and comprehensive social protection system. This improves the ability to respond to shocks that might have lasting effects on the population. In this sense, social protection coverage of vulnerable groups—together with other measures, such as universal access to essential services—mitigates fluctuations in households' income, which promotes macroeconomic stability (UNICEF 2020). This study indicates that there is a significant gap in social protection coverage in Sudan, as the coverage rate is low regardless of the methodology used to calculate it. In other words, the benefits currently provided by the government are insufficient to address the risks that affect the population throughout the life cycle, hampering people's livelihoods and the country's development.

In this sense, even though increased participation in social protection schemes is crucial to enhance the Sudanese social protection coverage rate, it is important to keep in mind that this is not the only relevant aspect. The type and level of benefit also need to be capable of addressing the risks by providing sufficient protection to the target population. Therefore, it is essential to comprehend the risks that affect each section of the population and design interventions suited to mitigate them.

The availability of reliable data is essential to enable an accurate measurement of the coverage rate and guide evidence-based policymaking. Therefore, it is important to overcome current limitations of the NHBS. Some of the improvements needed include the following:

- The structure of the survey hampers the calculation of the coverage rate of each programme, since it is not possible to disaggregate it for different schemes. Thus, the questionnaire should encompass detailed questions

on economic transfers, disaggregating the sources and enquiring about the value, type (in-kind or cash) and frequency of the transfers. The text and order of questions also need to be examined, as the way they are framed interferes with respondents' answers.

• The section on labour force participation should also include questions on future work arrangements and other information that would allow a better estimate of unemployment and distinguish between formal- and informal-sector workers.

• It would be easier to estimate coverage if it were easier to identify eligible groups through the data. For instance, greater complementarity between the poverty census and the NHBS would make it easier to identify those households considered poor and needy and eligible to receive support from the Zakat Fund.

• Lastly, the supporting documentation should also provide more information, allowing the application of statistical inference.

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ANNEX I—MATRIX OF SOCIAL GROUPS AND RISKS BASED ON THE 2014-2015 NHBS

Age group	Social groups									
	Women	Rural	Unemployed	Farmer	Out of school	Food insecurity	Insufficient earnings	Unemployment	Crop failure	Natural disaster
Early childhood (0–5)	0	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	0	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	0	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	1	0	0	0	1	0	0	0	0
Early childhood (0–5)	1	1	0	0	0	1	0	0	0	0
School age (6–11)	0	0	0	0	1	1	0	0	0	0
School age (6–11)	0	0	0	0	1	1	0	0	0	0
School age (6–11)	0	1	0	0	1	1	0	0	0	0
School age (6–11)	0	1	0	0	1	1	0	0	0	0
School age (6–11)	0	1	1	0	1	1	0	0	0	0
School age (6–11)	1	0	0	0	1	1	0	0	0	0
School age (6–11)	1	0	0	0	1	1	0	0	0	0
School age (6–11)	1	0	1	0	1	1	0	0	0	0
School age (6–11)	1	1	0	0	1	1	0	0	0	0
School age (6–11)	1	1	0	0	1	1	0	0	0	0
School age (6–11)	1	1	1	0	1	1	0	0	0	0
School age (6–11)	1	1	0	0	1	1	0	0	0	0
School age (6–11)	0	0	0	0	1	1	0	0	0	0

	Social groups									
Age group	Women	Rural	Unemployed	Farmer	Out of school	Food insecurity	Insufficient earnings	Unemployment	Crop failure	Natural disaster
School age (6–11)	0	0	0	0	1	1	0	0	0	0
School age (6–11)	0	0	1	0	1	1	0	0	0	0
School age (6–11)	0	1	0	0	1	1	0	0	0	0
School age (6–11)	0	1	0	0	1	1	0	0	0	0
School age (6–11)	0	1	1	0	1	1	0	0	0	0
School age (6–11)	1	0	0	0	1	1	0	0	0	0
School age (6–11)	1	0	0	0	1	1	0	0	0	0
School age (6–11)	1	1	0	0	1	1	0	0	0	0
School age (6–11)	1	1	0	0	1	1	0	0	0	0
School age (6–11)	0	1	1	0	1	1	0	0	0	0
Youth (12–17)	0	0	0	0	1	1	1	0	0	0
Youth (12–17)	0	0	0	0	1	1	1	0	0	0
Youth (12–17)	0	1	1	0	1	1	1	0	0	0
Youth (12–17)	0	1	0	0	1	1	1	0	0	0
Youth (12–17)	0	1	0	0	1	1	1	0	0	0
Youth (12–17)	1	1	1	0	1	1	1	0	0	0
Youth (12–17)	1	0	0	0	1	1	1	0	0	0
Youth (12–17)	1	0	0	0	1	1	1	0	0	0
Youth (12–17)	1	0	1	0	1	1	1	0	0	0
Youth (12–17)	1	1	0	0	1	1	1	0	0	0
Youth (12–17)	0	1	0	0	1	1	1	0	0	0
Youth (12–17)	0	0	0	0	1	1	1	0	0	0
Youth (12–17)	0	0	1	0	1	1	1	0	0	0
Youth (12–17)	0	0	0	0	1	1	1	0	0	0
Youth (12–17)	0	1	0	0	1	1	1	0	0	0
Youth (12–17)	0	1	1	0	1	1	1	0	0	0

Age group	Women	Rural	Unemployed	Farmer	Out of school	Food insecurity	Insufficient earnings	Unemployment	Crop failure	Natural disaster
Youth (12–17)	1	0	0	0	1	1	1	0	0	0
Youth (12–17)	1	0	0	0	1	1	1	0	0	0
Youth (12–17)	1	0	0	0	1	1	1	0	0	0
Youth (12–17)	1	0	1	0	1	1	1	0	0	0
Youth (12–17)	1	1	0	0	1	1	1	0	0	0
Youth (12–17)	1	1	0	0	1	1	1	0	0	0
Youth (12–17)	1	1	1	0	1	1	1	0	0	0
Working age (18–60)	0	0	0	0	0	1	1	1	0	0
Working age (18–60)	0	0	0	0	0	1	1	1	0	0
Working age (18–60)	0	0	1	0	0	1	1	0	0	0
Working age (18–60)	0	1	0	0	0	1	1	1	0	0
Working age (18–60)	0	1	0	0	0	1	1	1	0	0
Working age (18–60)	0	1	1	0	0	1	1	0	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	1	0	0	1	1	0	0	0
Working age (18–60)	1	0	1	0	0	1	1	0	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	1	0	0	1	1	0	0	0
Working age (18–60)	1	1	1	0	0	1	1	0	0	0
Working age (18–60)	0	0	0	0	0	1	1	1	0	0
Working age (18–60)	0	0	0	0	0	1	1	1	0	0
Working age (18–60)	0	0	1	0	0	1	1	0	0	0
Working age (18–60)	0	1	0	0	0	1	1	1	0	0

Age group	Social groups									
	Women	Rural	Unemployed	Farmer	Out of school	Food insecurity	Insufficient earnings	Unemployment	Crop failure	Natural disaster
Working age (18–60)	0	1	0	0	0	1	1	1	0	0
Working age (18–60)	0	1	1	0	0	1	1	0	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	0	0	0	1	1	1	0	0
Working age (18–60)	1	0	1	0	0	1	1	0	0	0
Working age (18–60)	1	0	1	0	0	1	1	0	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	0	0	0	1	1	1	0	0
Working age (18–60)	1	1	1	0	0	1	1	0	0	0
Working age (18–60)	1	1	1	0	0	1	1	0	0	0
Working age (18–60)	0	0	0	1	0	1	1	1	1	1
Working age (18–60)	0	1	0	1	0	1	1	1	1	1
Working age (18–60)	1	0	0	1	0	1	1	1	1	1
Working age (18–60)	1	1	0	1	0	1	1	1	1	1
Working age (18–60)	0	0	1	1	0	1	1	1	1	1
Working age (18–60)	0	1	1	1	0	1	1	1	1	1
Working age (18–60)	1	0	1	1	0	1	1	1	1	1
Working age (18–60)	1	1	1	1	0	1	1	1	1	1
Old age (above 60)	0	0	0	0	0	1	1	1	0	0
Old age (above 60)	0	0	0	0	0	1	1	1	0	0
Old age (above 60)	0	0	1	0	0	1	1	0	0	0
Old age (above 60)	0	1	0	0	0	1	1	1	0	0
Old age (above 60)	0	1	0	0	0	1	1	1	0	0
Old age (above 60)	0	1	1	0	0	1	1	0	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0

| | Social groups | | | | | | | | | |
Age group	Women	Rural	Unemployed	Farmer	Out of school	Food insecurity	Insufficient earnings	Unemployment	Crop failure	Natural disaster
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	1	0	0	1	1	0	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	1	0	0	1	1	0	0	0
Old age (above 60)	1	1	1	0	0	1	1	0	0	0
Old age (above 60)	0	0	0	0	0	1	1	1	0	0
Old age (above 60)	0	0	0	0	0	1	1	1	0	0
Old age (above 60)	0	0	1	0	0	1	1	0	0	0
Old age (above 60)	0	1	0	0	0	1	1	1	0	0
Old age (above 60)	0	1	1	0	0	1	1	1	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	0	0	0	1	1	1	0	0
Old age (above 60)	1	0	1	0	0	1	1	0	0	0
Old age (above 60)	1	0	1	0	0	1	1	0	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	0	0	0	1	1	1	0	0
Old age (above 60)	1	1	1	0	0	1	1	1	0	0
Old age (above 60)	1	1	1	0	0	1	1	0	0	0

Source: Developed by the IPC-IG.

ANNEX II—COVERAGE FUNCTIONS

Income-related risks **without** thresholds

The risk of a child being out of school is considered to be related to the household's income level, but there is no predetermined income threshold that indicates their vulnerability level. Therefore, the coverage functions against these risks are built through the estimation of a logit regression for each risk.

Considering that π_i is the probability of the risk occurring for the individual i, it is first necessary to estimate the coefficients of the following equation:

$$ log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 log\left(income_i\right) + \sum_{j=1}^{k} \gamma_j D_{ij} + \epsilon_i $$

where:

- D_{ij} is one of the k dummy variables identifying a particular group to which the individual i belongs;

- Y_j is related to the differences in the incidence of the risk between groups;

- β_1 is the regression coefficient related to the increase in the probability of the risk due to changes in the household's income. It is supposed to be negative—i.e. the probability decreases as income increases;

- β_0 is the coefficient related to the probability of the risk when individual i has no income; and

- ϵ_i is the random error assumed to follow a Gaussian probability density function.

Once the model is estimated, the probability of the risk given a specific value of per capita income x, $p(x)$, is given by:

$$ p(x) = \frac{e^{\beta_0 + \beta_1 log(x) + \sum_{j=1}^{k} \gamma_j D_{ij}}}{1 + e^{\beta_0 + \beta_1 log(x) + \sum_{j=1}^{k} \gamma_j D_{ij}}} $$

where β_0, β_1 and Y_j, $j=1, ..., k$ are the respective estimates of the logit regression model. In other words, $p(0)$ is the probability of the risk occurring given the specific group the individual i belongs to. As income x increases and β_1 is assumed to be negative, $p(x)$ is lower. Therefore, a coverage function can be defined as the reduction in $p(0)$ due to a specific transfer.

More specifically, the coverage function for each source of protection was estimated as follows:

- **Income coverage** is the difference between the estimated probability of the risk occurring when the household's income is equal to zero and the probability when the income is equal to the household's net income—i.e. the household's income without the economic transfers it receives. So,

$$ Incomecoverage = p(0) - p(netincome) $$

- **Transfer coverage** is the difference between the estimated probability of the risk when the income is equal to the household's net income and the estimated probability of the risk when the income is equal to the household's net income plus the specific transfer. In other words,

$$Transfer\ coverage = p(net\ income) - p(net\ income + transfer)$$

Figure 10 illustrates the probability curve for the risk of being out of school as a function of income for girls of school age (6–11 years old) in rural areas. The income coverage is equal to the difference between the probability when income is equal to zero (blue line) and the probability for net income (red line).

The coverage provided by government transfers is calculated as the difference between the probability of the value of the household's net income (red line) and the probability considering the household's net income plus the government transfers it receiveds (green line).

Figure 10. Out of school probability as a function of income
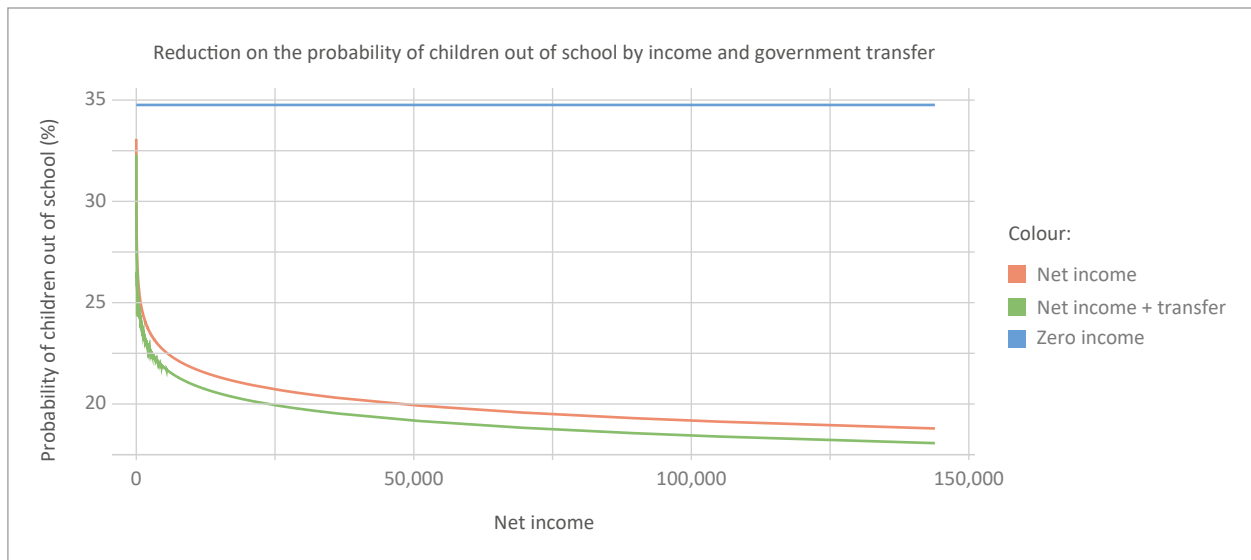
Source: Authors' elaboration based on the NHBS.

Income-related risks **with** predefined thresholds

The risks of food insecurity and insufficient earnings have determined thresholds that define whether or not the household is covered against them.

a. Food insecurity

For food insecurity, the coverage function considers two thresholds: the national food poverty line (FPL) and the global poverty line (GPL). If the household's per capita food consumption value ($food_{pc}$) is under the FPL, its members are considered to have zero coverage against this risk. On the other hand, if the household's per capita food consumption value is above the GPL, its members are considered completely covered.

The remaining families (FPL< $food_{pc}$< GPL) are considered vulnerable to the risk of food insecurity; therefore, the coverage function is between 0 and 1. The coverage function is defined as follow:

- The income coverage is the ratio between the food$_{pc}$ and the GPL:

$$IncomeCoverage = \begin{cases} 0, & if\ food_{pc} \leq FPL \\ \dfrac{netincome}{GPL}, & if\ FPL < food_{pc} < GPL \\ 1, & if\ food_{pc} \geq GPL \end{cases}$$

- The transfer coverage is determined by the share of the gap between the GPL and the food$_{pc}$ that it covers:

$$TransferCoverage = \begin{cases} 0, & if\ food_{pc} \leq FPL \\ \dfrac{transfervalue}{GPL - food_{pc}}, & if\ FPL < food_{pc} < GPL \\ 1, & if\ food_{pc} \geq GPL \lor transfervalue \geq GPL - food_{pc} \end{cases}$$

b. Insufficient earnings

The risk of insufficient earnings also uses the GPL as a threshold. More specifically, a family is considered to be vulnerable to insufficient earnings if its net per capita income is below the GPL.

The coverage is equal to the share of the gap between net income and GPL (GPL_{GAP}) that is covered by the transfer or income source:

$$TransferCoverage = \begin{cases} \dfrac{transfervalue}{GPL_{gap}}, & if\ transfervalue \leq GPL_{gap} \\ 1, & if\ transfervalue > GPL_{gap} \end{cases}$$

Farmer-related risks (crop failure, livestock issues and natural disaster)

The coverage function is determined by the answers given to question L10, which contains a field asking if the household suffered that particular shock and the coping strategy used.

L10. Over the past five years, was the household severely affected by any of the following events? […]

3. **Drought**

4. **Flood/rains**

5. **Crop diseases or pests**

6. **Livestock died or stolen**

7. **Severe illness or accident of a household member**

8. **Death of a household member**

9. **Death of the head of the household**

10. Fire

11. Robbery/burglary/assault

12. Dwelling damaged, destroyed

13. Severe water shortage

14. Other

The field for listing the mechanisms "to try to cope/regain the former welfare level" has 25 possible codified answers. The list of codes and specific meanings is shown in Table 19.

Table 19. Code list for coping strategies

Code	Description
1	Spent cash saving
2	Sent children to live with relatives
3	Sold assets (tools, furniture etc.)
4	Sold farm land
5	Rented out farm
6	Sold animals
7	Sold more crops
8	Worked more/worked longer hours
9	Other household members who weren't working went to work
10	Started a new business
11	Removed children from school to work
12	Went elsewhere to find work for more than a month
13	Borrowed money from relatives
14	Borrowed money from a money lender
15	Borrowed money from institutions (banks etc.)
16	Received help from a religious institution
17	Received help from a local NGO
18	Received help from an international NGO
19	Received help from the government
20	Received help from family/friends
21	Reduced food consumption
22	Consumed lower cost, but less preferred foods
23	Reduced non-food expenditures
24	Spiritual help: prayers, sacrifices, consulted diviner etc.
25	Other

Source: NHBS.

Each answer was associated with one of the six sources of economic transfers and/or access to credit, according to the list below.

- Income coverage: Every income-related answer such as *'Spent cash savings'* (code 1), '*Sold animals'* (code 6) or *'Worked more/longer hours'* (code 8), which corresponds to every code from 1 to 12 except for 2 (*'Sent children to live with relatives'*) and 11 (*'Removed children from school to work'*)

- Credit: Answers 14 (*'Borrowed money from money lender'*) and 15 (*'Borrowed money from institutions (banks etc.)'*)

- Government benefits (K2): Answers coded 19 (*'Received help from the government'*)

- NGO/charity schemes (K3): Answers coded 17 (*'Received help from local NGO'*) or 18 (*'Received help from an international NGO'*)

- Zakat Chamber (K4): Answers coded 16 (*'Received help from a religious institution'*)

- Individuals outside the household (K5): Answers coded 13 (*'Borrowed money from relatives'*) or 20 (*'Received help from family/friends'*).

Given the structure of the question, which asks about shocks in the five years before the survey, while the section on economic transfers considers those received in the 12 months before, the coverage function was calculated only for those who suffered the shock. In this case, the coverage function is equal to the percentage of people who marked each coping strategy.

ANNEX III—ZAKAT FUND ELIGIBILITY

The potential beneficiaries of the Zakat Fund are divided into eight categories, including those who are poor and needy, who receive most of the Zakat Fund's resources. The definition of the members of this target group considers, first, those people living in poverty who fulfil at least one of the 10 conditions listed in the section on the Zakat Fund. Those who meet this criterion are further evaluated according to the Poverty Inventory, which has a scoring system that divides poor and needy people into three groups according to their poverty level. The groups are determined by evaluating 12 categories covering the characteristics of the household and its members.

Therefore, to identify target groups in the NHBS according to the Zakat Fund's assessment methodology and calculate the effective coverage of social protection programmes, it is necessary to recreate these steps. This appendix demonstrates the necessary adjustments needed to follow the Zakat Fund's criteria using the available NHBS data, highlighting the limitations of the NHBS and the challenges they pose to this analysis.

A. Step 1: The 10 criteria

The 10 criteria that are used to identify those who are poor and the needy are:

- The household does not have any income, the head of the household is unemployed, and none of the other members are able to work.

- The head of the household earns less than SDG120 per month, and the household does not have any other source of income.

- The household's average monthly per capita consumption is below SDG114.

- The head of the household is unemployed due to a lack of work, disability or illness.

- The household's monthly income is below the minimum wage.

- The household is afflicted by diseases for which treatment needs to be paid, and the head of the household is a wage labourer.

- The head of the household suffers from a chronic illness, and the household comprises six or more members who are studying and have no other source of income.

- The head of the household owns assets such as a house, agricultural plot or taxi that do not generate enough income, there is no money available to invest, and the family depends on the household's head.

- Entrepreneurs such as carpenters, farmers and blacksmiths do not produce enough for their sustenance and do not have another source of income.

- Agricultural workers and shepherds do not have livestock or another source of income and have families of six or more members.

A.1 Auxiliary variables

Some variables had to be previously created to enable the establishment of the Zakat Fund's criteria.

Labour market status

Nine categories of labour market status were created:

- Own account worker

- Economically inactive

- Unemployed

- Paid employee

- Other employment status

- Retired

- Unpaid family worker

- Unpaid employee

- Employer.

The following eight questions were used to classify the respondents' labour market status.

B8. Does [NAME] suffer from any type of disability that prevents him from doing this normal/usual work?

1. Yes

2. No → Go to B10

D1. During the last 10 days, did [NAME] work at least one hour for pay (or without pay), profit in kind or for family business?

1. Yes → D7

2. No

D2. [NAME] did not work during the last 10 days but has a job to go back to?

1. Yes → D7

2. No

D3. [NAME] did <u>not work during the last 10 days but has worked before and is available for work?</u>

    1. Yes → D7

    2. No

D4. [NAME] has never worked before but is seeking work?

    1. Yes → E1

    2. No

D5. [NAME] did <u>not work before and is not seeking work?</u>

    1. Yes

    2. No

D6. For those who have never worked before and are not seeking work (from D5):
Why did [NAME] not seek work? (Mark only one)

    1. No hope to find job

    2. Full-time student

    3. Income recipient

    4. Too old

    5. Disabled/too sick

    6. Full-time homemaker/housewife

    7. Pensioner/retired

D7. For those who worked in the last 10 days or have worked before (from D1, D2 or D3): What was [NAME]'s main employment status?

    1. Paid employee

    2. Employer

    3. Own account worker

    4. Unpaid family worker

    5. Unpaid working for others

Unemployment status was verified for the population aged between 10 and 64 years. Those who answered 'yes' to D3 or D4 are defined as unemployed.[38]

If the respondent chose the answer 'Pensioner/retired' in D6, he/she is defined as **retired**.

If the respondent answered 'yes' to B8 **or** 'yes' to D5, he/she is categorised as **economically inactive**.

Those who do not meet any of these criteria **and** have answered D7 are classified according to the option marked in D7.

Other employment status is the remainder—in other words, those who do not fit into any of the above-mentioned categories.

Table 20 shows the total population estimated for each category and the share of poor families according to the labour market status of the head of the household. The majority of the population are wage labourers or own account workers, which are also the two groups that have the highest proportion of poor households.

Table 20. Estimated size of each labour market status group and percentage of poor households according to the labour market status of the head of the household

Labour market status		Population (thousands)	Percentage
Own account worker		9,783	33
Paid employee		12,154	25
Economically inactive		6,615	24
Unemployed	E1	1,032	37
Retired		780	12
Other employment status		682	25
Employer		2,599	27
Unpaid family worker		917	55
Unpaid working for others		13	45

Source: Authors' elaboration based on 2014-2015 NHBS data.

Able to work

A respondent is considered able to work if he/she is older than 10 years old, does not suffer from any kind of disability (**B8**=2), is not a full-time student (**D6**=2), is not too old (**D6**=4), is not disabled/too sick (**D6**=5) or a pensioner/retired (**D6**=7).

Annual and monthly individual and total family income

The NHBS has a set of variables that provide information on income from various sources in the month before the survey. It asks about both income in the last month and income in the last year, with a total of 18 income variables for each of these time periods (36 in total). The sum of these values defines, respectively, the monthly and the annual household income.

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38. The IPC-IG tested other approaches, adopting the one with the most similar results to those of the African Development Bank. For instance, another possibility tested was initially defining retired people, then those who are economically inactive, unemployed and, finally, the other classes established in D7.

Figure 11. Household income section on the NHBS

Source: NHBS questionnaire p. 39.

Similarly, it is possible to calculate the income derived from livestock (considering items O1_3, O1_4, O1_5) and from crops (O1_1 and O1_2). This is a necessary step to assess whether a respondent meets the Zakat Fund's eighth and ninth eligibility criteria.

Lastly, it is also necessary to know the individual income of the head of the household. To estimate it, two variables were necessary:

- **D10: What was the value of [NAME]'s last payment (cash or in-kind)? Or, if not yet received payment: what is the value of the payment that [NAME] expects to receive (cash or in-kind)?** SDG, no decimals

- **D11: How many days did [NAME] work for the payment just reported (D10)? Or, if not yet received: how many days does [NAME] expect to work for the payment just reported** (in days, no decimal)**?**

Therefore, the individual monthly wage, ms, was given by:

$$ms = 30 * \frac{d10}{d11}$$

Figure 12. Log of the household's monthly income using an alternative approach
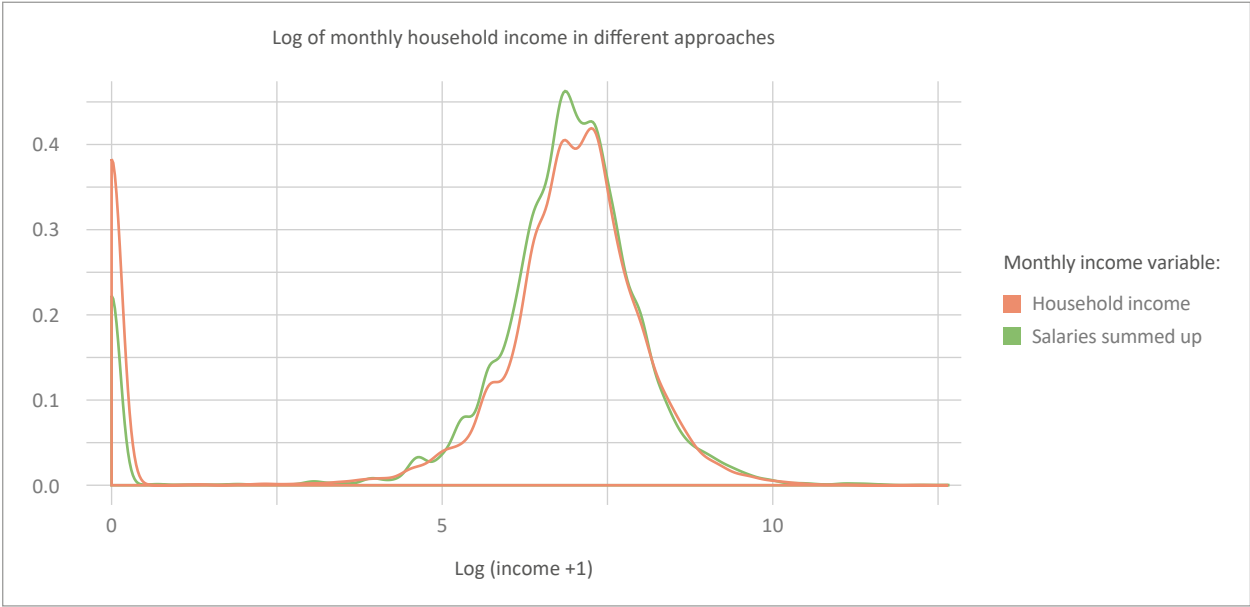
Source: Authors' elaboration based on the NHBS.

Figure 13. Log of the household's annual income using an alternative approach
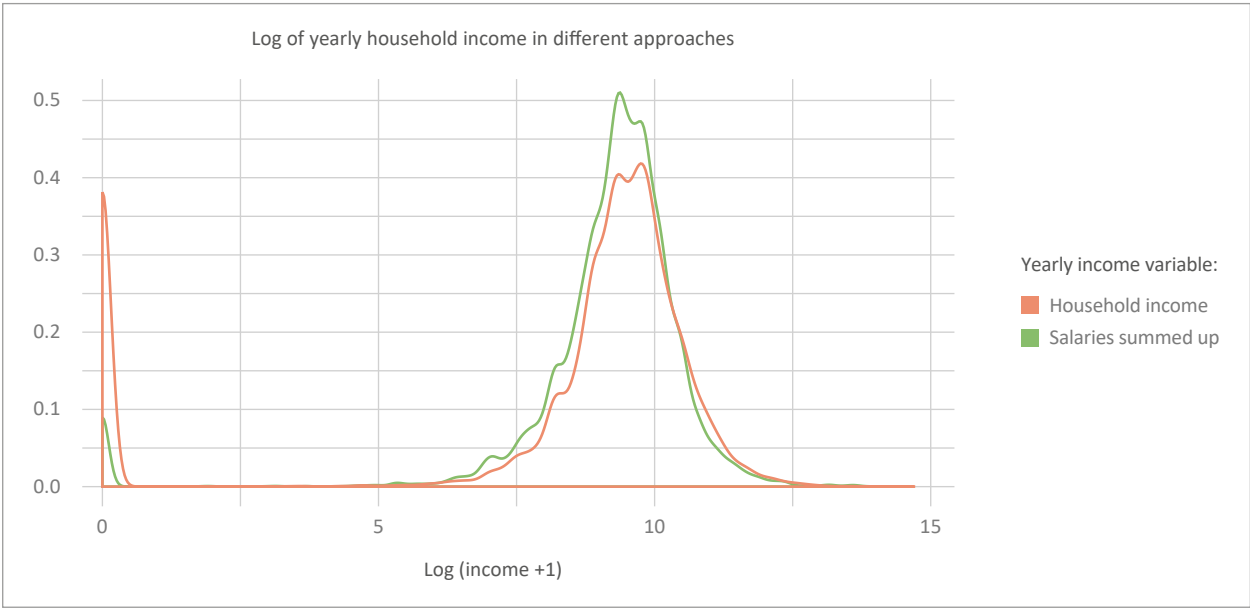
Source: Authors' elaboration based on the NHBS.

Agricultural workers and shepherds who have no livestock or other source of income

This considers those who declared being a livestock owner (**D13**=2) but have no livestock in the household (**N6_1**=2), or a crop manager (**D13**=2) when there is no crop in the household (**N1**=2).

In addition, it was checked whether all of the household income came from livestock or crops, respectively (i.e. the household income is equal to the income from livestock/crops).

Assets in the household

Table 21. Variables used to assess each of the Zakat Fund's 10 eligibility criteria through the 2014-2015 NHBS

Condition	Implementation	Percentage of households that fulfil the condition (NHBS estimation)
1. The family does not have any income, the head of the household is unemployed, and there is no one able to work	Labour market status of the household's head is 'unemployed' or D6=1 Household monthly income equals zero **and** Number of people in the household able to work is equal to zero	0.00
2. The income of the head of the family is less than SDG120 per month, and the family has no other source of income	The head of the household's individual income is less than SDG120 **and** None of the other household members declare receiving any income (no occurrence of D9=1)	1.99
3. The average monthly per capita consumption of the family is less than SDG114	The annual per capita consumption divided by 12 is less than SDG114	0.16
4. The household's head is unemployed due to a lack of work, disability or illness	The head of the household is considered economically inactive **and** has disabilities (B8=1 and D6 equals 5 or D6=1) **or** is unemployed	9.03
5. The total monthly income of the household is less than the minimum wage	The monthly income of the household is less than SDG425 **or** the annual income divided by 12 is less than SDG425	22.63
6. The family is afflicted by diseases for which treatment needs to be paid, and the head of the household is a wage labourer	The labour market status of the head of the household is 'paid employee' **and** There is at least one person in the household suffering from chronic diseases (B15=1) **or** not seeking work because he or she is too sick or disabled (D6=5)	8.55
7. The household's head suffers from a chronic illness and has a family of six or more members, who are all in education and have no other source of income	B15=1 for the head of the household **and** Excluding the head of the household, the number of people currently studying (C2=1) should be equal to the number of total household member minus one[39] **and** The number of household members should be equal to six or more **and** **The other household members (excepting the head) have no income**	0.04
8. The head of the household owns assets such as a house, agricultural land or a taxi that does not work, so these assets do not generate income, and he has no money to invest and a family who depends on him	There is at least one asset in the household **and** The annual per capita income is lower than the food poverty line **and** No other member of the household has any income	29.25
9. Entrepreneurs such as carpenters, farmers and blacksmiths who do not produce enough for their sustenance and have no other income	At least one person in the household is an employer or an own account worker (D7 = 2 **or** 3) **and** There is no other type of worker receiving salary or wages (D9 ≠ 1 for all other workers) **and** The annual per capita household income is less than the food poverty line	22.52
10. Agricultural workers and shepherds who have no livestock or other source of income and have families of six or more members	The household has six or more members **and** There is a crop manager, **and** the household does not have crops nor another source of income, **or** There is one member who is a livestock farmer, **and** the household has no livestock **and** no other source of income	0.31

Source: Authors' elaboration based on the NHBS.

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39. A variable was created by aggregating every member of the household except for the head.

The 2014 NHBS provides information only on household assets, which were used as a proxy for individual ownership. The household has assets if it fulfils at least one of the following conditions:

- The main source of the household's livelihoods is an owned business enterprise or property income ($I1$= 4 **or** 5);

- At least one member of the household declares that he/she uses any agricultural, forest or pasture land (**N1=**1), and this land is owned or partially owned (**N2**=1 **or** 3).

- At least one member of the household states that she/he currently owns livestock or poultry (**N6_1**=1).

Table 21 gives the variables used to assess each of the Zakat Fund's 10 eligibility criteria through the 2014-2015 NHBS. It also shows the percentage of Sudanese households that fit each condition.

B. Step 2: The Poverty Inventory scoring system

However, there are several caveats, since the NHBS and the Poverty Inventory questionnaires do not use the same questions or categories. Thus, the use of proxies that followed the inventory's logic was required. Importantly, even with this measure, the three groups were not of the expected size according to the information provided by the Sudanese government. Besides the possibility of distortions in the scoring system due to the proxies used or the sample surveyed by the CBS, we concluded that the scoring classification was squeezing the size of the first group, which comprises the poorest population. This is because the Poverty Inventory uses the following categories:

- Group I (extremely poor): 1–33 points

- Group II (poor): 34–66 points

- Group III (not poor): 67–100 points.

The scoring system was adapted slightly. Instead of considering a minimum of 0 and a maximum of 100 points, the maximum score was set at 80, given that not all criteria were applied. The new score was then divided into the following three groups:

- Group I (extremely poor): 0–25 points

- Group II (poor): 26–52 points

- Group III (not poor): 53–80 points.

Importantly, this scoring system adopted by the Poverty Census squeezes the group with the lowest score. This is because it is not possible to score zero: even if a household always marks the worse option in all categories, it would still score 12 points in the original system. Therefore, the actual possible range of scores is 12–100; thus, Group I has a smaller range than the other two groups.

Overall, the Poverty Inventory and the NHBS do not cover the same categories, offering different options in the cases in which both have questions regarding the same topic. In these cases, the NHBS data on annual consumption per capita were used to guide the ranking of the options, grouping them—if necessary—to match the number of points intervals provided by the Poverty Inventory. Nonetheless, there were two categories that could not be recreated in this study, as there were no similar questions in the NHBS.

Table 22 shows the categories and points considered in the original scoring system and the adapted version, highlighting the changes that had to be adopted to attempt to identify the Zakat Fund's poor and needy group using the data provided by the NHBS.

Table 22. Categories and points considered in the original scoring system and the adapted version

Category (Poverty Inventory)	Options (Poverty Inventory)	Points	Adapted options (NHBS)	Points
Number of persons per room	Individual room	5	Ratio person/no. of bedrooms ≤ 1	5
	2–3 per room	4	1 < Ratio of person/no. of bedrooms > 4	4
	4–6 per room	3	4 ≤ Ratio person/no. of bedrooms > 7	3
	7 or more per room	2	Ratio person/no. of bedrooms ≥ 7	2
	There are no rooms	1	No of bedrooms (H5) equal to no of rooms (H4) **and** both equal to one	1
Building material	Cement	10	Multi-storey house	10
	Brick and cement	9	Flat or apartment	9
	Burned brick	7	Villa **or** house of one floor: brick/concrete	7
	Gallus and bricks	4	House of one floor: mud	4
	Gallus[40]	3	*Tukul/gottiya*: sticks **or** house constructed of wood	3
	Straw and sticks	2	*Tukul/gottiya*: mud **or** Incomplete	2
	Other	1	Tent **or** dwelling of straw mats	1
Property ownership	Owner	10	Not implemented	
	Possession through other means	8		
	Legacy	5		
	Extended family	4		
	Living with partner's family	3		
	Rent	2		
	Others	1		
Sanitation	Western	10	Private flush toilet	10
	Sub-western	7	Public/sewage system	7
	Hole	5	Shared flush toilet	5
	Plastic/other similar	3	*Hufra Imtysas* **or** bucket toilet	3
	Other	2	Pit latrine private **or** shared pit latrine	2
	There is no bathroom	1	No toilet-based facility	1

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40. This is the original translation of the Poverty Inventory. *Gallus* is the name of a local type of shelter built using dry clay blocks. Typically, it indicates precarious living conditions.

Category (Poverty Inventory)	Options (Poverty Inventory)	Points	Adapted options (NHBS)	Points
Drinking water source	Pipe in the house	10	Water-filtering stations with common network/ stand pipe	10
	Pipe from neighbours	6	Mechanical boreholes with common network/stand pipe	8
	Public pipe	5	Deep boreholes with network **or** sand filters with common network stand pipe **or** *hafeer*/dam with filter **or** *turdal*/*fula*/river	6
			Deep boreholes without network **or** running open water source **or** water vendor from deep boreholes **or** water vendor from shallow wells, pond/river/spring	4
	Water container	2	*Hafeer*/dam without filter	2
	Other	1	Hand pumps **or** shallow wells	0
Lighting type	Public electricity	10	Public electricity	10
	Home generator	8	Solar power **or** biogas	8
	Area generator	6	Private electricity (generator)	6
	Gas bulb	4	Gas **or** paraffin lantern	4
	Candle	3	Candle wax	3
	Other	2	Paraffin lamp **or** firewood **or** grass	2
	There is no light	1	No lighting	1
Cooking fuel	Electricity	10	Electricity	10
	Gas	8	Gas **or** biogas	8
	Kerosene	6	Charcoal	4
	Coal	4	Firewood	2
	Wood	2	Paraffin **or** cow dung **or** grass	1
	Other	1	No cooking	0
Adaptation to poverty	Do not apply	10	Not implemented	
	Others	9		
	Look for any work	8		
	I borrow	5		
	Use less expensive products/spend less	4		
	I sell some of my property	3		
	I seek refuge in others	2		
	I skip some meals	1		
Health: Number of patients in the household	No patient	10	Zero	10
	1–2 patients	5	1–2	5
	3–4 patients	3	3–4	3
	5 or more patients	1	5 or more	1
Number of household members	1–3 household members	5	1–3 household members	5
	4–6 household members	3	4–6 household members	3
	7 or more household members	1	7 or more household members	1

$\longrightarrow$

Category (Poverty Inventory)	Options (Poverty Inventory)	Points	Adapted options (NHBS)	Points
Educational level of the head of the household	University	5	University (proxy)	5
	Secondary	4	Secondary (proxy)	4
	Primary	3	Primary (proxy)	3
	Reads and writes	2	Reads and writes (proxy)	2
	Illiterate	1	Illiterate (proxy)	1
Consumption value	14 and over	5	5th quintile	5
	10−13	4	4th quintile	4
	7−9	3	3rd quintile	3
	3−6	2	2nd quintile	2
	1−3	1	1st quintile	0
Maximum number of points: Poverty Inventory		100	Maximum number of points: NHBS	80

Source: Authors' elaboration based on the NHBS.

Number of persons per room

'Room' in the Poverty Inventory was interpreted to mean 'bedroom'.

In the 2014 NHBS there is:

H4: How many rooms does this household have? _____

H5: How many rooms are used for sleeping indoors? _____

Therefore, it was possible to calculate the ratio of people per sleeping room. If H4 = H5 = 1, then it was considered to have no bedrooms.

Building material

H1: What type of dwelling does this household live in? (mark only one)

1. **Tent**

2. **Swelling of straw mats**

3. *Tukul/gottiya*: **mud**

4. *Tukul/gottiya*: **sticks**

5. **Flat or apartment**

6. **Villa**

7. **House of one floor: mud**

8. **House of one floor: brick/concrete**

9. **House constructed of wood**

10. **Multi-storey house**

11. **Incomplete**

The available options for question H1 in the 2014 NHBS were ranked according to the average income per capita of the people who selected each option, grouping those closely related together when necessary to meet the same number of options as those in the Poverty Inventory questionnaire. The average consumption per capita was chosen over income per capita because the variable of consumption per capita is already provided by the NHBS data and regards annual consumption, while the income covered by the NHBS is the monthly income, which is more vulnerable to transitory fluctuations.

Property ownership

Although the NHBS has one question on property ownership, the options are completely unrelated to those available in the Poverty Inventory questionnaire. Moreover, the options were sufficiently distinct that it was not possible to implement the same logic used in the Poverty Inventory and group and rank respondents by income or consumption per capita. Therefore, it was not included.

Sanitation

What is the main type of toilet facility used by this household?

1. **Private pit latrine**

2. **Shared pit latrine**

3. **Private flush toilet**

4. **Shared flush toilet**

5. *Hufra Imtysas*[41]

6. **Bucket toilet**

7. **Public/sewage system**

8. **No toilet facility**

In this case again, consumption per capita was used to group and rank the NHBS options, since they were so different from those in the Poverty Inventory.

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41. *Hufra Imtysas* is an extremely basic local sanitation modality that could be translated as 'deep hole'. It is not connected to any public sanitation system and does not meet UN Habitat standards.

Main water source

H9: What is the <u>main source of drinking water for this household?</u>

1. Water-filtering stations with common network/stand pipe

2. Mechanical boreholes with common network/stand pipe

3. Deep boreholes without network

4. Deep boreholes with network

5. Hand pumps

6. Sand filters with common network stand pipe

7. Shallow wells (dug wells)

8. Hafeer/dam without filter (still open water)

9. Hafeer/dam with filter (still open water)

10. Turdal/fula/river (still open water)

11. Running open water source (river, pond, tura'a)

12. Water vendor: from deep boreholes

13. Water vendor: from shallow wells, pond/river/spring

In this case again, consumption per capita was used to group and rank the NHBS options, since they were so different from those in the Poverty Inventory.

Lighting type

H11: What is the <u>main source of lighting for this household?</u>

1. Public electricity

2. Private electricity (generator)

3. Gas

4. Paraffin lantern

5. Paraffin lamp

6. **Firewood**

7. **Grass**

8. **Candle wax**

9. **Solar power**

10. **Biogas**

11. **No lighting**

In this case again, consumption per capita was used to group and rank the NHBS options, since they were so different from those in the Poverty Inventory.

Cooking fuel

H12: What is the <u>main source of energy for cooking in this household?</u>

1. **Firewood**

2. **Charcoal**

3. **Gas**

4. **Electricity**

5. **Paraffin**

6. **Cow dung**

7. **Grass**

8. **Biogas**

9. **No cooking**

In this case, the same logic followed by the Poverty Inventory was used to group and rank the options available in the NHBS.

Adaptation to poverty

The NHBS does not have data on this; therefore, it was not included.

Health—number of patients in the household

Information on members of the household with disabilities or who were chronically ill was used as a proxy for 'patients'.

Educational level

C1: Can [NAME] read and write with understanding a simple sentence in any language?

    1. Yes

    2. No

C3: Has [NAME] ever attended school?

    1. Yes

    2. No

C6: For those currently attending school or who have previously attended school: What is the highest level that [NAME] has completed?

    1. No qualifications (previously)

    2. Incomplete primary (currently)

    3. Primary 4

    4. Primary 6

    5. Primary 8

    6. Junior 3

    7. Intermediate

    8. Secondary 3

    9. Secondary 4

    10. Post-secondary diploma programme

    11. University

    12. Post-graduate diploma

    13. Master's degree

    14. PhD

    15. *Khalwa*[42]

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42. A *khalwa* is an extremely basic form of community/informal school. They are the lowest possible form of education and are usually not recognised by the State.

Five groups were assembled based on the answers:

- Illiterate: Those who answered 'no' to C1

- Reads and writes: Those who answered 'yes' to C1 **or** 'no' to C3 **and** 1 **or** 2 **or** 15 **or** NA to C6

- Primary: Those who answered 'yes' to C1 **and** 'yes' to C3 **and** 3, 4, 5, 6 **or** 7 to C6

- Secondary: Those who answered 'yes' to C1 **and** 'yes' to C3 **and** 8, 9 **or** 10 to C6

- University: Those who answered 'yes' to C1 **and** 'yes' to C3 **and** 11, 12, 13 **or** 14 to C6.

Consumption level

The per capita consumption variable was divided into five quantiles, and each of them was a different value group.

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