Comprehensive Food Security Survey (CFSS)

Republic of Yemen

March 2010

Data collected in
October - November 2009

WFP
World Food Programme
wfp.org

vam
food security analysis

Comprehensive Food Security Survey, Yemen

March 2010

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List of Acronyms

AEZ	Agro-Ecological Zone
BMI	Body Mass Index
CFSAM	Crop and Food Security Assessment Mission
CFSS	Comprehensive Food Security Survey
CSO	Central Statistical Organisation
DHS	Demographic Health Survey
EA	Enumeration Area
FAO	Food and Agriculture Organization of the United Nations
FCS	food consumption score
FHS	Family Health Survey
FIVIMS	Food Insecurity and Vulnerability Information and Mapping System
GLM	general linear model
HBS	Household Budget Survey
IFPRI	International Food Policy Research Institute
MENA	Middle East and North Africa region
MoPIC	Ministry of Planning and International Cooperation
MUAC	mid-upper arm circumference
NDVI	Normalized Difference Vegetation Index
SWF	Social Welfare Fund
UNICEF	United Nations Children's Fund

1 ACKNOWLEDGEMENTS

The Comprehensive Food Security Survey (CFSS) process was initiated in Yemen during the first stakeholder meeting in August 2009, when the urgent need for updated information on the food security situation at the household level was unanimously considered a priority. Since then, WFP's partners have expressed considerable interest in the survey and extended regular encouragement, which has facilitated the survey's swift, professional implementation. The CFSS was carried out over a six-month period and at every stage of this important exercise a number of people and organizations have provided crucial, highly valuable input, supporting our efforts, and thereby pushing the survey forward. For this, the WFP Country Office in Yemen would like to express its deep gratitude.

First of all, WFP would like to thank the Ministry of Planning and International Cooperation which, through the Central Statistical Organisation, provided the CFSS team with invaluable technical and practical support and advice throughout this exercise.

Also, WFP would like to express its sincere gratitude for the valuable input, feedback and suggestions that were received from our sister United Nations agencies, NGOs and other partners, ensuring the survey's high quality and relevance to all those with a mandate to combat food insecurity in Yemen. Particular thanks in this regard go to the United Nations Children's Fund (Dr Kamel Ben Abdallah, Dr Rajia Sharhan, Etona Ekole), the World Bank in Washington (Pierre Rondot), Deutsche Gesellschaft für Technische Zusammenarbeit (Henning Baur), the International Food Policy Research Institute (Clemens Breisinger, Olivier Ecker) and Save the Children (Sophie Dunn).

Deep appreciation also goes to the CFSS team at WFP headquarters in Rome who provided indispensable support at critical times of the survey and without whom the timely and comprehensive data analyses would not have been possible. Sincere thanks in this regard go to Claudia Ah Poe, Cinzia Papavero, Amit Wadhwa, Chiara Brunelli and Rogerio Bonifacio.

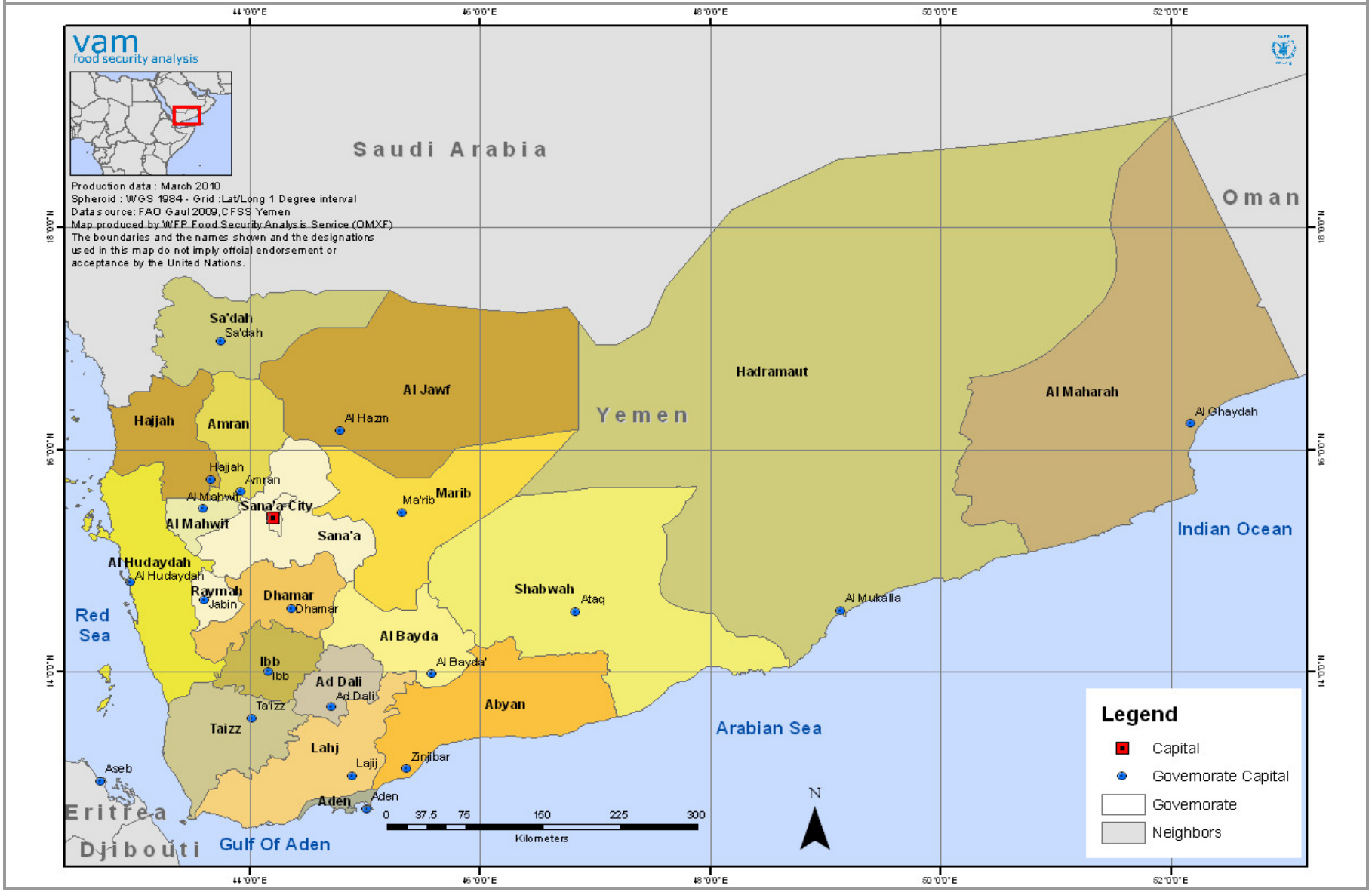
We would also like to thank the Vulnerability Analysis and Mapping (VAM) Unit of our Regional Bureau in Cairo, in particular Osama Mohamed for his practical support during the course of the survey's primary data collection.

We are also grateful for the assistance the Country Office has received from the Programme Unit in Cairo and the OMXD Nutrition Unit in Rome in making the step from CFSS findings to the most appropriate and feasible response options for WFP to adopt in 2010—2011.

Last but not least WFP would like to thank the 6,733 families and 570 communities who were willing to give us a small insight into their day-to-day lives. The awareness that has been gained helps the Government of Yemen and the international community, including WFP, to understand the constraints that one in three Yemenis experience in their quest to lead a healthy and active life, and to prioritize among the actions that will need to be taken immediately and in the medium to long term in order to reduce the unacceptably high food insecurity and malnutrition prevalence rates among the population. WFP looks forward to continued collaboration with the Government of Yemen and the international community in this endeavour and hopes that this updated, comprehensive information base will be of help during this process.

Gian Carlo Cirri
WFP Representative, Yemen

Map 1-1: Republic of Yemen



2 EXECUTIVE SUMMARY

Overview, scope and methods

Yemen is one of the poorest countries in the world and the poorest country in the Middle East and North Africa (MENA) region. The 2009 Human Development Index compiled by the United Nations Development Programme (UNDP) ranks the country 140th out of 182 countries. With an average national income per capita of US$950, Yemen is a low-income country. Nearly half of the population lives on less than two dollars a day and social development indicators, such as child malnutrition, maternal mortality and educational attainment, remain extremely poor.

The substantial rise in food prices over the past two years has significantly increased the number of Yemenis who are affected by food insecurity and poverty. Food availability and access to food are influenced by volatility in international market prices — for oil, which creates most of the Government's revenue, and for food, which needs to be imported.

Yemen is confronted with a number of challenges that negatively impact on the population's overall well-being, such as complex political crisis in several parts of the country, recurrent droughts and floods, the increased influx of refugees from the Horn of Africa and other countries and the rising number of internally displaced persons in the north, all of which affect the food security and nutritional status of the population, among other factors.

WFP carried out a nationwide comprehensive food security survey (CFSS) between September 2009 and January 2010[1] with the aim of guiding WFP's interventions in 2010—2011, informing Yemen's Humanitarian Response Plan 2010 and providing a potential basis for improved geographic and socio-economic targeting of the most food-insecure people.

How many people are food-insecure?

According to the CFSS findings about 6.8 million Yemenis (31.5 percent) are food-insecure and, within this group, 2.5 million people (11.8 percent) were found to be severely food-insecure. If the national average prevalence of food insecurity were to be applied to the governorates of Al-Jawf and Saada, the overall number of food-insecure people in Yemen could be expected to reach 7.2 million. This is believed to be a rather conservative estimate, given that the region's population has been exposed to renewed civil unrest since mid-2009.[2]

Yemen also has one of the highest rates of malnutrition in the world, with 13.2 percent of children aged between 6 and 59 months wasted and 55.7 percent stunted.[3] According to the CFSS and on the basis of the mid-upper arm circumference (MUAC) method,

[1] Of Yemen's 21 governorates, two (Al-Jawf and Saada) could not be covered because of security concerns and are therefore not included in the analysis.
[2] The actual number of food-insecure Yemenis as determined by the CFSS is based on 2010 population estimates. According to IFPRI's simulation analyses, which are based on data from the Household Budget Survey 2005/06 and include all 21 governorates, the total number of food-insecure people in Yemen amounts to 7.5 million, representing 32.1 percent of the population.
[3] Household Budget Survey, 2005/06.

9.2 percent of children between 12 and 59 months are acutely malnourished, with the highest burden among children below 2 years.[4]

Where do the food-insecure people live?

Food insecurity is not distributed evenly in the country and large regional differences exist. Rural areas are more affected and have double the share of food-insecure people living in urban areas. More than one quarter of the population in 13 out of 19 governorates in Yemen is affected by food insecurity.[5] Sixty-one percent of all food-insecure and 66 percent of severely food-insecure people in the country are to be found in just five of these governorates.[6] The severely food-insecure population is concentrated in Ad Daleh, Amran, Ibb and Rayma, with more than one in five people affected in each.

Who are the food-insecure people?

More than half of all food-insecure households (52.2 percent) are engaged in making a living from the following livelihoods: wage labour (agricultural and non-agricultural); crop and livestock production; reliance on the receipt of in-country remittances, family support and social benefits; and livestock trading.

Common denominators of these livelihoods are uncertainty and unsustainability: reliance on family support and social benefits implies lack of control over the quantity and the frequency of informal support, while the formal sources may not be sufficient. Agropastoral livelihoods are exposed to low production, animal and plant diseases, uncertain weather and changing climatic conditions, and increasingly difficult access to water supplies. Wage labour, whether agricultural or non-agricultural, generally involves temporary employment and seasonal migration, increasing the number of households relying on remittances.

Additional characteristics that food-insecure households have in common include **high rates of dependants**, such as young and old household members not contributing to the household's overall income because of their age. Furthermore, food-insecure households are more likely to be headed by individuals who received very **limited formal education** or who are illiterate and who themselves are less likely to send their own children to school than are food-secure households, especially as the (female) children grow older. This is also because they tend to **live further away from the nearest primary and secondary schools**. Food-insecure households engage in **fewer income activities**, which makes them more vulnerable to potential future shocks, whether natural or resulting from human intervention, as the level of vulnerability depends on the ability of households to alternate between the different incomes sources that are at their disposal. Rural food-insecure households mainly **grow cereals in limited quantities and qat**, predominately **relying on rainwater** for cultivation. While using **markets as the main source of food**, they appear to live at greater walking distances from them than food-secure households. They purchase their food on a less regular basis and tend to make use of **informal credit sources** such as family and friends, shopkeepers and/or moneylenders. The largest share of their monthly expenditures is for bread, followed by health expenses and qat. The **quality of their diet is poor**, they are more likely to resort to food-related coping strategies in times of limited food access and they are more likely

[4] The prevalence of acute child malnutrition cannot be compared with previous findings because different methods were applied and different age ranges were used for anthropometric measurements (6-59 months) and MUAC (12-59 months).
[5] > 25 percent of the population food insecure: Rayma, Hajja, Ibb, Addahle, Amran, Al-Mahweet, Al-Bayda,Taiz, Laheg, Mareb, Abyan, Al-Hodieda, Shabwa.
[6] Al-Hodieda, Amran, Hajja, Ibb and Taiz.

to be challenged by **malnutrition in women and children** than their food-secure counterparts. Food-insecure households indicated they had been challenged mostly by **high food prices**, **lack of rainfall** and **lack of drinking water** in 2009**.** They generally consider their own economic standing and well-being to have worsened substantially over the year preceding the survey.

Why are they food-insecure?

Poverty. Following the rise in food and fuel prices since 2006, the country's poverty incidence has increased by 8 percentage points (IFPRI 2010), leaving 42.8 percent of the population with insufficient resources to access enough nutritious food and invest in their livelihoods, their personal development and the development of their children. The CFSS found that the food security status of a household is significantly associated with its socio-economic standing in society, i.e. the poorer the household the more likely it is to be food-insecure. Also, poor households were found to be more likely to reduce the number of meals eaten during the day or consume less expensive or less preferred foods, which in turn increases their vulnerability to becoming food-insecure.

Exposure to market price volatilities. Yemen's food availability is mainly ensured by commercial imports, making the country highly vulnerable to international market price volatilities transmitting down to the local level, as witnessed in 2007/08 with wheat price increases of 88 percent (WFP 2008). Given that 96 percent of Yemenis are net buyers (IFPRI 2010), high food prices are one of the determining factors of household food insecurity in Yemen. Although food prices have decreased since their peak in 2008, they remain at pre-crises levels.

Limited sustainable investments in rural infrastructure and livelihoods. Agriculture provides an income for approximately 80 percent of the population (Household Budget Survey (HBS) 2005/06), yet the sector remains highly underdeveloped. Crop yields remain below potential compared with levels of other countries that have similar environmental conditions (Crop and Food Security Assessment Mission (CFSAM) 2009), access to efficient irrigation techniques is greatly limited and post-harvest losses are high as a result of poor harvesting, handling, packaging, transport and storage systems. Qat, the most commonly cultivated cash crop, uses 40 percent of Yemen's water resources, leaving increasingly insufficient quantities for food crops and for drinking water. Although markets are the main source of food for almost the entire population, they are significantly more difficult to access in rural areas, in some disadvantaged governorates and for the poorer segments of society. All of the above constraints and limitations have been found to negatively impact the food security status of the rural population.

Limited investment in human development, especially for women. As in most parts of the world, there is a very strong link in Yemen between the educational level of the household head and his spouse and the household's food security status. A good educational status among all, both men and women, is matched by a significantly improved food security status. However, educational levels in Yemen remain considerably low, with illiteracy rates reaching 45.9 percent at the national level, 26.9 percent among men and 65.3 percent among women.[7] The rural/urban divide is greater than ever, with 80.5 percent of all households with illiterate heads residing in the countryside. The CFSS found more than half of all food-insecure households to have an illiterate head of household, compared with one in three food-secure households. Additionally, there is a direct correlation between the educational background of mothers and the malnutrition status of their children. Food-insecure households were found to be less inclined to send their girls to school.

[7] Central Statistical Organisation, Statistical Yearbook 2008.

Population growth at the macro level and high number of dependants at the micro level. Yemen's population growth at 3 percent per year is one of the fastest in the world, and is seriously impacting on the country's already limited natural resources and contributing to a stagnating unemployment rate of 15 percent.[8] Yemen has an average of 5.4 children born per woman, one of the highest fertility rates in the world[9]. At the micro level, a determining factor of food insecurity is the number of dependants, i.e. young and old family members not contributing to the household's income: the higher the number of dependants, the more likely the household was to be affected by food insecurity.

Health environment. The use of unsafe drinking water and sanitation facilities[10] in Yemen heightens the likelihood of having malnourished children and women in the household. Access to safe drinking water appears to have deteriorated since 2006, particularly in rural areas. While the situation in urban areas has improved quite substantially, more than half of the rural population still drinks water from unsafe sources, facing increased risks of having malnourished household members. The greatly limited access to both safe drinking water and improved sanitation facilities, particularly in rural areas, is one factor underlying the elevated prevalence of malnutrition in Yemen. Access to health facilities is also greatly limited in rural areas, which was found to be a determining factor of both the food security status of the household and the nutritional well-being of its women and children.

Poverty, food insecurity and malnutrition — a vicious circle

Poverty, food insecurity and malnutrition are closely intertwined, with changes in one likely to impact the others, particularly in rural locations. While economically poor Yemenis are not food-insecure and challenged by malnutrition by default, the likelihood of them being confronted by food insecurity and malnutrition is considerably higher than it is for better off Yemenis.

Poverty has been on the rise since 2006, when food and fuel prices started to increase and the global financial crisis — together known as the "Triple F" crisis — negatively affected the country. Given the strong and positive link between poverty and food insecurity, the number of Yemenis having difficulties accessing sufficient, safe and nutritious food can be assumed to have increased in tandem. And those Yemenis who are seriously challenged by poverty yet still manage to eat acceptable diets, are nevertheless at considerable risk of becoming food-insecure as a consequence of minor food price increases, not to mention as a result of a bigger shock, be it natural or the result of human action.

While poverty reflects a chronic, long-term household status, food insecurity and malnutrition can be temporary, challenging the household at specific times during the course of the year when agricultural produce is low and food prices are high or in response to a shock. Poverty, food insecurity and malnutrition tend to exacerbate one another but their linkage provides a number of entry points that, when addressed, can break the vicious circle.

[8] Ibid.
[9] UNCTAD, 2008.
[10] Based on the United Nations Children's Fund (UNICEF) definition of improved and unimproved drinking water sources and sanitation facilities, except for bottled water, which the CFSS team classified as improved. See http://www.who.int/water_sanitation_health/monitoring/oms_brochure_core_questionsfinal24608.pdf (page 16).

Recommendations for interventions

Following a number of workshops with key stakeholders, short-, medium- and long-term interventions have been proposed in the light of the CFSS findings to address Yemen's high food insecurity and malnutrition rates. They include:

Medium- to long-term interventions:

- Promotion of girls' education;
- Improvement of access to clean water and sanitation;
- Implementation of nutrition training for mothers to address care and feeding practices, family planning, etc.;
- Provision of employment opportunities and means of income-diversification;
- Provision of loans and credit to help people buy productive assets, both agricultural and non-agricultural;
- Augmentation of food availability through own production at the household and community levels in rural areas;
- Establishment of a food security monitoring system, including a nutrition surveillance system and market price monitoring system.

Short-term interventions (WFP-specific):

- Reduction of acute malnutrition to below emergency levels through therapeutic and supplementary feeding programmes for children aged 6-59 months;
- Prevention of acute malnutrition to below emergency levels through blanket and targeted supplementary feeding programmes for children under two years and malnourished pregnant and lactating women respectively, to break the intergenerational cycle of malnutrition;
- Provision of an emergency-based safety net for the poorest and most food-insecure households in rural and urban areas, complementing the Social Welfare Fund's cash transfer and other existing safety-nets.

3 INTRODUCTION

In 2000 Yemen launched its Strategic Vision, consisting of a comprehensive set of socio-economic development goals to facilitate the country's graduation from a low- to a middle-income country by the year 2025.[11] The main focus during this long-term process has been placed on reducing the country's high population growth, strengthening the health and education sector, ensuring increased school enrolment especially among girls, and generally applying bold measures to alleviate poverty in the country by creating job opportunities and gradually raising people's income. The Government's third five-year Socio-Economic Development Plan for Poverty Reduction (DPPR) 2006-2010 is currently implementing Vision 2025 and will be succeeded by the DPPR 2011-2015, which is currently under preparation. A number of strategies, policies and practical interventions have been developed and implemented over the years, and have already helped to pave the way towards achieving the objectives of Vision 2025.[12]

Food insecurity is not a new phenomenon in Yemen. It has been assessed, acknowledged and/or inferred through a number of surveys preceding the CFSS, including the Yemeni Family Health Survey (2003), which concentrated on health and nutrition, the Food Insecurity and Vulnerability Information and Mapping Systems Survey (2003), which looked directly at food insecurity, and the Household Budget Survey (HBS) (2005/06), the focus of which was poverty.[13] The results of these three most prominent nationwide surveys have since guided and shaped the targeting systems and criteria used to implement the development and humanitarian interventions of the Government and its partners.

Prior to the high food and fuel prices and the financial crisis (the "Triple F" crisis), food insecurity had been predominately addressed through poverty reduction means while a national strategy had been absent. But in the wake of the Triple F crisis, food security gained momentum on the national agenda. The Government now intends to adopt a comprehensive approach to tackle short- and longer-term food security concerns in the country and in 2008 requested the World Bank to assist in the preparation of a national food security strategy. The strategy, co-developed by the International Food Policy Research Institute (IFPRI), is expected to be launched in the second quarter of 2010 and will facilitate the prioritization of food security policy options and public spending.

Hence, the CFSS — the first nationwide food security survey of its kind in Yemen — clearly comes at a suitable time. It is a tool that helps develop a better understanding of who the food-insecure and vulnerable people are in the country and where they live. But most importantly, it points to the underlying causes of limited access to sufficient and nutritious food and malnutrition among children and women. Only by knowing the answers to these key questions is it possible to decide on the most effective means to address the underlying causes at their roots. Addressing the root causes is the surest and most cost-effective way to help people help themselves and ensure sustainability of

[11] For Yemen to achieve middle-income status with a minimum of US$7,416 GDP per capita (according to the United Nations Development Programme (UNDP)), the country's economic growth rate would have to reach an average of 7 percent per year by 2025. To achieve the "middle human development" rank, GDP would have to grow at an annual average rate of 9 percent (Vision 2025).

[12] Strategies/Policies: the National Public Health and Nutrition Strategy (currently in draft form); the National Water Sector Strategy and Investment Program 2009-2015; the National Strategy for Fisheries and Development (2008); the Ministry of Agriculture and Irrigation Aden Agenda (2000); the National Basic Education Development Strategy (2003). National social welfare programmes: see Annex XII for an overview of the Government's currently ongoing interventions.

[13] The next nationwide household budget survey is under preparation and is expected to be implemented in 2010.

development gains. Additionally, the survey is intended to be a tool against which the success of future interventions and negative impacts of natural shocks or those resulting from human action can be measured.

The report is structured around the five key questions that a WFP CFSS is designed to answer. Sections 4 and 5 provide a brief summary of the country context and an explanation of the methodology applied. Section 6 presents an overview of the food security situation on the basis of the CFSS findings, answering the following four questions: *How many food-insecure people are there*? *Who are the food-insecure*? *When are they food-insecure*? *Why are they food-insecure*? Section 7 gives an overview of the acute malnutrition status among children and women, outlining the underlying factors found by the survey. Section 8 looks into the most appropriate and feasible response options in the light of the CFSS findings. The section includes detailed recommendations for WFP's potential future interventions that are the result of extensive internal discussions and external consultations with the Programme's key stakeholders.

4 COUNTRY CONTEXT

4.1 HISTORICAL AND POLITICAL CONTEXT

The Republic of Yemen was created with the unification of the Yemen Arab Republic and the People's Democratic Republic of Yemen in 1990. Unification of the two Yemen states was overshadowed by socio-economic differences and opposing political ideologies that had shaped the two Yemens up to that point. While the North had been marked by Zaidic imamate rule and a civil war between royalists and republicans, the South had been governed by a socialist constitutional government following 139 years of British colonial rule. Tensions between the North and the South escalated and resulted in a civil war in 1994.

The Republic of Yemen is a constitutional democracy led by President Ali Abdullah Saleh, the former President of the Yemen Arab Republic and the first and only President of the united Yemen since 1990. The President has held political power over the past 30 years with his fourth and last presidential term extended from five to seven years in 2006. The next presidential elections are scheduled for 2013 and parliamentary elections, initially scheduled for April 2009, have been postponed to 2011. The Government is based on a multi-party system with the long-ruling General People's Congress led by the President. The opposition consists of five opposition parties, the Joint Meeting Parties (JMP).

4.2 POPULATION

According to latest 2010 estimates, Yemen has a population of 23.2 million people, up from 19.7 million in 2004.[14] With one of the highest population growth rates (at an annual 3.2 percent) in the world and an average of 5.4 children born per woman[15], Yemen's population is expected to double in 20 years to around 40 million[16]. The population is young, with 45.0 percent below the age of 15 years and only 3.5 percent above 65 years of age in 2007.[17]

Eighty percent of the population lives on 16 percent of the total area of the country, mainly in the highlands. Despite this concentration, more than two thirds live in rural areas, scattered among small and remote villages. While Yemen remains predominantly rural, rapid rates of urbanization are driven by rural-urban migration and population growth.

Adult illiteracy rates are high, with 45.9 percent of the population unable to read or write. The national average hides a large gender gap — 73.1 percent of the male population is literate compared with only 34.7 percent of the adult female population.[18] Gender inequalities continue to be high, with Yemen ranking 140th (out of 182 countries) on the 2006 Gender Development Index. Yemen also ranks last on the Gender Empowerment Measure in the UNDP 2009 Human Development Report, because of the strong gender disparities in education levels and the fact that economic power is concentrated in the hands of men.

[14] Central Statistical Organisation, Statistical Yearbook, 2008.
[15] UNCTAD, 2008.
[16] National Population Council, 2010.
[17] World Health Organization, 2009, Country Profiles.
[18] UNICEF,,At a Glance: Yemen, Statistics 2000-2007.
http://www.unicef.org/infobycountry/yemen_statistics.html#56

The unemployment rate of 15 percent[19] has been more or less constant over the past four years, although unofficial sources estimate it as high as 40 percent. The gender gap is large, with 11.5 percent of men and 40.9 percent of women unemployed.[20]

4.3 GEOGRAPHY, CLIMATE AND WATER AVAILABILITY

Yemen is the second largest state in terms of land area on the Arabian Peninsula, where it is situated at the southernmost tip between latitudes 12°N and 20°N and longitudes 41°E and 54°E. Administratively, Yemen is divided into 21 governorates[21] and 333 districts. These administrative regions fall into six agro-ecological zones (AEZs): (1) the Upper Highlands (above 1,900 m), (2) the Lower Highlands (below 1,900 m), (3) Red Sea and Tihama Coast, (4) Arabian Sea coast, (5) the Internal Plateau and (6) Desert. (For detailed characteristics of each AEZ, refer to Annex 11-17.)

Yemen's topography varies widely from sea level to inter-mountain plains, steep slopes and rugged mountains reaching up to 3,760 m. This extremely diverse topography leads to climatic conditions that are highly dissimilar across the country's six AEZs. Overall, Yemen's climate is semi-arid to arid. The mountains are temperate year round, while the Tihama coast and the desert zones are hot and dry during winter and even hotter in summer, with temperatures rising to over 50°C. There are two main rainy seasons — in spring between March to May and in the summer from July to September. Precipitation ranges from less than 50 mm along the coast to 500-800 mm in the western highlands and decreases to below 50 mm inland. The highlands contain *wadis*, or dry riverbeds, that fill up with water during the rainy seasons, creating pockets of biodiversity (MoPIC 2003; Alabsi 2006).

The country is characterized by climatic variability with seasonally intense, short-lived heavy storms that produce flash floods, interspersed with long dry periods resulting in widespread droughts, all exacerbated by the impact of climate change. Climate change is expected to intensify the variation in precipitation distribution, most likely leading to a hotter climate with more frequent droughts and increased desertification across the country and heightened vulnerability along the coastal areas as a result of rising sea levels.[22]

Yemen is already one of the most water-scarce countries in the world, lacking rainfall and surface water. High population growth and water scarcity result in a chronic imbalance between water needs and availability. The per capita water resources stand at 125 m^3 compared with 1,250 m^3 in the MENA region, already one of the driest regions in the world, and the global average of 7,500 m^3 (WFP 2008). Per capita consumption exceeds water supply (WFP 2008d). The annual deficit was 0.4 km^3 in 1990 and is expected to reach 1 km^3 in 2010 (MoPIC 2009). The country has limited freshwater and overall water withdrawals exceed recharge rates by 123 percent of renewable water resources (World Resources Institute 2003). Agriculture is by far the dominant water user, with 96 percent of water use (Shetty 2006), while qat alone accounts for around 40 percent (Ministry of Agriculture and Irrigation).

As underground water becomes harder to reach and the cost of new wells rises, irrigation resources will tend to be concentrated in the hands of the wealthier farmers. The current context of rising inequality in water access, ownership of irrigated land and competition

[19] Central Statistical Organization, Statistical Yearbook, 2008.
[20] The high unemployment rate among women is likely to be underestimated, given women's involvement in the unofficial employment sector.
[21] The governorates are Abyan, Ad Daleh, Aden, Al-Bayda, Al-Hodieda, Al-Jawf, Al-Mahara, Al-Mahweet, Amran, Dhamar, Hadramout, Hajja, Ibb, Laheg, Mareb, Rayma, Saada, Sana'a, Sana'a City, Shabwa and Taiz.
[22] UNDP/World Bank Sub-regional workshop on climate change and adaptation, November 2009, Sana'a, Yemen.

between agricultural and urban users suggests a worrying scenario for the poorest sectors of rural society.

The main factor influencing water use in agriculture in Yemen has been the increase in the area under higher value crops, particularly qat. The area under qat grew thirteenfold between 1970 and 2000 (Förch 2009), while the area under vegetables and fruit has also increased but at significantly lower rates.

4.4 MACROECONOMY

Table 4-1: Key economic indicators

	2007	2008	2009	2010 est.
GDP per capita, nominal (US$)	1,042.3	1,171.1	1,096.2	1,316.1
GDP growth (%)	3.5	3.2	5.0	7.8
Agriculture and fishing (share %)	10.5	10.4	11.1	12.0
Services (share %)	52.3	53.3	56.8	56.9
Industry — oil (share %)	29.1	28.9	24.0	22.0
Industry — non-oil (share %)	8.1	7.4	8.1	9.1
Inflation (%)	11.8	10.8	8.8	10.3
Value of Yemeni rial against US$ (end of year)	200.0	201.5	205.0	218.4
Population growth (%)	3.0	3.0	3.1	3.2

Source: World Bank; Central Bank of Yemen; Economist Intelligence Unit

Yemen's economic growth declined from 4.6 percent in 2005 to 2.3 percent in 2008 as a consequence of falling oil production. The country is confronted with a highly imbalanced trade portfolio, with the oil sector accounting for 85 percent of export earnings in 2007 and providing 70 percent of Government revenue on the one hand, while the country is dependent on imports to cover 90 percent of domestic wheat and 100 percent of its rice requirements on the other. This makes Yemen extremely vulnerable to food and fuel price volatilities, and to the potential impacts of global financial crises, which have already translated into significant reductions in public and private external inflows such as financial remittances, official development assistance and foreign direct investment.[23] The Government's provision of fuel subsidies and the recent augmentation of public wage rates are intended to counterbalance the negative impact of rising prices. However, they have added substantially to the country's continuously increasing account deficit, which was estimated at US$2.6 billion in 2009. The Government began an economic reform programme in 2006 to strengthen the non-oil sectors and attract foreign investment, but declining oil production and security concerns have greatly undermined these efforts.

4.5 FOOD AVAILABILITY AND MARKETS

Since the 1980s, Yemen's food availability has mainly been ensured by commercial imports. With increasing population growth, accompanied by a stagnating trend in per capita cereal production of about 30 kg per person per year (CFSAM 2009), imports steadily rose between 2000 and 2009. It is estimated that Yemen will produce only

[23] Förch, W. (2009). Yemen: Secondary Data Analysis on Food Security and Vulnerability.

27 percent of its domestic cereal requirements in 2009/10, the remainder being imported. Food imports amount to 24 percent of total imports, with cereals constituting the largest share of food imports, followed by dairy and sugar products (Breisinger et al. 2009). Based on a number of estimates and assumptions that are detailed in Annex 11-18, the CFSAM 2009 estimated the country's cereal import requirements for 2010 to be approximately 3.2 million mt, which means that 20 percent of domestic food requirements may be covered by local production.

Table 4-2: National cereal supply/demand balance from January to December 2010 (metric tons)

	Wheat	Sorghum	Rice	Maize	Millet	Barley	Total
Domestic availability	**502 471**	**418 158**	**35 000**	**105 246**	**82 950**	**31 067**	**1 174 892**
Stock change	350 000	30 000	35 000	40 000	10 000	4 000	469 000
Production	152 471	388 158	0	65 246	72 950	27 067	705 892
Total utilization	**2 986 199**	**418 158**	**418 231**	**434 819**	**82 950**	**31 067**	**4 371 426**
Food use	2 601 327	290 327	383 231	162 583	58 065	11 613	3 507 147
Seed use	19 624	11 366	0	3 449	2 240	4 482	41 161
Feed use	0	28 242	0	219 000	7 538	8 266	263 046
Losses	15 247	58 224	0	9 787	5 107	2 707	91 072
Closing stocks	350 000	30 000	35 000	40 000	10 000	4 000	469 000
Import requirement	**2 483 728**	**0**	**383 231**	**329 573**	**0**	**0**	**3 196 534**

Source: CFSAM 2009

Yemen's reliance on food imports has left the country highly vulnerable to international market price volatilities transmitting down to the local level, as witnessed in 2007/08 when wheat prices increased by 88 percent (WFP 2008). While markets are generally well stocked, food price volatility is the main constraint experienced by Yemenis, 96 percent of whom are net buyers (IFPRI 2009).

4.6 POVERTY TRENDS

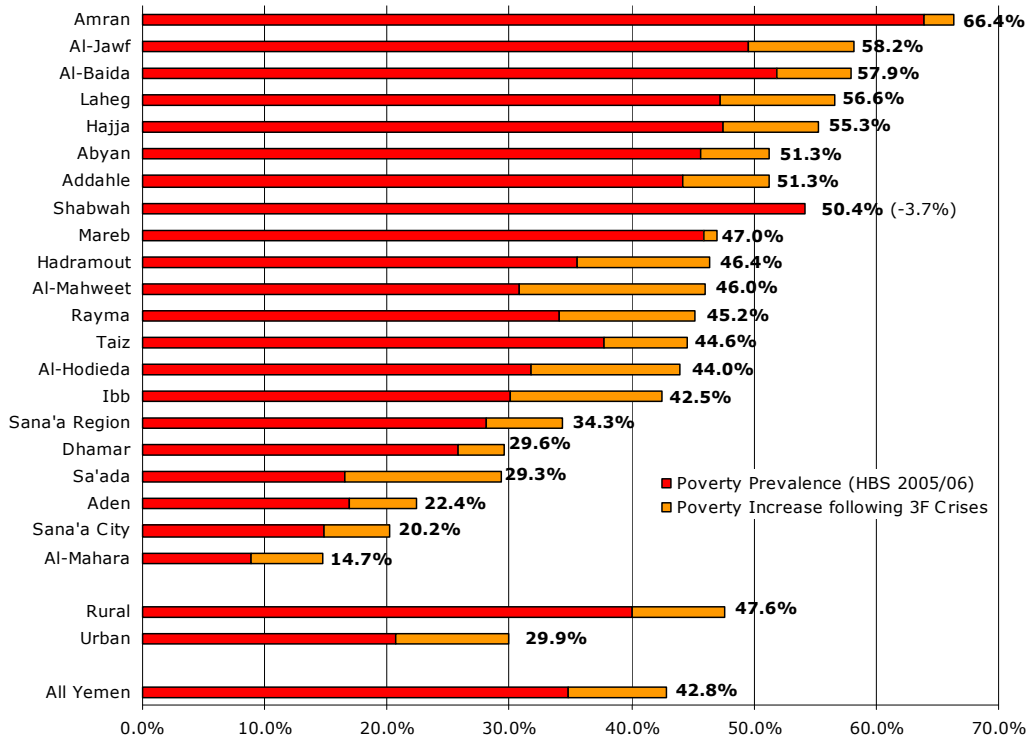
Yemen is one of the poorest countries in the world and the poorest country in the MENA region. The UNDP 2009 Human Development Index ranks the country 140th out of 182 countries, and with an average national income per capita of US$950 Yemen is categorized as a low-income country. According to the last nationwide HBS in 2005/06, which used food and non-food expenditure as an indicator of poverty, 34.8 percent of the population is poor. Poverty has been and continues to be significantly more prevalent in rural than in urban areas.

Large inter-governorate and inter-district differences in poverty exist, according to the HBS 2005/06. Governorates with more than half of their population identified as poor in 2005/06 include Amran (63.9 percent), Shabwa (54.1 percent), Al-Bayda (51.9 percent) and Al-Jawf (49.6 percent), compared with less than 20 percent of the population in Aden, Al-Mahara, Saada and Sana'a City.

IFPRI (2010) carried out a simulation analysis based on an economy-wide model to assess the impact of the high food and fuel prices and the global financial crisis. The "Triple F"

crisis affected the country particularly badly between 2007 and 2009, and has been challenging the country's economy at the macro level and the overall well-being of its population at the micro level ever since.

Graph 4-1: A reflection of the impact of the food, fuel and financial crisis ("Triple F" crisis): poverty prevalence at the national, governorate and rural/urban levels in 2005/06 and 2010

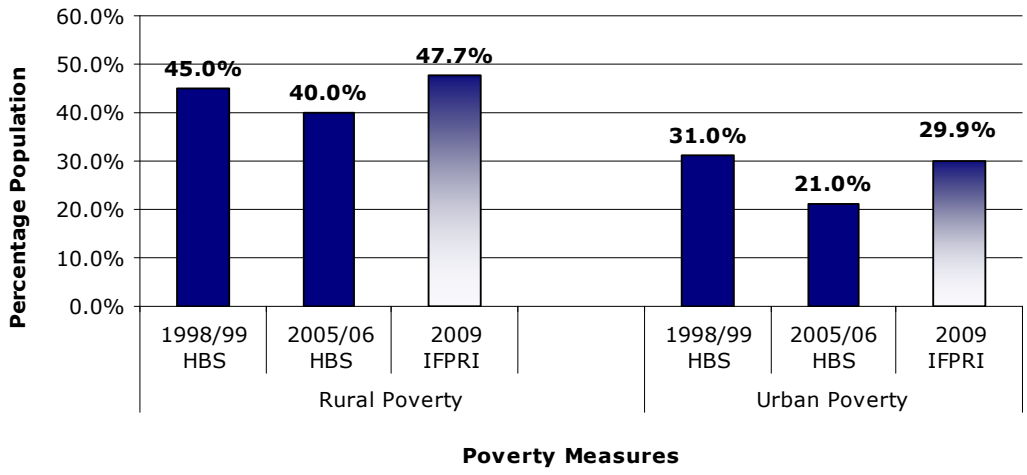


Source: HBS 2005/06; IFPRI 2010

Looking back over the last 11 years, it becomes clear that the gains in poverty reduction between 1998/99 and 2005/06 seem to have been reversed again. According to IFPRI's findings,[24] poverty in Yemen has increased by 8 percentage points over the past five years, from a national prevalence of 34.8 percent in 2005/06 to 42.8 percent in 2010. Almost half (47.7 percent) of the rural population now appears to be affected by poverty and 29.9 percent of the urban population. The country's aim is to decrease poverty to 10 percent by 2025, a goal that is becoming increasingly difficult to achieve.

[24] See IFPRI, National Food Security Strategy Paper Part 1, February 2010 (draft).

Graph 4-2: Rural and urban poverty in Yemen between 1998/99 and 2009



Source: HBS 1998/99; HBS 2005/06; IFPRI 2010

5 PROCESS AND METHODOLOGY

5.1 RATIONALE AND OBJECTIVES

The primary objective of the CFSS in Yemen is to provide much needed, updated baseline information on the food security and vulnerability situation of the population and its causes at the national (urban and rural), governorate and AEZ levels. Its findings will help formulate appropriate and feasible responses for WFP and its partners, such as the Government, other United Nations agencies and NGOs, and will facilitate the targeting of the most vulnerable and food-insecure people in the country. The survey is to serve as a tool with potential for guiding Yemen's development framework, including the five-year development plan, and informing the national food security strategy and the country's 2010 Humanitarian Response Plan.

Specific objectives are as follows:

- Identify the food-insecure and vulnerable households;
- Estimate how many people are currently food-insecure at the national and sub-national levels;
- Determine where the food-insecure and vulnerable people live;
- Identify the underlying causes and risk factors of food insecurity and malnutrition;
- Identify the most appropriate response options to address food insecurity and targeting criteria;
- Inform Yemen's national food security strategy and feed into the five-year development plan (DPPR 2011-2015).

5.2 IMPLEMENTATION AND INVOLVEMENT OF KEY STAKEHOLDERS

The CFSS was implemented between September 2009 and January 2010. The process was set under way with an extensive secondary data analysis in June/July 2009, drawing on all sources available at that time to provide a preliminary picture of the food security situation in Yemen.

On the basis of the findings of the secondary data analysis, a response analysis consultation process[25] was initiated by WFP in August 2009 in which representatives of key ministries, United Nations agencies and civil society participated. The workshop's objectives were to discuss the relevance of ongoing food security-related interventions by WFP and partners, refine targeting mechanisms, elaborate on potential response options for the 2010 Humanitarian Response Plan and identify opportunities for complementary/joint planning and monitoring. One of the main outcomes of the event was the uniform consensus among all participants on the need to urgently update the country's food security information base. WFP's proposal to implement a nationwide CFSS was considered an appropriate and welcome means to that end.

During the course of the implementation of the survey, regular meetings with main stakeholders were called to ensure its relevance for all. Household and community questionnaires were developed in collaboration with partners in September and field-tested prior to the training of enumerators in October. Primary data were collected from 14 October to 15 November, and immediately followed by data entry and data analysis in December 2009 and January 2010. The dissemination of preliminary findings started in mid-January 2010.

A crucial partner in this exercise was the Ministry of Planning and International Cooperation, through the Central Statistical Organisation (CSO). The CSO provided technical advice on the sampling design developed by WFP and drew the final sample based on the 2004 population census. The CSO was represented during the enumerator training and once data had been collected it was responsible, in close collaboration with WFP, for entering data from all household and community questionnaires.

Furthermore, the CFSS was enriched through WFP's technical collaboration with IFPRI, which had been tasked by the Ministry with developing the country's national food security strategy by the end of the first quarter of 2010. The strategy is guided by an economy-wide microsimulation analysis that uses data from the country's last household budget survey, HBS 2005/06, as a basis to provide an updated estimation of the food insecurity prevalence in 2009 and beyond. The updated primary data of the CFSS were utilized to cross-check IFPRI's findings and trends with regard to the food security situation.

Under the overall coordination of the Ministry, a joint IFPRI/WFP workshop took place on 16 January 2010 for technical experts from the Food Security Committee to validate the methodologies and findings of IFPRI and WFP. Following the validation process, IFPRI presented the first part of Yemen's National Food Security Strategy at the ministerial level on 17 January 2010, using CFSS findings as one of its information sources.

[25] The response analysis consultation workshop took place to facilitate and guide the Yemen Country Office in its task of designing its programmes for 2001-2011. The workshop was designed to contribute to consensus-building among WFP representatives and key partners from the Government, United Nations, NGO and donor community. Specific objectives were to: (1) present and discuss findings of the secondary data analysis that was conducted in June/July 2009; (2) elaborate potential response options for the Humanitarian Response Plan and WFP country programme; (3) identify opportunities for complementary/joint planning and monitoring; and (4) present and discuss plans for implementing the CFSS. The workshop was organized by the WFP Country Office and co-hosted by the Ministry of Planning and International Cooperation (MoPIC).

Table 5-1: CFSS timeline

Activities	Sep 2009				Oct 2009				Nov 2009				Dec 2009				Jan 2010				Feb 2010			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Survey and sampling design																								
Questionnaire development																								
CFSS stakeholder meeting (16.9.09)																								
Pilot test of data collection tools																								
Training (4 days including pilot)																								
Data collection																								
Data entry																								
CFSS stakeholder meeting (18.11.09)																								
Data processing, cleaning and analysis																								
MoPIC/IFPRI technical NFSS meeting																								
Mid-term review workshop of NFSS																								
Finalization of CFSS report																								

5.3 Food Security and Nutritional Security Conceptual framework

There is no single measure to analyse the level of food security of a population, a community or an individual. Food security is highly complex in that it is determined by a range of interrelated agro-environmental, socio-economic and biological factors, all of which must be addressed to ascertain whether or not food security exists. The complexity of food security can be simplified by focusing on three distinct, but also highly interrelated dimensions of food security:[26]

Definition of food security

At the World Food Summit in 1996, food security was agreed to exist when:

"…all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

Food availability: concerns the food that is physically present in the area of study, through all forms of domestic production, commercial imports and food aid. This may be aggregated at the regional, national, district or community level.

Food access: concerns a household's ability to regularly acquire adequate amounts of food, through a combination of its own home production and stocks, purchases, barter, gifts, borrowing or food aid.

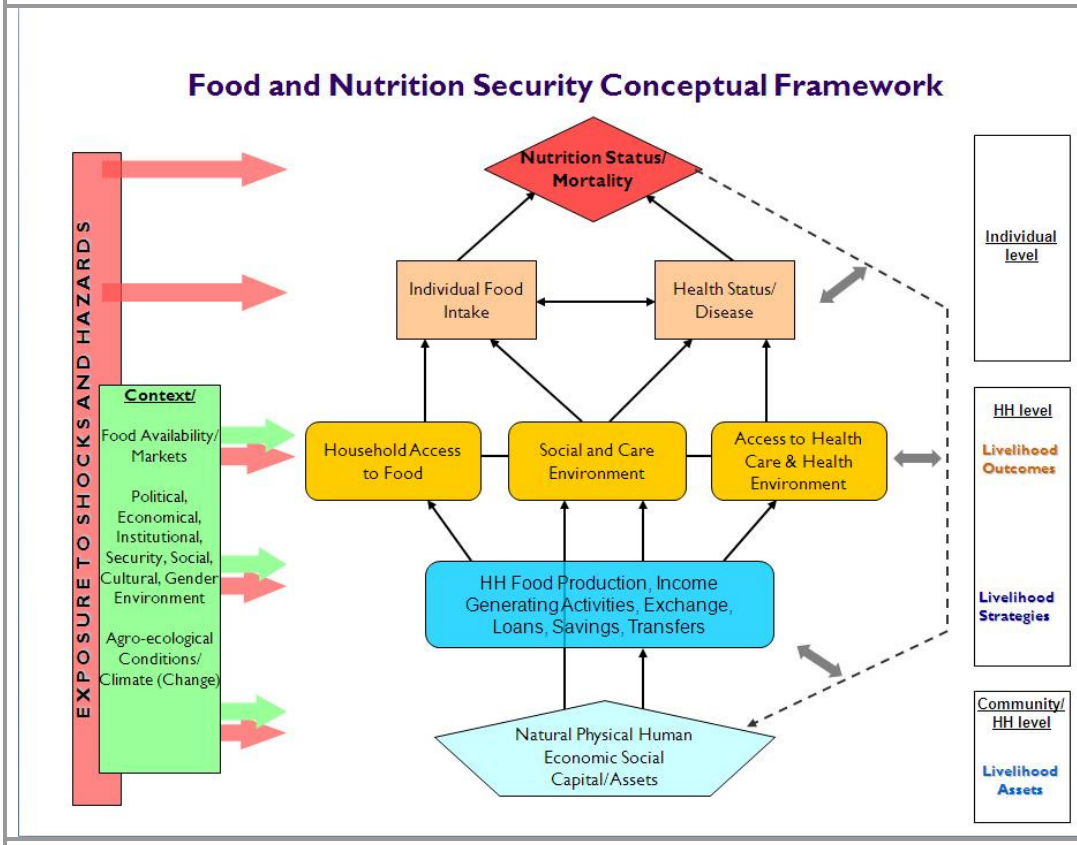
Food utilization: refers to a household's use of the food to which it has access, and an individual's ability to absorb and metabolize the nutrients, i.e. the conversion efficiency of the body.

[26] WFP Emergency Food Security Assessment Handbook, 2009.

The Food and Nutrition Security Conceptual Framework on which the CFSS is based considers malnutrition and mortality to be the final outcome or the manifestation of insufficient food intake and/or disease at the individual level. These two immediate determinants of malnutrition and mortality are in turn determined by the household's ability to access food, the care practices used, and the wider health and hygiene environment in which the household lives.

The conceptual framework recognizes that a **household's food security situation is subject to change and fluctuates.** This can be either in response to specific shocks — whether naturally occurring or caused by human intervention — or as a result of natural seasonality during the course of the year, reflecting the agricultural cycle of the lean season and times of plenty. In order to do justice to the dynamic nature of food security, the CFSS analyses households' vulnerability to future shocks and problems and determines their capacities to withstand them. Capacities to withstand shocks such as floods, high food prices and droughts depend on many factors, including a solid asset base, the ease with which households are able to alternate between and rely on the incomes from different livelihoods, the health and physical strength of individual household members, the political environment. By assessing future risks and their potential detrimental impact on household food security, the level of vulnerability of households and individuals is determined.

Graph 5-1: The food and nutrition security conceptual framework



Source: WFP 2009

5.4 HOUSEHOLD FOOD CONSUMPTION AS A PROXY INDICATOR OF FOOD SECURITY

Food consumption is a reflection of food availability and food access at the household level and is used as a proxy indicator of the current food security situation. Food consumption at the household level is a crucial element in a food security analysis because the types of foods people consume and how often they are consumed is an outcome their livelihoods.

Food consumption, according to WFP's standard methodology, is defined by the diversity of the diet and the frequency with which staple and non-staple foods are consumed. Together, diet diversity and frequency of food consumption are considered to be reliable proxy indicators of the access dimension of food security and nutrition intake. Research has demonstrated that diet diversity is highly correlated with caloric and protein adequacy, percentage of protein from animal sources (high quality protein) and household income.[27]

Diet diversity is measured by the number of different foods from different food groups consumed in the household and the frequency by the number of days in a week those items were eaten. The quantities of the food items are not considered. Households were asked on how many of the seven days prior to the data collection they had eaten seventeen different food items, reflecting eight standard food groups of main staples, such as cereals, tubers and roots; legumes and nuts; meat, fish, poultry and eggs; vegetables (including green leaves); fruits; oils and fats; milk and dairy products; and sugar and sweets.

Food consumption groups are created on the basis of similar household food consumption characteristics and patterns. The standard food consumption groups are poor, borderline and acceptable. For the grouping, food consumption scores (FCS) were computed to distinguish among those different consumption groups. Reported dietary diversity and the frequency with which staple and non-staple foods had been consumed (number of days per week) were used for this analysis, the rationale being that there is a proven correlation between diet diversity and nutrient adequacy, children's and women's anthropometry and socio-economic status.[28] This is another reason why it is considered to be a good proxy indicator of the access dimension of food security and nutrition intake.

The FCS is computed by grouping together the food items for which consumption was assessed over a seven-day recall period. For each food group the frequency represents the number of days an item from the food group was consumed, with a range from 0 (never) to 7 (every day). A weight is assigned to each food group, representing the nutritional importance of that group. The weight of each food group is multiplied with the number of days each food group was consumed over the seven days preceding the survey. The FCS is the sum across food groups of the product of the number of days each food group was consumed with their respective weight, while the value of each food group above seven is recoded as seven days. See Annex 11-2 and Annex 11-3 for more information and the weights assigned to each food group and/or refer to WFP's Comprehensive Food Security and Vulnerability Analysis Guidelines (2009).[29]

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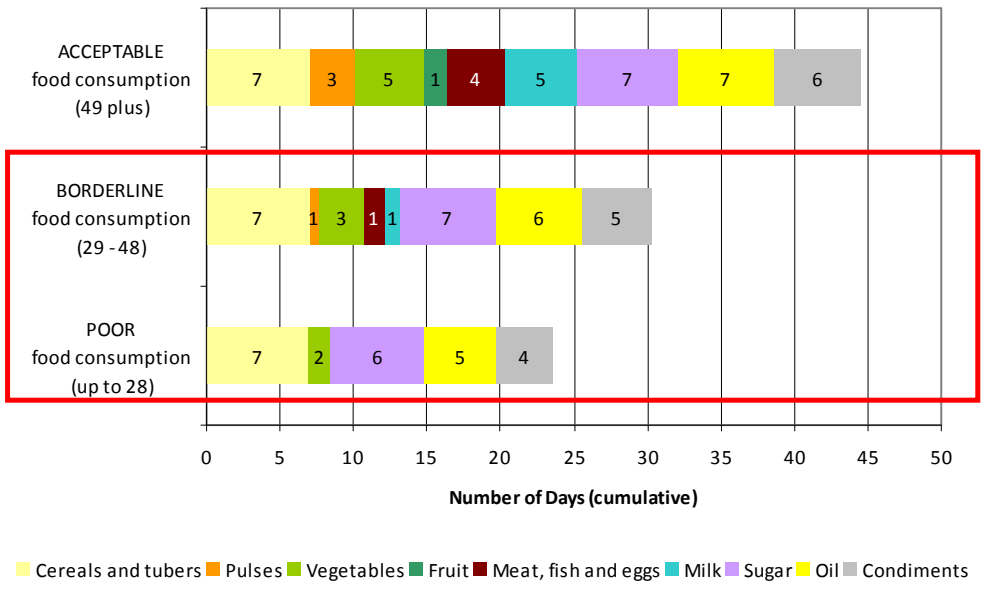
[27] WFP (2006), Food Consumption Analysis: Calculation and use of the Food Consumption Score in Food Security Analysis.

[28] Ruel M. (2003): Operationalizing Dietary Diversity: A Review of Measurement Issues and Research Priorities. *Journal of Nutrition* 133 (11 suppl. 2) 3911S-3926S.

[29] For more details on the FCS, see Annex III or refer to WFP's Comprehensive Food Security and Vulnerability Analysis Guidelines (2009): http://www.wfp.org/content/comprehensive-food-security-and-vulnerability-analysis-cfsva-guidelines-first-edition

Graph 5-2: Food consumption groups: diet composition and number of days of foods consumed



Poor food consumption (0 — 28) in Yemen corresponds to a diet that is dominated by cereals eaten on a daily basis, complemented by sugar on six days, oil on five days and vegetables on two days per week. Meat, fish and eggs, essential sources of protein and vitamins, are rarely eaten. The mean FCS at the national level for the poor food consumption group is 22.9.

Borderline food consumption (29 — 48) remains relatively similar to poor food consumption with a focus on cereals, sugar and oil. However, meat, fish and egg consumption picks up with one day and vegetables about three days per week. Dairy products and pulses are also consumed but only once per week. The mean FCS at the national level for the borderline food consumption group is 38.2.

Acceptable food consumption (above 49) consists of a diet with daily consumption of cereals, sugar and oil, immediately followed by vegetables and dairy products consumed five days per week. Meat and pulses become much more important, being eaten four and three days per week respectively. And fruits, for the first time, become prominent with a consumption of one day per week. The mean FCS at the national level for the acceptable food consumption groups is 74.4.

In order to be sure that the FCS is an appropriate and valid proxy indicator of food security in Yemen, it was validated by comparing it with other proxy indicators of food access and food utilization, including the Wealth Index, the Coping Strategies Index (CSI), per capita monthly food expenditure, per capita total expenditures, the share of monthly expenditures on food. **Bivariate correlations and ANOVA tests using those proxy indicators and the FCS show that food consumption is an adequate proxy for measuring the current food security situation in Yemen.** See Annex 11-4 for more details on the validation of the FCS.

In the case of Yemen, the three food consumption groups were adapted to the country context in the sense that the cut-offs that define each group can be said to reflect

Yemen-specific caloric intake requirements calibrated at plus/minus 2,100 kcal/per capita taking gender and age distribution of the population into account.[30] This refinement of the FCS method was achieved thanks to IFPRI's re-analysis of the data on caloric intake collected as part of the HBS in 2005/06. In other words, poor and borderline food consumption reflects a diet that does not provide the individual with the minimum caloric requirement of 2,100 kcal per day. Given that the FCS was positively validated against other proxy indicators of food access, poor and borderline food consumption directly translates into food insecurity in Yemen.

Nationally, 11.8 percent of the population can be considered to have a poor food consumption and 19.7 percent a borderline food consumption. Their diet is not considered diverse enough, nor are essential food groups consumed sufficiently often to guarantee a healthy and active life. Additionally, given that the survey was conducted at a favourable time of the year, i.e. during and/or right after the harvest, households that fall into those two consumption groups are considered food-insecure. These are the households that ought to be prioritized for any immediate interventions deemed most appropriate and feasible, especially in the second and third quarter of the year, which households themselves indicated to be a time of year during which it is difficult to access sufficient, nutritious food (see section 6.4). The objective in those cases would be, broadly speaking, to prevent households from having to resort to negative coping strategies in accessing enough food, support their livelihoods to increase their resilience and alleviate any acute signs of food insecurity, such as malnutrition among children.

The majority of the population (68.5 percent) has an acceptable diet. However, this national prevalence tends to hide striking regional differences that are highlighted in the following sections.

5.5 Mid-Upper Arm Circumference (MUAC) and Body Mass Index (BMI) as proxy indicators of acute malnutrition

The CFSS is not a nutrition survey.[31] Nutrition information was collected as part of the CFSS to shed light on the underlying causes of malnutrition, with a particular focus on the nature of the relationship between malnutrition at the level of the individual and food insecurity, or lack of access to sufficient, nutritious food at the level of the household.

The prevalence of acute malnutrition was assessed by taking MUAC measurements of children between 12 and 59 months and MUAC and BMI measurements of women between 15 to 49 years (reproductive age). The thresholds used to determine the level of malnutrition are provided in Table 5-2.

[30] The calorie consumption amounts are derived from the food consumption recall in the HBS 2005/06, which was re-analysed by IFPRI. See National Food Security Strategy Part I (February 2010 Draft) for more information

[31] Yemen's next national nutrition survey is scheduled to be implemented during the course of 2010 and will provide an updated picture of the different forms of malnutrition among Yemeni children and women on the basis of anthropometric measurements. It is likely to be a joint effort involving the Ministry of Health supported by UNICEF and other international and national partners.

Table 5-2: MUAC and BMI indicators and thresholds for acute malnutrition at the individual level

Children (12 - 59 months)		Women (15 - 49 years)			
MUAC		MUAC		BMI	
severe	< 11.5 cm	severe	< 21.4 cm	severe	< 16
moderate	11.5 - 12.5 cm	moderate	21.4 - 22.2 cm	moderate	16.0 - 16.99
malnourished (severe + moderate)	< 12.5 cm	malnourished (severe + moderate)	< 22.2 cm	mild	17.0 - 18.49
"at risk"	12.5 - 13.5 cm	well nourished	22.2 cm +	normal	≥ 18.5 – 24.99
well nourished	13.5 cm +				
* Increased risk of mortality		* Increased risk of low birth-weight babies		* Increased risk of mortality * Increased risk of low birth-weight babies	

Source: WHO 1999

Given that MUAC and BMI measurements were found to be very highly correlated (Pearson correlation coefficient: 0.808; 95 percent confidence interval), it was decided to report only on MUAC prevalence for women; however, BMI prevalence rates are reported in Output Tables 12-10.

5.6 SCOPE AND SURVEY INSTRUMENTS

A two-stage cluster sampling approach was applied for the CFSS. The sampling frame was stratified by AEZ at the governorate level before enumeration areas (EAs) were selected to ensure that all AEZs are adequately reflected:

- Stage 1: Thirty EAs at the governorate level were randomly selected, using probability proportional to size, in order to ensure that each household in the population, whether from a small or large village, has an approximately equal probability of being selected;
- Stage 2: Twelve randomly selected households within each EA were also sampled.

Due to insecurity in parts of the country, clusters were oversampled to compensate for the reduction. In addition to the 30 EAs, three additional EAs were randomly selected in the same AEZ to serve as alternatives. Households in each EA were oversampled to adjust for potential non-response. A minimum of 12 households per EA were interviewed. During the analysis phase, when results were aggregated at the national, AEZ or rural/urban level, a weighting system was applied to account for the different population sizes of the governorates.

The primary data collection took place between 14 October and 15 November 2009 and was implemented in 19 out of 21 governorates.[32] In total, 570 randomly selected rural and urban EAs were visited in which twelve households were randomly sampled for interviews. A total of 6,733 households were interviewed and the nutritional status of 4,802 children under 5 years of age and 9,781 mothers between 15 and 49 years of age was determined.[33] Representative conclusions regarding the food security situation can be drawn at the national, governorate, AEZ and rural/urban area levels.

[32] Saada and Al-Jawf had to be excluded because of the volatile security situation here at the time of the survey.
[33] Women's body mass index (BMI) measurements were taken, while mid-upper arm circumference (MUAC) measurements were taken of both children and their mothers.

The **household questionnaire** captured information on demography, education, migration, housing and facilities, agriculture, fishing and livestock production, agricultural constraints, employment and income sources, labour migration and remittances, access to markets, expenditures and debts, food consumption and diversity, coping mechanisms, exposure to shocks and risks, and nutritional health of children under 5 years of age and women of childbearing age. The seasonality of a number of indicators was also assessed. In addition to the household questionnaires, **community interviews** were conducted in each EA, asking key informants about agricultural practices in the community, their access to markets, health and education facilities and the community's views on constraints experienced during the twelve months preceding the survey.

5.7 LIMITATIONS

All efforts were made to ensure that survey results properly and reliably reflect the food security situation on the ground. However, some limitations to the survey have to be acknowledged and should be taken into consideration when reading the report and interpreting the results:

- The primary data collection was carried out between October and November, which is usually a time of year when food is more readily available and prices are lower than at other times of the year. The timing of the survey may therefore not have captured households that are experiencing difficulties in accessing food during the remainder of the year, but are faring relatively well during harvest times. In other words, it could be argued that the prevalence of food insecurity may be an underestimation;
- Against initial plans and contrary to the sampling design, the sample of children used for analyses of acute malnutrition was smaller than expected. Despite extensive training of enumerators, some questions in the nutrition section were not interpreted and asked in a uniform manner. This inconsistency led to a large share of incomplete child data that had to be excluded from the analyses. However, the CFSS did not aim to provide Yemen with an updated, official child malnutrition prevalence rate. Instead, the objective was solely to shed light on the relationship between the nutritional status of children and food insecurity at the household level, for which purpose the sample was sufficiently large to draw confident conclusions, though at larger confidence intervals.
- The desert, as one of the six AEZs and the most sparsely populated among them, also counted fewer households than initially planned for. In other words, findings at this level should be interpreted with care as the confidence intervals of key indicators could be larger.
- In urban areas, one major challenge was the administration of community questionnaires. Key informants were difficult to find and were often unable to make time for the interview. Additionally, the concept of "community" appeared to be difficult to relate to in an urban setting, which may have made the answers less precise and random.

6 OVERVIEW OF FOOD SECURITY SITUATION

6.1 HOW MANY PEOPLE ARE FOOD-INSECURE?

At the time of the survey 31.5 percent of the population or 6.8 million Yemenis were found to be food-insecure, meaning that they had limited or no access to sufficient, nutritious food and were eating a poor or borderline diet according to internationally set standards. The worst affected among the food-insecure are those eating poor diets: 11.8 percent of

the population or 2.5 million people could be considered severely food-insecure. The remaining 68.5 percent of the population ate an acceptably well-balanced diet and experience no difficulties in accessing the food required for their families.[34]

Two of the nineteen governorates, Al-Jawf and Saada, could not be included in the survey because of security concerns and lack of access. If the national average prevalence of food insecurity were to be applied to those two governorates, the total number of food-insecure Yemenis would reach 7.2 million. This is believed to be a rather conservative estimate, given that the region's population has been exposed to renewed civil unrest since mid-2009. IFPRI's simulation analyses based on the HBS 2005/06 data point to above average food insecurity prevalence rates in those two governorates, particularly in Al-Jawf. In other words, the total number of food-insecure people determined by the CFSS findings may be an underestimation.[35]

[34] Figures are based on 2010 population estimates and exclude Saada and Al-Jawf.
[35] The IFPRI simulation analyses, which include Al-Jawf and Saada, estimate 32.1 percent of the population or 7.5 million people to be food-insecure.

Table 6-1: Food security prevalence at the national, governorate, AEZ and rural/urban levels (percentage of population)

	poor food consumption (%)	borderline food consumption (%)	food insecure (%)	poor food consumption (no.)	borderline food consumption (no.)	food insecure (no.)
Governorates						
'Rayma'	24.3%	28.4%	52.8%	113,490	132,590	246,090
'Hajja'	17.1%	29.1%	46.3%	299,760	509,830	809,590
'Ibb'	20.1%	24.0%	44.0%	491,690	588,100	1,079,780
Addahle'	19.7%	24.3%	44.0%	112,600	138,410	251,010
'Amran'	21.1%	21.7%	42.8%	204,450	211,040	415,490
'Al-Mahweet'	16.4%	24.2%	40.5%	95,060	140,090	235,140
'Al-Bayda'	12.7%	25.6%	38.3%	83,700	168,070	251,770
'Taiz'	15.9%	20.5%	36.4%	438,060	563,410	1,001,470
'Laheg'	12.9%	22.5%	35.4%	108,170	188,860	297,030
'Mareb'	8.4%	25.6%	34.0%	23,530	71,380	94,910
'Abyan'	8.4%	25.3%	33.7%	41,610	126,120	167,730
'Al-Hodieda'	10.1%	23.1%	33.2%	261,160	595,930	857,090
'Shabwa'	9.8%	16.9%	26.7%	52,860	91,230	144,090
'Dhamar'	6.8%	16.9%	23.7%	100,060	248,530	348,600
'Sana'a'	3.1%	12.6%	15.6%	31,690	129,920	161,610
'Aden'	1.5%	10.6%	12.1%	10,530	76,980	87,510
'Al-Mahra'	4.8%	5.6%	10.3%	5,370	6,300	11,670
'Hadramout'	2.2%	7.7%	9.8%	26,290	93,390	119,680
'Sana'a City'	1.4%	7.2%	8.5%	31,970	166,630	198,600
Agro-Ecological Zones						
Upper Highlands	18.1%	23.8%	42.0%			
Red Sea & Tihama Coast	11.7%	23.0%	34.7%			
Desert	6.0%	21.8%	27.8%			
Internal Plateau	6.8%	17.0%	23.7%			
Lower Highland	7.3%	15.7%	22.9%			
Arabian Sea	3.4%	10.5%	13.9%			
Rural-Urban Areas						
Rural	15.1%	23.1%	38.1%			
Urban	3.5%	11.0%	14.5%			
Total	**11.8%**	**19.7%**	**31.5%**	**2,532,050***	**4,246,810***	**6,778,860***

Source: CFSS 2010

* excludes Saada and Al-Jawf governorates

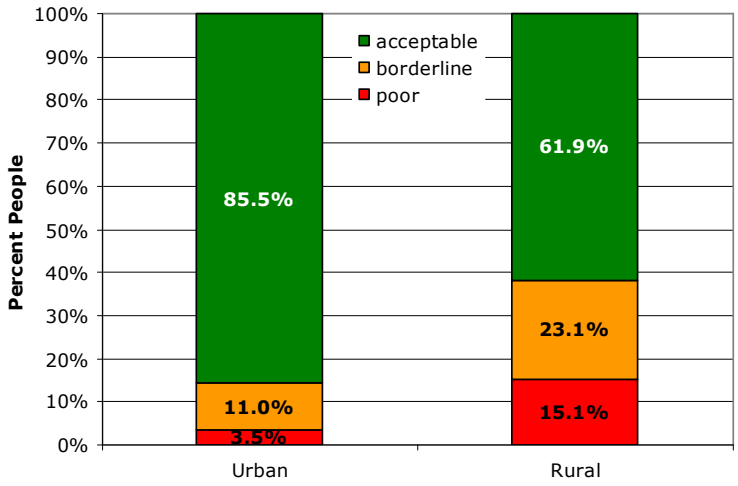
The timing of the data collection between mid-October and mid-November — when food availability is high and prices are low — may have introduced a bias and potentially led to an underestimation of the food insecurity situation in the country. Despite the fact that agricultural self-sufficiency at the household level is more an exception than the rule, food crop production constitutes both a vital source of income from sales and a source of home consumption for the majority of Yemenis. Agricultural income may be stretched during the second and third quarter of the calendar year, which is the period that households themselves indicated to be challenging in terms of accessing sufficient nutritious food for their families. Regular monitoring throughout the year may be advisable to capture those households that are also food-insecure during the remaining months, outside the harvest season.

The food insecurity prevalence at the national, rural and urban levels is further confirmed by the results of IFPRI's macro-econometric analyses (2010), which also found almost one in three Yemenis suffering from food insecurity. The recent global food, fuel and financial crises that have not spared Yemen have led to a large increase of 23 percent in poverty. According to the CFSS findings, poverty is highly and positively correlated with food insecurity, meaning that the poorer the household, the more likely its members are to face challenges in accessing sufficient nutritious food (see section 8). Recent information sources[36] confirm the alarming prevalence of food insecurity in Yemen, and call for urgent, bold and immediate interventions to avoid the situation from worsening and facilitate a speedy reversal of the trend.

6.2 WHERE ARE THE FOOD-INSECURE PEOPLE?

Food insecurity is not distributed evenly in the country. As shown by previous findings,[37] the rural areas continue to be much more affected by food insecurity than the urban areas: in fact, the share of food-insecure people in the countryside is more than twice the share found in urban areas. However, even the rural areas are not homogenous and vary considerably in terms of the quality of facilities and assets, such as the environment in which people make a living.

Graph 6-1: Percent of food-insecure people in rural and urban settings

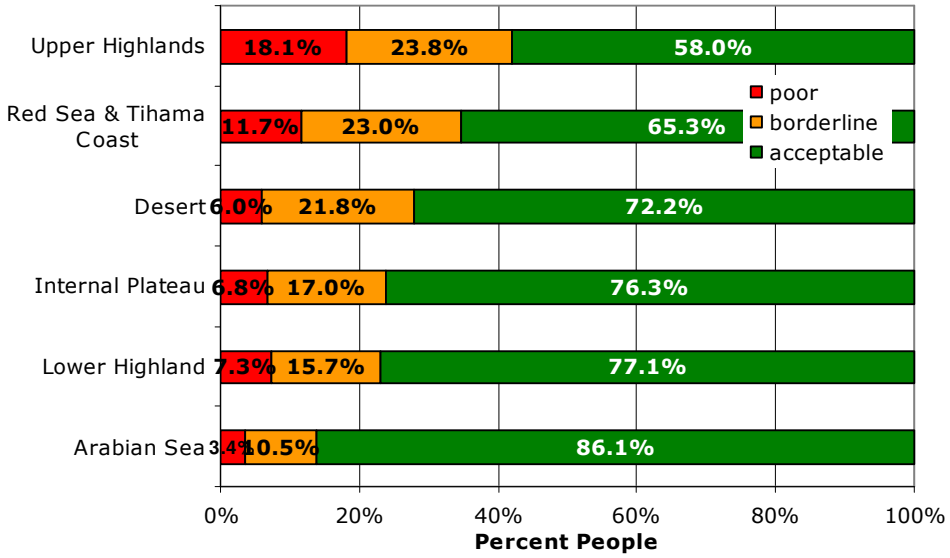


Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

[36] IFPRI (2010); UNDP (2008)..
[37] HBS 2005/06.

Of the 333 districts in the country, the World Bank and the Ministry of Planning and International Cooperation classified 41 percent as wealthy, 36 percent as medium and 23 percent as very poor rural districts.[38] According to preliminary findings of this re-analysis of the HBS 2005/06 data, the wealthier districts are characterized by better resource endowments for agriculture and increased household access to land and irrigation. In addition, their rural economies were found to be more vibrant, providing greater entrepreneurial opportunities. Poor districts, on the other hand, are marked by challenging agro-climatic conditions, less access to agricultural land and reduced livestock rearing opportunities, forcing the population to temporarily migrate to earn their living elsewhere. The large majority of the population (74 percent) was found to reside in those very poor rural districts.

Graph 6-2: Percent of food-insecure people* in the six agro-ecological zones



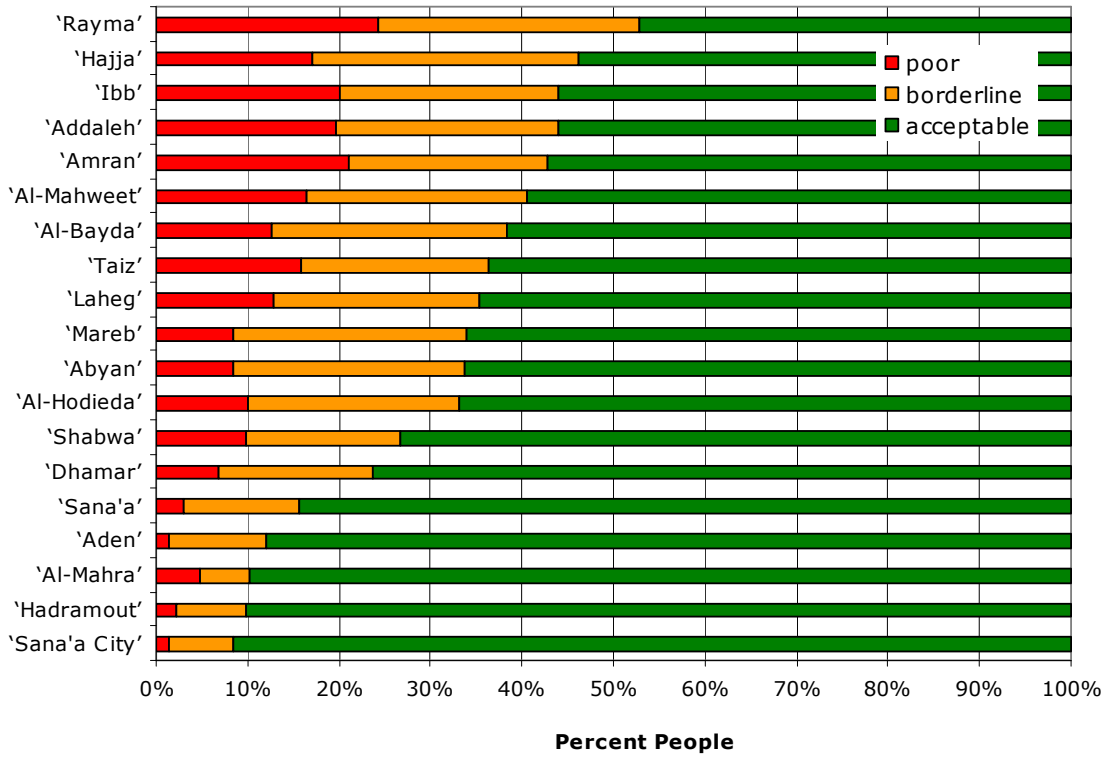
Source: CFSS 2010
*Food insecurity equals poor or borderline food consumption

Among the six AEZs, the Upper Highlands has the highest rate of food-insecure people with 42.0 percent. This is the most densely populated zone with a concentration of more than 30 percent of the country's population, putting considerable pressure on the region's seriously declining land and water resources. The Red Sea and Tihama Coast has the second highest prevalence (34.7 percent) of food insecurity. It is known to be the poorest area in the country and is characterized by extremely hot temperatures, making agriculture impossible without access to water pumps. In the Desert zone 27.8 percent of the population was found to be food-insecure and although findings were significant, firm conclusions about this zone's ranking in relation to the other five zones should be drawn with care, given the relatively small size of the sample surveyed in this area. The Internal Plateau and the Lower Highlands were ranked fourth and fifth respectively, with about one quarter of each zone's population affected by food insecurity. The Lower Highlands produces over 40 percent of the country's cereals, which may be one factor contributing to the reduced share of food-insecure people compared with the other four worse affected

[38] World Bank/Ministry of Planning and International Cooperation, Pathways out of rural poverty – A presentation of preliminary findings, August 2009.

zones. Least affected is the Arabian Sea zone in the south of the country, a sparsely populated zone with 15 percent of food-insecure households.

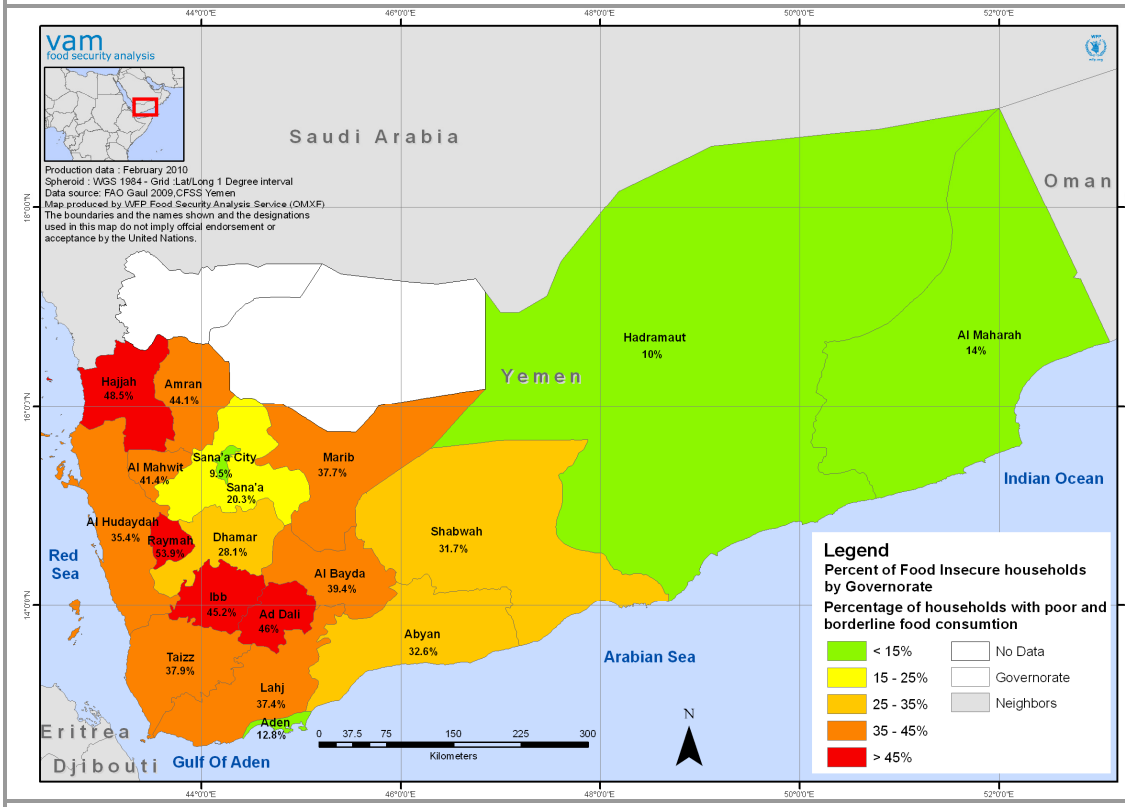
Graph 6-3: Percent of food-insecure people* in 19 governorates



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

There are large regional differences in terms of the percent of people affected by food insecurity, as illustrated in Graph 6-3 and Map 6-1. The worst affected governorate with more than half of its population food-insecure is Rayma (52.8 percent) followed by Hajja, Ibb, Ad Daleh, Amran and Al-Mahweet, each with more than 40 percent of their population food-insecure. Third in line are Al-Bayda, Taiz, Laheg, Mareb, Abyan and Al-Hodieda with over 30 percent of people food-insecure. Interestingly, regions marked by a high prevalence of food insecurity have a range of additional characteristics in common, the most prominent being poverty. The regions least affected by both food insecurity and poverty include Yemen's major cities, Sana'a and Aden, and Hadramout and Al-Mahara.

Map 6-1: Percent of food-insecure households* at governorate level



Source: CFSS 2010

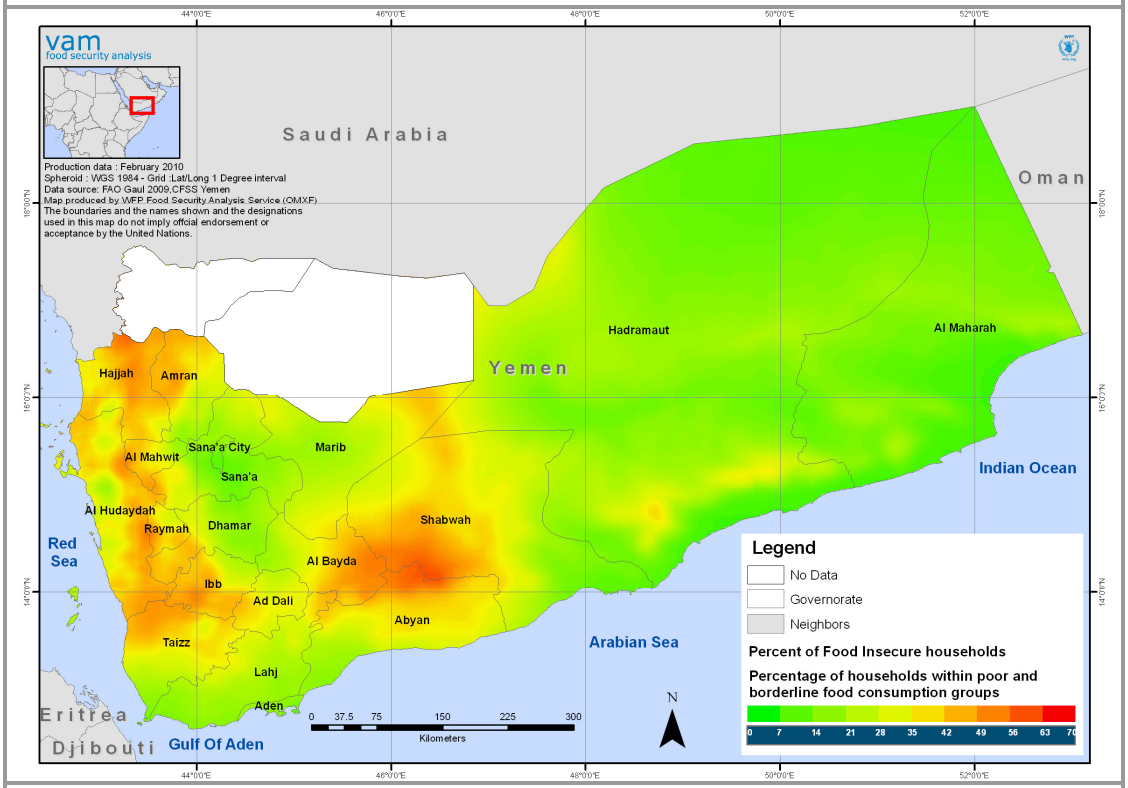
*Food insecurity equivalent to poor or borderline food consumption

In short, 13 out of 19 governorates in Yemen have more than one quarter of their population affected by food insecurity, while 61.4 percent of all food-insecure and 66.9 percent of severely food-insecure people in the country are concentrated in 5 of the 19 governorates (Al-Hodieda, Amran, Hajja, Ibb and Taiz).

The spatial distribution of food insecurity levels was investigated further. The interest was in mapping food insecurity in a smooth and continuous way such that the shape and magnitude of variations within administrative boundaries could be identified — a simple geographical plotting of the values of food insecurity levels at each sampled village/cluster shows some spatial variation even within one governorate.

The method used was a spatial regression approach (geographical weighted regression) where the variable of interest (level or prevalence of food insecurity in this case) is related to explanatory variables that are available as a continuous grid (such as a map or satellite image). This may also help provide some insight into which variables (e.g. population density, distance to roads, vegetation, elevation) exercise more influence on the spatial variation of food insecurity. A similar exercise was also carried out for poverty levels.

Map 6-2: Percent of food-insecure households* across Yemen



Source: CFSS 2010

*Food insecurity equivalent to poor or borderline food consumption

The result of the mapping is shown in Map 6-2. The spatial pattern of food insecurity is made more evident, confirming the higher levels of food insecurity in the western governorates, but also in an area around the border of the governorates of Abyan, Al-Bayda and Shabwa.

The map also highlights the considerable variation in food insecurity levels within some governorates. The governorates just mentioned are a case in point — within Al-Bayda the prevalence of food insecurity varies by a factor of two (25 percent in the west of Al-Bayda compared with 55 percent in the east). A similar range of variation is also seen in the western governorates of the Tihama coast. Note that the spatial pattern arises from the data and is not introduced by the nature of the regression model (the model only makes it more evident and easy to perceive). A more in-depth investigation into the spatial patterns of the food insecurity levels is warranted — at this stage, the regression modelling is used primarily as a mapping tool. Annex 11-14 provides more details on the mapping methodology.

6.3 WHO ARE THE FOOD-INSECURE HOUSEHOLDS?

This section highlights the most prominent factors that have been found to be significantly associated with households challenged by food insecurity. It does not, however, purport to provide any conclusive evidence of causal relationships among these factors. Instead it offers indications and tendencies, which could be used as targeting criteria for interventions. The list of characteristics provided is not exhaustive but rather a stepping stone towards the development of more refined geography- and situation-specific

targeting tools. Additionally, they already point towards potential response options that could reduce people's vulnerability to food insecurity.

6.3.1 Demography

Food-insecure households tend to have a larger number of dependants[39] than food-secure households. The average number of household members stands at 7.51 people. The larger the household, the better off it was found to be in terms of its food security and wealth status: food-secure households were found to have an average number of 7.70 household members compared with 7.12 members among food-insecure households. Similarly, wealthier households (fifth wealth quintile) had an average of 7.48 household members compared with 6.74 among the poorer households (first wealth quintile). In other words, wealthier households have a larger number of adult household members able to earn an income, which may in turn increase their wealth.

The number of dependants in relation to the overall number of household members (dependency rate) appears to make a difference: dependants, i.e. young and old household members, do not provide a substantial contribution to the household's overall income. Instead, they have to be supported by the income earned by a few adult household members, thereby stretching the household budgets. At the national level, 20.4 percent of the households were found to have a high dependency rate, which is defined as having more than 70 percent of household members as dependants. The largest shares were found in the rural areas of the country. More than one quarter (27.0 percent) of food-insecure households were found to have dependency rates of 70 percent, compared with only 17.1 percent of food-secure households.

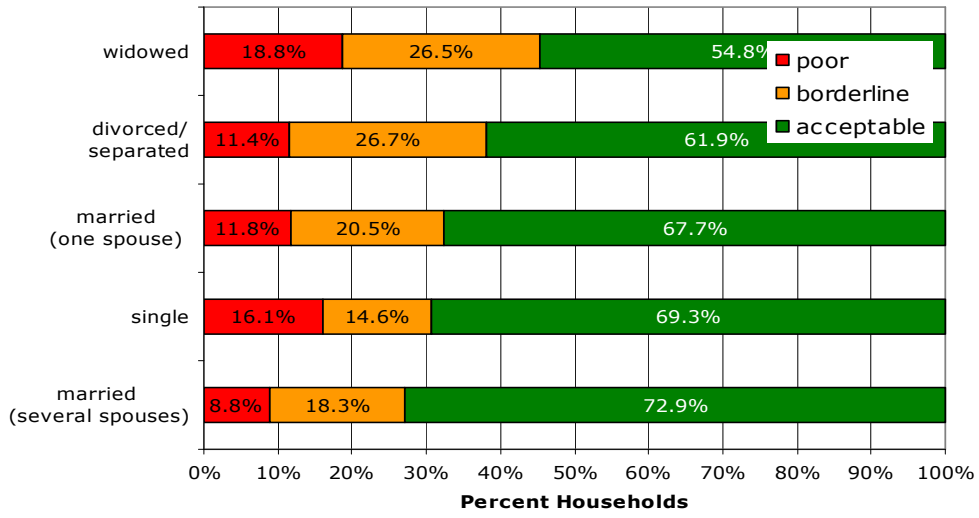
Food-insecure households are more likely to have women and widowed household heads than are food-secure households. Households headed by women are relatively uncommon in Yemen, constituting 13.3 percent of the overall sample. The largest population of woman-headed households was found in Aden, Al-Mahweet, Ibb and Taiz. Such households are more common in rural than in urban areas, which may be a reflection of the high and increasing rate of rural-urban migration of Yemeni men who tend to support their families from afar. Households headed by women are significantly more prone to food insecurity than those headed by men: 45.7 percent of all woman-headed households were found to be food-insecure, compared with 31.4 percent of all households headed by men. Woman-headed households were found to spend a larger share of their total income on food, which is likely to leave fewer resources available for important and essential non-food expenditures, such as health and education. A higher number of such households also reported buying food on credit, an indication of the limited resources available and increased vulnerability to indebtedness. Of all food-insecure households, 18.3 percent were headed by women, compared with 10.8 percent of food-secure households.

Living a married life appears to offer an effective shield against food insecurity, providing social and economic securities that widowed, divorced or separated household heads do not enjoy (see Graph 6-4). Widowed household heads are clearly the worst off with 37.6 percent of them food-insecure, followed by the divorced or separated (31.4 percent). In comparison, 26.1 percent of households with married heads were found to be food-insecure. Again, of all severely food-insecure households 12.1 percent had widowed heads, compared with 6.6 percent of food-secure households.

[39] Dependency rate is measure of the portion of household members who are too young or too old to work, i.e. children below 15 years of age and those above 65 years.

Polygamous marriages are not very common in Yemen, with 7 percent of married women living in polygamous unions in 1997,[40] a rate significantly lower than of most other Arab countries. In the CFSS, only 1.8 percent of household heads interviewed were living in polygamous marriages, the largest share of whom reside in Mareb (6.1 percent), Abyan (4.0 percent) and Shabwa (3.5 percent). Interestingly, and contrary to previous findings, polygamy was the marital status that was least affected by food insecurity and poverty. Polygamous unions may be a reflection of wealth, given that only men with sufficient resources can afford to marry more than one wife. However, given the small share of polygamous households in the sample, the representativeness of this group may be questionable, demanding further research.

Graph 6-4: Marital status of household head by food security status of household*



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

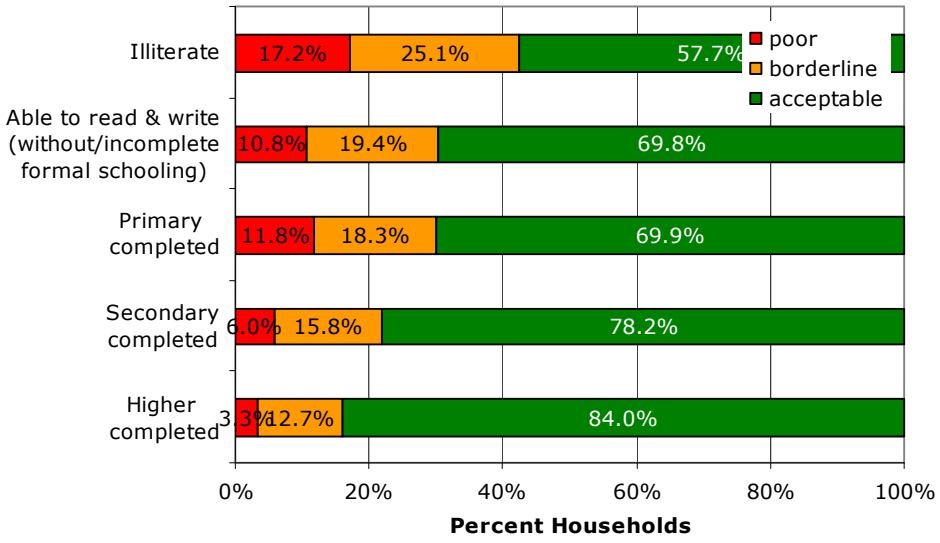
6.3.2 Education

Food-insecure households tend to have household heads with limited or no education. As in most parts of the world, there is a very clear, strong link between the educational level of the household head and the household's food security status. A good educational status among all, both men and women, results in a significant decrease in their vulnerability to food insecurity. The lower the educational level of the household head, the less adequate the family's food consumption (see Graph 6-5. In Yemen 43.8 percent of household heads were illiterate, 24.0 percent had not received any formal education but could read and write, 11.3 percent had completed primary school, 11.1 percent secondary school and 9.8 percent had completed education at the tertiary level. Over two thirds of spouses were found to be illiterate (68 percent), only 5.5 percent of them had completed primary school. Given that most interviews were administered with men heads of household, spouses in this case are predominately female, further highlighting the extremely low literacy among Yemeni women.

[40] Central Statistical Organisation (1997), Demographic and Maternal and Child Health Survey.

More than half of all food-insecure households (55.8 percent) were headed by illiterate household heads, compared with 37.8 percent of food-secure households. With the increase in educational attainment by the household head, the likelihood of the household being affected by food insecurity steadily decreases. While 42.3 percent of all households with an illiterate household head were found to be food-insecure, 21.8 percent of households with a head who completed secondary school and 16.0 percent with a head who completed higher education were food-insecure. There was no significant difference in the food security status of households headed by individuals who had completed secondary school or higher education. Clearly, illiteracy does not automatically translate into food insecurity — more than half of the households with an illiterate household head had adequate access to food. However, the chances of them being affected by food insecurity are significantly higher than for those who have some level of education. A similar relationship was found between the educational background of the household head's spouse and the household's food security status: the higher the educational background of the spouse, the less likely it was for the household to be affected by food insecurity. Of all food-insecure households, 87.5 percent of them had an illiterate spouse, compared with 72.1 percent of food-secure households. The rural/urban divide is profound, with 80.5 percent of all households that have illiterate heads residing in rural areas.

Graph 6-5: Educational level of household head by food insecurity status of household*



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Food-insecure households tend to send fewer children, especially girls, to school. Based on household interviews, net primary school enrolment[41] of children between 7 and 12 years of age stands at 81.2 percent. The large rural/urban divide continues to persist, with primary school enrolment rates in urban areas of 88.9 percent, compared with 78.2 percent in the rural areas. Overall school enrolment generally decreases with age,

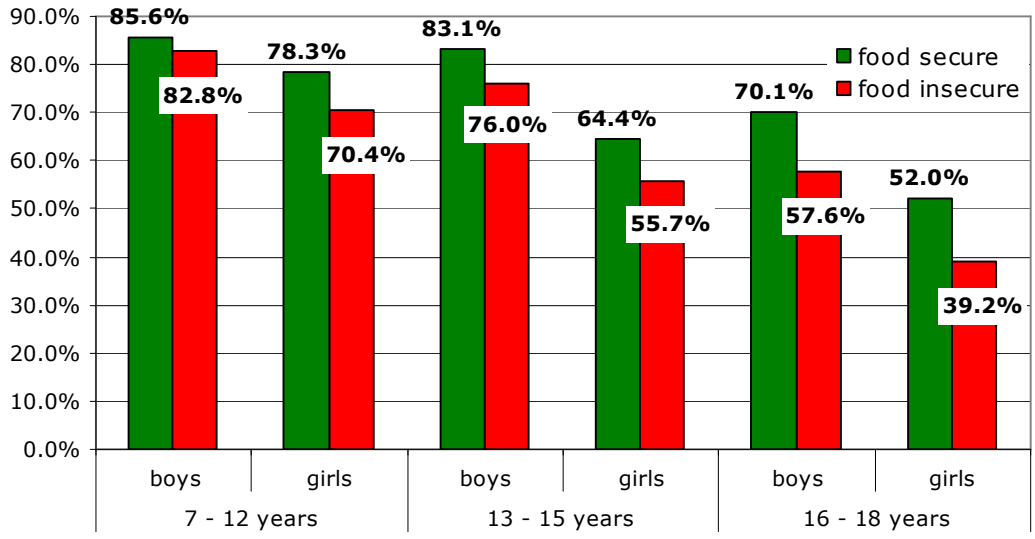
[41] The net primary school enrolment ratio is the number of children enrolled in primary school who belong to the age group that officially corresponds to primary schooling, divided by the total population of the same age group.

dropping to 60.5 percent of children between 16 and 18 years, highlighting the limited investment in human development generally, which in turn is one of the most critical factors contributing to the poverty prevalence in the country.

The gender gap remains wide but appears to be closing slowly: primary school enrolment of boys remains the same at 84.8 percent, while girls' enrolment increased from 65 percent during the period 2000-2007[42] to 76.2 percent in 2009. The lowest rate of enrolment of girls (7-12 years) was recorded in Al-Hodieda (52.0 percent), Hajja (57.6 percent) and Al-Mahweet (66.9 percent). Households with the lowest girls' enrolment rates include livestock traders (47.2 percent), agricultural wage labourers (60.1 percent) and crop and livestock producers (62.1 percent).

Food-insecure households generally tend to send fewer of their children to school than food-secure households, regardless of the sex and age of the children. The gender gap among food-insecure households appears to widen with age: while the rate of primary school enrolment of girls from food-insecure households stands at 70.4 percent, it drops to 39.2 percent by the time girls reach the secondary school age of 16-18 years. This is a 31.2 percent difference in girls' school enrolment, compared with a 25.2 percent difference in school enrolment of boys of the same age from food-insecure households. In other words, although school enrolment of boys also decreases over time, it seems to taper off to a lesser extent than that of girls. A larger share of boys than girls from food-insecure households stays enrolled until 18 years of age.

Graph 6-6: Net school enrolment rates of boys and girls from food-secure and food-insecure households* between primary and secondary school age



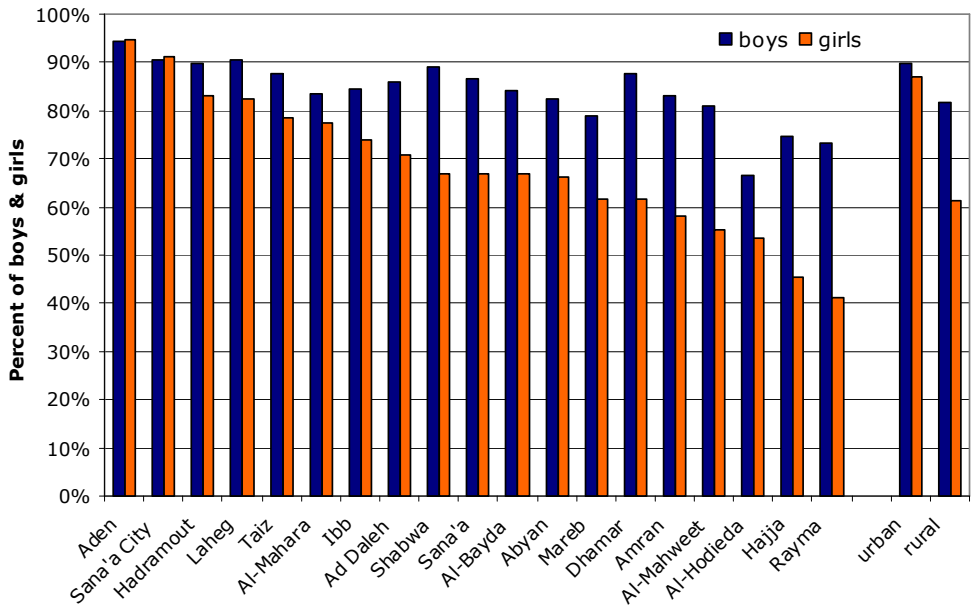
Source: CFSS 2010
*Food insecurity equals poor + borderline food consumption

There are large differences between primary school enrolment rates for boys and girls across the 19 governorates and between rural and urban areas. Key informants in each community visited were asked to estimate the share of boys and girls enrolled in primary school and actually attending. Enrolment rates for girls are lower than those for boys

[42] UNICEF, At a Glance: Yemen; http://www.unicef.org/infobycountry/yemen_statistics.html#56

across all governorates, except in Aden and Sana'a City. The lowest girls' enrolment rates were reported in Rayma (41 percent), Hajja (46 percent), Al-Hodieda (53 percent) and Al-Mahweet with 55 percent of girls enrolled and actually attending primary school. Interestingly, these governorates also have the highest shares of economically poor (see section 6.3.3) and food-insecure households (section 6.2). The rural/urban divide is large, with 61.4 percent of girls enrolled in rural areas compared with 87.0 percent in urban areas.

Graph 6-7: School enrolment of boys and girls across governorates and urban and rural areas according to key informants' perceptions in 570 communities



Source: CFSS 2010

Food-insecure households tend to live further away from primary and secondary schools than food-secure households. Based on qualitative data,[43] children from the majority of households (80.6 percent) are able to reach the nearest primary school by walking less than one hour. Comparatively speaking, rural areas continue to be disadvantaged in terms of accessibility of primary schools, with children from 74.0 percent of households walking up to one hour, 22.4 percent walking up to two hours and 2.9 percent up to three hours to reach their primary school. Almost all urban households, on the other hand, live less than one hour away from their nearest primary school; the remaining 2.0 percent walk up to two hours. Of all 19 governorates, Rayma (36.7 percent), Hajja and Laheg (26.7 percent) and Shabwa (24.1 percent) have the largest shares of households whose children have to walk up to two hours to reach their primary schools.

Fewer children from food-insecure households (75.4 percent) are able to reach school in less than one hour, compared with food-secure households (83.1 percent). Also, children from 21.3 percent of food-insecure households walk between one and two hours, compared with 14.9 percent of children from food-secure households. And 3.1 percent of children from food-insecure households live two to three hours' walking distance from the

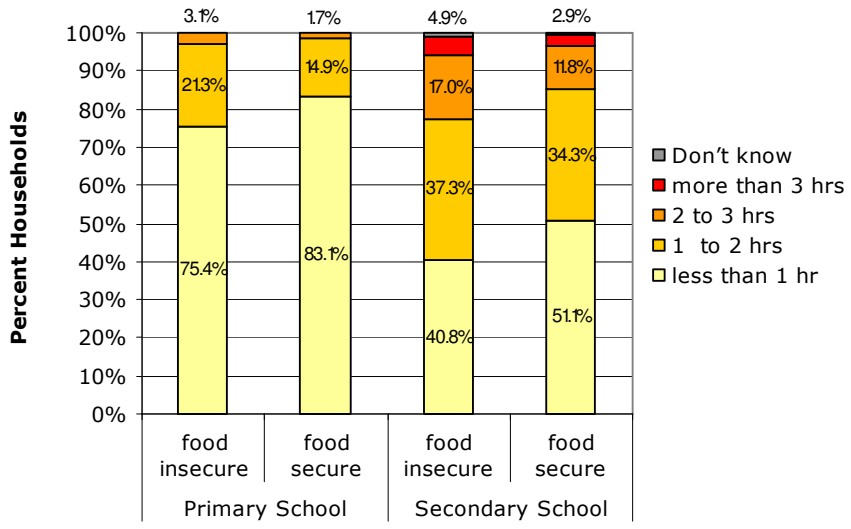
[43] Community interviews with key informants in each village visited.

nearest primary school, while only 1.7 percent of children from food-secure households have to walk that long.

Secondary schools are generally more difficult to access than primary schools. Less than half of households (49.4 percent) are able to reach the nearest secondary school within one hour of walking, while 33.7 percent have to walk up to 2 hours. Again, the rural/urban divide is stark, with only 37.6 percent of rural households having a secondary school within less than one hour's walking distance, compared with 78.6 percent of urban households. Accessibility to secondary schools appears particularly limited in Rayma, where children from 71.4 percent households have to walk between one and two hours, followed by Amran with children from almost half of all households (48.1 percent) having to cover a similar distance. Households in Hajja also live far from secondary schools, with 39.1 percent of households needing to walk between two and three hours and 13.0 percent more than three hours.

Walking distance to the nearest secondary school also varies considerably according to the food security status of the household, with only 40.8 percent of food-insecure households but more than half of all food-secure households (51.1 percent) able to reach the nearest secondary school within one hour. The greatly limited access to secondary schools among the food-secure is surprising, possibly reflecting the limited availability of secondary schools generally across the country.[44]

Graph 6-8: Walking time to nearest primary and secondary school for food-insecure* and food-secure households



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

[44]Ministry of Education, Girls' Education Sector, GTZ, UNICEF, National review of program experiences in support of girls' education in Yemen, November 2007; see also: http://lite.alertnet.org/thenews/newsdesk/IRIN/133d191ac9b8f3ce9565dccdf57c4318.htm; http://www.yemenpost.net/30/Reports/20081.htm

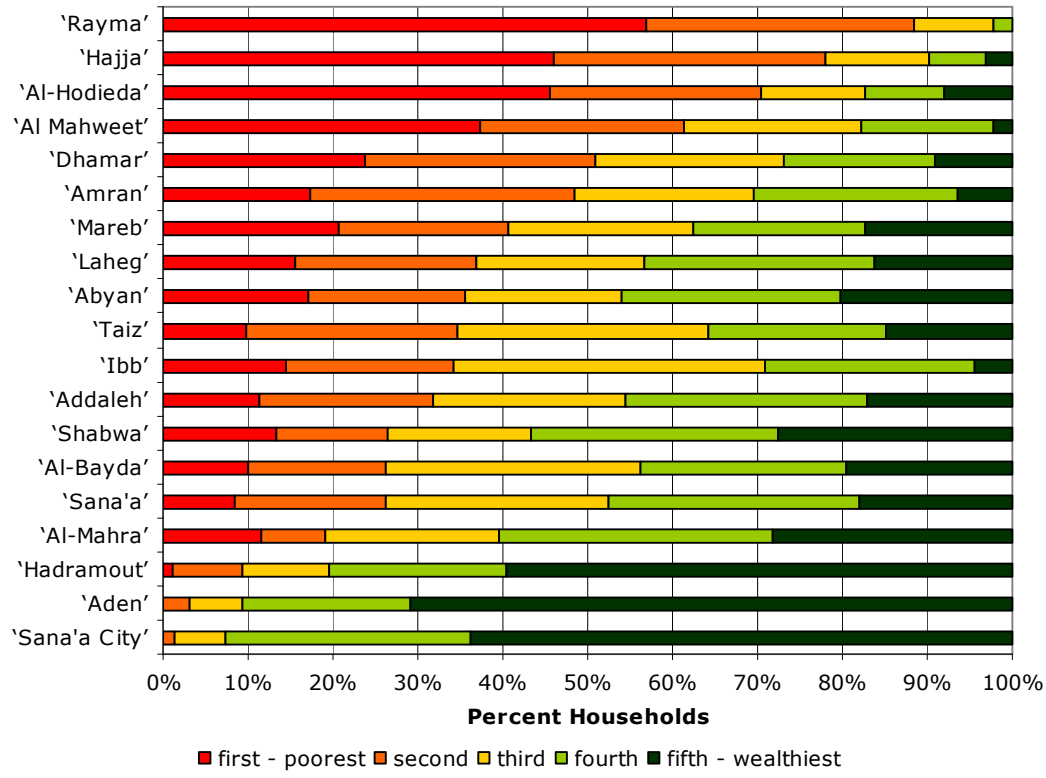
6.3.3 Poverty and livelihoods

Wealth refers to the value of all natural, physical and financial assets owned by a household. A wealth index was created using a methodology similar to that of the Demographic and Health Survey[45] and Multiple Indicator Cluster Survey. The index is not intended to be a measure of the entire wealth of the household (natural and financial assets, for example, are excluded) but rather used as a proxy for it. The components of the wealth index typically include household amenities and non-productive items that, if owned, are assumed to reflect relative wealth independent of the livelihood the household engages in. In other words, agricultural tools and machines, fishing nets and boats, and similar items were excluded from the asset list on which the index is based. Wealth index quintiles were calculated as the quintiles of the wealth index variable. This calculation resulted in five quintiles, each representing 20 percent of the households in Yemen. For the full list of items included and a detailed explanation of how the index was calculated, refer to Annex 11-5.

Poverty continues to challenge the Yemeni population, particularly following the increase in food prices that still seriously undermines the purchasing power of the poor. At the national level 40.0 percent of households fall into the two lowest wealth quintiles, the poorest of the poor. As is the case with food insecurity, this national average hides significant regional differences. For example, there is a vast rural/urban divide, with 54.4 percent of the rural population falling into the two lowest wealth quintiles, compared with 6.2 percent of the urban population. Similarly, governorates differ greatly with respect to the prevalence of poverty. In 12 out of 19 governorates, the share of poor households[46] is above 30 percent and in 5 governorates more than half of the population is poor, with Rayma reaching the highest poverty prevalence of 88.4 percent, followed by Hajja (78.0 percent), Al-Hodieda (70.5 percent) and Al-Mahweet (61.3 percent). Least affected by poverty are Sana'a City (1.4 percent), Aden (3.1 percent) and Hadramout (3.9 percent). Interestingly, the trend as illustrated in Graph 6-9, very closely follows the food insecurity trend as discussed above, highlighting the close link between poverty and food insecurity.

[45] http://www.measuredhs.com/pubs/pub_details.cfm?ID=470
[46] Households falling into the two lowest/poorest wealth quintiles.

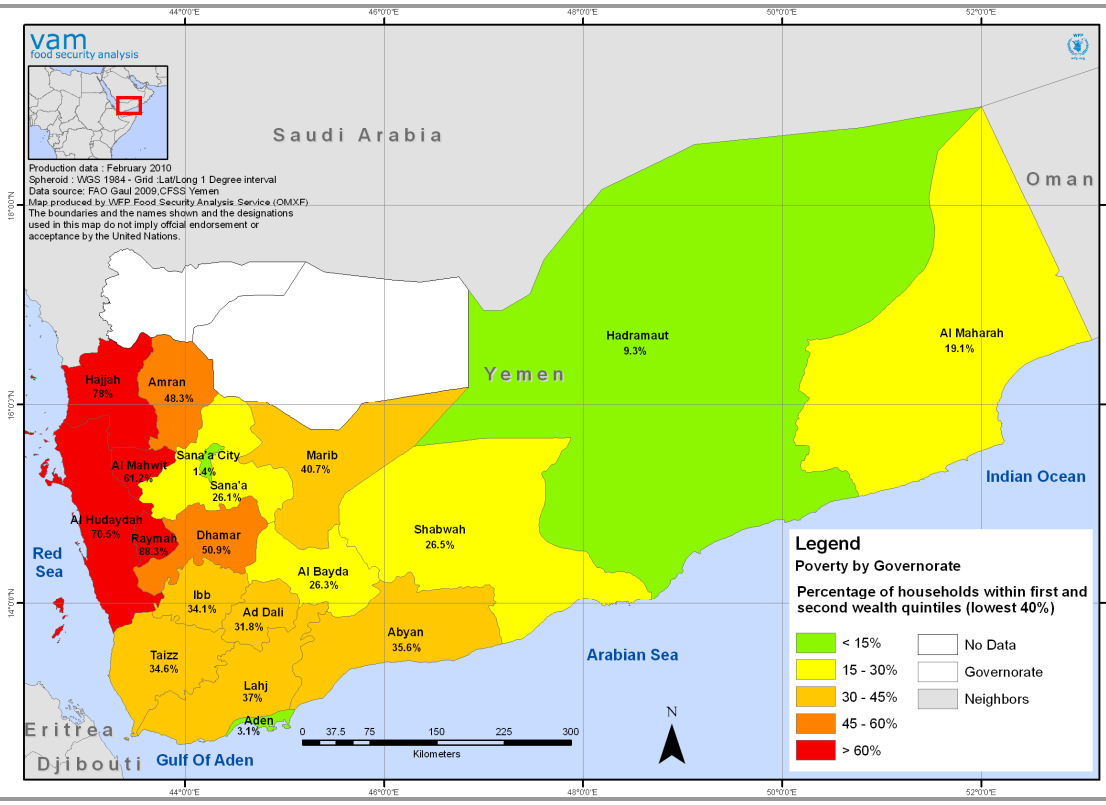
Graph 6-9: Governorates by five wealth quintiles



Source: CFSS 2010

This geographic variation can be better perceived by looking at Map 6-3 showing the proportion of households that fall into the two lowest wealth quintiles for each governorate. There is a clear concentration of high levels of poverty in the northernmost and westernmost governorates. The lowest poverty levels occur around the major cities (Sana'a and Aden) and towards the eastern half of the country. The southern governorates show medium levels of poverty.

Map 6-3: Poverty levels by governorate



Source: CFSS 2010

The poverty level is defined as the proportion of households within the lowest two quintiles (lowest 40 percent) of the wealth index national distribution

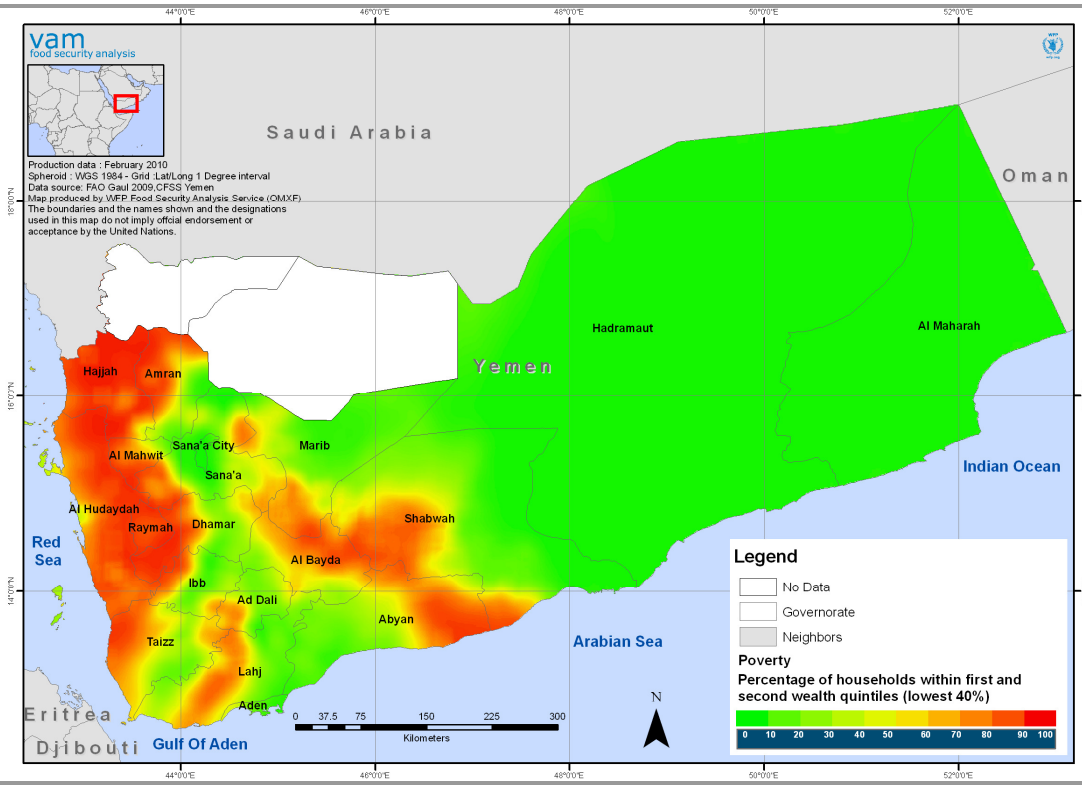
The spatial distribution of poverty levels was investigated further. The interest was in mapping the poverty levels in a smooth and continuous way such that the shape and magnitude of variations within administrative boundaries can be identified. It was evident from a plain geographical plotting of the values of poverty levels in each sampled village/cluster that:

- considerable spatial variation existed within certain governorates;
- changes from fairly high to fairly low poverty levels could occur over short distances; and
- patterns of poverty levels exhibited well-defined spatial arrangements within Yemen.

The method used was a spatial regression approach (geographical weighted regression) where the variable of interest (level or prevalence of poverty) is related to explanatory variables that are available as a continuous grid (e.g. such as a map or satellite image). This may also help provide some insight into which variables (e.g. population density, distance to roads, vegetation, elevation) have more impact on the spatial variation of poverty levels.

The result of the mapping is shown in Map 6-4. The pattern of poverty variation across the country is more evident and additional detail can be perceived. The high poverty levels in the west of the country already evident in the previous governorate-based map are more visible.

Map 6-4: Poverty levels across Yemen



Source: CFSS 2010

The poverty level is defined as the proportion of households within the lowest two quintiles (lowest 40 percent) of the wealth index national distribution

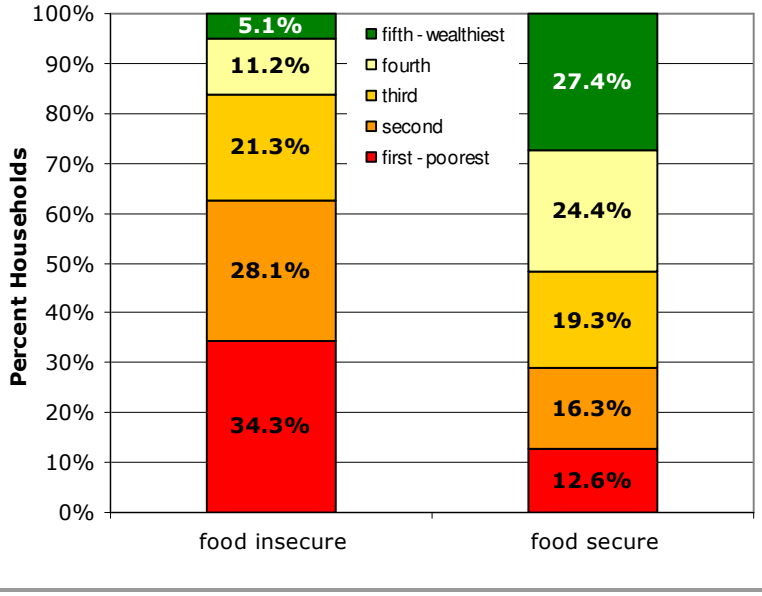
However, the map also clearly illustrates the considerable variation in poverty levels within some governorates. Dhamar is a case in point — poverty levels vary from about 90 percent of the households in its western half to about 10 percent in its eastern half. Abyan, Al-Bayda, Amran, Shabwa and Taiz also show significant variation within their borders. Note that these spatial features are contained in the data, they are in no way introduced by the details of the regression model (the model simply makes them more evident and easier to perceive). An investigation into why the poverty levels display such consistent and well-defined spatial patterns requires a more in-depth analysis — here the regression modelling may help provide some insight, but at this stage it is primarily used as a mapping tool. For more information on the mapping methodology, refer to Annex 11-14.

Food-insecure households are significantly more likely to be poor than better off. Three out of five food-insecure households (62.4 percent) fall into the two lowest wealth quintiles, compared with 28.9 percent of those identified as food-secure. Yet it would be wrong to assume that a poor household is food-insecure and a food-insecure household is poor by default: after all, 5.1 percent of all food-insecure households fell into the wealthiest quintile while 12.6 percent of all food-secure households were found to belong to the poorest segments of society (lowest wealth quintile).[47] It is important to bear in

[47] The share of wealthier food-insecure households (5.1 percent in fifth and 11.2 percent in fourth wealth quintile) may appear surprising, yet looking at the entire sample, this group represents just 1.7 percent of the population. See Annex XX for more detailed profiling.

mind that the indicators for food security (the FCS) and poverty (the wealth index) are proxy indicators and provide an **indication of trends**: in other words, food-insecure households are more likely to be poor than better off, while poor households are more likely to be food-insecure than better off households.

Graph 6-10: Food security* by wealth quintiles



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Livelihoods are "the capabilities, assets and activities required for a means of living linked to survival and future well-being".[48] Yemeni households were asked to indicate the main livelihood that provides the largest share of their income and ensures their families' survival and well-being. An overview of the most common livelihoods in Yemen is presented in Table 6-2. Regular salaries from Government employment are by far the most common income sources for one quarter of the population, closely followed by non-agricultural wage labour, which provides one in six Yemenis with an income. The importance of crop and livestock production may appear very low on the list, with only 4 percent of the population. However, this percentage hides considerable variations in the prevalence of livelihoods across governorates and rural/urban areas. Most importantly, it hides the large share of households receiving some income from agriculture to complement their main income from a non-agricultural livelihood. In fact, few rural households can make a living on agriculture alone because of low productivity and incomes (MoPIC 2003) and a recent World Bank/Ministry of Planning and International Cooperation analysis[49] showed that in rural areas 36 percent of households have multiple sources of income. Most smallholders seek off-farm employment as casual labourers while migration, seasonal or permanent, is an important strategy, particularly for poor families.

[48] The description of livelihoods presented in this section is based on the sustainable livelihoods approach. See www.livelihoods.org/info/info_guidancesheets.html for more details.
[49] World Bank/Ministry of Planning and International Cooperation (2009), Pathways out of rural poverty – A presentation of preliminary findings.

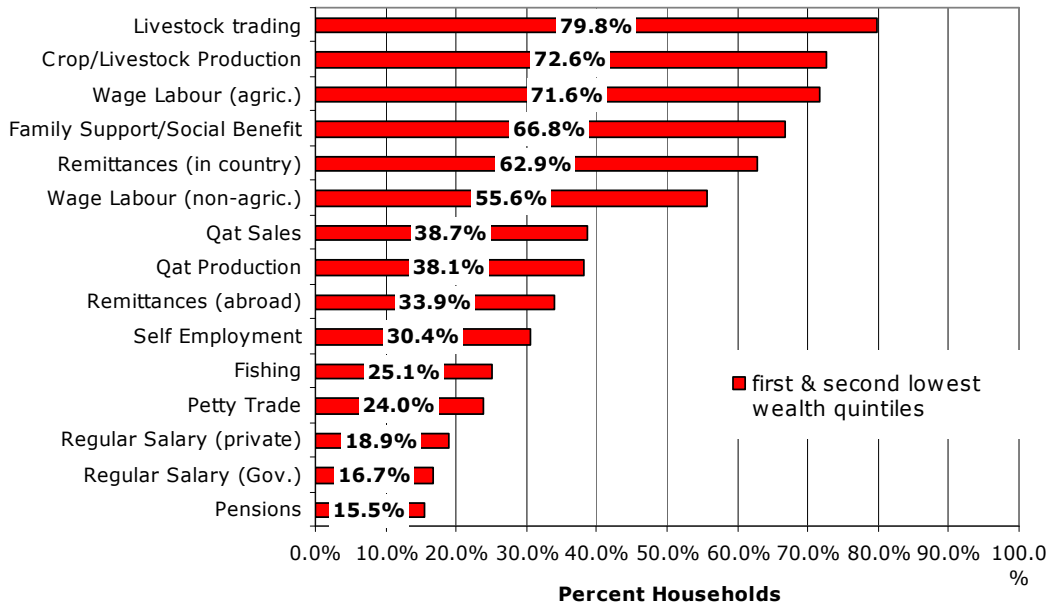
Table 6-2: Fifteen most common livelihoods in rural and urban areas in Yemen

OVERALL			RURAL AREAS			URBAN AREAS		
Livelihoods	Households		Livelihoods	Households		Livelihoods	Households	
	%	unweighted count		%	unweighted count		%	unweighted count
Regular Salary (Gov.)	20.1%	1423	Wage Labour (non-agric.)	17.2%	794	Regular Salary (Gov.)	30.3%	576
Wage Labour (non-agric.)	15.0%	955	Regular Salary (Gov.)	15.8%	847	Self Employment	18.8%	308
Self Employment	14.4%	929	Self Employment	12.5%	621	Regular Salary (private)	10.1%	156
Wage Labour (agric.)	5.6%	380	Qat Sales	8.6%	445	Wage Labour (non-agric.)	9.9%	161
Remittances (abroad)	5.1%	384	Family Support/Social Benefit	7.7%	382	Pensions	9.2%	160
Pensions	5.0%	329	Wage Labour (agric.)	7.5%	359	Family Support/Social Benefit	4.6%	90
Regular Salary (private)	4.9%	268	Remittances (abroad)	5.6%	314	Remittances (abroad)	3.9%	70
Qat Sales	6.6%	477	Crop/Livestock Production	5.4%	261	Petty Trade	3.7%	61
Family Support/Social Benefit	6.8%	472	Livestock trading	3.7%	178	Fishing		
Crop/Livestock Production	4.0%	275	Pensions	3.2%	169	Qat Sales		
Livestock trading	2.7%	190	Remittances (in country)	2.9%	107	Wage Labour (agric.)		
Petty Trade	2.3%	139	Regular Salary (private)	2.7%	112	Remittances (in country)	below 50 cases	
Remittances (in country)	2.3%	122	Qat Production	2.3%	116	Crop/Livestock Production		
Fishing	0.9%	115	Petty Trade	1.7%	78	Livestock trading		
Qat Production	1.6%	117	Fishing	0.5%	66	Qat Production		

Source: CFSS 2010

Poverty and wealth vary considerably across the fifteen different livelihoods. Livelihoods with over half of their population falling into the two lowest/poorest wealth quintiles include livestock trading (79.8 percent), crop and livestock production (72.6 percent), agricultural wage labour (71.6 percent), reliance on support from family, friends and social benefits (66.8 percent), in-country remittances (62.9 percent) and non-agricultural wage labour (55.6 percent). The lowest shares of poor households with less than one-fourth falling into the two lowest wealth quintiles were found among households receiving private regular salaries (18.9 percent), households with regular salaries from the government (16.7 percent) and households receiving pensions (15.5 percent).

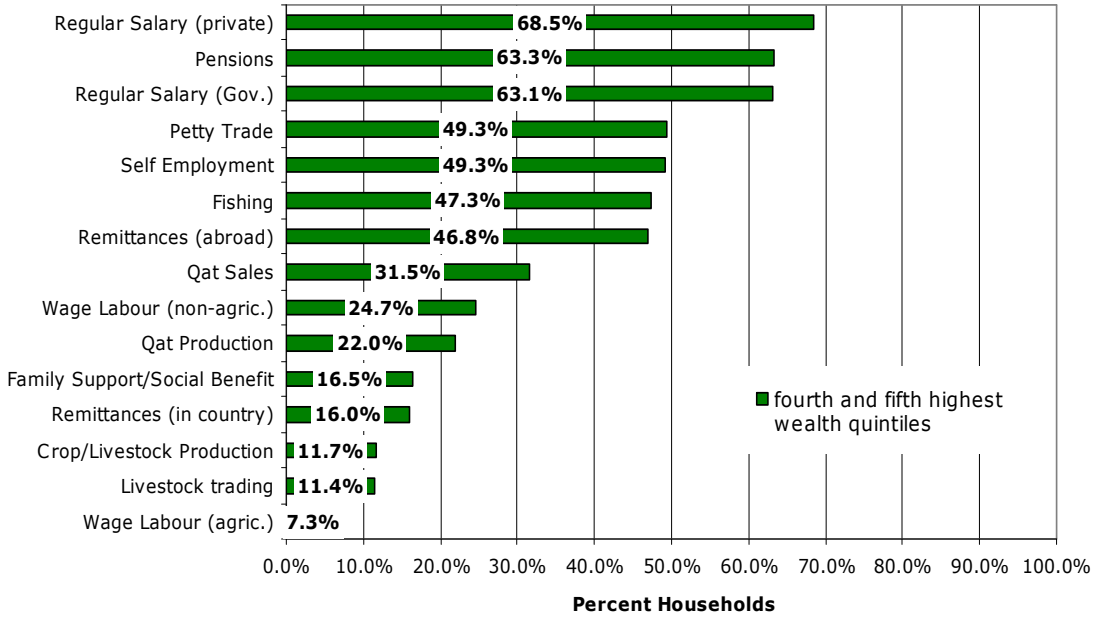
Graph 6-11: Percent of poor* households in each livelihood group



Source: CFSS 2010
*First and second lowest wealth quintile

The largest shares of better off households, with over three in five households falling into the fourth and fifth highest wealth quintiles, were mostly found among those receiving private regular salaries (68.5 percent), households receiving pensions (63.3 percent) and households with regular salaries from the Government (63.1 percent). Next in line are the petty traders and self-employed households with almost half of their households (49.3 percent) wealthy, followed by fishing households (47.3 percent) and those receiving remittances from abroad (46.8 percent). The lowest shares of better off households were found among the crop and livestock producers (11.7 percent), the livestock traders (11.4 percent) and households engaged in agricultural wage labour (7.3 percent).

Graph 6-12: Percent of well-off households in each livelihood group



Source: CFSS 2010
*Fourth and fifth highest wealth quintile

Food-insecure households engage in fewer income activities than food-secure households. Overall, the average number of activities households engage in was 1.59, with a higher number among rural (1.65) than urban households (1.43). Having access to multiple income sources provides a buffer against potential shocks and a safety net in times of need, thereby generally decreasing households' overall vulnerability. Food-insecure households had, on average, 1.56 income activities compared with the 1.60 of food-secure households. Although the difference does not appear to be much, it is significant and is confirmed by secondary data.[50]

Food-insecure households predominately obtain their income from wage labour, crop and livestock production, livestock trading and external support such as in-country remittances and support from friends/family and social benefits. More than half of all food-insecure households (52.2 percent) engage in one of the livelihoods listed above; furthermore, more than half the population engaged in these livelihoods falls into the lower two wealth quintiles. In 13 out of the 19 governorates these livelihoods represent the main income sources for more than one third of the population, with the highest shares in Rayma (65.0 percent), Al-Mahweet (51.7 percent), Hajja (49.9 percent)

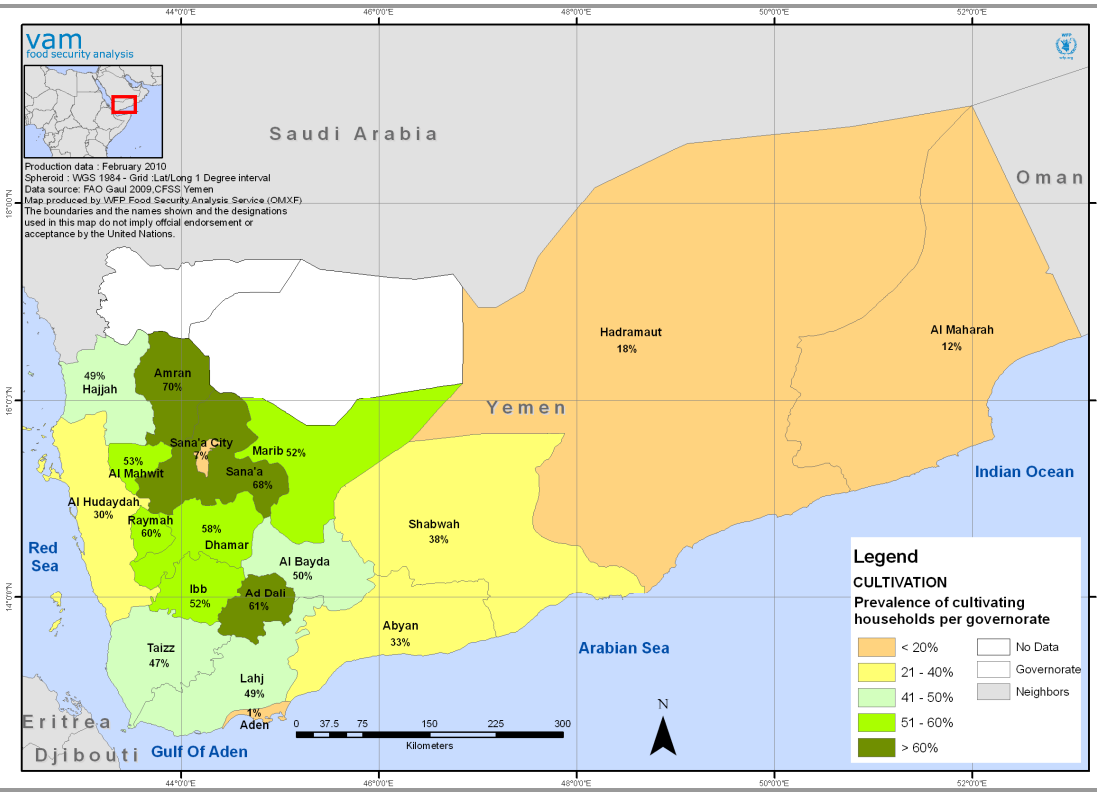
[50] Förch W. (2009). Secondary data analysis on food insecurity and vulnerability in Yemen.

and Al-Hodieda (46.2 percent). The common denominator that best characterizes these livelihoods is uncertainty and unsustainability: wage labour, whether agricultural or non-agricultural, generally involves temporary, often uncertain employment, coupled with the need for seasonal migration. The remainder of the family is usually left behind and supported from afar by means of remittances. Agropastoral livelihoods (crop/livestock production, livestock trading) are challenged by low production, animal and plant diseases, uncertain weather and changing climatic conditions, as well as increasingly difficult access to water supplies. Reliance on family support and social benefits implies lack of control over the quantity of support and the frequency with which it is received from informal sources, while formal sources such as social benefits may not be sufficient to meet the food consumption needs of households. These six livelihoods are more predominant in the rural (44.4 percent) than urban (17.4 percent) areas. The share of urban households making a living from those livelihoods is too small to be able to draw any firm conclusions.

Food-insecure households in rural areas engage in agropastoral livelihoods, after wage labour and reliance on external support. Despite only 2.04 percent of Yemen's land surface being suitable for cultivation (CFSAM 2009) and agriculture contributing only a 15 percent share to the country's GDP, over 70 percent of its people live in rural areas (CSO 2007), the majority depending on agricultural activities as their main or secondary livelihood. According to CFSS findings, agropastoral livelihoods[51] provided a main income source for 9 percent of rural households. However, over half (55.6 percent) of rural households have access to agricultural land, and 61.2 percent of these households access this land through private ownership. In other words, while agropastoral activities may not represent the main source of income for most Yemenis, such activities complement the overall income for more than half of the population.

[51] Agropastoral livelihoods in this context include crop and livestock production and livestock trading.

Map 6-5: Proportion of crop-cultivating households in October/November 2009



Source: CFSS 2010 Community Interviews

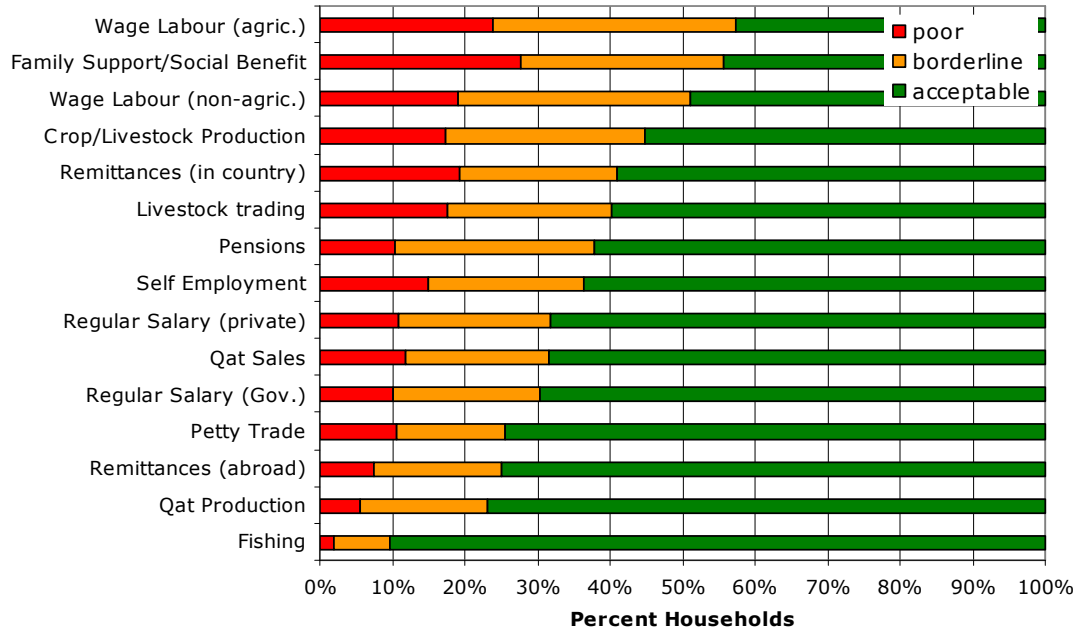
Agropastoralists in Yemen have the potential to be the wealthiest people in the country and are also very likely to be the poorest (MoPIC/World Bank 2010). Similarly, agropastoralists are not all equally susceptible to food insecurity. The food security status of households living off agropastoral activities is closely associated with their access to productive assets used to support and enrich their livelihoods, such as the size of land, the types of crops grown, the type of watering used, the impact of constraints the household is exposed to during the course of an agricultural year, the support they receive from agricultural extension services. Having access to agricultural land and having cultivated the land in 2009 immediately reduces the likelihood of households being food-insecure: 65 percent of all households with access to agricultural land were food-secure. However, among the agriculturalists in rural areas, the crop and livestock producers are the most affected by food insecurity with 44.9 percent of households, followed by the livestock traders with 40.3 percent of households. The lowest shares were found among the qat producers (i.e. their main income stems from qat production) and fishing households with 23.0 percent and 9.5 percent respectively.

Food-insecure households that obtain their main income from agricultural livelihoods mainly grow maize, sorghum and qat, while high value food crops such as fruits and vegetables are a rarity. The most frequently cultivated crops in 2009 included maize (48 percent of households), qat (32 percent) and sorghum (29 percent). According to the HBS 2005/06 findings, the consumption of home-produced food constitutes a large component of households' total agricultural income: while self-sufficient agriculturalists are an exception rather than the rule in Yemen, nearly half of households' agricultural income is reflected as consumption of home products

(IFPRI 2010). In other words, cereals, when cultivated, are mostly consumed at home rather than commercialized. The CFSS findings show the highest shares of home consumption in Dhamar with 13.2 percent of food consumed from own production, followed by Rayma (12.6 percent), Amran (9.9 percent) and Sana'a (9.2 percent).

Cereals are also the most common crops among food-insecure agricultural households, with almost half of them having cultivated maize (48 percent), followed by sorghum (27.0 percent). The third most commonly cultivated crop among food-insecure households is qat: more than one quarter of food-insecure households cultivated this crop in 2009. Other types of cash crops such as coffee, fruits and vegetables are highly unlikely to be grown by them, most likely a reflection of their limited access both to productivity-increasing means, such as irrigation, fertilizers, quality seeds, storage facilities, and to agricultural extension services. In other words, it appears that with the cultivation of high value food/cash crops, requiring high maintenance and a solid productive asset base, the likelihood of agriculturalists being affected by food insecurity decreases substantially.

Graph 6-13: Fifteen main livelihood groups in RURAL areas by percent of food-insecure households*



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Qat is the most frequently grown non-food crop with the largest shares of households cultivating it in Sana'a (69.1 percent), Ad Daleh (59.1 percent) and Amran (52.9 percent). According to the HBS (2005/06), qat accounts for 84 percent of income from crops in the Lower Highlands and 60 percent in the Upper Highlands. It is a cash crop that, unlike all other cash crops, requires low maintenance and most importantly, is 10 to 20 times more profitable than any other crop (CFSAM 2009). For those reasons, an increasing number of farming households have started producing qat, which represents a crucial complementary cash contribution to households' overall agricultural income. According to CFSS findings, almost one in three rural farming households (31.6 percent) cultivates qat. Qat has had considerable positive impacts on the standard of living in the rural areas, having

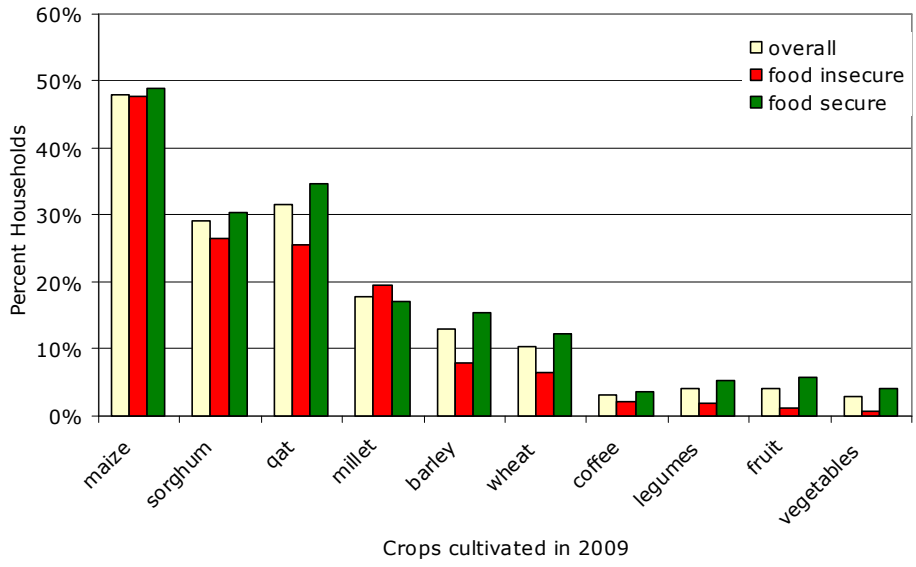
contributed to a substantial rise in farmers' income, to the creation of job opportunities and to an increasing supply route and connection between the rural and urban areas, particularly in the Highlands.[52] With these positive developments, farming households have been increasingly able to invest in digging wells, extending their land area allocated to qat and other crops, and most importantly have access to sufficient cash reserves to purchase enough food on the market. In fact, fully-fledged qat producers who obtain their main income from qat cultivation have been found to be least affected by food insecurity among all rural livelihoods (see Graph 6-13).

The area under qat cultivation steadily increased between 2004 and 2008 at a rate of 3.3 percent per year from 122,843 ha in 2004 to 146,810 ha in 2008. According to the CFSAM (2009), since 2005 the land area under qat has consistently expanded at a rate of 7.3 percent, adding around 4,800 ha each year. Areas of vegetables, fruit crops, pulses and fodders have also steadily increased over the same period, but at a much lower rate than for qat.

While qat has been a crucial factor in improving the rural standard of living in the Highlands, its expansion and consumption have had a number of serious negative side effects at both the macro and micro levels that will have considerable impact on the food security status of the population. Firstly, its increased share of the total cropped area has come at the expense of cereals, as well as fruits and vegetables. This has not only resulted in a decrease in agricultural exports — which brought in much needed revenue — compared with the 1970s, but it has also increasingly exposed the population to food price volatilities because their main source of food has become the market. Secondly, according to Yemen's Ministry of Agriculture and Irrigation, qat cultivation consumes 40 percent of the country's water resources, thereby contributing to their fast depletion. Lack of water, particularly lack of improved sources for drinking water, was one determining factor of household food insecurity and the nutritional status of women. Thirdly, qat consumption has been found to negatively impact people's health and nutrition status, especially that of children in cases where caregivers regularly consume qat. This may be the result of less being care given to children by parents under the influence of qat and/or due to reasons of a biological nature when women chew qat during pregnancy (IFPRI 2010).

[52] Ministry of Planning, Ministry of Agriculture, FAO (2002), Towards the formulation of a comprehensive qat policy in the Republic of Yemen.

Graph 6-14: Percent of households with access to land by household food security status* and by types of food and non-food crops cultivated in 2009

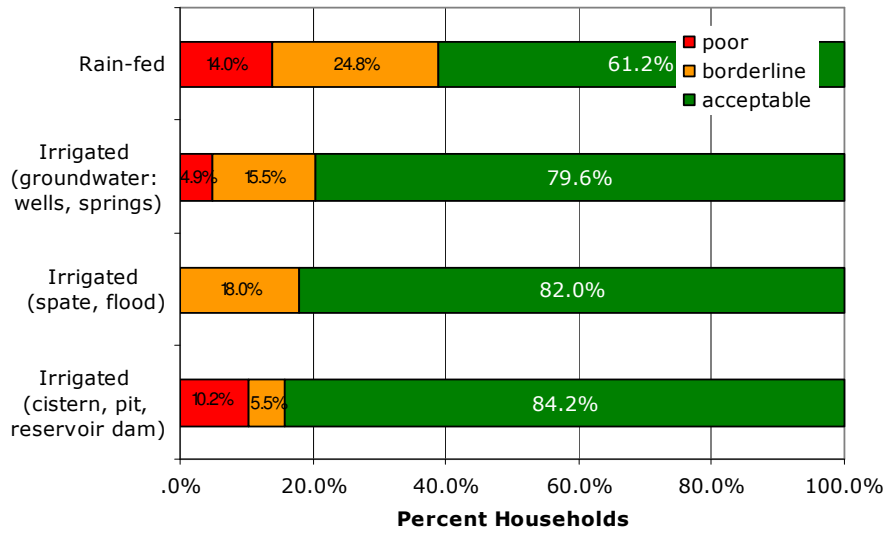


Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Food-insecure households in rural areas are reliant on rainwater for the cultivation of their crops. Rainwater is the main source of water for cultivation for the majority of the rural population: 74.4 percent engage in rainfed agriculture, compared with 18.5 percent of households using groundwater in the form of wells and springs, and the remaining 2 percent using spate/flood irrigation or reservoirs. Cereal crops are mainly rainfed, partially contributing to continuing low yields of between 0.6 tons and 1.6 tons of grains per ha. According to FAO (2009), yields for cereals in Yemen are less than half of the average of other Middle Eastern countries. Rainfed agriculture is occasionally supplemented by irrigation, especially for cash crops such as fruits and vegetables that require regular and large amounts of water. The costs of groundwater extraction are kept low by Government fuel subsidies, an initiative that has led to a considerable and unsustainable increase in water-pumping activities by those who can afford it. Groundwater pumping is usually carried out with diesel fuel, which has been reported to cost on average 17 cents per litre or 68 cents per gallon.[53] Approximately half of Yemen's arable land is irrigated (IFPRI 2010), yet only 21 percent of farming households indicated they had access to irrigation means, highlighting its unequal distribution.

[53] See http://www.middle-east-online.com/ENGLISH/features/?id=36797

Graph 6-15: Percent of food-secure and food-insecure* households by type of irrigation system used for cultivation of crops



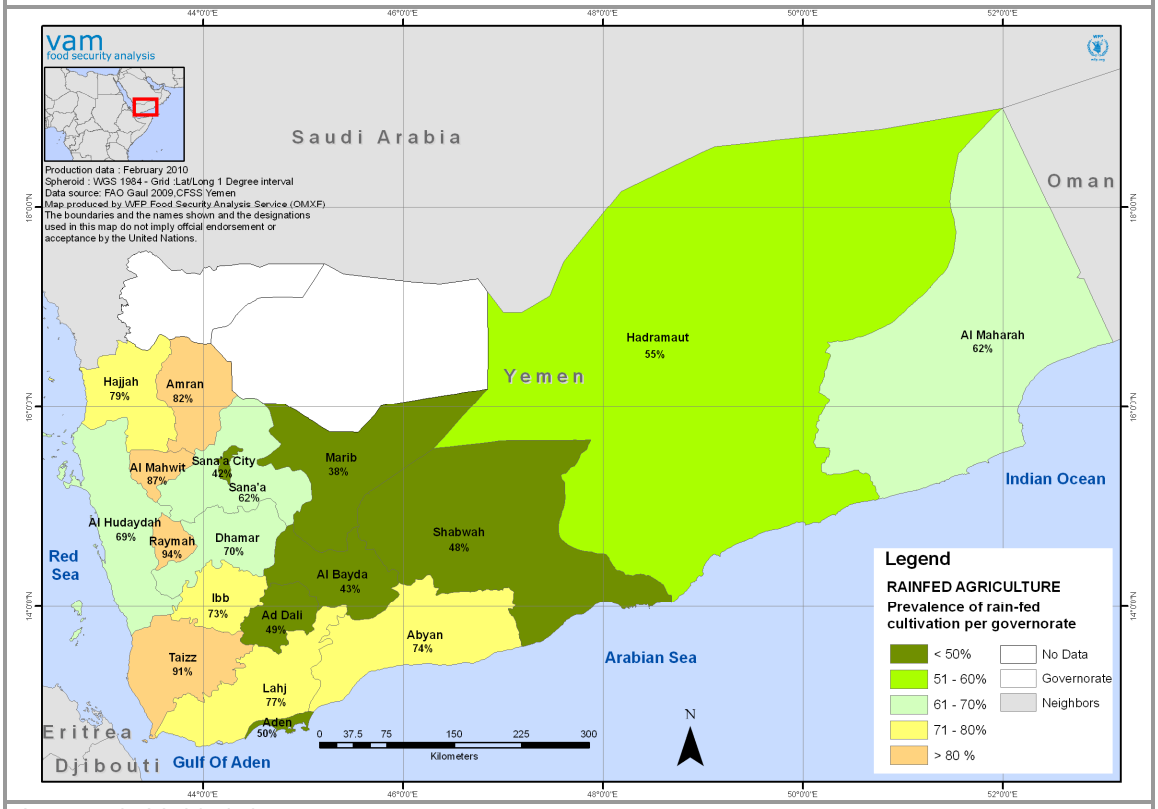
Source: CFSS 2010
* Food insecurity equivalent to poor or borderline food consumption

Rural households using rainwater as their main source of water for irrigating their lands are significantly more likely to be food-insecure than those using different irrigation techniques. Of all those relying on rainwater, 38.8 percent of households were food-insecure, compared with 15.8 percent accessing cisterns, reservoirs or dams, for example. Since they are likely to be poorer, they have a limited asset base with limited access to irrigation means. Only 11.8 percent of food-insecure households indicated irrigating their land, the remainder relying on rainwater. Up to one quarter of food-secure households (25.0 percent), on the other hand, were found to use irrigation mechanisms.

Relying on rainwater renders farming households particularly vulnerable to natural disasters, climate volatility and rainfall variability. In fact, lack of rainfall was the most frequently mentioned shock experienced by 44.5 percent of all rural households and more than half of all food-insecure households (52.8 percent) during the course of 2009 across all surveyed governorates.

While reliance on rainwater as the main source of water for cultivation is the most common way of watering the land, there are considerable variations among governorates. Almost the entire population of Rayma and Taiz is dependent on rainwater for the cultivation of its crops, followed by Abyan, Al-Mahweet, Amran and Hajja with over 80 percent of their population not using any irrigation means. Some of these governorates also have some of the highest shares of food-insecure households in the country, particularly Amran, Hajja, Rayma and Taiz.

Map 6-6: Prevalence of rainfed cultivation per governorate



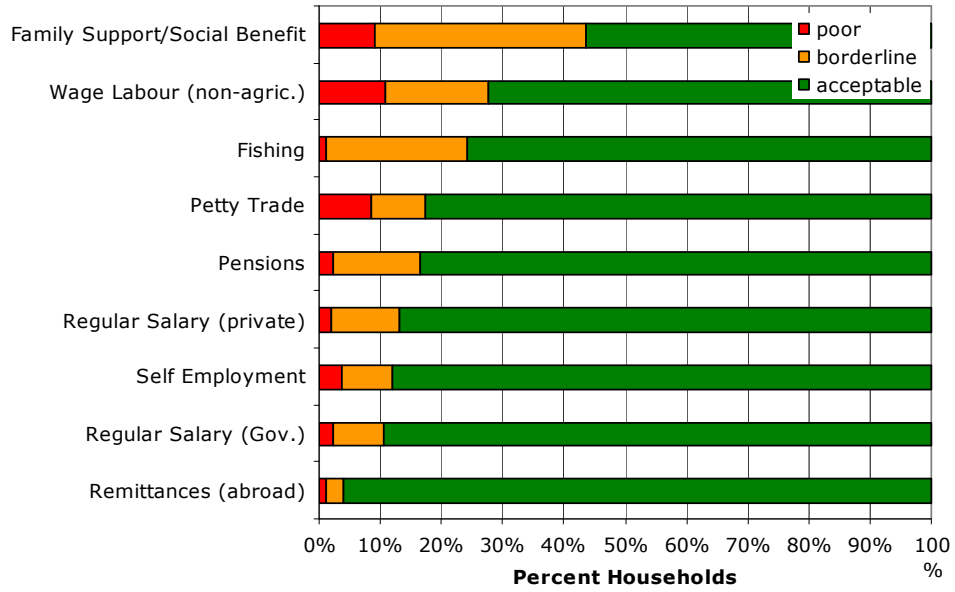
Source: CFSS 2010 Community Interviews

Food-insecure households keep livestock; however, they own fewer heads and tend to be more affected by livestock disease than food-secure households. Livestock represents about 20 percent of agricultural GDP, plays a crucial role in the economy of poor households and contributes to poverty alleviation (World Bank 2009). Cattle, goats, sheep and poultry are the most common livestock in Yemen, kept by at least two thirds of the rural households across all governorates. According to the World Bank, livestock ownership is less unequal than access to land, having an "inequality decreasing effect". More than half of all food-insecure households (55.7 percent) likely to belong to the poorer segments of society own livestock and poultry. Yet, while food-insecure households tend to own between one and two heads of livestock, food-secure households are more likely to own above 10 heads of livestock. Also, of all households that indicated they had had serious difficulties with livestock diseases in 2009, one quarter (25.0 percent) were food-insecure and 30.2 percent were the poorest of the poor, compared with 9.2 percent who were wealthier pastoralist households. The governorates with the largest shares of communities that indicated having had problems with livestock disease include Taiz (17.4 percent), Al-Hodieda (15.8 percent) and Hajja (11.2 percent).

Food-insecure households in <u>urban areas</u> mostly receive support from family and friends or social benefits and engage in non-agricultural wage labour, fishing and petty trading; more than one in three food-insecure households in urban areas (36.7 percent) make a living from these livelihoods. In addition to lack of access to sufficient and nutritious food, households earning a living from these three livelihoods have been found to have the largest shares of economically poor households (i.e. the largest shares of households in the lowest and second lowest wealth quintiles). The urban

food-insecure households represent 63 percent of the urban poor. In other words, food-insecure households in urban areas have significantly fewer resources available for essential non-food items than wealthier households, such as households receiving regular monthly salaries, 92.2 percent of which fall into the two wealthiest wealth quintiles. Furthermore, it can be assumed that high food prices continue to undermine their already limited purchasing power, as do the generally higher costs of living in urban centres compared with rural areas. In fact, as a result of the increase in food and fuel prices the urban population has been significantly more impacted than the population in the countryside, with double the increase in poverty at 40 percent over the last five years (IFPRI 2010). The urban poor (first/lowest wealth quintile) allocate spend 53.6 percent of their total monthly expenditures to food, compared with 37.3 percent destined for food by wealthier households in the urban areas.

Graph 6-16: Nine main livelihood groups in URBAN areas[54] (% of entire sample) by percent of food-insecure households*



Source: CFSS 2010
* Food insecurity equivalent to poor or borderline food consumption

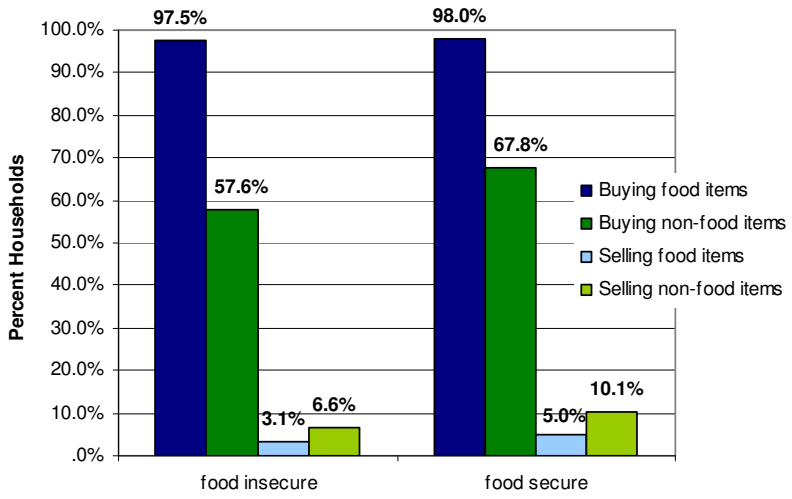
6.3.4 Sources of food, access to markets and expenditures

Food-insecure households are net buyers, purchasing their food with cash like the rest of the population (IFPRI 2010). However, they tend to use different sources to purchase their food and they purchase on a less frequent basis than food-secure households. Almost all Yemenis are net buyers (96 percent), purchasing their food with cash from the market or the shop, regardless of the food security and wealth status of the household. Buying food is by far the most common activity when households visit the market, for both food-secure and food-insecure households, followed

[54] Livelihood groups with fewer than 50 households were excluded as they are not representative. These are: agricultural wage labour, qat sales, crop and livestock production, livestock trading, remittances (in-country), qat production.

by the purchasing of non-food items. Selling, on the other hand, of either food or non-food items was found to be least common among the activities that households engage in when visiting the market. This finding may be surprising given that the largest share of agricultural income stems from the sales of crops, livestock and fisheries (IFPRI 2010). However, the two findings may not necessarily contradict each other because engaging in sales in the market may be considered rather formal while most sales of products may in fact take place among individuals in the village, in other words, in a less formal setting than the market place. Despite the fact that the difference between the two findings can be explained, the location where households tend to sell their products may demand further research.[55]

Graph 6-17: What are the main activities in the market?

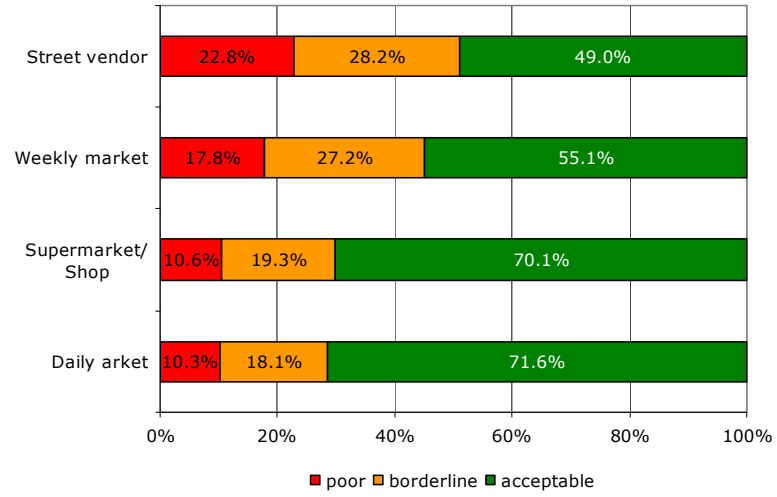


Source: CFSS 2010

Differences lie in the types of food sources (markets, shops, etc.) used and the frequency with which foods are purchased. Comparatively speaking, daily markets and supermarkets are a more common source for urban than rural households: for example, 70.2 percent of households in urban areas buy their food from daily markets while only 46.4 percent of rural households do. The latter tend to make more use of weekly markets and street vendors. A similar trend can be seen among food-insecure households: buying food from street vendors and weekly markets is more common for food-insecure households than going to supermarkets or weekly markets: half of all households buying from street vendors (51.0 percent) and 45.0 percent of households buying from weekly markets are food-insecure, while the large majority of households buying from supermarkets and daily markets are food-secure, possibly a reflection of their higher wealth status and their rural or urban location.

[55] A WFP market and traders assessment is tentatively planned for the first quarter of 2010, which could shed more light on this and the following issues.

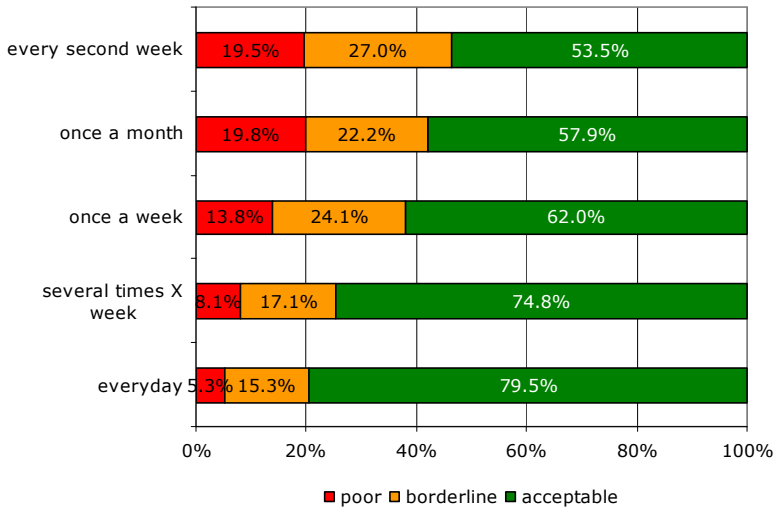
Graph 6-18: Where do food-insecure households* purchase their food?



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Food-insecure households buy their food significantly less often than food-secure households: buying food every second week or once a month is more common for food-insecure households than buying food on a daily basis or even several times per week as illustrated in Graph 6-19. This may be an indication of the longer distances that food-insecure households, predominant in the rural areas, have to cover in order to reach the nearest food market. According to IFPRI's findings (2010) food-insecure households need to travel 10 to 20 minutes longer to reach the nearest local market or urban centre.

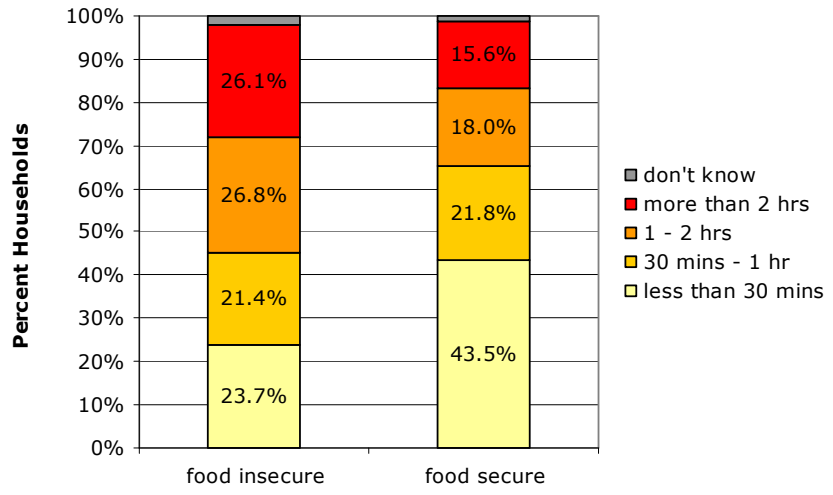
Graph 6-19: How often do food-insecure households* purchase their food?



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Food-insecure households are more likely to walk up to two hours to the nearest market or shop to purchase their food than food-secure households, the majority of which have a market within one hour's walking distance. Access to markets also differs considerably with the food security status of the household: while more than half of all food-insecure households (52.9 percent) walk more than one hour to reach the nearest food market or shop, with 26.1 percent requiring more than two hours, 65.3 percent of food-secure households need a maximum of one hour and 15.6 percent more than two hours. Based on the perception of key informants interviewed in each village visited, 58.9 percent of the Yemeni population reach the nearest food market or shop within less than one hour of walking, compared with 20.2 percent who need up to two hours and 19.6 percent who walk more than two hours. There are large variations across the country: the overall trend is reversed in rural areas where less than half of the households (43.1 percent) can reach their market or shop within one hour while the entire urban population is able to do so (99.3 percent). More than one quarter of the rural population (27.7 percent) walks more than two hours. The governorates with largest shares of the population needing more than two hours to purchase their food include Hajja (41.4 percent), Al-Mahweet (37.5 percent) and Rayma (31.0 percent).

Graph 6-20: Distance to nearest food market/shop by household food security status*



Source: CFSS 2010
* Food insecurity equivalent to poor or borderline food consumption

Food-insecure households have access to credit but to a lesser extent than the food-secure. If they do have access their sources are predominately informal. Overall, the large majority of households (73.0 percent) indicated having access to credit sources, which are, however, are mainly informal rather than formal sources: the most common credit sources used across the board include relatives and friends (64.2 percent), credits from shopkeepers (55.2 percent), followed by banks (3.9 percent) and other formal credit organizations (1.2 percent). While rural and urban households do not differ greatly in terms of accessing informal credit sources, formal credit institutions are significantly less common in the countryside than in the cities. Two in three food-insecure households (66.9 percent) indicated having access to credit sources compared with 76.0 percent of food-secure households. While informal credit sources (such as relatives/friends and shopkeepers/moneylenders) are most common among both food-secure and food-insecure households, there are significant differences that it could

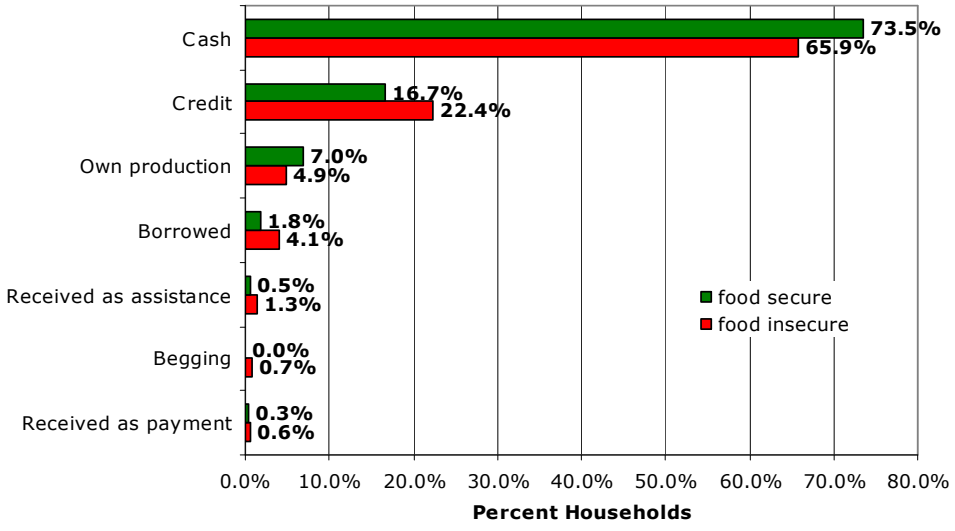
be argued point to an increased vulnerability status among the food-insecure. Comparatively speaking, a larger share of food-secure households (66.2 percent) has access to credit from relatives/friends than food-insecure households (59.6 percent). Also, a surprisingly large share of food-insecure households (57.3 percent), similar to the share of food-secure households (54.3 percent), access their credit from shopkeepers and/or moneylenders. The use of this credit source, on the other hand, can be assumed to involve the payment of interest rates that could easily lead to an accumulation of debts in the long run. Last but not least, the small share of households that indicated having access to credit from banks and other credit organizations were almost all food-secure, with 94.3 percent of households using banks as a source of credit being food-secure and 87.2 percent of those using other credit organizations food-secure.

Overall, 62.1 percent of households had loans or debts to pay off at the time of the survey, with 64.0 percent of the rural and 57.6 percent of the urban population, 63.6 percent of the food-insecure and 61.3 percent of the food-secure households. The average time needed to pay off the debt or loan was 42 weeks or 10.5 months and did not differ significantly in relation to the location of households or their food security status.

Food-insecure households mostly buy their food with cash; however, compared with food-secure households, they rely more on credit, borrowing and gifts as food sources. Households were asked about the main sources of the foods consumed over the seven days preceding the survey. Cash purchases in the market were found to be the main food source for all households. In addition to market purchases, food-insecure households, however, appear to be more likely to also access food by buying on credit, borrowing, receiving food as gifts, than food-secure households. These are food sources that are generally considered to be less reliable, posing a risk of debt accumulation. Accessing food from own production was more prevalent among the food-secure (7.0 percent) than food-insecure households (4.9 percent), see Graph 6-21).

Borrowing food, buying food on credit and receiving food as gifts are also most common among households in the six most vulnerable livelihood groups. For example, the food share that non-agricultural wage labourers bought on credit over the seven days preceding the survey was almost as high as that of households earning a regular salary from the Government, which is one of the livelihoods with the highest prevalence of wealthy and food-secure households. While the latter households may be able to cope with an accumulation of debts, wage labourers, likely to belong to the poorer segments of society, can be assumed to be at an increased risk of indebtedness in the medium to long term. Borrowing food is most common among households that mostly rely on support from family and friends (14.1 percent), as well as receiving food as gifts (4 percent). Accessing food from own production is more common among rural food-secure (10.7 percent) than rural food-insecure households (4.7 percent).

Graph 6-21: Sources of food over the seven days preceding the survey by food-secure and food-insecure households*

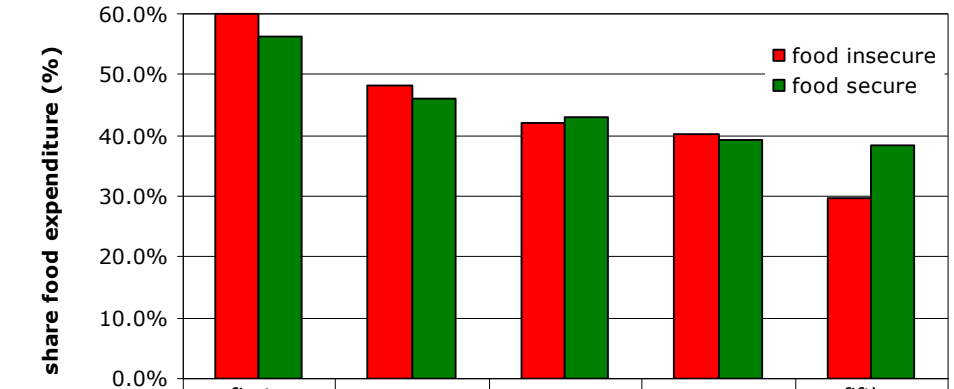


Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Food-insecure households allocate about half of their overall monthly expenditures to food - 14 percent more than food-secure households - an indication of their having to stretch resources to acquire the minimum level of food and make ends meet. At the national level, Yemeni households allocate on average 45 percent of their monthly expenditure to food, with the highest shares spent on bread (22.7 percent). The highest non-food expenditures are for qat (9.0 percent), clothing (6.7 percent), utilities (6.7 percent) and health (6.6 percent). Differences among governorates in that regard are substantial, with the share of household expenditure on food reaching 57.9 percent in Rayma, 54.9 percent in Hajja and 52.6 percent in Al-Hodieda, while it drops down as far as 33.8 percent in Sana'a City. High food prices, which challenged 86.5 percent of households interviewed over the twelve months preceding the survey, may have greatly eroded household purchasing power, obliging households to allocate a disproportionate share of their expenditure to food. In fact, 58.3 percent of the total expenditure of the poorest households is allocated to food, compared with 37.6 percent destined for food by the wealthiest households.

Shares of total monthly expenditure on food greatly exceed the national average when combining the food security and wealth status of a household: poor, food-insecure households were found to spend up to 60 percent of their income on food, leaving the remainder for non-food expenses. Poverty is the main factor determining the share spent on food, as even poor households, not challenged by food insecurity, spend up to 56 percent of their outlay on food. Better off households, on the other hand, can afford to dedicate more than two thirds of their expenditures to essential non-food items such as education and health.

Graph 6-22: Share of food expenditure of total household income by household food security* and wealth quintile



	first - poorest	second	third	fourth	fifth - wealthiest
food insecure	59.9%	48.2%	42.2%	40.1%	29.7%
food secure	56.2%	46.0%	43.1%	39.2%	38.3%

Wealth Quintiles

Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

Of all household expenditures, the largest share is on bread for both food-secure and food-insecure households. Food-insecure households, however, spend significantly more on bread, with 32.7 percent, compared with the 17.8 percent of food-secure households. The latter spend more on vegetables, meat, fruits and dairy products, a reflection of their diversified diet, which determines their food security status and, for example, makes them more resilient to micronutrient deficiencies than food-insecure households.

Furthermore, the share of expenditure on qat by food-insecure households (7.1 percent) is almost as high as expenditure on health (7.3 percent). After bread and health expenditures, qat is the item that food-insecure households spent most of their resources on. The governorates where households were found to allocate the largest shares — more than 10 percent of their monthly expenditures — to qat include Amran with 13.5 percent spent on qat, followed by Sana'a (12.6 percent), Ad Daleh (11.8 percent), Ibb (11.8 percent) Sana'a City (11.7 percent), Mareb (11.7 percent) and Dhamar (10.1 percent). In terms of livelihoods, households involved in the production and sale of qat were also found to spend most of their resources on the crop, accounting for up to 22.2 percent of monthly expenditures by qat producers. Poorer livelihoods, such as crop and livestock producers, livestock traders and households relying on support from family and social benefits for example, spent comparatively low shares on qat, with 3-6 percent.

Table 6-3: Share of monthly household expenditures on food and non-food items by food security status

Overall		Food insecure		Food secure	
Share of monthly expenditures on FOOD items					
Bread, cereals	22.7%	Bread, cereals	32.7%	Bread, cereals	17.8%
Vegetables	6.4%	Vegetables	5.9%	Vegetables	6.7%
Diary	4.0%	Diary	3.2%	Diary	4.5%
Poultry	3.9%	Poultry	3.1%	Poultry	4.3%
Fish	2.4%	Drinking water	2.5%	Fish	2.8%
Drinking water	2.3%	Fish	1.4%	Pulses	2.3%
Pulses	1.9%	Pulses	1.0%	Drinking water	2.2%
Meat	1.6%	Fruits	0.8%	Meat	2.1%
Fruits	1.6%	Meat	0.7%	Fruits	2.0%
Meals consumed outside home	0.5%	Meals consumed outside home	0.3%	Meals consumed outside home	0.6%
Average on food	**45.0%**	**Average on food**	**49.1%**	**Average on food**	**42.9%**
Share of monthly expenditures on NON-FOOD items					
Qat	9.0%	Health	7.3%	Qat	9.9%
Clothing	6.7%	Qat	7.1%	Utilities	6.6%
Utilities	6.7%	Clothing	6.8%	Clothing	6.6%
Health	6.6%	Utilities	6.8%	Health	6.2%
Debts	3.7%	Soap	3.7%	Debts	4.1%
Transport	3.5%	Fuel for cooking	3.3%	Transport	3.9%
Soap	3.2%	Debts	3.0%	Soap	2.9%
Fuel for cooking	2.7%	Transport	2.6%	Fuel for cooking	2.5%
Communication	2.0%	Education	1.6%	Communication	2.4%
Rent	1.7%	Tobacco	1.2%	Rent	2.0%
Education	1.7%	Rent	1.1%	Education	1.7%
Tobacco	1.3%	Communication	1.1%	Tobacco	1.3%
Celebrations	1.1%	Celebrations	0.8%	Celebrations	1.2%
Remittances	0.9%	Remittances	0.8%	Housing	1.2%
Housing	0.9%	Seeds	0.5%	Remittances	1.0%
Seeds	0.5%	Housing	0.4%	Seeds	0.5%
Business	0.2%	Business	0.1%	Hiring labour	0.3%
Hiring labour	0.2%	Hiring labour	0.1%	Business	0.3%
Average on non-food	**55.0%**	**Average on non-food**	**50.9%**	**Average on non-food**	**57.1%**

Source: CFSS 2010

6.3.5 Exposure to shocks and coping strategies used

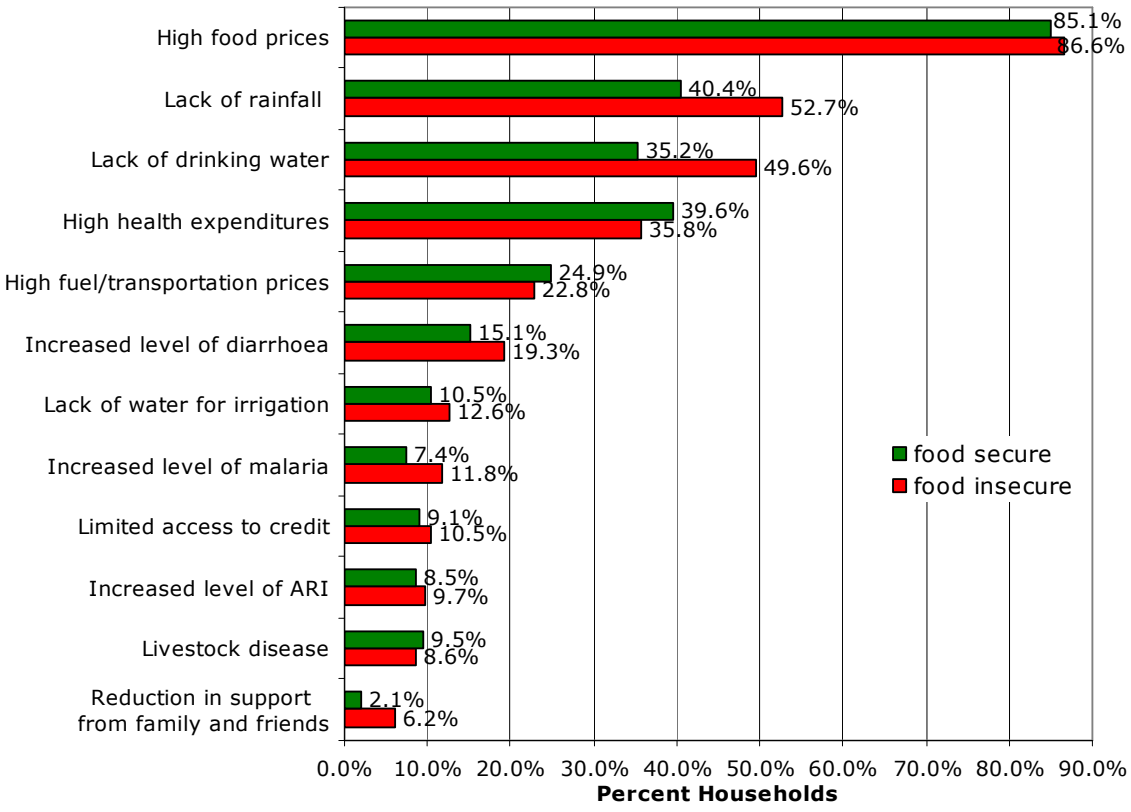
Household food security is determined by the external environment in which people live. Within the external environment, critical trends (e.g. population growth, national and international economic trends, governance and technological changes), seasonal cycles (of prices, production, livelihood strategies) and shocks (natural and resulting from human intervention) frame the vulnerability context. Within that vulnerability context, the risk of ensuing food insecurity is defined as the interaction between the probability of a given hazard of a certain intensity, the vulnerability of the population to the hazard and the size of the population.

The following section is limited to providing an insight into the most prominent difficulties to which households have been exposed during the course of 2009 and how they have coped in response to constraints on their access to food.

The most pressing difficulties experienced by food-insecure households during 2009 include high food prices, lack of rainfall and lack of drinking water. This trend holds true at the national level and among the rural population. Urban households differed in their ranking of the most prominent difficulties: following high food prices as the main problem (87.1 percent) were high health expenditures (40.3 percent) and high fuel and transportation costs (28.5 percent) in the urban areas. Governorates with the highest share of households that indicated having been affected by high food prices are Aden (94.6 percent), Mareb (92.0 percent) and Abyan (90.6 percent), while lack of rainfall was cited mostly in Amran (77.1 percent), Al-Mahweet (70.7 percent) and Mareb (70.1 percent). The largest shares of households that suffered from lack of drinking water were found in Hajja (59.8 percent), Amran (56.0 percent) and Rayma (55.3 percent).

High food prices was the most frequently mentioned difficulty in 2009, with 85.6 percent of households, regardless of their location or food security status. The second and third most pressing difficulties for food-insecure households were lack of rainfall (52.7 percent) and lack of drinking water (49.6 percent). Food-secure households ranked these problems in a similar way, although the percentage of households affected by each differs (see Graph 6-23).

Graph 6-23: Household perceptions regarding shocks experienced over the 12 months preceding the survey (Oct 2008—Oct 2009) by food security status of households*



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption
** Acute respiratory infection

The level of vulnerability to drought is clear from the fact that 82.3 percent of all food-insecure households rely on rainfall for the cultivation of their crops, while 52.7 percent indicate lack of rainfall as one of the main challenges in 2009. Similarly, according to the key informants in the villages visited, lack of water and lack of rainfall are the two most pressing problems that communities face after poverty, with 38.7% of all communities experiencing lack of water and 28.7 percent lack of rainfall. Governorates where more than half of the communities are challenged by scarcity of water include Amran (63.3 percent), Sana'a (58.6 percent), Rayma (57.1 percent), Hajja (56.7 percent), Abyan (53.3 percent) and Taiz (51.7 percent).

Based on the crop calendars derived from the community interviews and data generated through the Normalized Difference Vegetation Index (NDVI), an indicator of vegetation development, an analysis of the risks to rainfed agriculture was conducted. The NDVI data enable identification of areas with the highest variability in the development of vegetation (crop/pasture) from one season to the next. High variability in vegetation development is linked to the variability in water supply (whether from irregular rainfall or surface runoff/river flow). This variability may be a factor in the vulnerability of rural households relying on rainfall or surface runoff (*wadi* flow levels) for cultivation.

In these areas the risk of crop failure is higher and the low stability of crop and/or pasture production may limit household options of agricultural diversification. The governorates where seasonal variability is highest also feature high in the ranks of those more affected by poverty and food insecurity. An analysis of the risks to rainfed crop production in Yemen was carried out and is provided in Annex 11-19.

Food-insecure households consider their socio-economic situation and general well-being to be "much worse" compared with the same time one year before. At the national level, the large majority of households (64.2 percent), regardless of their food security status or rural-urban location, indicated their economic situation and general well-being as having become "worse" than one year before. Stark differences were found between those households reporting that their situation has become "much worse", with 30.1 percent of food-insecure as opposed to 16.2 percent of food-secure households. Although these findings are based on perceptions only and are likely to have been subject to exaggeration, food-insecure households perceived their situation to be worse than last year at a higher rate than food-secure households.

The reduced **Coping Strategies Index (CSI)** was used as another proxy indicator of household food security in order to better understand how Yemenis cope in response to food access constraints. Households were asked on how many of the past seven days they experienced not having enough food or money to buy food. If households reported having experienced this difficulty by indicating the number of days, they answered five questions on five different types of strategy that could be applied in order to make ends meet, including:

1. Rely on less preferred and less expensive food;
2. Borrow food or rely on help from friends/relatives;
3. Limit portion size at mealtimes;
4. Restrict consumption by adults in order for small children to eat;
5. Reduce the number of meals eaten in a day.

The information was used to compute a summative scale, the reduced CSI, which takes into account both the frequency and gravity of the strategy used.[56]

CSI terciles were calculated as the terciles (*low*, *medium* and *high*) of the reduced CSI variable, each of which represents 33 percent of the households that report not having enough food or money to buy food. For more information on the CSI, refer to Annex 11-6.

The limitations of this section include: 1) household coping strategies cannot be linked to a specific shock, but must be viewed as a response to food access constraints; and 2) household risks and vulnerability to potential future shocks cannot be assessed. In this regard, it is recommended that more focused impact assessments be conducted after potentially damaging events (either naturally occurring or resulting from human intervention), in addition to longitudinal studies, in order to improve our understanding of shocks and coping mechanisms at different times of the year and shed light on what strategies are usually adopted in response to which shock.

Food-insecure households are likely to experience difficulties in accessing enough food during the course of the week, which, consequently, makes them more likely to adopt food-related coping strategies than food-secure households. Households were asked whether, over the preceding seven days, there were times when they did not have enough food or money to buy food. At the national level, one quarter of households (26.9 percent) experienced difficulties in accessing food, with a significantly larger share of rural (30.3 percent) than urban households (19.1 percent). There are also considerable differences among the 15 livelihoods: almost half of the agricultural wage labourers (49.8 percent) had experienced this problem, followed by households relying on support from family and friends (45.1 percent), fishing households (39.9 percent), non-agricultural wage labourers (37.7 percent), livestock traders (31.6 percent) and crop and livestock producers (31.1 percent). Food-insecure households (42.8 percent) were also more likely not to have enough food or money to buy food than food-secure households (19.1 percent).

At the national level, 73.2 percent of households did not have to resort to any food-related coping strategies in these situations of limited food access; however, while only 19.0 percent of households in urban areas employed strategies of this nature, 30.1 percent of rural households needed to do so. Similarly, only 18.9 percent of food-secure households had to employ a coping strategy in response to the lack of food or money to buy food, but 42.6 percent of food-insecure households needed to do so.

The order in which the five coping strategies were cited based on the frequency with which households applied them is set out below, and holds true across the different livelihoods and the food security status of households:

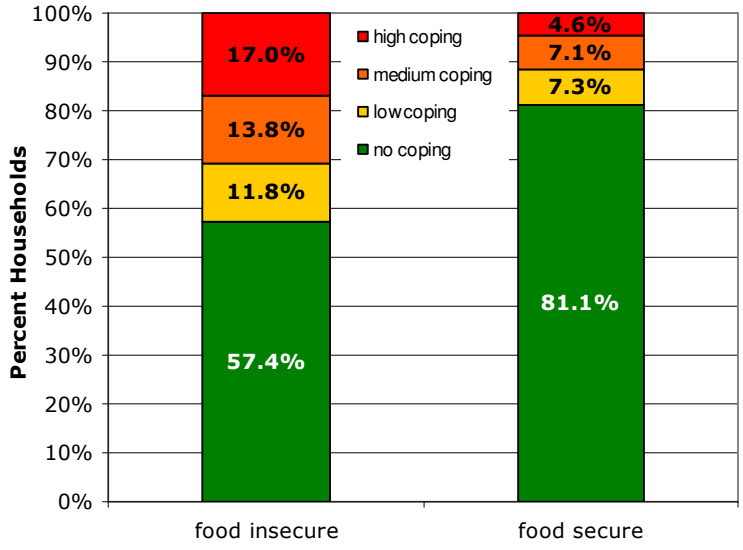
1. Rely on less preferred and less expensive food;
2. Limit portion size at mealtimes;
3. Borrow food or rely on help from friends/relatives;
4. Reduce the number of meals eaten in a day;
5. Restrict consumption by adults in order for small children to eat.

The share of food-insecure households in each coping tercile is significantly higher than that of food-secure households, further underlining their level of vulnerability (see Graph 6-24). There are also considerable differences among the livelihoods, with households

[56] Eating less preferred/less expensive food, limiting portion size at mealtime and reducing the number of meals per day have a severity score of 1. Borrowing food or relying on the help of friends/relatives has a severity score of 2 and limiting adult intake in order to allow small children to eat has a severity score of 3.

relying on support from family and social benefits having the highest share in the "medium" and "high" coping terciles (37.1 percent), followed by agricultural wage labourers (36.2 percent) and non-agricultural wage labourers (27.7 percent). The livelihoods of households that least needed to adopt any of the five coping strategies include living off remittances from abroad, with only 9.4 percent of such households in the two highest coping terciles, followed by qat production (9.8 percent) and regular salaries from the Government (10.3 percent).

Graph 6-24: Household food security status* by food-related coping strategies



Source: CFSS 2010
*Food insecurity equivalent to poor or borderline food consumption

6.4 WHEN ARE HOUSEHOLDS LIKELY TO BE FOOD-INSECURE DURING THE COURSE OF THE YEAR?

Food insecurity appears to be seasonal. Households were asked whether they had experienced any difficulties in obtaining enough food to eat over the 12 months preceding the survey and during which months. Additionally, they indicated during which months of that year they suffered most from lack of rainfall and high food prices. Although qualitative in nature given that the data are based on people's perceptions, possibly requiring further verification, the findings are useful in that they can provide guidance in determining the most appropriate timing for potential food-based interventions.

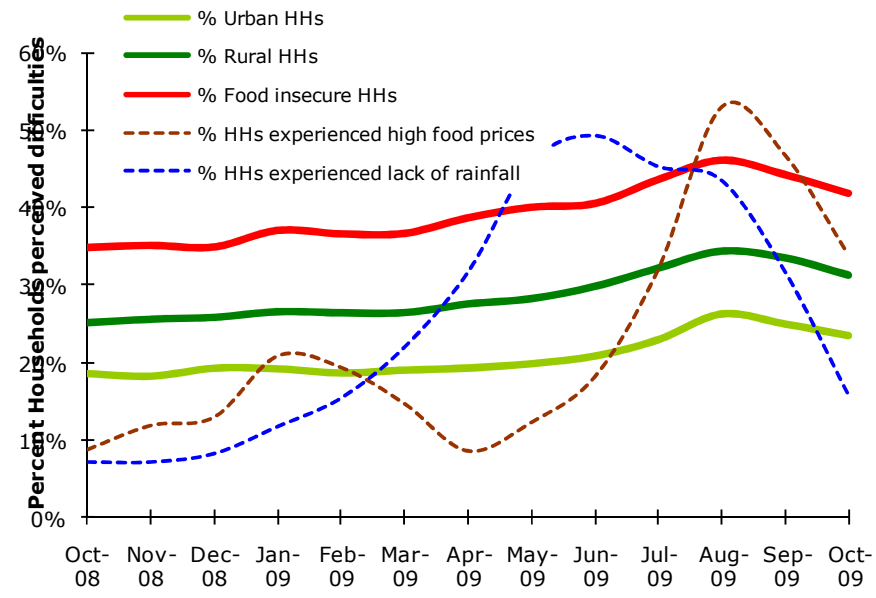
Despite the differences in magnitude, the seasonal trend is more or less the same for rural and urban areas, as well as for food secure and food insecure households: the majority of households indicated having experienced difficulties in obtaining enough food between May and October, corresponding to the lean season, with a peak in August, the onset of the rains.

Household perceptions of high food prices during the months of August and September may not be solely attributable to the lean season. The month of Ramadan — between 22 August and 19 September in 2009 — is generally associated with a considerable increase

in food demands, an intensification of trade flows and significantly higher prices of basic food and non-food commodities. Given the limited state control over markets, traders tend to manipulate prices, taking advantage of the increasing demands during Ramadan and of the monopoly they hold over food commodities generally.[57] While these price increases can take their toll at every socio-economic level, even among the wealthier households, the greatest impact of price increases can be assumed to be felt among the economically disadvantaged households, whose budgets are seriously stretched as a result.

Graph 6-25 illustrates the link between rising food prices and the progression of the lean season, when food availability is reduced and rainfall is low. In a synchronous manner, the share of households experiencing difficulties accessing enough food in urban areas gradually increases in tandem with that in rural areas, from April through to August, albeit with some delay. With the onset of the harvest, food prices decrease, as do food access problems. Annex 11-20 provides the cropping calendars for the most commonly cultivated crops by AEZs.

Graph 6-25: Household (HH) <u>perceptions</u> of difficulties accessing food, high food prices, lack of rainfall in rural and urban areas, and by food security status (October 2008—November 2009)



Source: CFSS 2010

[57] http://www.sabanews.net/en/news193824.htm

6.5 WHY ARE THEY FOOD-INSECURE?

Food security is a complex concept reflecting multiple dimensions: food availability, food access and food utilization. The FCS is commonly used as a proxy indicator of the current food security situation because it is a reliable and easily replicable measure that correlates well with more complex measures such as individual caloric intake.

In order to shed light on why people are food-insecure, bivariate analyses[58] were conducted and showed that the FCS is correlated with variables typically considered to be related to food security, including wealth, food expenditures and other vulnerability factors. Additionally, a general linear model (GLM)[59] was conducted to further examine the most prominent underlying factors of food insecurity and to explore individual-level predictors of food security, using 13 variables in the model and food consumption as the dependent variable. The result of the regression analysis is a coefficient given for each of the variables included in the model. A higher coefficient indicates a higher projected FCS and therefore better food security status.

The following section reports on the results of the bivariate analyses with a significance level of 0.05 and provides the coefficients for those variables that were included in the regression model. Findings from secondary data complement the CFSS findings. Annex 11-8 supplies more details of the statistical analyses carried out.

6.5.1 The poverty trap

Following the rise in food and fuel prices since 2006, the country's poverty incidence has increased by 8 percent (IFPRI 2010), leaving 42.8 percent of the population with insufficient resources to access enough nutritious food and invest in their livelihoods, their personal development and the development of their children. The CFSS found that the FCS is significantly associated with wealth (wealth index) at the household level (Pearson correlation coefficient: .560**). Additionally, there is a clear correlation between wealth and the adoption of coping strategies: the poorer the household the more likely its members are to resort to food-related strategies in order to cope (Pearson correlation coefficient: -.259). The adoption of food-related coping strategies in turn leads to a significant reduction of the household's FCS and therefore to a worsening food security status (GLM coefficient: -.283). Additionally, the higher the number of months households indicated having experienced difficulties accessing food during the course of 2009, the more inadequate their FCS was found to be (GLM coefficient: -.330). The outcome in the short and long term is a productive and non-productive asset base that is further undermined, together with a seriously depleted human capacity, making it more difficult for households to lift themselves out of the poverty trap and build up a buffer that is a thick enough to withstand potential future shocks, whether natural or the result of human intervention.

So far, national-level attempts to address poverty in the country have not had a sizeable impact in terms of pulling people out of the poverty trap (IFPRI 2010). The Government has been investing in the Social Welfare Fund (SWF) since 2002 to support the poorest of the poor in the country. The Fund is challenged by shortcomings in its targeting system, greatly limited coverage and the size of its transfers. IFPRI found that only about one third of the total disbursement of the SWF goes to food-insecure households. The amount

[58] ANOVA and Pearson correlations.
[59] The analysis was run using the Complex Sample in SPSS. The Complex Sample Linear Model (CSGLM) procedure performs linear regression analysis, as well as analysis of variance and covariate, for samples drawn by complex sampling methods, such as cluster analysis.

appears to be even lower for the Agriculture and Fisheries Production Promotion Fund, another national source of social transfer support, with only 10 percent of its funds targeted to food-insecure households. The targeting mechanism of the SWF is currently being improved with support from the World Bank, which should, once adopted in 2010, reduce the large exclusion/inclusion error that has flawed the system to date.

6.5.2 Exposure to food price volatilities

Yemen's reliance on food imports has left the country highly vulnerable to international market price volatilities transmitting down to the local level, as witnessed in 2007/08 with wheat price increases as high as 88 percent (WFP 2008). While markets are generally well-stocked, food price volatilities continue to undermine the purchasing power of poor Yemenis, 96 percent of whom are net buyers (IFPRI 2009). While food prices have decreased since their peak in 2006, they remain at pre-crises levels. The most frequently cited difficulty experienced in 2009 by 85.6 percent of households was **high food prices** which, in fact, has been one of the determining factors of household food insecurity: households that reported not having been challenged by high food prices in 2009 were likely to have a higher predicted FCS (GLM coefficient: 2.167).

6.5.3 Limited investment in rural infrastructure and livelihoods

Agriculture provides an income for approximately 80 percent of the population (HBS 2005/06), with **lack of access to agricultural land** being found to negatively impact on a household's FCS (GLM coefficient: -3.7). Yet the agricultural sector remains highly underdeveloped, thereby undermining the wealth and food security status of the rural population. According to the recent CFSAM (2009), **crop yields remain below potential** compared with levels of other countries having similar environmental conditions, which in turn keeps the agricultural income of households significantly below potential. Access to efficient and sustainable irrigation mechanisms is extremely limited and unequally distributed across governorates and socio-economic groups. **Reliance on rainfall** for the cultivation of crops was significantly associated with increased food insecurity at the rural household level: while 38.8 percent of households relying on rainwater were found to be food-insecure, only 15.7 percent using irrigation mechanisms such as cisterns and reservoirs were food-insecure.

On the basis of HBS 2005/06 data, similar conclusions were drawn about agricultural extension services, which are extremely limited in Yemen: only 3 percent of the rural population indicated having received this type of support, with an even lesser likelihood of food-insecure households having benefited from such services (IFPRI 2010). **Productivity-increasing inputs** such as fertilizers, pesticides and modern seed varieties are also used significantly less by food-insecure households (IFPRI 2010). And in cases where farming potentials are reached, post-harvest losses remain high as a result of poor harvesting, handling and packaging techniques, poor transportation and storage systems, inadequate infrastructure (CFSAM 2009). Extensive human effort and financial resources may be invested, but for minimal output, keeping the farming households below the poverty line, thereby increasing their vulnerability to food insecurity.

Sustainable water management systems are extremely limited in the countryside, contributing to the rapid depletion of the country's water resources. One third of all groundwater abstraction is utilized for qat cultivation, leaving increasingly insufficient quantities not only for the irrigation of food crops and high value foods, such as fruits and

vegetables, but also for drinking water.[60] In fact, half of all households (49.6 percent) mentioned lack of quality drinking water as one of their most frequently experienced shocks in 2009. **Drinking from unimproved sources**, common among 40.9 percent of households, was found to be a determining factor of household food security status. The FCS was significantly better with the use of improved sources of drinking water (GLM coefficient: 2.5).

Lastly, **limited access to markets** appears to influence the food security status of a household but may need more research. Given that almost all Yemenis buy their food with cash, and that approximately 40 percent of agricultural income stems from crop sales and 10 percent from livestock and fish sales, household access to markets — significantly more limited in rural than in urban areas — is a crucial determinant of food security status (IFPRI 2010). Access to markets in terms of walking distance was considerably more limited for food-insecure than for food-secure households. More than half of all food-insecure households (52.9 percent) live more than one hour's walking distance from the nearest food market, compared with 43.5 percent requiring less than 30 minutes to reach a food market.

6.5.4 Limited investment in human development, especially for women

As in most parts of the world, there is a very clear, strong link between the **educational level of the household head** and the food security status of the household. A good educational status among all, both men and women, results in a significant decrease in their vulnerability to food insecurity, and a better food security status is likely to promote a higher educational attainment. In fact, the more limited the educational level of the household head, the less adequate the family's food consumption, the higher the prevalence of malnutrition among children and women, and the lower the likelihood of children attending school. According to the GLM analysis, illiteracy among household heads was found to lead to an FCS that was 6.8 points below that of households whose head had completed education beyond secondary school. Similarly, when compared with household heads who had completed secondary education (or more), a completed primary school background led to an FCS reduction of -6.2 and a completed secondary school background led to a reduction of -3.5.

Educational levels remain considerably low, with illiteracy rates reaching 45.9 percent at the national level, 26.9 percent among men and 65.3 percent among women.[61] The CFSS found a significant association between the food security status of the household and the **educational background of the household head's spouse** (Pearson correlation coefficient: -.250). A similar relationship exists between the spouse's educational background and her children's nutritional status. Severely malnourished children are significantly more likely to have an illiterate mother (90.9 percent) than well-nourished children (74.5 percent). In light of the impact of the spouse's educational background on the household's food security and her children's nutritional status, the finding of 68.0 percent of illiterate spouses is of great concern.

The majority of food-insecure households reside in rural areas, where long distances and low availability result in schools being much more difficult to access. The CFSS findings suggest that communities facing longer walking **distances to the nearest primary school** also had a higher share of households affected by food insecurity (see section 6.3.2). Also, given that the educational level of women is determining factor of household food security status and the nutritional well-being of children (see section 7.2.3), the

[60] World Bank,(2007), Yemen: Towards Qat Demand Reduction.
[61] Central Statistics Organisation, Statistical Yearbook 2008.

finding that food-insecure households are **less likely to send their girls to school** is also cause for concern.

6.5.5 Population growth at the macro level and high number of dependants at the micro level

At 3 percent per year, Yemen's population growth rate is one of the highest in the world, and is seriously impacting on the country's already limited natural resources and contributing to a stagnating unemployment rate of 15 percent.[62] At the micro level, larger families were found to have an improved food security status (and wealth status): food-insecure households have an average number of 7.12 household members, compared with 7.70 among food-secure households. Similarly, households in the poorest (or first) wealth quintile had an average of 6.74 household members, while wealthier households (fifth wealth quintile) had an average of 7.48 members. Such households can be assumed to have a higher number of adult household members who can actively contribute to the household's income, which in turn elevates their wealth status. The key factor is the number of **dependants**, i.e. young and old family members not contributing to the household's income, in relation to the non-dependant adult household members: the higher the number of dependants, the lower the household FCS, given the increased pressure on the household budget (GLM coefficient: -0.43).

[62] Ibid.

7 OVERVIEW OF ACUTE MALNUTRITION SITUATION

7.1 HOW MANY WOMEN AND CHILDREN ARE ACUTELY MALNOURISHED AND WHERE DO THEY LIVE?

One quarter of all Yemeni women between 15 and 49 years of age and 9 percent of children between 12 and 59 months were found to be acutely malnourished.[63] Maternal malnutrition has remained unchanged since 2003,[64] making the achievement of Millennium Development Goal 1 by 2015 unlikely.

Table 7-1: Acute malnutrition prevalence rates in children and women by governorates, agro-ecological zones and rural/urban areas*

	Children (12-59 months) MUAC						Women (15-49 years) MUAC		
	Severe <11.5cm	Moderate 11.5 - 12.5cm	"At risk" 13.5 - 12.5cm	Malnourished* <12.5cm			Severe <21.4cm	Malnourished* <22.2cm	
	%	%	%	%	Number**		%	%	Number**
Governorates									
'Al-Hodeidah'	6.0%	9.6%	22.8%	15.6%	65,490	'Rayma'	26.8%	39.8%	43,580
'Mareb'	2.5%	12.9%	22.3%	15.4%	6,990	'Al-Mahweet'	25.9%	38.7%	51,400
'Sana'a'	3.9%	9.2%	18.7%	13.2%	22,150	'Al-Hodeidah'	24.2%	37.0%	213,420
'Dhamar'	2.9%	10.2%	22.3%	13.1%	31,290	'Hajja'	23.1%	34.2%	131,860
'Hajja'	3.2%	9.0%	22.8%	12.2%	34,680	'Amran'	19.8%	31.0%	67,220
'Rayma'	3.5%	6.2%	21.4%	9.7%	7,350	'Dhamar'	17.8%	27.1%	92,280
'Amran'	1.3%	8.4%	22.3%	9.6%	15,130	'Sana'a'	15.0%	26.9%	62,780
'Al-Bayda'	1.5%	7.9%	17.2%	9.4%	10,030	'Ibb'	15.6%	23.3%	134,040
'Al-Mahweet'	2.2%	6.8%	24.5%	9.0%	8,480	'Taiz'	13.6%	22.4%	147,390
'Ibb'	2.8%	6.1%	17.4%	8.9%	35,440	'Mareb'	14.3%	20.9%	12,510
'Addaleh'	1.4%	5.7%	16.4%	7.1%	6,580	'Hadramout'	12.5%	20.3%	55,170
'Taiz'	3.7%	2.8%	15.5%	6.5%	29,070	'Abyan'	14.2%	19.4%	21,780
'Abyan'	1.5%	4.3%	13.0%	5.8%	4,690	'Al-Bayda'	12.3%	19.2%	28,630
'Laheg'	0.5%	4.8%	20.1%	5.3%	7,220	'Laheg'	11.4%	19.1%	36,900
'Sana'a City'	1.2%	3.6%	15.1%	4.8%	18,160	'Addaleh'	11.0%	17.9%	22,900
'Aden'	0.8%	4.0%	16.0%	4.8%	5,640	'Sana'a City'	11.8%	17.7%	85,320
'Hadramout'	0.7%	3.3%	13.1%	4.0%	7,930	'Shabwa'	9.8%	16.5%	19,800
'Shabwa'	0.0%	2.6%	12.4%	2.6%	2,280	'Al-Mahra'	7.2%	12.4%	2,940
'Al-Mahra'	0.5%	1.3%	9.8%	1.7%	300	'Aden'	6.0%	10.1%	15,730
Agro-Ecological Zones									
Red Sea & Tihama Coast	4.8%	8.8%	21.9%	13.6%		Red Sea & Tihama Coast	21.8%	34.2%	
Upper Highlands	3.2%	6.6%	19.9%	9.8%		Upper Highlands	19.1%	28.9%	
Desert	0.5%	8.0%	26.2%	8.4%		Desert	13.8%	20.3%	
Lower Highland	2.1%	6.4%	17.3%	8.4%		Internal Plateau	12.5%	20.2%	
Internal Plateau	0.4%	4.2%	13.1%	4.6%		Lower Highland	12.7%	20.2%	
Arabian Sea	0.9%	3.4%	14.7%	4.3%		Arabian Sea	9.4%	15.6%	
Urban/Rural Areas									
Rural	3.1%	7.1%	19.7%	10.2%		Rural	18.4%	28.8%	
Urban	1.7%	4.4%	15.2%	6.1%		Urban	11.8%	17.7%	
Total	**3.0%**	**6.5%**	**19.0%**	**9.5%**	**318,900**	**Total**	**16.4%**	**25.4%**	**1,245,650**

* includes "severe" and "moderate"
** based on estimated number of 12-59 months of children and 15-49 years women using population estimates for 2010

Source: CFSS 2010
* Confidence intervals are set at 95 percent and are provided in Annex 11-10 and Annex 11-11.

[63] The nutrition status of women was measured using MUAC (<22.2 cm) and BMI (<18.5). Both recorded a malnutrition rate of 25 percent (MUAC 25.4 percent; BMI 25.0 percent). Since the two indicators were found to be highly correlated with each other, the remainder of the analysis is mainly based on MUAC findings as they refer to both pregnant and non-pregnant women, thereby providing a more complete picture. For the same reason, MUAC is also recommended for use as a targeting criterion.

[64] The Family Health Survey was the last nutrition survey implemented in Yemen, in 2003. BMI measurements were taken for women of child-bearing age and the national malnutrition prevalence was recoded at 25 percent.

Differences between rural and urban areas are striking, with rural areas having significantly larger shares of acutely malnourished women (28.8 percent) and children (10.2 percent) than urban areas, where the rate of acute malnutrition among women is 17.7 percent and among children 6.1 percent. Urban acute malnutrition rates among women in particular remain high even with the increased standard of living that can be associated with urban areas. These findings highlight the persistent nature of acute malnutrition in Yemen, implying other potentially underlying, intertwined factors, such as poverty, household food access, the quality of drinking water and sanitation facilities, which will be presented in the following section.

National averages also hide significant regional variations. In terms of both child and maternal malnutrition, the population in the Red Sea and Tihama Coast and the Upper Highlands zones are most affected. Governorates with the highest child and maternal acute malnutrition rates include Al-Hodieda, Al-Mahweet, Amran, Dhamar, Hajja, Mareb, Rayma and Sana'a. The highest rate of severe acute malnutrition among women (<21.4 cm) was most prevalent in Rayma (26.8 percent), Al-Mahweet (25.9 percent), Al-Hodieda (24.2 percent) and Hajja (23.1 percent), while the highest rates of severe acute malnutrition in children (<11.5 cm) were found in Al-Hodieda (6.0 percent), Sana'a (3.9 percent), Taiz (3.7 percent) and Rayma (3.5 percent). An additional 19 percent of Yemeni children have been found to be at risk of becoming acutely malnourished, with the highest risks in Al-Mahweet (24.5 percent), followed by Al-Hodieda and Hajja (22.8 percent), and Amran, Dhamar and Mareb (22.3 percent).

In sum, acute malnutrition in children and women appears to be concentrated in five governorates: Al-Hodieda, Dhamar, Hajja, Ibb and Taiz together have 61.5 percent of all acutely malnourished children below the age of 5 and 57.7 percent of all acutely malnourished women between 15 and 49 years.

With 25 percent of the female population acutely malnourished, Yemen's maternal malnutrition rate is considered "high".[65] Acutely malnourished women are at increased risk not only of giving birth to low-weight babies, but also of mortality.[66] Yemen has one of the highest maternal mortality rates globally, with 430 deaths per 100,000 live births compared with the MENA region average of 210 deaths per 100,000 live births.[67] Acutely malnourished children (MUAC <12.5 cm) are also at risk of dying and at increased risk of morbidity. In the ranking of countries according to high mortality rates of infants and children under 5, Yemen is placed 41st out of 189 countries. These rates have improved since 1990, but nevertheless stand at 73 per 1,000 live births for under-5s and 55 per 1,000 live births for infants, compared with 46 for under-5s and 36 for infants in the MENA region as a whole.[68]

Yemen's overall malnutrition status shows little improvement. On the contrary: more than half of the children in the country are chronically malnourished (55.7 percent) or too short for their age, and 13.2 percent are wasted and too thin for their height.[69] Out of 18 countries with a stunting prevalence of over 45 percent, Yemen is ranked in second place, highlighting grave underlying, structural challenges that have led to an increase rather than a decrease in chronic malnutrition and stagnating acute malnutrition status over the

[65] WHO standard thresholds for BMI (1999).

[66] The maternal mortality ratio is the annual number of deaths of women from pregnancy-related causes per 100,000 live births.

[67] UNICEF, 2009. State of the World's Children.

[68] Ibid.

[69] HBS 2005/06.

past 20 years. The most prominent factors include the high prevalence of poverty and low educational levels among women.[70]

Table 7-2: Historical overview of malnutrition prevalence rates in children and women in Yemen between 1997 and 2010

	1997 DHS	2003 FHS	2005/06 HBS	2009 CFSS	2010 IFPRI
CHILDREN < 5 years					
Chronic Malnutrition					
Stunting -2SD (children 6 - 59 months)	51.7%	53.1%	55.7%	*not collected*	57.90%
Acute Malnutrition					
Wasting -2SD (children 6 - 59 months)	12.9%	12.4%	13.2%	*not collected*	15.70%
MUAC <12.5 cm (children 12-59 months)				9.0%	
WOMEN 15-49 years					
Acute Malnutrition					
BMI (< 18.5)	25.2%	25.0%	*not collected*	24.5%	
MUAC (<22.2 cm)			*not reliable**	25.4%	

Source: DHS 1997; FHS 2003; HBS 2005/06; IFPRI 2010 (simulation based on HBS 2005/06)

It should be pointed out that the 9 percent rate of acute malnutrition in children reported in the CFSS may in fact be an underestimation of the real situation on the ground and it is advisable not to compare previous measurements of acute malnutrition (i.e. wasting) with the MUAC prevalence. The reasons are as follows:

- MUAC measurements only capture acute malnutrition in children between 12 and 59 months, and do not refer to those aged 6 to 12 months, who are instead included for wasting measurements;
- Wasting measurements for the HBS in 2005/06 were collected throughout the calendar year, while CFSS MUAC measurements were taken during October and November, generally a favourable time of year in terms of food access and availability.

A nationwide nutrition survey is scheduled to be implemented by the Ministry of Public Health and Population in collaboration with UNICEF and other international and national partners in 2010 and will provide updated, comprehensive prevalence rates of malnutrition based on anthropometric measurements.

7.2 WHAT ARE THE UNDERLYING FACTORS OF ACUTE MALNUTRITION?

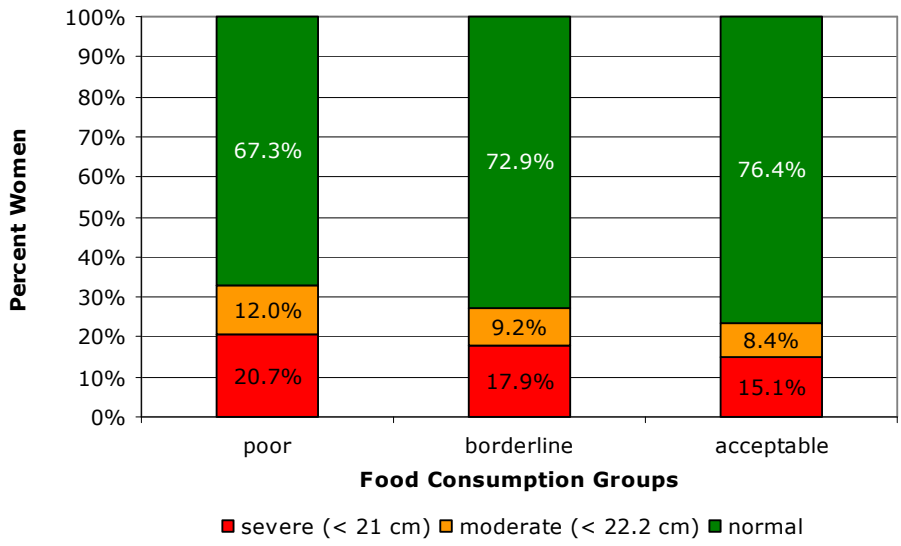
7.2.1 Limited access to sufficient and nutritious food at the household level

The survey found a significant association between food insecurity and acute malnutrition in women, whereby acute malnutrition at the individual level

[70] UNICEF (2009), Tracking progress on child and maternal nutrition.

decreases with the improvement of diet at the household level. A poor Yemeni diet mainly consists of cereals, sugar, oil and, to a limited extent, vegetables. The consumption of meat, dairy products, pulses and fruits is minimal or entirely absent. Hence this type of diet falls well below internationally set nutritional standards,[71] having serious impacts on the individual's nutrition status. The association between individual nutritional status and household food security status is particularly strong for women, while the link between child malnutrition and household food insecurity also exists but is less evident. This is a common finding because the coping mechanisms households resort to in times of need often tend to benefit the young members of the household at the expense of the adult members. Adults in the household, particularly the women, may decide to skip a meal or generally eat less in order to save resources and make them available for the children instead. The association between food insecurity and malnutrition is a particularly crucial finding as it not only demands immediate, targeted interventions to treat malnutrition among Yemeni women, but also calls for bold, preventive measures to address the underlying causes of food insecurity at the household level.

Graph 7-1: Percent of acutely malnourished women (MUAC <22.2 cm) by food consumption groups



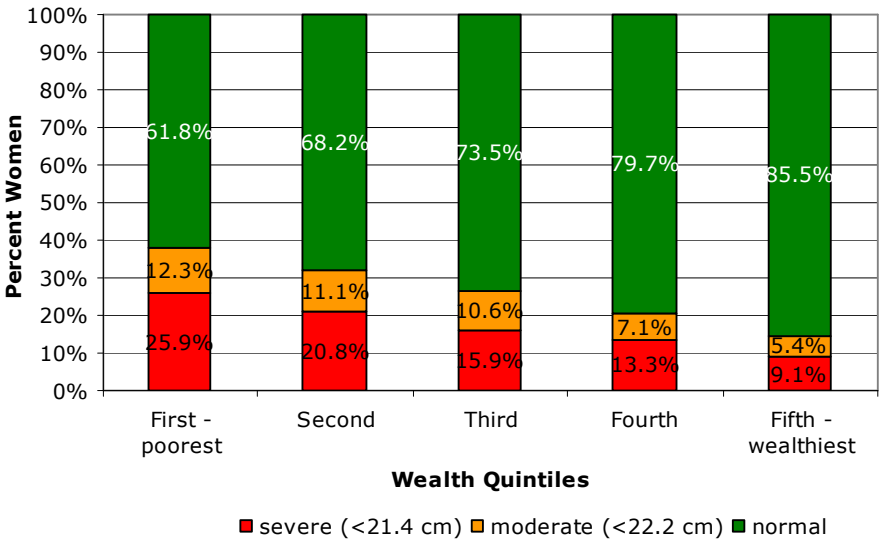
Source: CFSS 2010

Not unlike food insecurity, **poverty is a strong underlying factor of malnutrition**, meaning that acutely malnourished women and children tend to live in poorer households. Over 30 percent of poor households have acutely malnourished women or children as household members, compared with less than 20 percent of households that are better off (see Graph 7-2 and Graph 7-3). Households affected by acute malnutrition, which are more likely to be poorer than wealthier, were found to spend larger shares of their incomes on food (46.8 percent), particularly bread (25.0 percent), to satisfy caloric needs, compared with households without acutely malnourished members that spend 43.2 percent on food and 20.8 percent on bread. In the long run, however, an unbalanced diet may result in micronutrient deficiencies and malnutrition. Furthermore, poorer households have fewer resources to spend on essential non-food items that may ensure or

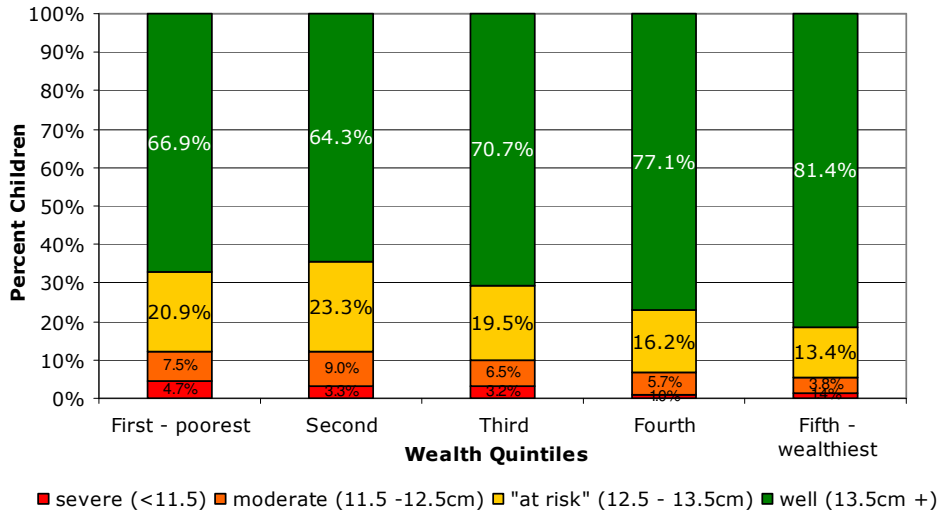
[71] Sphere Project (2004), Nutritional Requirements in Emergencies.

enhance the health and nutritional status of their members. In fact, the share of non-food expenditures, such as health and education, is lower for households affected by acute malnutrition (53.2 percent) than it is for those whose female household members are well-nourished (56.8 percent).

Graph 7-2: Percent of moderate acutely malnourished (MUAC <22.2 cm) and severely acutely malnourished (MUAC <21.4 cm) women by wealth quintiles



Graph 7-3: Percent of acutely malnourished children (MUAC <12.5 cm) and children "at risk" of becoming acutely malnourished (MUAC <12.5—13.5 cm) by wealth quintiles



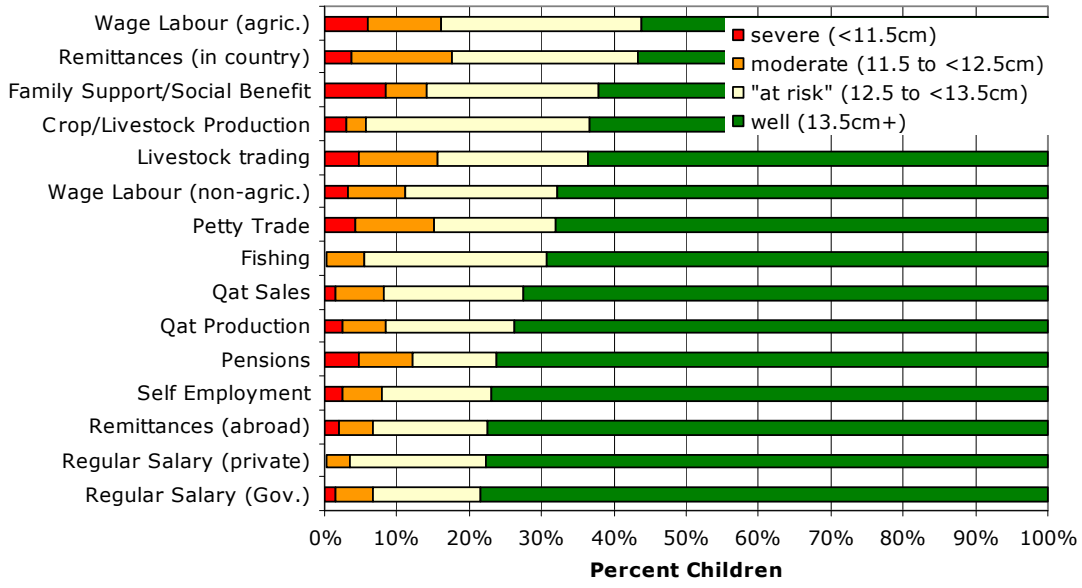
Source: CFSS 2010

Given that food prices remain high and shown no signs of declining to pre-2006 levels, the concern is that poor households may have been obliged to divert resources from

expenditures that would normally maintain or ameliorate their health and nutrition status (such as purchases of medication, visits to health facilities, routine medical check-ups) in order to save money for food. Similarly, households could be increasingly forced to purchase cheaper, less nutritious food. These developments could bring about further deterioration in the already critical health and nutrition situation in the country and it is strongly recommended that they be closely monitored.

The wealth of a household is also reflected in the type of income activities or livelihoods its members engage in to earn a living. The six livelihoods most affected by food insecurity (agricultural wage labour, non-agricultural wage labour, reliance on family support and social benefits, in-country remittances, crop and livestock production, livestock trading) were also found to have the largest share of acutely malnourished children and children "at risk" of becoming malnourished, with 43.8 percent among the agricultural wage labourers and 43.3 percent among households relying on in-country remittances. Isolating acute malnutrition from being at risk of malnutrition, the highest rates of acutely malnourished children were found among households relying on in-country remittances (17.5 percent) followed by agricultural wage labourers (16.2 percent), livestock traders (15.6 percent) and petty traders (15.1 percent). Interestingly, households involved in qat production and qat sales are not immune to acute malnourishment of children, with 8 percent of such households affected. These findings further highlight the interconnectedness among all these different indicators, underlining the vulnerabilities to which these livelihoods are exposed. Households obtaining their main income from regular salaries from the Government are least affected by acutely malnourished children, as are households engaged in fishing, which may be a reflection of their improved diet with an almost daily consumption of protein.

Graph 7-4: Percent of households with acutely malnourished children (MUAC <12.5 cm) and children "at risk" of becoming acutely malnourished (MUAC 12.5—13.5 cm) by livelihoods



Source: CFSS 2010

7.2.2 Health environment

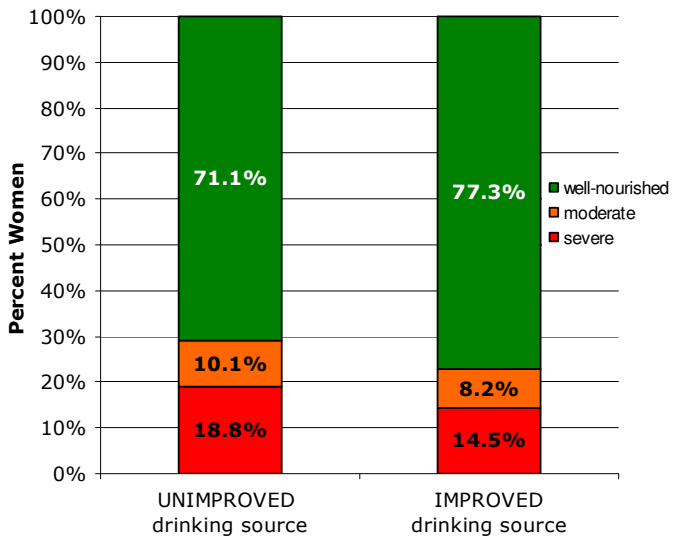
Household amenities, such as water and sanitation facilities, housing and roofing structures and materials, and sources of lighting, are crucial components of the wealth index and important indicators of socio-economic status that can help identify the most vulnerable in the population. In addition to providing an indication of households' relative wealth, household ownership patterns of such assets are essential in a food security analysis as they provide an insight into potential health and nutrition implications.

The use of unimproved drinking water and sanitation facilities[72] heightens the likelihood of having acutely malnourished children and women in the household. Access to **safe drinking water** appears to have deteriorated since 2006, particularly in rural areas. At the national level, 40.9 percent of the population drinks from unimproved water sources, which is up from 34 percent three years ago. While the situation in the urban areas has improved substantially, with 82.3 percent of households having access to safe drinking water compared with 32 percent in 2003, more than half of the rural population (50.7 percent) still drinks unimproved water. More than one quarter of all households drinking unimproved water are likely to have acutely malnourished women (28.9 percent) and children (28.6 percent). And, in fact, drinking water from unimproved sources was found to be a determining factor of malnutrition in women.

Generally speaking, the widespread use of unimproved drinking water in Yemen, even among the better off households, is an underlying factor of the persistent high malnutrition rates that appear to cross socio-economic boundaries: 13.4 percent of households in the fifth or wealthiest wealth quintile and 33.4 percent of households in the fourth quintile use unimproved sources for drinking water. Governorates with over half of their population drinking from unimproved water sources include Hajja (66.9 percent), Ad Daleh (63.4 percent), Rayma (61.7 percent), Shabwa (59.5 percent), Amran (56.1 percent), Mareb (53.8 percent), Al-Mahara (52.1 percent) and Abyan (50.5 percent).

[72] Based on the UNICEF definition of improved and unimproved drinking water sources and sanitation facilities, except for bottled water, which the CFSS team classified as improved. See http://www.who.int/water_sanitation_health/monitoring/oms_brochure_core_questionsfinal24608.pdf (page 16).

Graph 7-5: Percent of acutely malnourished women living in households drinking from improved and unimproved water sources



Source: CFSS 2010

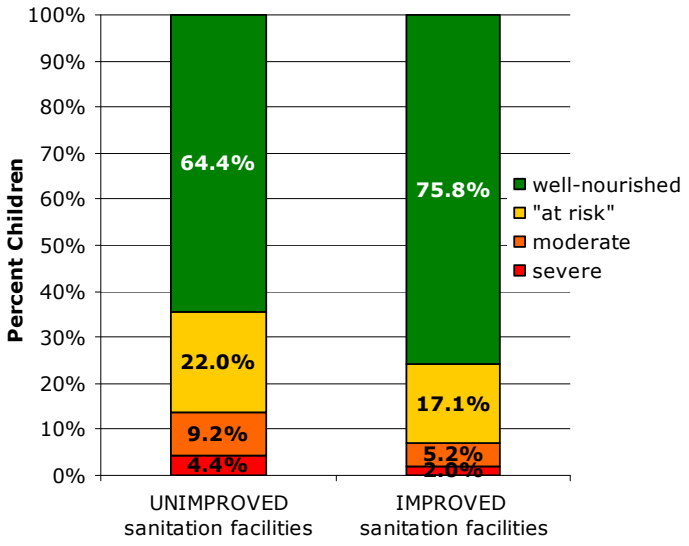
Proper sanitation facilities promote health because they allow people to dispose of their waste appropriately. In Yemen, where most of the population relies on groundwater and collected rainwater as sources for drinking water, lack of access to improved sanitation facilities is especially troublesome. Cisterns are replenished by rainfall, which may wash human and animal excreta from the catchment area into the cisterns. Water-related and water-borne diseases have been traced back to the use of contaminated water in the cisterns.

At the national level, 69.1 percent of the households indicated having access to flush latrines/toilets, with 59.0 percent of households in the rural areas and 92.7 percent in the urban areas, highlighting the persistent divide between rural and urban areas in terms of safe sanitation facilities. No sanitation facilities are used by 18.7 percent of the population, which is down from 35 percent in 2006 (UNICEF 2009). Improvements have been witnessed in both rural and urban areas, with a significant decrease in the share of households not having access to any sanitation facilities at all. Despite the progress made, 35.6 percent of households using unimproved facilities had acutely malnourished female household members, compared with 24.3 percent of households that use safe facilities. Similarly, the likelihood of child malnutrition in the household increases with the use of unimproved sanitation facilities: of all households using unimproved facilities, 13.7 percent had acutely malnourished children, compared with 7.2 percent of households that use improved facilities.

Livelihoods most affected by food insecurity, malnutrition and poverty have also been found to have the highest shares of households using unimproved sanitation facilities. These include livestock traders, with almost half using unimproved facilities (48.3 percent), followed by agricultural wage labourers (37.7 percent), households relying on family support and social benefits (37.5 percent) and crop and livestock producers (33.7 percent). Governorates in which the usage of unimproved sanitation facilities is most common include Rayma (48.6 percent), Al-Hodieda (48.3 percent), Al-Mahweet (47.5 percent) and Hajja (43.4 percent). The greatly limited access to both safe drinking

water and improved sanitation facilities, particularly in rural areas, partially explains the elevated prevalence of acute malnutrition in Yemen.

Graph 7-6: Percent of acutely malnourished children living in households using improved and unimproved sanitation facilities

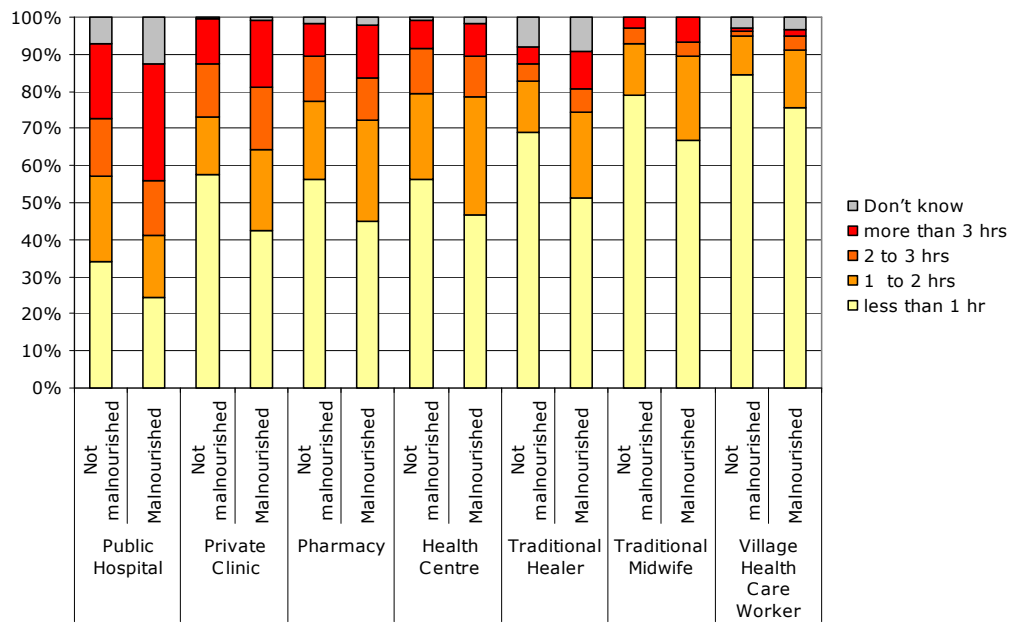


Source: CFSS 2010

Access to health facilities was also found to be a determining factor of acute malnutrition in women. Based on the results from the community interviews, village healthcare workers are the easiest to reach by the majority of households (80.9 percent) within less than one hour of walking, followed by the traditional midwife (73.1 percent), the traditional healer (63.4 percent), the health centre (53.0 percent), the private clinic (52.7 percent), the pharmacy (52.2 percent) and the public hospital (29.3 percent). Urban and rural areas differ greatly in terms of walking distance to nearest health facilities, with more than one third of rural households (37.2 percent) living three hours' walking distance from the nearest public hospital, compared with 3.6 percent of urban households. Furthermore, 16.0 percent of rural households also live more than three hours' walking distance from the nearest pharmacy, while almost all households in urban areas (93.2 percent) are able to reach a pharmacy within less than one hour.

Access to health facilities was found to be significantly more limited among households affected by malnutrition in women, with larger shares of women having to walk longer distances to reach such facilities than households that are not challenged by malnutrition. In terms of ease of access to the nearest health facilities, the greatest differences between households with malnutrition and those without were found in their access to traditional healers, followed by private clinics, traditional midwifes, health centres and public hospitals. For example, while more than half of households with well-nourished women (56.4 percent) are able to walk to the nearest pharmacy in less than one hour, 53.0 percent of households with acutely malnourished women would have to walk more than one hour and 14.5 percent would have to walk even more than three hours (see Graph 7-7).

Graph 7-7: Walking distances to the nearest health facilities by the acute malnutrition status of female household members (MUAC <22.2 cm)



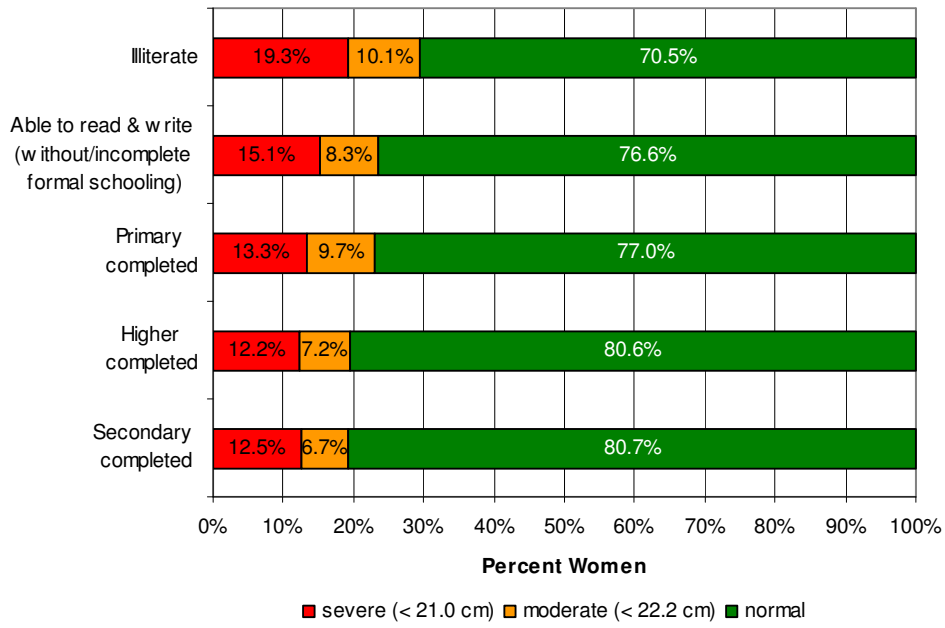
Source: CFSS 2010

7.2.3 Social care

There is a **very clear and strong link between education and nutritional status**. The less educated the household head, the more likely the household is to be challenged by malnutrition in women and children. Similarly, the less educated the mother, the higher the likelihood of her children being acutely malnourished.

Of all the acutely malnourished women, half (49.9 percent) are living in a household whose head is illiterate. Similarly, 29.4 percent of the households with an illiterate head have acutely malnourished women in the family, compared with 19.4 percent of those households whose heads have received education beyond secondary school. Although the relationship is clear, the high prevalence of malnutrition even among educated households is striking and highlights the persistent and widespread nature of this problem.

Graph 7-8: Percent of acutely malnourished women (MUAC <22.2 cm) by educational level of household head



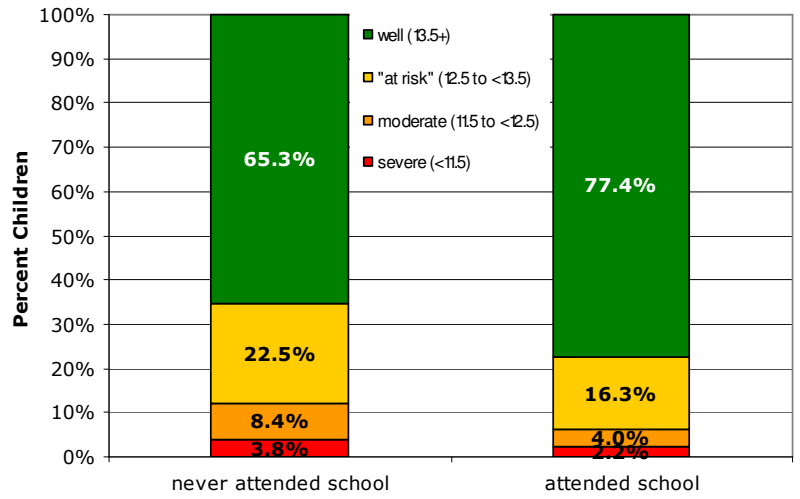
Source: CFSS 2010

Of all the mothers who never attended school, 34.7 percent have acutely malnourished children, compared with 22.6 percent who did have formal schooling. Young women without education tend to be disadvantaged in terms of lack of knowledge about optimal child nutrition and the importance of exclusive breastfeeding. In fact, UNICEF observations on feeding practices partially explain the high malnutrition rates and reinforce the need for mothers to be educated in good infant and child feeding practices: only 12 percent of children are exclusively breastfed for the first six months, while solid foods were given to 45 percent of infants before they reached the age of 6 months. [73] [74] Furthermore, dietary recall of the items fed to young children under 36 months revealed high reliance on rice and limited consumption of animal-source foods.

[73] UNICEF, At a Glance: Yemen; http://www.unicef.org/infobycountry/yemen_statistics.html#56

[74] WHO recommends the introduction of complementary food at the age of 6 months to ensure a child's optimal growth.

Graph 7-9: Educational background of mothers by nutrition status of their children



Source: CFSS 2010

Lack of education also entails lack of knowledge regarding general and reproductive health and family planning,[75] and there are generally very high unmet needs for family planning in the country, contributing to an average of 5.4 children born per woman, making Yemen's fertility rate the highest in the world[76]. As is the case with food insecurity, the likelihood of acutely malnourished children in the household tends to increase with the number of dependants the household has to take care of:[77] 10.8 percent of all households with 70 percent of dependants have acutely malnourished children, compared with 8.7 percent of households that have a low (less than 70 percent) dependency rate.

7.2.4 Health status

The health status of a large share of the female population in Yemen poses serious challenges in ensuring well-nourished future generations. Selected key indicators reflecting maternal nutrition and health are illustrated in Table 7-3.

[75] POLICY Project (2003), Adolescent and Youth Reproductive Health in Yemen. Status, Issues, Policies and Programs. United States Agency for International Development.
[76] UNCTAD, 2008.
[77] Dependants include children below 15 years of age and those above 65 years.

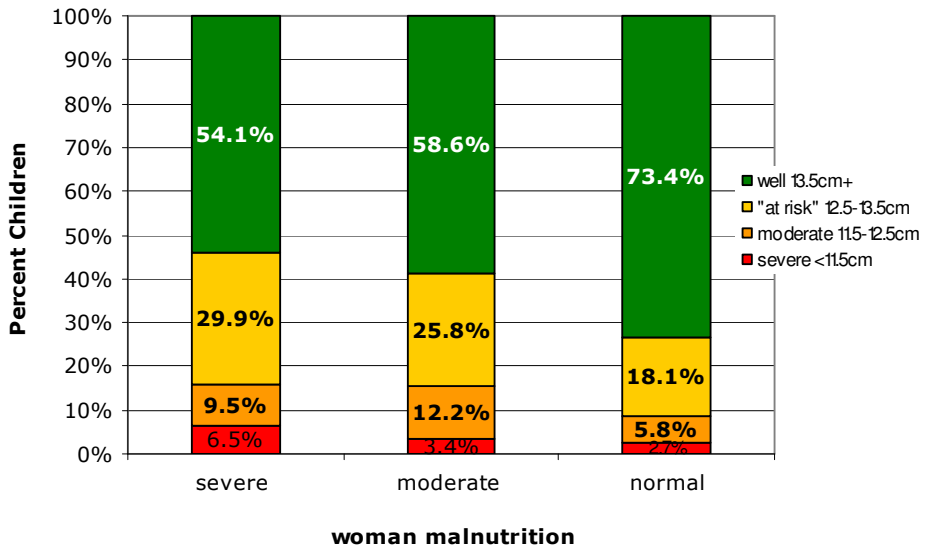
Table 7-3: Selected maternal nutrition and health indicators

		Reference Year
Anaemia, non-pregnant women (<120 g/l)	51%	2008
Antenatal care (at least one visit)	41%	2000-07
Antenatal care (at least four visits)	11%	2000-07
Skilled attendant at birth	37%	2006
Exclusive breastfeeding (< 6 months)	12%	2009
Fertility rate (no. of children by woman)	6	2007
Maternal mortality ratio, adjusted	430	2005
Contraceptive prevalence	28%	2007

Source: UNICEF 2009; WHO 2009

The intergenerational cycle of malnutrition persists in Yemen: according to the CFSS findings the likelihood of an acutely malnourished mother having an acutely malnourished child is significantly higher than that of a healthy, well-nourished mother. Although a good nutritional status does not automatically prevent child malnutrition — 27 percent of well-nourished women were found to have children suffering from acute malnutrition — the tendency is clear, as illustrated in Graph 7-10, calling for bold, highly targeted measures to be put in place to address maternal malnutrition, which will in turn contribute to a reduction in child malnutrition.

Graph 7-10: The intergenerational cycle of acute malnutrition: percent of acutely malnourished women with acutely malnourished children by severity (MUAC measurements)



Source: CFSS 2010

Ill health in children and malnutrition are closely intertwined, with changes in one likely to affect the other. When mothers/caretakers were asked about the occurrence of illness in their children in the past two weeks, more than one in three children were found to have had an episode of one or more of the following three

illnesses: cough (43.0 percent), fever (42.2 percent) and diarrhoea (40.2 percent). In comparison with the last nationwide nutrition survey (2003), the share of children suffering from coughs and fever seems to have remained unchanged, while there appears to be an increasing trend of children suffering from diarrhoea, with 29.6 percent in 2003 compared with 40.2 percent in 2009. Governorates with the highest prevalence (approximately 50 percent or more) of children affected by these illnesses include Ad Daleh, Al-Mahweet, Amran, Hajja, Mareb, Sana'a and Taiz.

Between 11 percent and 13 percent of the children who suffered from one or more of these illnesses were also found to be acutely malnourished. Children's poor health status is very likely to be the result of poor care and feeding practices, among other factors. The low exclusive breastfeeding rate of 11.5 percent,[78] for example, may leave a large share of children vulnerable to illnesses due to a weak immune system.

8 Poverty, Food Insecurity and Malnutrition — A Vicious Circle

Poverty, food insecurity and malnutrition are closely intertwined, with changes in one likely to impact the others, particularly in rural locations. Nevertheless, economically poor Yemenis are not food-insecure and challenged by malnutrition by default — 42.5 percent of households that fell into the poorest wealth quintile did not have difficulties accessing food and 61.8 percent were also not affected by malnutrition in women. In other words, poor households are not necessarily the same as food-insecure households. However, given the positive linear relationship between the two indicators, it can be said that the likelihood of a poor household also being affected by food insecurity is significantly higher than it is for better off households, and vice versa. The same trend also holds true for poverty and malnutrition: the likelihood of a poor household being impacted by food insecurity and malnutrition as a result of its disadvantaged economic standing is significantly higher than it is for wealthier households. Annex 11-12 illustrates these linkages.

Table 8-1: Correlations* between food insecurity, poverty and malnutrition at the household and governorate levels

Indicators	At Household level			At Governorate level (19 cases)
	Overall	**Rural**	**Urban**	**Overall**
Food Insecurity x **Poverty**	0.580**	0.518**	0.457**	0.773**
Food Insecurity x **Women Malnutrition**	0.199**	0.152**	0.094**	0.580**
Poverty x **Women Malnutrition**	0.324**	0.288**	0.128**	0.879**

Note

* Pearson correlation

** significant at 95% CI

Food insecurity = FCS < 48

Poverty = 1.+2.WQ

Women Malnutrition = MUAC < 22.2 cm

Source: CFSS 2010

High food and fuel prices have led to a 25 percent increase in poverty over the last five years, by now affecting two in five Yemenis (IFPRI 2010). Given the strong and positive

[78] Family Health Survey, 2003.

link between poverty and food insecurity, the number of Yemenis experiencing difficulties accessing sufficient, safe and nutritious food has inevitably increased in tandem. And those Yemenis who are seriously challenged by poverty, yet still manage to eat acceptable diets, are nevertheless at considerable risk of becoming food-insecure in response even to minor food price volatilities, and surely as a result of a larger shock, whether naturally occurring or the result of human intervention.

While poverty reflects a chronic, long-term household status, food insecurity and malnutrition can be temporary, challenging the household at specific times during the course of the year when agricultural produce is in short supply and food prices are high, or in response to a shock. Poverty, food insecurity and malnutrition tend to exacerbate one another but their linkage provides a number of entry points that, when addressed, can break the vicious circle.

The strong link between poverty, food insecurity and malnutrition is a major finding of the CFSS, reconciling previously noted discrepancies among them. This was possible because the three indicators were addressed in the same survey and assessed using the same households and communities.

9 WHAT NEEDS TO BE DONE AND WHERE?

One of the main objectives of the CFSS is to provide recommendations as to what type of assistance, food and non-food alike, may be most appropriate and effective to support the food-insecure people in accessing sufficient and nutritious food all year round.

Two workshops took place with key stakeholders/partners in January 2010[79] to discuss potential responses that best attend to the plight of over 6.8 million Yemenis as laid out by the CFSS findings and confirmed by IFPRI's macroeconometric analyses. There is wide-ranging consensus among all partners on the need to adopt a multi-sectoral approach when putting the recommended short-, medium- and long-term measures in place. Also, any food security interventions should be built on already existing programmes and initiatives and should aim to strengthen and/or expand them, instead of implementing stand-alone activities.

The following medium- to long-term response recommendations are not WFP-specific. They will be further refined following IFPRI's development of operational priorities for the key sectors that have been identified as the most relevant in the endeavour to achieve food security in Yemen: agriculture and water, markets and trade, nutrition, health and education.

Medium to long term:

- Promotion of girls' education, especially in rural areas and beyond primary school; one option could be food for education;
- Augmentation of food availability at the household and community levels in rural areas through own production, by addressing the stagnating productivity growth of cereals, horticultural crops and livestock, providing access to and disseminating information on improved, economically viable water management and irrigation techniques, and by improving storage and conservation facilities, particularly in the horticultural sector; food for asset creation or potential cash interventions may be an option;
- Improvement of access to clean water and sanitation, including extensive awareness campaigns;
- Implementation of nutrition training for mothers in care and feeding practices, family planning, etc.;
- Continued support to the Government's efforts addressing acute and chronic malnutrition, and generally supporting the national health system;
- Provision of employment opportunities and income-diversification to increase people's economic access to food in the agricultural and non-agricultural sector;
- Provision of loans and credit to help people access productive assets, both agricultural and non-agricultural;
- Establishment of a food security monitoring system, including a nutrition surveillance and market price monitoring system.

The short-term response options are tailored to WFP's mandate and are in line with those that were initially recommended during the WFP workshop with key stakeholders/partners in August 2009. At that time, response recommendations were based on the findings of an extensive secondary data analysis on food security; they have now been verified and refined on the basis of the CFSS findings. This updated information base on the food security status at the household and community levels will provide the required justifications and rationale for any future interventions to be implemented by WFP and its

[79] 13 January 2010 (WFP with Cooperating Partners); 17 January 2010 (IFPRI/WFP with Food Security Committee).

partners, in addition to guidance on both the duration of interventions and the targeting criteria to be used at the geographic, household, group and individual levels.

Short term:

- Reduction of acute malnutrition to below emergency levels through therapeutic and supplementary feeding programmes for children aged 6-59 months;
- Prevention of acute malnutrition to below emergency levels through blanket and targeted supplementary feeding programmes for children below 2 years and acutely malnourished pregnant and lactating women respectively, to break the intergenerational cycle of malnutrition;
- Provision of food-based safety nets for the poorest and most food-insecure households in rural and urban areas, complementing the SWF cash transfers with food transfers.[80]

[80] The food transfer will cover the food requirement gap, based on a minimum food basket, that is not covered by the SWF cash transfer.

Table 9-1: Recommended short-term, food-based response option in the light of CFSS findings

CFSS findings[81]	
No. of people **food–insecure**	6.8 million
No. of people severely food–insecure	2.5 million
No. of children acutely malnourished	0.3 million (below 5 years of age)
No. of women acutely malnourished	1.2 million (between 15 and 49 years of age)

Type: Relief	
Provision of food-based safety net, complementing Social Welfare Fund's cash transfer with a food transfer to cover the food requirement gap, based on the cost of the minimum food basket	
Objectives:	• Save lives and livelihoods by alleviating the unacceptably high food insecurity status of the Yemeni population and the serious-to-critical level of malnutrition rates among children below 5 years of age and women of reproductive age
Recommended targeting criteria:	Geographic targeting • Prioritization of governorates with high prevalence of severe food insecurity (poor food consumption at the household level) • Prioritization of districts with high prevalence of poverty as per latest updates (IFPRI 2010) Household targeting • As per updated Social Welfare Fund targeting
Period:	During the lean season

[81] Excludes Al-Jawf and Saada governorates.

Table 9-1 (continued): Recommended short-term, food-based response option in the light of CFSS findings

Type: Nutrition	
Targeted therapeutic and supplementary feeding for children aged 6—59 months and pregnant and lactating women	
Objectives:	• Reduce and prevent acute malnutrition in children under 5 in targeted populations • Improve nutritional status of targeted children under 5 and pregnant and lactating women
Recommended targeting criteria:	Geographic targeting • Prioritization of governorates with high prevalence of acute child malnutrition (MUAC < 12.5%) • Prioritization of districts with implementation capacity (i.e. health strengthening systems in place), availability of partners and accessibility Individual targeting **For children** • Children with a MUAC between 11.5 cm and <12.5 cm are referred to health centres for supplementary feeding; admission based on a weight-for-height measurement (WFH >-3 SD and <-2 SD) or MUAC **For women** • Pregnant or lactating women with a MUAC <23 cm eligible for supplementary feeding until delivery • Lactating women stay in programme until 6 months after delivery • Pregnant and lactating women enter the programme at any given time during pregnancy and lactation (until 6 months after delivery) if MUAC <23 cm
Period:	Throughout the year
Type: Nutrition	
Blanket supplementary feeding for children aged 6—23 months	
Objectives:	• Prevent acute malnutrition in children under 2 in targeted populations • Improve nutritional status of targeted children under 2
Recommended targeting criteria:	Geographic targeting • Prioritization of governorates with high prevalence of acute child malnutrition (MUAC < 12.5%) • Prioritization of districts with implementation capacity (i.e. health strengthening systems in place), availability of partners and accessibility Individual targeting • Children between 6 and 23 months eligible to receive blanket supplementary food rations
Period:	Throughout the year

10 REFERENCES

Alabsi, A.A. (2006). Country Pasture/Forage Resource Profiles: Yemen.

Breisinger, C. You, L. Rondot, P. Collion, M.-H. Diao, X. Funes, J. McCool, C. & Yu, B. (2009). Developing a National Strategy to Improving Food Security in Yemen. Powerpoint presented at the Food Security Strategy Workshop in Sana'a June 7, 2009 IFPRI, Ministry of Planning and International Cooperation.

CSO (1997). Demographic and Maternal and Child Health Survey (1997), Sana'a, Yemen.

CSO (2007). Household Budget Survey 2005/2006, Sana'a, Yemen.

CSO (2008). Statistical Yearbook Yemen 2007, Sana'a, Yemen.

CSO (2009). Statistical Yearbook Yemen 2008, Sana'a, Yemen.

Economist Intelligence Unit (2009). Yemen Country Report.

FAO (2002). Towards the Formulation of a Comprehensive Qat Policy. Rome.

FAO (2004), Food Insecurity in Yemen: Results of the 2003 FIVIMS Survey — Draft — Volume I: Main Report — Volume II: Appendices. With Central Statistical Organisation and Department of Statistics of the Ministry of Agriculture. Rome.

FAO/WFP (2009), Crop and Food Supply Assessment Mission (CFSAM). Rome.

Förch, W. (2009), Yemen: Secondary Data Analysis on Food Security and Vulnerability.

Fotheringham, A.S., Brunsdon, C., Charlton, M.E. (2002). Geographically Weighted Regression: The Analysis of Spatially Varying Relationships, Wiley, UK.

IFPRI (2009), Validation of the World Food Programme's food consumption score and alternative indicators of household food security. Washington D.C.

IFPRI (2010). Yemen National Food Security Strategy Part I (February 2010 draft). Washington D.C.

Ministry of Public Health and Population (2003). Summary Report of the Family Health Survey 2003.

Ministry of Planning and International Cooperation (2003). Rural and Local Development Strategy: Implementing the Poverty Reduction Strategy in Rural Areas. www.mpic-yemen.org/2006/English/strategies.asp?contantmain=6&key=15.

Ministry of Planning and International Cooperation (2005). Yemen's Strategic Vision 2025.

Ministry of Planning and International Cooperation (2009). Report on: The Mid-Term Review of the 3rd Socio-Economic Development Plan for Poverty Reduction 2006-2010.

Ministry of Planning and International Cooperation & World Bank (2010).Coping Strategies in Rural Yemen – Proposed Priorities for the 4th Five Year Development Plan for Poverty Reduction (PowerPoint Presentation).

POLICY Project (2003), Adolescent and Youth Reproductive Health in Yemen. Status, Issues, Policies and Programs. United States Agency for International Development. Washington D.C.

Ruel, M.T. (2003). Operationalizing Dietary Diversity: A Review of Measurement Issues and Research Priorities. *Journal of Nutrition*, 133(11, suppl.2), 3911S-3926S.

Shetty, S. (2006). Water, Food Security and Agricultural Policy in the Middle East and North Africa Region. World Bank. Washington D.C.

SFD (2007). Annual Report. Social Fund for Development.

Sphere Project (2004). Humanitarian Charter and Minimum Standards in Disaster Response. Geneva.

UNCTAD (2008). Least Developed Countries Report 2008: Growth, Poverty and the Terms of Development Partnership. p. 197. Geneva: United Nations Conference on Trade and Development.

UNDP (2007). Human Development Report 2007/2008: Fighting Climate Change: Human Solidarity in a Divided World. New York.

UNDP (2008). Some Reflections on Rising Food Prices in Yemen. New York.

UNFPA (2008). State of World Population 2008. Reaching Common Ground: Culture, Gender and Human Rights. New York.

UNICEF (2009a). The State of the World's Children 2009. Maternal and Newborn Health. New York.

UNICEF (2009b). Tracking progress on child and maternal nutrition. New York.

Van de Walle, D. (2002). Poverty and Transfers in Yemen. In *Middle East and North Africa Working Paper Series*, 30, World Bank, Washington D.C.

World Bank/Ministry of Planning and International Cooperation (August 2009). Pathways out of rural poverty – A presentation of preliminary findings. Washington D.C.

World Bank (2007a). Yemen. Poverty Assessment Report. World Bank. Washington D.C.

World Bank (2007b). Yemen: Towards Qat Demand Reduction. Washington D.C.

World Resources Institute (2003). EarthTrends. Yemen Country Profile. Washington D.C.

WFP (2008). Food Consumption Analysis: Calculation and Use of the Food Consumption Score in Food Security Analysis.

WFP (2008). Regional Market Survey for the Middle East. Food Markets and Food Security in Lebanon, Syria, Jordan, Iran, Yemen and Palestine.

WFP (2009a). Emergency Food Security Assessment (EFSA) Handbook, second edition.

WFP (2009b). Comprehensive Food Security and Vulnerability Analysis (CFSVA) Guidelines.

WHO (1999). Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers.

World Health Organization (2009). http://www.emro.who.int/emrinfo/index.asp?Ctry=yem

11 ANNEXES

Annex 11-1: Sampling design and its parameters

A two-stage cluster sampling approach was applied for the CFSS. The sampling frame was stratified by agro-ecological zone (AEZ) at the governorate level before enumeration areas (EAs) were selected to ensure that all AEZs were adequately reflected.

- Stage 1: Thirty EAs randomly selected at the governorate level (proportional to population size)

- Stage 2: Twelve households randomly selected within each EA.

As a result of security concerns in two governorates, clusters were over-sampled to compensate for the reduction. In addition to the 30 EAs, three additional EAs were randomly selected in the same AEZ to serve as alternatives. As the sampling frame is based on the 2004 census data, households in each EA are also over-sampled (15 instead of 12).

A minimum of 12 questionnaires were administered for each EA. During the analysis phase, when results were aggregated at the national, AEZ or rural/urban level, a weighting system was applied to account for the different populations sizes of the governorates.

The sample size calculation was based on the following parameters:

Estimated prevalence of key indicators (BMI, Family Health Survey 2003)	25%
Confidence interval width (precision at governorate level)	(+/-) 6%
Confidence coefficient	95%
Design effect	2
Number of women of reproductive age per household	1.6
Non-response	10%
Number of women per stratum	480
Number of households required per stratum	300
Total sample size (21 strata)	**6,300**

Annex 11-2: The weighting system

Weights were applied during the analysis of data relating to households, children and women. The weighting variables were constructed using 2004 census data along with population growth estimates to determine the predicted population size (in terms of households, women and children) per governorate and by urban/rural classification. The weight variable was calculated by first determining the proportion of the total population in each governorate and urban/rural classification. This proportion was then multiplied by the total number of units (households, women, children) sampled to determine the standardization factor. The standardization factor was then divided by the number of units sampled per governorate to yield the weight factor.

In addition to weights for calculating household statistics, a **population weight** was used in order to compute the total numbers of person affected by food insecurity. This weight was created simply by taking the household weight as noted above and multiplying it by the household size (as determined by the response from the questionnaire). Population-based figures reported in the analysis use this weight while household-based figures use the household weight. The tables below show the household, women and child weight calculations and results.

Households

Urban / Rural	Governorate	Total number of households	Number of households sampled	Percent of population in this governorate	Standardization factor	Weight
Rural	Ibb	253,183	311	10%	661.13	2.1258
	Abyan	43,040	241	2%	112.39	0.4663
	Sana'a City					
	Al-Bayda	53,933	308	2%	140.83	0.4572
	Taiz	286,077	265	11%	747.02	2.8189
	Hajja	177,134	324	7%	462.54	1.4276
	Al-Hodieda	236,549	256	9%	617.69	2.4129
	Hadramout	65,022	181	2%	169.79	0.9381
	Dhamar	162,763	327	6%	425.02	1.2997
	Shabwa	44,244	286	2%	115.53	0.4040
	Sana'a	120,956	364	5%	315.85	0.8677
	Aden					
	Laheg	95,699	335	4%	249.89	0.7460
	Mareb	24,141	316	1%	63.04	0.1995
	Al-Mahweet	64,464	325	2%	168.33	0.5179
	Al-Mahara	8,125	191	0%	21.22	0.1111
	Amran	87,359	315	3%	228.12	0.7242
	Ad Daleh	51,562	319	2%	134.64	0.4221
	Rayma	56,321	366	2%	147.07	0.4018
Urban	Ibb	52,069	49	2%	135.97	2.7748
	Abyan	15,793	103	1%	41.24	0.4004
	Sana'a City	254,866	372	10%	665.52	1.7890
	Al-Bayda	13,639	61	1%	35.61	0.5839
	Taiz	81,655	95	3%	213.22	2.2444
	Hajja	17,838	36	1%	46.58	1.2939
	Al-Hodieda	112,760	109	4%	294.45	2.7013
	Hadramout	59,787	167	2%	156.12	0.9348
	Dhamar	25,002	36	1%	65.29	1.8135
	Shabwa	8,821	61	0%	23.03	0.3776
	Sana'a					
	Aden	90,667	362	3%	236.75	0.6540
	Laheg	9,314	24	0%	24.32	1.0134
	Mareb	3,887	48	0%	10.15	0.2115
	Al-Mahweet	4,649	36	0%	12.14	0.3372
	Al-Mahara	5,808	155	0%	15.17	0.0978

	Amran	19,373	48	1%	50.59	1.0539
	Ad Daleh	8,332	36	0%	21.76	0.6044
	Rayma					
Total		**2,614,832**	**6828**	**100%**	**2047.90**	

Women

Urban / Rural	Governorate	Total number of women	Number of women in sample	Percent of women population in this governorate	Standardization factor	Weight
Rural	Ibb	393,343	381	9%	911.52	2.3924
	Abyan	72,153	327	2%	167.20	0.5113
	Sana'a City					
	Al-Bayda	105,065	512	2%	243.47	0.4755
	Taiz	415,823	362	10%	963.62	2.6619
	Hajja	299,981	428	7%	695.17	1.6242
	Al-Hodieda	312,631	352	7%	724.48	2.0582
	Hadramout	123,732	300	3%	286.73	0.9558
	Dhamar	256,142	415	6%	593.57	1.4303
	Shabwa	88,715	509	2%	205.59	0.4039
	Sana'a	206,247	567	5%	477.95	0.8429
	Aden					
	Laheg	147,775	425	3%	342.45	0.8058
	Mareb	46,266	547	1%	107.21	0.1960
	Al-Mahweet	102,651	412	2%	237.88	0.5774
	Al-Mahara	11,495	318	0%	26.64	0.0838
	Amran	163,046	455	4%	377.84	0.8304
	Ad Daleh	91,409	456	2%	211.83	0.4645
	Rayma	88,374	442	2%	204.80	0.4633
Urban	Ibb	90,754	64	2%	210.31	3.2861
	Abyan	27,001	170	1%	62.57	0.3681
	Sana'a City	422,446	511	10%	978.96	1.9158
	Al-Bayda	26,161	104	1%	60.63	0.5829
	Taiz	129,770	128	3%	300.72	2.3494
	Hajja	33,794	55	1%	78.31	1.4239
	Al-Hodieda	184,265	176	4%	427.01	2.4262
	Hadramout	115,213	284	3%	266.99	0.9401
	Dhamar	45,021	56	1%	104.33	1.8630
	Shabwa	17,955	115	0%	41.61	0.3618
	Sana'a					
	Aden	142,708	442	3%	330.71	0.7482
	Laheg	15,155	26	0%	35.12	1.3508
	Mareb	7,713	99	0%	17.87	0.1805
	Al-Mahweet	8,722	48	0%	20.21	0.4211
	Al-Mahara	9,018	255	0%	20.90	0.0820
	Amran	36,191	65	1%	83.87	1.2903
	Ad Daleh	15,071	47	0%	34.92	0.7431
	Rayma					
Total		**4,251,806**	**9853**	**100%**	**3075.05**	

Children

Urban / Rural	Governorate	Total number of children	Number of children in sample	Percent of child population in this governorate	Standardization factor	Weight
Rural	Ibb	253,715	236	10%	538.08	2.2800
	Abyan	46,540	179	2%	98.70	0.5514
	Sana'a City					
	Al-Bayda	67,769	284	3%	143.73	0.5061
	Taiz	268,215	141	11%	568.84	4.0343
	Hajja	193,495	362	8%	410.37	1.1336
	Al-Hodieda	201,654	217	8%	427.67	1.9708
	Hadramout	79,810	126	3%	169.26	1.3434
	Dhamar	165,217	306	7%	350.40	1.1451
	Shabwa	57,223	265	2%	121.36	0.4580
	Sana'a	131,995	334	5%	279.94	0.8381
	Aden					
	Laheg	95,318	220	4%	202.15	0.9189
	Mareb	29,842	299	1%	63.29	0.2117
	Al-Mahweet	66,212	285	3%	140.42	0.4927
	Al-Mahara	7,415	152	0%	15.72	0.1035
	Amran	105,168	298	4%	223.04	0.7485
	Ad Daleh	58,961	250	2%	125.05	0.5002
	Rayma	56,847	296	2%	120.56	0.4073
Urban	Ibb	43,218	20	2%	91.66	4.5829
	Abyan	12,858	52	1%	27.27	0.5244
	Sana'a City	202,696	193	8%	429.88	2.2274
	Al-Bayda	12,459	61	0%	26.42	0.4332
	Taiz	61,798	49	2%	131.06	2.6748
	Hajja	16,093	16	1%	34.13	2.1332
	Al-Hodieda	87,750	62	3%	186.10	3.0016
	Hadramout	54,866	128	2%	116.36	0.9091
	Dhamar	21,440	19	1%	45.47	2.3931
	Shabwa	8,550	64	0%	18.13	0.2833
	Sana'a					
	Aden	67,960	142	3%	144.13	1.0150
	Laheg	7,217	11	0%	15.31	1.3915
	Mareb	3,673	74	0%	7.79	0.1053
	Al-Mahweet	4,153	20	0%	8.81	0.4404
	Al-Mahara	4,295	133	0%	9.11	0.0685
	Amran	17,235	30	1%	36.55	1.2184
	Ad Daleh	7,177	18	0%	15.22	0.8456
	Rayma					
Total		**2,518,835**	**5342**	**100%**	**1343.41**	

Annex 11-3: The food consumption score[82]

Food consumption indicators are designed to reflect the quantity and/or quality of people's diets. In WFP's comprehensive food security surveys the most commonly used food consumption indicator is the food consumption score (FCS). This proxy indicator represents the dietary diversity and energy, and the macro and micro (content) value of the food people eat. It is based on dietary diversity (the number of food groups consumed by a household over a reference period), food frequency (the number of times, usually in days, a particular food group is consumed) and the relative nutritional importance of different food groups. The FCS is calculated from the types of foods and the frequency with which they are consumed over a seven-day period.

Although it provides essential information on people's current diet, the FCS is of limited value for in-depth analysis of food consumption patterns, for the following reasons:

- It is based on a seven-day recall period only. This is insufficient for a full analysis of food consumption over longer periods, which is likely to vary according to season, for example.
- It provides no indication of the quantity of each foodstuff consumed.
- It does not give information on intra-household food consumption, such as who eats first and last.
- It does not show how food consumption has changed as a result of a crisis, unless previous FCSs for the same types of households are available.

More information is needed if food consumption practices and trends are to be fully understood. For example, questions regarding customary food consumption should be asked to complement the seven-day household FCS.[83]

Calculation of the food consumption score

In the household questionnaire

Households are asked to recall the **foods they consumed in the previous seven days** (see the list of items in Table 11-1). Each food item is given a score of 0 to 7, depending on the number of days it was consumed. For example:

- If potatoes were eaten on three of the last seven days, they are given a frequency score of 3.
- If potatoes were eaten on three of the last seven days, even if they were eaten twice on each of those days, at two meals, they are still given a frequency score of 3.

In the analysis

Food items are grouped according to **food groups** (see Table 11-1) and the frequencies of all the food items surveyed in each food group are summed. Any summed food group frequency value over 7 is recoded as 7. Each food group is assigned a **weight** (see Table 11-1), reflecting its **nutrient density**. For example:

[82] WFP Comprehensive Food Security & Vulnerability Analysis Guidelines, January 2009
[83] For further information on the application of the FCS, see *Food Consumption Analysis: Calculation and Use of the Food Consumption Score in Food Consumption and Food Security Analysis*, WFP Vulnerability Analysis and Mapping Branch, January 2008.

- Beans, peas, groundnuts and cashew nuts are given a weight of 3, reflecting the high protein content of beans and peas and the high fat content of nuts.
- Sugar is given a weight of 0.5, reflecting its lack of micronutrients and the fact that it is usually eaten in relatively small quantities.

For each household, the household FCS is calculated by multiplying each food group frequency by each food group weight and then summing these scores into one composite score. The household score can have a maximum value of 112, which implies that each of the food groups was consumed every day for the last seven days.

Table 11-1: A completed food consumption score table

	FOOD ITEMS (*examples*)	Food groups (definitive)	Weight (definitive) (A)	Days eaten in past 7 days (B)	Score A x B
1	Maize, maize porridge, rice, sorghum, millet pasta, bread and other cereals Cassava, potatoes and sweet potatoes, other tubers, plantains	Main staples	2	7	14
2	Beans, peas, groundnuts and cashew nuts	Pulses	3	1	3
3	Vegetables, leaves	Vegetables	1	2	2
4	Fruits	Fruit	1	0	0
5	Beef, goat, poultry, pork, eggs and fish	Meat and fish	4	0	0
6	Milk, yogurt and other dairy	Milk	4	1	4
7	Sugar and sugar products, honey	Sugar	0.5	4	2
8	Oils, fats and butter	Oil	0.5	2	1

The household score is compared with pre-established **thresholds** that indicate the status of the household's food consumption. WFP finds the following thresholds to be applicable in a wide range of situations:

- Poor food consumption: 0 to 21
- Borderline food consumption: 21.5 to 35
- Acceptable food consumption: > 35

These thresholds can be adjusted if there is clear justification for doing so. In the case of Yemen, further analysis of the FCS in correlation to consumption of kcals per capita per day provided a means to further refine the thresholds defining food consumption groups. Further details are provided in the section on adaptation to country context below.

Since the FCS is a continuous variable, standard statistics such as the mean and variance can be calculated, and trends of means over time and across categories can be determined. For food consumption groups, frequencies and cross-tabulations can be determined.

Validation of the food consumption score and its adaptation to the country context

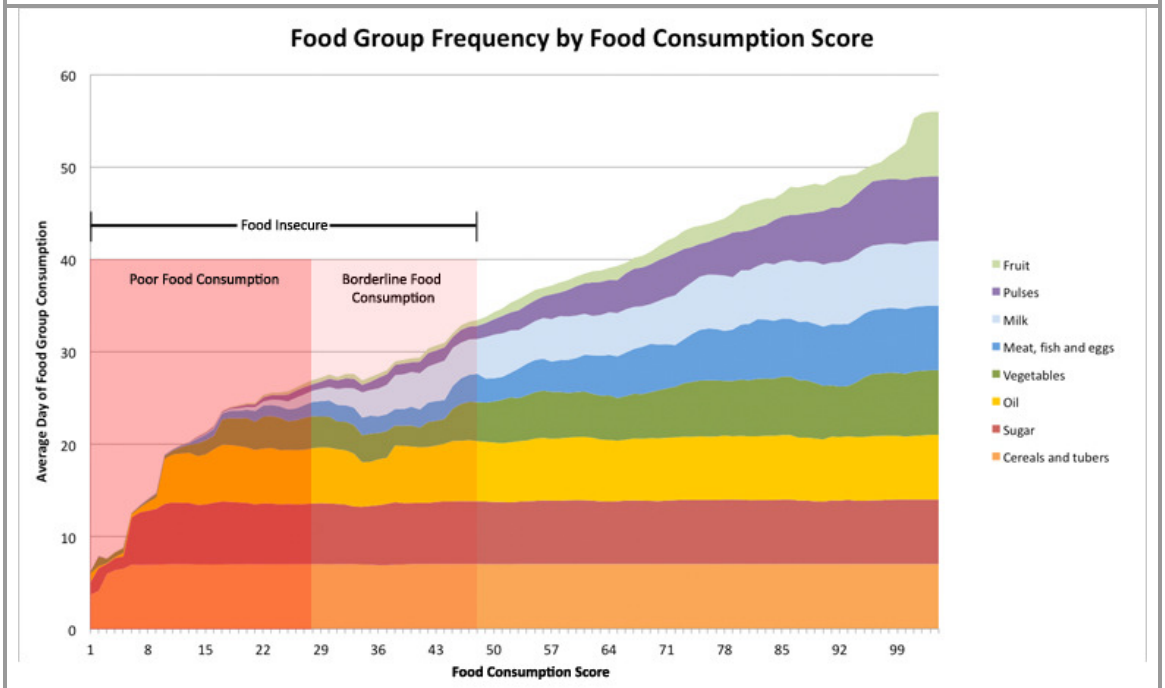
Recent research conducted by the International Food Policy Research Institute (IFPRI) has attempted to validate the use of the FCS for the classification of household food security status with the help of survey data from three countries — Burundi, Haiti and Sri Lanka.[84] The study found the usefulness of the dietary diversity and food frequency indicators encouraging. There are positive and statistically significant associations with calorie consumption per capita, particularly when small quantities are excluded from food frequencies. However, the cut-off points currently used by WFP to define poor, borderline and adequate food consumption groups correspond with energy intake, which is considerably below the usual average 2,100 kcal per capita per day benchmark that is often used to define undernourishment. Hence, the "poor food consumption group" corresponds with extreme undernourishment, and even some households belonging to the "acceptable food consumption group" have consumption levels below 2,100 kcal per capita per day. These data reinforce the notion of context specificity in formulating FCSs, which has been secured in the case of Yemen.

On the basis of IFPRI's re-analysis of the caloric intake data collected as part of the HBS 2005/06,[85] the food consumption groups were adapted to reflect minimum per capita daily caloric requirements. FCSs below 49 do not cover these requirements. Given the validation of the FCS with other proxy indicators of food security (see Annex 11-4), FCSs below 49 translate into food insecurity, while scores below 28.5 are an indication of severe food insecurity.

The graph below presents the composition of the food groups as it evolves with an increasing FCS. For each FCS value, a moving average of the surrounding values for that food group and the value in question was used to smooth the graph. Additionally, here the cut-offs of 28 and 48 are highlighted to facilitate interpretation.

[84] IFPRI (2009), *Validation of the World Food Programme's food consumption score and alternative indicators of household food security*.
[85] IFPRI, National Food Security Strategy, Part I, Draft February 2010.

Graph 11-1: Food Group Frequency by Food Consumption Score



Source: CFSS 2010

Annex 11-4: Validation of the food consumption score (FCS) as a proxy indicator of food security

The food consumption score (FCS) was validated against other proxy indicators of food security. Several validating cross-tabulations are provided in the body of the report. A correlation analysis is presented below.

Spearman's rho correlation matrix

		Food Consumption Score	Wealth Index	Reduced CSI	Per capita monthly food expenditure	Per capita total expenditures	Share (%) food expenditure (out of the total)
Food Consumption Score	Correlation Coefficient	1.000	0.560	-0.338	0.533	0.525	-0.144
	Sig. (2-tailed)	.	0.000	0.000	0.000	0.000	0.000
	N	6224	6160	6221	6170	6170	6070
Wealth Index	Correlation Coefficient	0.560	1.000	-0.302	0.440	0.542	-0.321
	Sig. (2-tailed)	0.000	.	0.000	0.000	0.000	0.000
	N	6160	6160	6160	6110	6110	6011
Reduced CSI	Correlation Coefficient	-0.338	-0.302	1.000	-0.251	-0.277	0.111
	Sig. (2-tailed)	0.000	0.000	.	0.000	0.000	0.000
	N	6221	6160	6221	6167	6167	6067
Per capita monthly food expenditure	Correlation Coefficient	0.533	0.440	-0.251	1.000	0.819	0.045
	Sig. (2-tailed)	0.000	0.000	0.000	.	0.000	0.000
	N	6170	6110	6167	6170	6170	6070
Per capita total expenditures	Correlation Coefficient	0.525	0.542	-0.277	0.819	1.000	-0.493
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	.	0.000
	N	6170	6110	6167	6170	6170	6070
Share (%) food expenditure (out of the total)	Correlation Coefficient	-0.144	-0.321	0.111	0.045	-0.493	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	.
	N	6070	6011	6067	6070	6070	6070

It should be noted that, while the FCS is validated as a proxy indicator of food security, it fails to take into account certain aspects, such as reliability of food sources or seasonality. Therefore results should be interpreted with caution and triangulated with other information and secondary data.

Annex 11-5: The wealth index

The wealth index was created using a methodology similar to that of the Demographic Health Survey (DHS) or Multiple Indicator Cluster Survey. The process and indicators specific to this survey are outlined below. The wealth index is a relative proxy indicator of wealth, constructed using appropriate house construction data, household assets, access to water, sanitation, electricity and other such non-livelihood-specific indicators. It is a proxy for economic wealth, but is not intended or able to replace poverty statistics such as poverty line computation. As it is a comparative indicator, it can indicate who (according to this proxy) is 'wealthier' or 'poorer', but not who is 'wealthy' or 'poor' in absolute terms. This fact should be kept in mind when interpreting the results.

All non-livelihood-specific assets were considered for use in the wealth index, along with access to safe drinking water, access to adequate sanitation, house construction materials, lighting source and crowding. All bivariate indicators with very low or very high frequencies were excluded or combined. Indicators such as land ownership, livestock ownership and ownership of productive agriculture assets were excluded from the analysis as they are livelihood-specific. Such livelihood-specific assets may be correlated with wealth among households sharing a similar livelihood, but the nature of the sample, covering a wide variety of livelihoods and urban and rural areas, necessitated the use of more 'generalized' assets.

The final wealth index took into account the following indicators:

- Literate head (illiterate head = 0, literate head =1)
- Electricity (electricity not available =0, electricity available= 1)
- Flush toilet (without flush toilet =0, with flush toilet=1)
- Drinking water source (unimproved =0, improved =1 following DHS definition (bottled/sached included in safe))
- Cooking sources (LPG =1, wood =0)

The remaining variables were included as 1=owned, 0=not owned straight from the questionnaire without being combined:

- Television
- Mobile telephone
- Landline telephone
- Refrigerator
- Satellite dish
- Fan
- Air conditioning
- Heater
- Car/truck
- Clock/watch
- Stove
- Table
- Washing machine

These indicators were entered into a principle component analysis in SPSS, using no rotation and no probability weights. The first component accounts for 36.2 percent of the variance in the variables included. This first component was saved as the continuous wealth index variable.

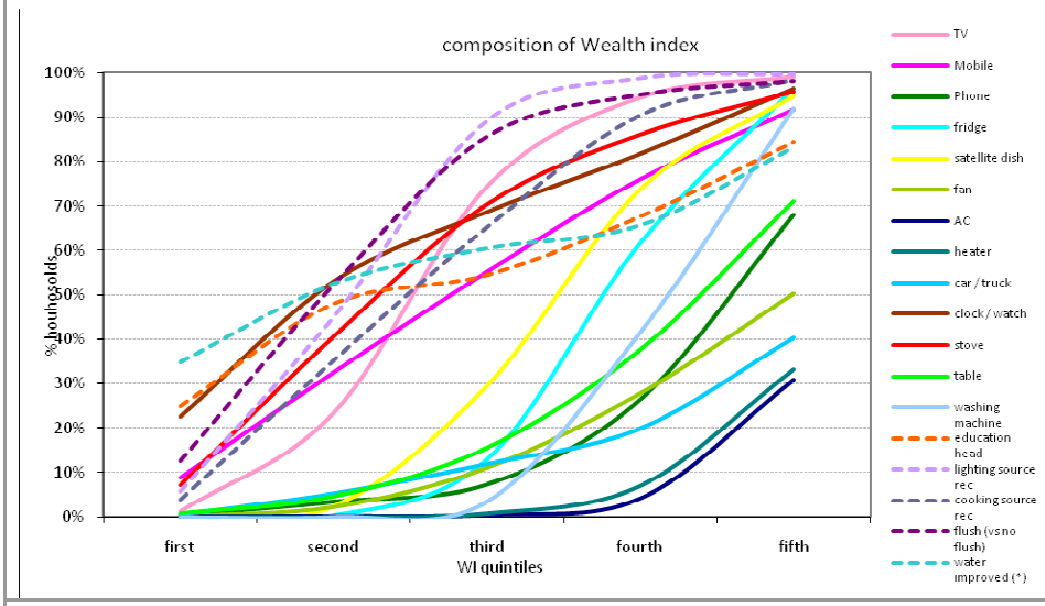
Component matrix(a)

	Component
Television	0.763
Mobile telephone	0.596
Landline telephone	0.589
Refrigerator	0.784
Satellite dish	0.772
Fan	0.484
Air conditioning	0.409
Heater	0.421
Car/truck	0.399
Clock/watch	0.526
Stove	0.643
Table	0.585
Washing machine	0.750
Education (head)	0.404
Lighting source	0.715
Cooking head	0.703
Flush (vs no flush)	0.644
Water recoded	0.318

The wealth index quintiles were calculated as quintiles of the wealth index variable, taking into account household probability weights (household size was not accounted for). This results in five quintiles, each of which represents 20 percent of the households in Yemen.

Next, to illustrate the components of the wealth index, the prevalence of all the indicators used to compile the wealth index by wealth index quintile was calculated and plotted on the following graph. Note that physical assets are indicated by solid lines on the graph, other indicators by dotted lines.

Graph 11-2: Composition of the Wealth Index



Source: CFSS 2010

Annex 11-6: The reduced coping strategies index (CSI)

The reduced coping strategies index (CSI) is a simple and easy-to-use indicator of household food security. It is straightforward and correlates well with more complex measures of food security. A series of questions about how households manage to cope with a shortfall in food for consumption results in a simple numeric score. In its simplest form, monitoring changes in the CSI score yields an indication of whether a household's food security status is declining or improving.

Households were asked the following question: "In the past seven days, were there times when you did not have enough food or money to buy food?" The answers to this question are the basis for the CSI module, as shown in the table below. The CSI tool relies on counting coping strategies that are not equal in severity. The different strategies are therefore "weighted", i.e. multiplied by a weight that reflects their severity, before being added together.

In the past 7 days, were there times when you did not have enough food or money to buy food?	Raw score (**example**)	Universal severity weight	Weighted score = frequency x weight
1. Rely on less preferred and less expensive food?	5	1	5
2. Borrow food or rely on help from friends/relatives?	2	2	4
3. Limit portion size at mealtimes?	7	1	7
4. Restrict consumption by adults in order for small children to eat?	2	3	6
5. Reduce number of meals eaten in a day?	5	1	5
Total household score (reduced CSI score)	**Sum down the totals for each individual strategy**		**27**

CSI terciles were calculated as the terciles (low, medium and high) of the reduced CSI variable, taking into account household probability weights. Each tercile represents 33 percent of the households in Yemen.

Annex 11-7: Yemen food security profiling summary

In order to make a comparative analysis of the characteristics of the food-insecure and the food-secure, several variables were examined. The outcome of interest is whether the household is described as food-secure or food-insecure using the 28-48 food consumption score (FCS) thresholds. The following variables are used:

Governorate
Agro-ecological zone
Urban/rural
Wealth quintiles
FIVIMS food security
CSI terciles

Expenditure non–food
Per capita monthly expenditure
Share food expenditure
Per capita monthly expenditure food
CSI
FCS

Sex of household head
Marital status
Education of household head
Literacy spouse
Household status (resident)
High dependency rate
Household size
% dependants
Household member contributing to income

Type of dwelling
Recoded dwelling
Walls
Roof
Own/rent
Drinking water
Drinking water recode
Sanitation
Flush toilet
Source cooking
Cooking recoded
Source light
Light recoded
Sewing machine
Television
Mobile phone
Telephone (landline)
Washing machine

FIVIMS livestock categories

Migration
Remittances
Access to credit
Livelihood

Summary of results

		Food-insecure	Food-secure
Highest prevalence governorate code	Rayma	53.9%	46.1%
	Hajja	48.5%	51.5%
	Ad Daleh	45.9%	54.1%
	Ibb	45.2%	54.8%
	Amran	44.1%	55.9%
	Al-Mahweet	41.4%	58.6%
Highest prevalence agro-ecological zones	Upper Highlands	43.7%	56.3%
	Red Sea & Tihama Coast	36.8%	63.2%
	Arabian Sea	15.0%	85.0%
	Internal Plateau	25.3%	76.5%
	Desert	32.5%	67.5%
	Lower Highlands	24.4%	75.6%
Urban vs rural	Urban	15.9%	84.1%
	Rural	40.7%	59.3%

The governorates with the highest rates of food insecurity are listed. All of these governorates are NOT significantly different from one another, but are significantly different from the other governorates.

The worst off agro-ecological zones are shown; there is a significant difference between all zones except for desert (small N).

The large difference in prevalence of food-insecure between urban and rural is significant.

		food-insecure	food-secure
Observe and note the type of dwelling	House	32.6%	67.4%
	Apartment	5.8%	94.2%
	Hut	49.7%	50.3%
	Corrugated house	78.7%	21.3%
	Tent/plastic sheets	42.5%	57.5%
	Other	56.0%	44.0%
		food-insecure	**food-secure**
Do you own or rent this dwelling?	Own	33.4%	66.6%
	Rent	23.5%	76.5%
	Staying for free	45.2%	54.8%
		food-insecure	**food-secure**
Where do you obtain your water for drinking (main source)?	Piped water (Government)	21.6%	78.4%
	Public tap	46.4%	53.6%
	Unprotected well	48.5%	51.5%
	Protected well	32.2%	67.8%
	Protected spring	41.7%	58.3%
	Rain water (dam, reservoir, cistern…)	40.8%	59.2%
	Bottled water	6.5%	93.5%
	River, creek, lake, canal	65.0%	35.0%
	Unprotected spring water	51.1%	48.9%
	Water tanker/drum on carts	31.4%	68.6%
		food-insecure	**food-secure**
Which type of sanitation do you use?	Flush toilet	25.7%	74.3%
	Ventilated improved pit latrine (VIP)	51.3%	48.7%
	Pit latrine	33.6%	66.4%
	Community latrines	59.2%	40.8%
	Bush/open field	54.7%	45.3%
		food-insecure	**food-secure**
What is your main source for lighting?	Public electricity	24.5%	75.5%
	LPG	40.2%	59.8%
	Kerosene	50.0%	50.0%
	Candle	59.6%	40.4%
	Private generators	28.9%	71.1%
	Shared generators	38.5%	61.5%
	Solar cells	56.6%	43.4%
		food-insecure	**food-secure**
Dwelling (recode)	Unimproved	50.8%	49.2%
	Improved	31.3%	68.7%
Walls	Non-durable materials	47.0%	53.0%
	Durable materials	30.1%	69.9%

Roof	Non-durable materials	37.0%	63.0%
	Durable materials	22.4%	77.6%
Lighting (recode)	No electricity	49.5%	50.5%
	Electricity	25.6%	74.4%
Cooking source (recode)	Wood	48.5%	51.5%
	LPG	22.8%	77.2%
Toilet type	No flush	50.3%	49.7%
	Flush	25.7%	74.3%
Water	Unimproved	39.5%	60.5%
	Improved	28.4%	71.6%
Television	No	49.4%	50.6%
	Yes	22.1%	77.9%
Mobile phone	No	48.0%	52.0%
	Yes	20.4%	79.6%
Telephone (landline)	No	38.8%	61.2%
	Yes	13.1%	86.9%
Sewing machine	No	36.1%	63.9%
	Yes	14.3%	85.7%
Washing machine	No	41.9%	58.1%
	Yes	11.3%	88.7%

The differences between all of the groups above (improved vs. unimproved or ownership vs. non-ownership) were significant.

		food-insecure	**food-secure**
Remittances from abroad	No	34.4%	65.6%
	Yes	19.4%	80.6%
Remittances from inside Yemen	No	33.3%	66.7%
	Yes	32.9%	67.1%
Access to credit	No	40.8%	59.2%
	Yes	30.5%	69.5%

Households receiving remittances from abroad are significantly better off than those that do not. However, domestic remittances are not an important factor in household food security and are not statistically significant.

Access to credit positively affects household food security and is statistically significant between those who have access to credit and those who do not.

		food-insecure	food-secure
Livestock count categories	No livestock	55.9%	44.1%
	1-2 head	38.8%	61.2%
	3-10 head	30.2%	69.8%
	11-20 head	27.8%	72.2%
	21+ head	13.0%	87.0%
		food-insecure	**food-secure**
Migrating members	No members migrated	33.9%	66.1%
	Members migrated	29.7%	70.3%
		food-insecure	**food-secure**
Livelihoods	Regular salary (Gov.)	21.5%	78.5%
	Wage labour (non-agric.)	46.6%	53.4%
	Self-employment	27.0%	73.0%
	Wage labour (agric.)	56.2%	43.8%
	Remittances (abroad)	20.3%	79.7%
	Pensions	26.2%	73.8%
	Regular salary (private)	20.3%	79.7%
	Qat sales	31.7%	68.3%
	Family support/Social benefits	53.3%	46.7%
	Crop/Livestock production	42.9%	57.1%
	Livestock trading	38.6%	61.4%
	Petty trade	21.7%	78.3%
	Remittances (in country)	38.6%	61.4%
	Fishing	18.7%	81.3%
	Qat production	22.9%	77.1%

The households with the highest prevalence of food insecurity are those of wage labourers (non-agricultural and agricultural), family support/social benefit recipients, crop/livestock producers, and other. While agricultural wage labourers appear the worst off, the difference between them and family support/social benefit recipients and other is not significant. The difference between the agricultural wage labourers and the other groups is significant.

		Food-insecure	Food-secure
Sex of the household head	Male	31%	69%
	Female	46%	54%
Education of the household head	Illiterate and no formal schooling or incomplete schooling but can read and write	38.0%	62.0%
	Primary completed	30.1%	69.9%
	Secondary completed	21.8%	78.2%
	Higher completed	16.0%	84.0%
Literacy of the spouse	Illiterate	87%	72%
Marital status	Single	30.7%	69.3%
	Married (one spouse)	32.3%	67.7%
	Married (several spouses)	27.1%	72.9%
	Divorced/separated	38.1%	61.9%

	Widowed	45.2%	54.8%
High dependency rate	Yes	43.9%	56.1%
	No	30.4%	69.6%

The differences between all education groups except for secondary and higher completed were significant.

Widowed household heads were significantly worse off than all other categories except for the divorced.

The difference between households with a high dependency rate and those without is significant.

FIVIMS food security	**Food-insecure**	**Food-secure**
Not vulnerable	23.4%	76.6%
Vulnerable	35.4%	64.6%
Food-insecure with moderate hunger	52.4%	47.6%
Food-insecure with severe hunger	57.8%	42.2%

Food-insecure with severe hunger and food-insecure with moderate hunger are not significantly different.

CSI terciles	**Food-insecure**	**Food-secure**
No coping strategies	26.1%	73.9%
Low	44.6%	55.4%
Medium	49.4%	50.6%
High	64.8%	35.2%
Mean CSI	7.3	2.5

All the differences are significant, apart from that between medium and low.

Continuous variables	**Food-insecure**	**Food-secure**
Mean CSI	7.3	2.5
Non-food expenditure*		
Per capita monthly expenditure*	4875	9624
Share food expenditure (Percent)		
Per capita monthly expenditure on food*		
FCS	32	74
Household size (No. members)	6.8	7.4
% of dependants	54%	49%
Number of household members contributing	1.59	1.88
Total income*	349,546	814,057
***Yemeni rials**		

Annex 11-8: Underlying causes of food insecurity

Food security is a complex construct reflecting multiple dimensions: food availability, food access and food utilization. The food consumption score (FCS) is commonly used as a proxy indicator of the current food security situation because it is a reliable and easily replicable measure that correlates well with more complex measures (e.g. caloric intake). At the bivariate level, the discussion on food consumption groups showed that the FCS is associated with variables typically considered to be related to food security, such as wealth, food expenditures and other vulnerability factors. For this analysis, a general linear model (GLM)[86] was conducted to explore individual-level predictors of food security. The dependent variable was the FCS (continuous variable).

The following 13 variables were included in the model:

- Governorate
- Agro-ecological zones
- Urban/rural
- Livelihood groups
- Literacy of the household head
- Having improved water source
- Having flush toilet
- Access to agricultural land
- Affected by shortfall of rain in the past 12 months
- Affected by high food prices in the past 12 months
- Coping strategies index
- Per capita monthly expenditure
- Number of dependants
- Household size
- Number of months household experienced difficulty in obtaining enough food in the past 12 months

The following factors were found to be statistically associated with food security (R^2 for the regression is 0.399);

- Rayma was used as the reference **governorate**. It is worth mentioning that Rayma has the highest proportion of food-insecure households. There were no significant differences between Rayma and Ibb, Al-Bayda, Abyan, Aden, Amran, Ad Daleh, Lahei, Mareb, Sana'a City, Shabwa or Taiz. There was a significant difference between Rayma and all the other governorates, and in all cases the coefficient was positive, indicating that the predicted FCS is higher in those areas after adjusting for other variables. The table below presents the adjusted regression coefficients. A higher coefficient results in a higher projected FCS and, therefore, better food security.

[86] The analysis was run using the Complex Sample in SPSS. The Complex Sample Linear Model (CSGLM) procedure performs linear regression analysis, as well as analysis of variance and covariate, for samples drawn by complex sampling methods, such as cluster analysis.

Food security GLM coefficients for significant governorates

Parameter	Coefficient	95% Confidence Interval		Hypothesis Test	
		Lower	Upper	t	Sig.
(Intercept)	50.153	43.200	57.106	14.168	.000
Hajja	5.241	.966	9.516	2.408	.016
Al-Hodieda	9.524	2.217	16.831	2.560	.011
Hadramout	9.184	2.576	15.793	2.730	.007
Dhamar	5.437	.657	10.216	2.234	.026
Sana'a	11.530	6.539	16.521	4.538	.000
Al-Mahweet	6.711	2.534	10.888	3.156	.002
Al Mahara	8.016	1.208	14.823	2.313	.021
Rayma	.000[a]	.	.	.	.

- With regard to **agro-ecological zones**, Upper Highlands was used as the reference category. There is a significant difference only between Upper Highlands and Lower Highlands, with a negative coefficient (-3.409), meaning that households living in the Upper Highlands have a lower FCS than households living in the Lower Highlands.
- Living in **urban** areas is associated with an increase (of 6.8 points) in the predicted FCS when compared with rural areas.
- When considering the **literacy of the household head**, the "higher education completed" category was used as the reference category. It is interesting to note that the differences between the highest literacy category and all the others are significant and negative. This means that having more education increases the predicted FCS, as shown in the table below.

Food security GLM coefficients for literacy of the household head

Parameter	Coefficient	95% Confidence Interval		Hypothesis Test	
		Lower	Upper	t	Sig.
(Intercept)	50.153	43.200	57.106	14.168	.000
Illiterate and no formal schooling or incomplete schooling, but can read and write	-6.831	-9.633	-4.029	-4.789	.000
Primary completed	-6.222	-9.281	-3.163	-3.995	.000
Secondary completed	-3.549	-6.155	-.944	-2.675	.008
Higher completed	.000[a]	.	.	.	.

- Regular salary from the Government was used as reference category for the **livelihood groups**, as this is the most reliable source of income. A significant negative difference exists between households relying on this source of livelihood and those whose main income derives from: agricultural and non-agricultural wage labour, regular salary from private companies, qat sales, family support and social benefits, crop and livestock production, and other income activities. Only households relying on remittances from abroad have a predicted FCS higher than those receiving regular salaries from the Government.

Food security GLM coefficients for significant livelihood groups

Livelihood clusters simple contrast	Coefficient (estimate - hypothesized)	Sig.
Wage labour (non-agric.)	-5.873	.000
Wage labour (agric.)	-8.098	.000
Remittances (abroad)	3.377	.054
Regular salary (private)	-3.344	.047
Qat sales	-4.078	.007
Family support/Social benefits	-6.452	.000
Crop/Livestock production	-3.773	.054
Other	-5.378	.008

- Having an improved **source of water** (coefficient of 2.5) or having a flush **toilet** (5.7) in the households is associated with an increase in the predicted FCS.
- Households with no **access to agricultural land** have a lower predicted FCS (-3.7) when compared with households that have access to land.
- Other factors producing a decrease in the predicted FCS are: a rise in the number of **dependants** in the households (-0.43), experiencing an increase in the **CSI** value (-.283), reporting having faced **difficulties** in a high number of the previous 12 months. Per capita total monthly expenditure is also significantly associated with the FCS (.001).
- The survey found that **larger households** have a higher predicted FCS; for each additional household member the score increases by 1.2.
- Considering **shocks** that occurred in the previous 12 months, households that were not affected by a shortfall of rain or high food prices have a predicted FCS that is 2.1 points higher.

Chronic vs transitory food security

Some of the factors analysed using the regression models could be considered transitory in terms of their impact on food security in the country. Factors of this nature are:

1. Shocks occurring in the past 12 months (high food price and shortfall of rain).
2. Having often adopted coping strategies in the past 7 days.
3. Facing difficulties in obtaining enough food to eat during the past 12 months.

Further indicators such as debt and other shocks were inserted into the regression model, but they were not significant.

Parameter Estimates

Parameter	Estimate	95% Confidence Interval		Hypothesis Test	
		Lower	Upper	t	Sig.
(Intercept)	50.153	43.200	57.106	14.168	.000
Ibb	-3.190	-8.080	1.700	-1.281	.201
Abyan	2.432	-3.414	8.279	.817	.414
Sana'a City	5.066	-.493	10.626	1.790	.074
Al-Bayda	2.886	-2.377	8.149	1.077	.282
Taiz	1.792	-2.525	6.109	.815	.415
Hajja	5.241	.966	9.516	2.408	.016
Al-Hodieda	9.524	2.217	16.831	2.560	.011

Hadramout	9.184	2.576	15.793	2.730	.007
Dhamar	5.437	.657	10.216	2.234	.026
Shabwa	-.329	-7.817	7.159	-.086	.931
Sana'a	11.530	6.539	16.521	4.538	.000
Aden	5.642	-.947	12.232	1.682	.093
Laheg	1.059	-3.538	5.657	.452	.651
Mareb	3.063	-1.911	8.037	1.209	.227
Al-Mahweet	6.711	2.534	10.888	3.156	.002
Al Mahara	8.016	1.208	14.823	2.313	.021
Amran	-.015	-5.219	5.189	-.006	.996
Ad Daleh	-.949	-5.987	4.089	-.370	.711
Rayma	.000[a]	.	.	.	.
Upper Highlands	-3.409	-6.415	-.402	-2.227	.026
Red Sea and Tihama Coast	-2.683	-9.271	3.905	-.800	.424
Arabian Sea	3.559	-1.883	9.001	1.285	.199
Internal Plateau	-.538	-6.424	5.349	-.179	.858
Desert	2.437	-4.519	9.394	.688	.492
Lower Highlands	.000[a]	.	.	.	.
Urban	6.821	3.942	9.700	4.654	.000
Rural	.000[a]	.	.	.	.
Regular salary (Gov.)	5.378	1.399	9.358	2.654	.008
Wage labour (non-agric.)	-.495	-4.559	3.569	-.239	.811
Self-employment	4.254	.093	8.416	2.008	.045
Wage labour (agric.)	-2.720	-6.942	1.503	-1.265	.206
Remittances (abroad)	8.755	4.057	13.452	3.661	.000
Pensions	5.736	1.274	10.197	2.525	.012
Regular salary (private)	2.034	-3.091	7.159	.780	.436
Qat sales	1.300	-3.200	5.800	.567	.571
Family support/Social benefits	-1.074	-5.362	3.214	-.492	.623
Crop/Livestock production	1.605	-3.423	6.633	.627	.531
Livestock trading	4.367	-2.003	10.736	1.347	.179
Petty trade	8.232	2.567	13.896	2.854	.004
Remittances (in-country)	3.024	-2.565	8.614	1.063	.288
Fishing	5.555	-.326	11.436	1.855	.064
Qat production	5.352	-.260	10.964	1.873	.062
Other	.000[a]	.	.	.	.
Illiterate and no formal schooling or incomplete schooling but can read and write	-6.831	-9.633	-4.029	-4.789	.000
Primary completed	-6.222	-9.281	-3.163	-3.995	.000
Secondary completed	-3.549	-6.155	-.944	-2.675	.008
Higher completed	.000[a]	.	.	.	.
Have no improved source of water	-2.556	-4.456	-.655	-2.642	.008
Have no access to agricultural land	-3.756	-5.735	-1.776	-3.726	.000
Have no flush toilet	-5.556	-7.457	-3.654	-5.739	.000
Have not been affected by shortfall of rain in the past 12 months	2.157	.398	3.916	2.409	.016
Have not been affected by high food prices in the past 12 months	2.167	.285	4.049	2.262	.024
Reduced CSI	-.283	-.358	-.208	-7.421	.000
Number of dependants	-.435	-.789	-.081	-2.416	.016
Household size	1.201	.921	1.481	8.419	.000
Per capita expenditure	.001	.001	.001	12.169	.000

Number of months having difficulties obtaining food in the past 12 months	-.330	-.464	-.196	-4.832	.000

Individual test results		
Livelihood clusters simple contrast	**Difference** (Estimate - Hypothesized)	**Sig.**
Level wage labour (non-agric.) vs. Level regular salary (Gov.)	-5.873	.000
Level self-employment vs. Level regular salary (Gov.)	-1.124	.336
Level wage labour (agric.) vs. Level regular salary (Gov.)	-8.098	.000
Level remittances (abroad) vs. Level regular salary (Gov.)	3.377	.054
Level pensions vs. Level regular salary (Gov.)	.358	.817
Level regular salary (private) vs. Level regular salary (Gov.)	-3.344	.047
Level qat sales vs. Level regular salary (Gov.)	-4.078	.007
Level family support/social benefits vs. Level regular salary (Gov.)	-6.452	.000
Level crop/livestock production vs. Level regular salary (Gov.)	-3.773	.054
Level Livestock trading vs. Level regular salary (Gov.)	-1.012	.704
Level petty trade vs. Level regular salary (Gov.)	2.853	.190
Level remittances (in country) vs. Level regular salary (Gov.)	-2.354	.317
Level fishing vs. Level regular salary (Gov.)	.177	.939
Level qat production vs. Level regular salary (Gov.)	-.026	.991
Level other vs. Level regular salary (Gov.)	-5.378	.008

Annex 11-9: Underlying causes of acute malnutrition in women (using MUAC)

A general linear model (GLM) was carried out to explore individual predictors of malnutrition in women aged between 15 and 49 years, using the MUAC as an outcome measurement.

Variables included in the model are:
- Governorate code
- Agro-ecological zones
- Urban vs. rural
- Livelihood clusters
- Literacy of household head
- Flush toilet
- Improved source of drinking water
- Food consumption score
- Per capita monthly expenditure
- Household size
- Age of women

Rayma was used as the reference **governorate** for comparison. For all the governorates listed in the table below, there is a significant difference when compared with Rayma. In all cases, the coefficient is positive, indicating that the predicted MUAC is higher in these governorates, adjusting for other variables in the model. As shown in the table, a higher coefficient results in a higher predicted MUAC.

MUAC GLM coefficients for significant governorate

Parameter	Coefficient	95% confidence interval		
		Lower	Upper	Sig.
(Intercept)	21.013	19.902	22.125	.000
Ibb	.582	.010	1.154	.046
Abyan	2.164	1.393	2.936	.000
Al-Bayda	1.235	.561	1.910	.000
Taiz	.992	.494	1.490	.000
Hadramout	1.817	.901	2.732	.000
Shabwa	1.881	.962	2.800	.000
Aden	1.985	1.000	2.970	.000
Laheg	1.417	.612	2.222	.001
Mareb	1.095	.401	1.789	.002
Al Mahara	3.448	2.487	4.410	.000
Ad Daleh	1.407	.777	2.038	.000

When comparing **urban and rural** strata, the rural population showed a lower predicted MUAC value by a coefficient of 1.055 cm.

Agro-ecological zones were examined with the dry Lower Highlands as the reference stratum. Only the temperate Upper Highlands, Internal Plateau and the Arabian Sea Coast showed a negative significant difference from the Lower Highlands, indicating that women in these areas have a lower MUAC (Upper Highlands, -.785; Internal Plateau, -.907; and Arabian Sea Coast, -.882).

Livelihood groups were compared using the regularly salaried (Government) group as the reference population. There was no significant difference between the reference stratum and the following livelihood groups:

- Wage labour (non-agricultural)
- Self-employment

- Remittances (from abroad)
- Pensions
- Livestock/crop production
- Regular salary (private)
- Qat sales
- Livestock trading
- Qat production
- Firewood collection
- Other

There was a significant difference between the reference strata and households relying on wage labour (agricultural), family support/social benefits, petty trade and remittances. All of these groups had a negative coefficient compared with the regular salaried (Government) group, meaning that women in each group had a lower predicted MUAC.

Livelihood clusters simple contrast	Contrast estimate	Sig.
Wage labour (agricultural)	-.602	.006
Family support/Social benefits	-.606	.016
Petty trade	-.737	.017
Remittances (in-country)	-1.164	.001

Women in households with an improved **source of water** or a **flush toilet** had a significantly better MUAC than those without (approximately 0.32 for those with an improved water source and 0.36 for those with a flush toilet).

Education was included in the analysis. Having a literate household head significantly improved the MUAC. The coefficient for household head literacy is .393.

Though **FCS**, **per capital monthly expenditure** and **household size** have low coefficients, they have a significant effect on the MUAC of women.[87]

The **age** of the woman also has an effect on the MUAC, with a coefficient of .132.

Parameter estimates						
Parameter	**Estimate**	**95% confidence interval**		**Hypothesis test**		
		Lower	**Upper**	**t**	**df**	**Sig.**
(Intercept)	21.013	19.902	22.125	37.132	562.000	.000
Ibb	.582	.010	1.154	1.999	562.000	.046
Abyan	2.164	1.393	2.936	5.511	562.000	.000
Sana'a City	.205	-.581	.991	.512	562.000	.609
Al-Bayda	1.235	.561	1.910	3.596	562.000	.000
Taiz	.992	.494	1.490	3.910	562.000	.000
Hajja	-.165	-.653	.324	-.663	562.000	.507
Al-Hodieda	-.493	-1.279	.293	-1.232	562.000	.218
Hadramout	1.817	.901	2.732	3.897	562.000	.000
Dhamar	-.058	-.652	.536	-.192	562.000	.848

[87] The wealth index was also examined using the GLM but was found to have a negative influence on key variables such as the FCS, water and sanitation, expenditure and household head literacy.

Shabwa	1.881	.962	2.800	4.020	562.000	.000
Sana'a	-.125	-.708	.459	-.420	562.000	.675
Aden	1.985	1.000	2.970	3.958	562.000	.000
Laheg	1.417	.612	2.222	3.457	562.000	.001
Mareb	1.095	.401	1.789	3.099	562.000	.002
Al-Mahweet	-.274	-.844	.296	-.944	562.000	.345
Al-Mahara	3.448	2.487	4.410	7.045	562.000	.000
Amran	-.140	-.785	.506	-.425	562.000	.671
Ad Daleh	1.407	.777	2.038	4.384	562.000	.000
Rayma	.000[a]	.	.	.	.	.
Urban	1.055	.703	1.406	5.886	562.000	.000
Rural	.000[a]	.	.	.	.	.
[livelihood_cluster=1]	-.218	-1.016	.580	-.536	562.000	.592
[livelihood_cluster=2]	-.304	-1.137	.529	-.717	562.000	.474
[livelihood_cluster=3]	-.014	-.830	.801	-.035	562.000	.972
[livelihood_cluster=4]	-.820	-1.680	.040	-1.872	562.000	.062
[livelihood_cluster=5]	-.245	-1.104	.614	-.560	562.000	.576
[livelihood_cluster=6]	.091	-.866	1.048	.187	562.000	.852
[livelihood_cluster=7]	-.183	-1.092	.727	-.395	562.000	.693
[livelihood_cluster=8]	-.136	-1.012	.741	-.304	562.000	.761
[livelihood_cluster=9]	-.824	-1.729	.081	-1.788	562.000	.074
[livelihood_cluster=10]	-.528	-1.466	.409	-1.107	562.000	.269
[livelihood_cluster=11]	-.260	-1.194	.674	-.546	562.000	.585
[livelihood_cluster=12]	-.955	-1.921	.011	-1.942	562.000	.053
[livelihood_cluster=13]	-1.382	-2.388	-.376	-2.698	562.000	.007
[livelihood_cluster=14]	-1.053	-2.356	.251	-1.586	562.000	.113
[livelihood_cluster=15]	-.452	-1.505	.601	-.843	562.000	.399
[livelihood_cluster=16]	.165	-1.004	1.334	.278	562.000	.781
[livelihood_cluster=17]	.000[a]	.	.	.	.	.
Illiterate household head	-.393	-.600	-.186	-3.734	562.000	.000
Do not have flush toilet	-.366	-.679	-.053	-2.295	562.000	.022
Do not have improved source of water	-.322	-.576	-.069	-2.494	562.000	.013
Upper Temperate Highlands	-.785	-1.191	-.379	-3.798	562.000	.000
Red Sea and Tihama Coast	-.467	-1.182	.248	-1.282	562.000	.200
Arabian Sea	-.882	-1.646	-.119	-2.270	562.000	.024
Internal Plateau	-.907	-1.704	-.110	-2.236	562.000	.026
Desert	-.848	-1.870	.174	-1.630	562.000	.104
Upper Highlands	.000[a]	.	.	.	.	.
FCS	.007	.001	.012	2.505	562.000	.013
Per capita_exp	.000	.000	.000	2.552	562.000	.011
Q_1_10_PERSONS	.004	-.019	.027	.327	562.000	.744
Q_11_2_W_AGE	.132	.120	.144	22.210	562.000	.000

Individual test results		
Livelihood clusters simple contrast	**Difference (estimate - hypothesized)**	**Sig.**
Level wage labour (non-agric.) vs. Level regular salary (Gov.)	-.086	.639
Level self-employment vs. Level regular salary (Gov.)	.204	.231
Level wage labour (agric.) vs. Level regular salary (Gov.)	-.602	.006
Level remittances (abroad) vs. Level regular salary (Gov.)	-.027	.909
Level pensions vs. Level regular salary (Gov.)	.309	.268
Level regular salary (private) vs. Level regular salary (Gov.)	.035	.889
Level qat sales vs. Level regular salary (Gov.)	.082	.724
Level family support/social benefits vs. Level regular salary (Gov.)	-.606	.016
Level crop/livestock production vs. Level regular salary (Gov.)	-.310	.271
Level livestock trading vs. Level regular salary (Gov.)	-.042	.878
Level petty trade vs. Level regular salary (Gov.)	-.737	.017
Level remittances (in-country) vs. Level regular salary (Gov.)	-1.164	.001
Level fishing vs. Level regular salary (Gov.)	-.835	.115
Level qat production vs. Level regular salary (Gov.)	-.234	.538
Level firewood collection vs. Level regular salary (Gov.)	.383	.383
Level other vs. Level regular salary (Gov.)	.218	.592

Annex 11-10: Acute malnutrition in women — confidence intervals

MUAC groups (simplified)

			95% Confidence Interval	
		Estimate	Lower	Upper
% of Total	Not malnourished	74.8%	73.0%	76.5%
	Malnourished (<22.2 cm)	25.2%	23.5%	27.0%
	Total	100.0%	100.0%	100.0%

MUAC groups (simplified)

				95% Confidence Interval	
'Urban -Rural'			Estimate	Lower	Upper
Urban	% of Total	Not malnourished	82.5%	79.5%	85.1%
		Malnourished (<22.2 cm)	17.5%	14.9%	20.5%
		Total	100.0%	100.0%	100.0%
Rural	% of Total	Not malnourished	71.3%	69.2%	73.4%
		Malnourished (<22.2 cm)	28.7%	26.6%	30.8%
		Total	100.0%	100.0%	100.0%

MUAC groups (simplified)

				95% Confidence Interval	
'Governorate Code'			Estimate	Lower	Upper
'Ibb'	% of Total	Not malnourished	76.8%	70.1%	82.4%
		Malnourished (<22.2 cm)	23.2%	17.6%	29.9%
		Total	100.0%	100.0%	100.0%
'Abyan'	% of Total	Not malnourished	80.3%	75.0%	84.7%
		Malnourished (<22.2 cm)	19.7%	15.3%	25.0%
		Total	100.0%	100.0%	100.0%
'Sana'a City'	% of Total	Not malnourished	82.3%	77.9%	86.0%
		Malnourished (<22.2 cm)	17.7%	14.0%	22.1%
		Total	100.0%	100.0%	100.0%
'Al Bayda'	% of Total	Not malnourished	80.8%	75.8%	84.9%
		Malnourished (<22.2 cm)	19.2%	15.1%	24.2%
		Total	100.0%	100.0%	100.0%
'Taiz'	% of Total	Not malnourished	77.8%	73.0%	82.0%
		Malnourished (<22.2 cm)	22.2%	18.0%	27.0%
		Total	100.0%	100.0%	100.0%
'Hajja'	% of Total	Not malnourished	65.8%	60.9%	70.3%
		Malnourished (<22.2 cm)	34.2%	29.7%	39.1%
		Total	100.0%	100.0%	100.0%
'Hodeidah'	% of Total	Not malnourished	63.2%	55.3%	70.5%
		Malnourished (<22.2 cm)	36.8%	29.5%	44.7%
		Total	100.0%	100.0%	100.0%
'Hadramout'	% of Total	Not malnourished	79.7%	73.0%	85.1%
		Malnourished (<22.2 cm)	20.3%	14.9%	27.0%
		Total	100.0%	100.0%	100.0%
'Dhamar'	% of Total	Not malnourished	72.7%	66.6%	78.1%
		Malnourished (<22.2 cm)	27.3%	21.9%	33.4%
		Total	100.0%	100.0%	100.0%
'Shabwa'	% of Total	Not malnourished	83.5%	79.6%	86.7%
		Malnourished (<22.2 cm)	16.5%	13.3%	20.4%
		Total	100.0%	100.0%	100.0%
'Sana'a'	% of Total	Not malnourished	73.1%	68.2%	77.6%
		Malnourished (<22.2 cm)	26.9%	22.4%	31.8%
		Total	100.0%	100.0%	100.0%
'Aden'	% of Total	Not malnourished	89.9%	84.8%	93.4%
		Malnourished (<22.2 cm)	10.1%	6.6%	15.2%
		Total	100.0%	100.0%	100.0%
'Lahej'	% of	Not malnourished	80.9%	74.9%	85.7%

	Total	Malnourished (<22.2 cm)	19.1%	14.3%	25.1%
		Total	100.0%	100.0%	100.0%
'Mareb'	% of Total	Not malnourished	78.7%	72.4%	83.9%
		Malnourished (<22.2 cm)	21.3%	16.1%	27.6%
		Total	100.0%	100.0%	100.0%
'Al Mahweet'	% of Total	Not malnourished	61.4%	54.9%	67.5%
		Malnourished (<22.2 cm)	38.6%	32.5%	45.1%
		Total	100.0%	100.0%	100.0%
'Al Mahra'	% of Total	Not malnourished	87.8%	83.5%	91.1%
		Malnourished (<22.2 cm)	12.2%	8.9%	16.5%
		Total	100.0%	100.0%	100.0%
'Amran'	% of Total	Not malnourished	69.1%	61.3%	75.9%
		Malnourished (<22.2 cm)	30.9%	24.1%	38.7%
		Total	100.0%	100.0%	100.0%
'Ad Daleh'	% of Total	Not malnourished	82.1%	76.9%	86.4%
		Malnourished (<22.2 cm)	17.9%	13.6%	23.1%
		Total	100.0%	100.0%	100.0%
'Rayma'	% of Total	Not malnourished	60.2%	53.7%	66.3%
		Malnourished (<22.2 cm)	39.8%	33.7%	46.3%
		Total	100.0%	100.0%	100.0%

Annex 11-11: Acute malnutrition in children – confidence intervals

MUAC groups (12—59 months)				
		Estimate	95% Confidence Interval	
			Lower	Upper
% of total	Severe malnutrition (<11.5)	2.7%	2.1%	3.5%
	Moderate malnutrition/at risk (11.5 to <12.5)	6.5%	5.5%	7.6%
	Mild malnutrition (12.5 to <13.5)	18.6%	17.1%	20.2%
	Well-nourished (13.5+)	72.2%	70.1%	74.2%
	Total	100.0%	100.0%	100.0%

MUAC groups (12—59 months)					
Urban/Rural			Estimate	95% Confidence Interval	
				Lower	Upper
Urban	% of total	Severe malnutrition (<11.5)	1.7%	.9%	3.1%
		Moderate malnutrition (11.5 to <12.5)	4.4%	2.8%	6.8%
		"At risk" malnutrition (12.5 to <13.5)	15.2%	12.1%	19.0%
		Well-nourished (13.5+)	78.6%	74.5%	82.2%
		Total	100.0%	100.0%	100.0%
Rural	% of total	Severe malnutrition (<11.5)	3.1%	2.3%	4.1%
		Moderate malnutrition (11.5 to <12.5)	7.1%	6.0%	8.5%
		"At risk" malnutrition (12.5 to <13.5)	19.7%	18.1%	21.4%
		Well-nourished (13.5+)	70.1%	67.7%	72.4%
		Total	100.0%	100.0%	100.0%

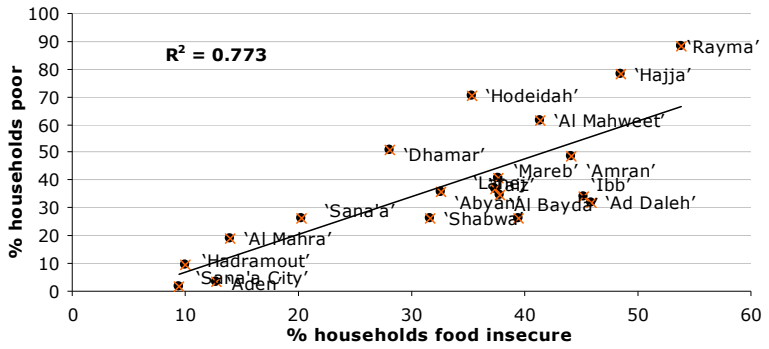
MUAC groups (12—59 months)					
Governorate Code			Estimate	95% Confidence Interval	
				Lower	Upper
Ibb	% of total	Severe malnutrition (<11.5)	2.8%	1.1%	7.0%
		Moderate malnutrition (11.5 to <12.5)	6.1%	3.5%	10.3%
		"At risk" malnutrition (12.5 to <13.5)	17.4%	12.6%	23.5%
		Well-nourished (13.5+)	73.7%	65.4%	80.6%
		Total	100.0%	100.0%	100.0%
Abyan	% of total	Severe malnutrition (<11.5)	1.5%	.4%	5.8%
		Moderate malnutrition (11.5 to <12.5)	4.3%	2.0%	9.0%
		"At risk" malnutrition (12.5 to <13.5)	13.0%	9.0%	18.5%
		Well-nourished (13.5+)	81.2%	75.9%	85.6%
		Total	100.0%	100.0%	100.0%
Sana'a City	% of total	Severe malnutrition (<11.5)	1.2%	.3%	4.5%
		Moderate malnutrition (11.5 to <12.5)	3.6%	1.2%	10.5%
		"At risk" malnutrition (12.5 to <13.5)	15.1%	9.6%	22.9%
		Well-nourished (13.5+)	80.1%	72.3%	86.2%
		Total	100.0%	100.0%	100.0%
Al-Bayda	% of total	Severe malnutrition (<11.5)	1.5%	.6%	3.8%
		Moderate malnutrition (11.5 to <12.5)	7.9%	5.2%	11.9%
		"At risk" malnutrition (12.5 to <13.5)	17.2%	12.7%	22.9%
		Well-nourished (13.5+)	73.4%	66.5%	79.3%

		Total	100.0%	100.0%	100.0%
Taiz	% of total	Severe malnutrition (<11.5)	3.7%	1.5%	8.8%
		Moderate malnutrition (11.5 to <12.5)	2.8%	1.2%	6.7%
		"At risk" malnutrition (12.5 to <13.5)	15.5%	10.7%	22.0%
		Well-nourished (13.5+)	77.9%	69.8%	84.4%
		Total	100.0%	100.0%	100.0%
Hajja	% of total	Severe malnutrition (<11.5)	3.2%	1.5%	6.6%
		Moderate malnutrition (11.5 to <12.5)	9.0%	5.0%	15.5%
		"At risk" malnutrition (12.5 to <13.5)	22.8%	18.2%	28.2%
		Well-nourished (13.5+)	65.1%	59.5%	70.3%
		Total	100.0%	100.0%	100.0%
Al-Hodieda	% of total	Severe malnutrition (<11.5)	6.0%	4.1%	8.9%
		Moderate malnutrition (11.5 to <12.5)	9.6%	6.5%	13.9%
		"At risk" malnutrition (12.5 to <13.5)	22.8%	18.3%	27.9%
		Well-nourished (13.5+)	61.6%	56.9%	66.1%
		Total	100.0%	100.0%	100.0%
Hadramout	% of total	Severe malnutrition (<11.5)	.7%	.2%	2.5%
		Moderate malnutrition (11.5 to <12.5)	3.3%	1.6%	6.6%
		"At risk" malnutrition (12.5 to <13.5)	13.1%	8.8%	19.1%
		Well-nourished (13.5+)	82.9%	75.6%	88.3%
		Total	100.0%	100.0%	100.0%
Dhamar	% of total	Severe malnutrition (<11.5)	2.9%	1.4%	5.9%
		Moderate malnutrition (11.5 to <12.5)	10.2%	6.7%	15.1%
		"At risk" malnutrition (12.5 to <13.5)	22.3%	17.4%	28.2%
		Well-nourished (13.5+)	64.6%	56.4%	72.1%
		Total	100.0%	100.0%	100.0%
Shabwa	% of total	Severe malnutrition (<11.5)	2.6%	1.3%	5.1%
		Moderate malnutrition (11.5 to <12.5)	12.4%	8.7%	17.4%
		"At risk" malnutrition (12.5 to <13.5)	85.0%	79.1%	89.4%
		Well-nourished (13.5+)	100.0%	100.0%	100.0%
Sana'a	% of total	Severe malnutrition (<11.5)	3.9%	2.2%	7.0%
		Moderate malnutrition (11.5 to <12.5)	9.2%	5.5%	15.0%
		"At risk" malnutrition (12.5 to <13.5)	18.8%	13.8%	25.0%
		Well-nourished (13.5+)	68.1%	60.0%	75.2%
		Total	100.0%	100.0%	100.0%
Aden	% of total	Severe malnutrition (<11.5)	.8%	.1%	5.5%
		Moderate malnutrition (11.5 to <12.5)	4.0%	1.6%	9.4%
		"At risk" malnutrition (12.5 to <13.5)	16.0%	10.8%	23.0%
		Well-nourished (13.5+)	79.2%	71.3%	85.4%
		Total	100.0%	100.0%	100.0%
Laheg	% of total	Severe malnutrition (<11.5)	.5%	.1%	3.2%
		Moderate malnutrition (11.5 to <12.5)	4.8%	2.8%	8.1%
		"At risk" malnutrition (12.5 to <13.5)	20.1%	15.3%	25.9%
		Well-nourished (13.5+)	74.6%	67.4%	80.6%
		Total	100.0%	100.0%	100.0%
Mareb	% of total	Severe malnutrition (<11.5)	2.5%	1.2%	5.2%
		Moderate malnutrition (11.5 to <12.5)	12.9%	8.1%	19.9%
		"At risk" malnutrition	22.3%	18.0%	27.2%

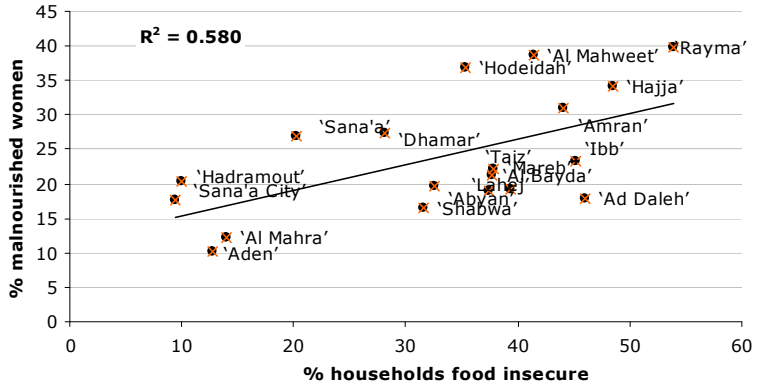
		(12.5 to <13.5)			
		Well-nourished (13.5+)	62.4%	55.6%	68.7%
		Total	100.0%	100.0%	100.0%
Al-Mahweet	% of total	Severe malnutrition (<11.5)	2.2%	.8%	6.1%
		Moderate malnutrition (11.5 to <12.5)	6.8%	4.3%	10.8%
		"At risk" malnutrition (12.5 to <13.5)	24.5%	18.3%	32.0%
		Well-nourished (13.5+)	66.5%	57.2%	74.6%
		Total	100.0%	100.0%	100.0%
Al-Mahara	% of total	Severe malnutrition (<11.5)	.5%	.1%	3.4%
		Moderate malnutrition (11.5 to <12.5)	1.3%	.4%	3.8%
		"At risk" malnutrition (12.5 to <13.5)	9.8%	6.9%	13.6%
		Well-nourished (13.5+)	88.5%	84.5%	91.6%
		Total	100.0%	100.0%	100.0%
Amran	% of total	Severe malnutrition (<11.5)	1.3%	.4%	4.0%
		Moderate malnutrition (11.5 to <12.5)	8.4%	5.2%	13.3%
		"At risk" malnutrition (12.5 to <13.5)	22.3%	18.9%	26.2%
		Well-nourished (13.5+)	68.0%	62.8%	72.8%
		Total	100.0%	100.0%	100.0%
Ad Daleh	% of total	Severe malnutrition (<11.5)	1.4%	.5%	4.3%
		Moderate malnutrition (11.5 to <12.5)	5.7%	3.0%	10.5%
		"At risk" malnutrition (12.5 to <13.5)	16.4%	12.3%	21.4%
		Well-nourished (13.5+)	76.5%	69.0%	82.7%
		Total	100.0%	100.0%	100.0%
Rayma	% of total	Severe malnutrition (<11.5)	3.5%	1.7%	6.9%
		Moderate malnutrition (11.5 to <12.5)	6.2%	4.0%	9.6%
		"At risk" malnutrition (12.5 to <13.5)	21.4%	16.8%	26.8%
		Well-nourished (13.5+)	68.9%	62.1%	74.9%
		Total	100.0%	100.0%	100.0%

Annex 11-12: Correlations between food insecurity, poverty and acute malnutrition in women, at the governorate level

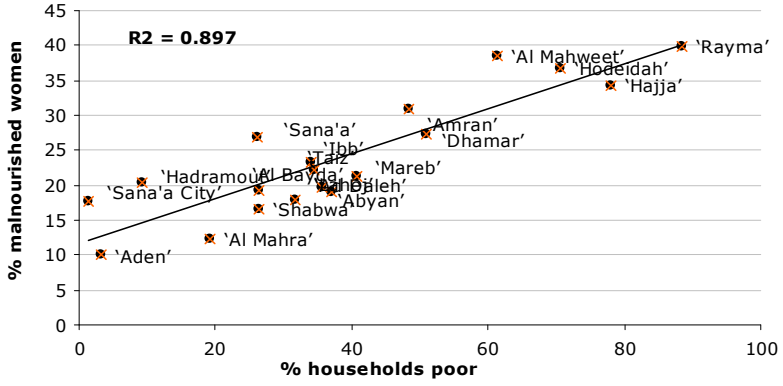
Graph 11-3: Correlation between Food Insecurity (Food Consumption Score) and Poverty (1. and 2. Wealth Index) at Governorate level



Graph 11-4: Correlation between Food Insecurity (Food Consumption Score) and Acute Malnutrition in Women (MUAC <22.2cm) at Governorate level



Graph 11-5: Correlation between Poverty (1. and 2. Wealth Index) and Acute Malnutrition in Women (MUAC <22.2cm) at Governorate level



Source: CFSS 2010

Annex 11-13: Criteria at the geographic, group, household and individual levels indicating high prevalence of food insecurity, poverty and malnutrition

Geographic	Group	Household	Individual
Governorates sorted by severity: • More than 10% of households with "poor" food consumption (<28 FCS): Rayma, Amran, Ibb, Ad Daleh, Hajja, Al-Mahweet, Taiz, Laheg, Al-Hodieda • Poverty prevalence of more than 40% (including two lowest wealth quintiles): Rayma, Hajja, Al-Hodieda, Al-Mahweet, Dhamar, Amran, Mareb • 10-19% ("mild", WHO 1999) of female population with BMI<18.5: Hadramout, Mareb, Dhamar, Ad Daleh, Shabwa, Al-Bayda, Sana'a City, Al-Mahara, Aden • 20-39% of female population ("high", WHO 1999) with BMI <18.5: Al-Mahweet, Rayma, Taiz, Abyan, Laheg, Sana'a, Amran, Ibb • >=40% of female population ("very high", WHO 1999) with BMI <18.5: Al-Hodieda, Hajja • More than 10% of households affected by child malnutrition (MUAC <12.5 cm = severe + moderate): Al-Hodieda, Mareb, Sana'a, Dhamar, Hajja, • More than 20% of households with children "at risk" of becoming acutely malnourished (MUAC 12.5-13.5 cm): Al-Mahweet, Hajja, Amran, Dhamar, Mareb, Rayma, Laheg • More than 40% of households with illiterate household head: Al-Hodieda, Al-Mahweet, Dhamar, Rayma, Hajja,	Rural areas: • Crop and livestock producers • Livestock traders • Agricultural and non-agricultural wage labourers • Households receiving support from family and social benefits • Households relying on in-country remittances Urban areas: • Households receiving support from family and social benefits • Non-agricultural wage labourers • Petty traders	Households with: • "poor" (<28 FCS) and "borderline" (<49 FCS) food consumption • Household headed by woman • Widowed household head • Illiterate household head and spouse • Dependency ratio of over 70% • Malnourished women (15—49 years) and/or children (6—59 months) • Children (6—59 months) affected by cough, fever, diarrhoea for more than two weeks • Limited/No access to safe drinking water) • Limited/No access to improved sanitation facilities	• Severely acutely malnourished women (MUAC <21.0 cm) • Severely acutely malnourished children aged 6—59 months (MUAC <11.0 cm) • Malnourished women (MUAC <22.2 cm) • Malnourished children aged 6—59 months (MUAC <12.5 cm) • Children aged 6—59 months affected by diarrhoea, cough and/or fever

Amran, Al-Bayda, Taiz, Al-Mahara, Ibb, Sana'a • Less than 80% of households with girls enrolled 7-12 years: Al-Hodieda Hajja, Rayma, Al-Mahweet, Dhamar, Abyan, Shabwa, Al-Mahara, Amran, Al-Bayda, Sana'a, Hadramout • Less than 80% of households with girls enrolled 13-15 years: Abyan, Hajja, Dhamar, Rayma, Al-Hodieda, Al-Mahweet, Shabwa, Al-Bayda, Sana'a, Mareb, Laheg, Ad Daleh, Hadramout, Amran, Al-Mahara, Ibb, Taiz • Less than 80% of households with girls enrolled 16-18 years: all governorates • More than 50% of households with unimproved sources of drinking water: Hajja, Ad Dhaleh, Rayma, Shabwa, Amran, Mareb, Al-Mahara, Abyan • More than 25% of households without access to any sanitation facilities: Rayma, Al-Hodieda, Al-Mahweet, Hajja, Mareb			

Annex 11-14: Spatial regression methodology

The report includes maps of food insecurity and poverty levels that were prepared using a method of spatial regression known as geographical weighted regression (GWR, Fotheringham et al, 2002). It is an extension of ordinary multivariate regression to the spatial case, i.e. when the variables to be analysed are collected at geographical locations and the spatial dimension has an influence on the analysis.

It accounts for the possibility that the relationship between an independent variable and explanatory variables may change across the region of interest. For example, if you want to model poverty levels over fairly large and diverse regions, you might expect the degree of influence exerted by some factors or their significance to be more important in some areas than others.

In ordinary regression, a variable of interest is modelled as a function of a set of explanatory variables:

$$\hat{Y} = b_o + \sum_N b_i \cdot X_i + e$$

In GWR, the above scheme is extended in such a way that the regression coefficients (and other standard regression elements such as standard errors and significance levels) are allowed to vary in space.

$$\hat{Y} = b_o(u,v) + \sum_N b_i(u,v) \cdot X_i + e$$

This means that you can obtain regression coefficients $\boldsymbol{b_i}$ at **any** arbitrary location within your region of interest. This is done by carrying out regressions which include all points in the dataset but weighted by their distance to the estimation point (hence the name geographically weighted regression): for any arbitrary location, data points close to it have more influence on the regression coefficients than data points further away.

The distance weighting uses a smoothly (gaussian) decaying function of distance, e.g.:

$$w_{ij} = exp(-1/2*(d_{ij} / h)^2)$$

where w_i is the weight of location i for estimation location j, d_{ij} is the distance between location i and estimation location j.

The variable h in the equation controls how fast this decay takes place. If h is large decay is slow; at the limit, if h is close to the maximum distance between data points GWR reverts to OLS (ordinary least squares, i.e. regression without a spatial dimension). The smaller h is the more spatially variable will the relationship. The method determines an optimum value of h such that estimation error is minimised.

For datasets with irregular distribution of data points it is possible to use a spatial varying inclusion window, whereby for any arbitrary location the local regression uses the nearest N data points, with N being determined optimally also by minimising estimation error. So, where many data points are found together the inclusion window is small, in areas of sparse sampling the inclusion window automatically adjusts to a wider size. The N points included are also weighted according to distance to the estimation point.

Given that regression coefficients can be obtained at any location, provided the explanatory variables are continuous spatial data, estimates of the independent variable can also be obtained at *any location* required – hence a map of the estimated variable can be derived.

This methodology is in the first stages of applicability to food security indicators. It has been applied to the study of the spatial variation in price data, crime rates, educational achievement, etc, and their explanatory factors.

Analysis for Yemen: In the context of this report the methodology has been applied primarily in order to define and make clear the patterns of spatial variation in key food security indicators, by estimating their value at unsampled locations. Essentially the method has been applied as an interpolation mechanism. A detailed analysis of the spatial variations in the regression coefficients (e.g. in order to identify where some determinants are more important than others) will be left for more advanced stages of the work.

In the analysis carried out for Yemen a set of potential explanatory variables were selected. These had to be available as maps/images and were assumed to have a bearing on food insecurity or poverty levels. The variables chosen were as follows:

- Population and infrastructure — urban areas, population density, distance to all-weather roads;
- Land cover-related — predominance of pasture, crop, forest, irrigated agriculture;
- Biophysical — vegetation (amount, inter-annual variability), topography (altitude, slope), distance to rivers.

The first set accounts for human settlement characteristics and ease of access to markets and other amenities (through distance to nearest all-weather road). The second and third set account for environmental factors — the type of landscape, variability of productivity, ease of access to water, etc…

In the analysis (which by and large follows the same approach as classic regression) only significant variables are retained in the final model. There is some additional complexity in that some variables may not be globally significant but may be locally significant in part of the area of interest.

For food insecurity prevalence (percentage of households with poor or borderline food consumption score), the variables retained were:

- Distance to roads
- Urban areas
- Elevation
- Vegetation amount
- Inter-annual vegetation variability (proxy for instability of crop production)

For poverty levels (percentage of households in lowest 40 percent wealth index distribution), the variables retained were:

- Distance to roads
- Population density
- Urban areas
- Distance to rivers
- Elevation
- Vegetation amount

General results for the modelling for each indicator are as follows :

FCS –
Global regression r2 : 0.20
GWR regression adjusted r2 : 0.33

WI –
Global regression r2 : 0.37
GWR regression adjusted r2 : 0.62

Note that the regression models provide a much better fit to the spatial variation in WI than to the FCS. This may have several causes among which the following are judged to be the most likely :

- FCS is intrinsically more variable at very short distances, while WI is markedly more continuous and spatially consistent. This may reflect greater sampling error in the FCS and a greater sensitivity. The WI is a more robust variable being related to core household assets which might not be expected to be so variable in space.

- The explanatory variables for FCS do not include variables related to socio-economic access – obtaining these variables as spatially continuous surfaces is not an easy task and may not be feasible. Hence, it is natural that in the absence of these variables, the models for FCS will always offer less explanatory power that for WI.

Annex 11-15: Overview of ongoing national programmes indirectly and directly addressing food insecurity, malnutrition and poverty[88]

The Social Welfare Fund

The Social Welfare Fund (SWF) is the country's main and largest social safety net programme, which was set up in 1996 by the Ministry of Social Affairs and Labour to assist the poor and vulnerable population in coping with the reduction in economic subsidies by means of monthly cash transfers. Following a wide-ranging reform of the SWF and improvement of targeting mechanisms and criteria, the SWF is reaching over one million beneficiaries across all twenty-one governorates. Beneficiaries include individuals and their families without any income, the elderly, the disabled, and orphans. Following the rising food prices, the cash transfer has been doubled to a maximum of 4,000 Yemeni Rials (US$20) per family of six per month. Enrolment durations vary from two to a maximum of five years, depending on the type of target group, before a reassessment of beneficiaries' eligibility is carried out.

The Government is planning to increase its caseload, which reached 1 million beneficiaries in 2009, but the impact of the oil crisis on Government revenue has delayed the implementation of the Government's commitment to expand SWF coverage. Thanks to the recently implemented nationwide Social Welfare Fund Survey (EuropeAid 2008), which verified the eligibility of currently registered beneficiaries and identified new cases, an improved targeting system has been developed based on the proxy means test methodology. Implementation of this new system is scheduled to start in 2010.

The Social Fund for Development

The Social Fund for Development (SFD) was established in 1997 with World Bank funds.[89] It was conceived as a demand-driven social fund aimed at raising living standards and promoting income-earning opportunities for the poor. The programme has three components: (i) community development, (ii) institutional support and capacity-building, and (iii) small-scale enterprise development[90] (van de Walle 2002). In its early phases,[91] the SFD has worked with local communities on health, education and infrastructure projects to improve access to basic social services, secure more effective delivery of social services and give access to microcredit. The SFD is currently in its fourth phase (MoPIC 2009). By the end of 2007, the SFD had spent US$596 million on 6,914 projects to reach 14.4 million beneficiaries, over half of whom were female, and created 23.6 million employment days (SFD 2007). During 2001-05, educational projects represent the largest share of investment (54 percent), followed by water (11 percent), health (7.5 percent) and roads (7.6 percent). Education, health, roads and water projects generate 73 percent of all direct beneficiaries, while health and water often target women. A considerably higher proportion of SFD resources is found to benefit the poorest households,[92] compared with other social welfare projects (World Bank et al. 2007).

The SFD is a major player in efforts to reduce poverty. However, it has suffered from limited resources and has been unable to meet the large number of requests submitted by communities, reflecting an urgent need (MoPIC 2009). Funding comes from a range of sources, including the Government, the Arab Fund for Economic and Social Development, European Commission, World Bank, the United Nations Educational, Scientific and Cultural Organization, and other bilateral and multilateral donors. Communities that receive support contribute by providing labour, construction materials, other in-kind contributions and cash (SFD 2007).

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[88] Förch (2009), Yemen: Secondary data analysis on food security and vulnerability..

[89] The SFD is an autonomous agency governed by a Board of Directors chaired by the Prime Minister.

[90] For example: (i) community development focuses on small-scale infrastructure to improve access to education, health, water harvesting services using labour-intensive techniques; (ii) institutional support and capacity-building provide assistance to NGOs, Government, and private-sector and community projects to promote service delivery; (iii) small-scale enterprise development supports income-generation through microcredit, savings and other programmes targeted to the poor.

[91] First phase: 1997—2000, US$90 million; second phase: 2001—03, US$175 million; third phase: 2004—08, US$75 million.

[92] Forty-two percent of SFD funds goes to the poorest decile, 59 percent to the poorest quintile.

Public Works Project

The Public Works Project (PWP) was established in June 1996 with World Bank funding. It aims to create jobs, provide the poor with small-scale development projects, enhance community participation and develop local contracting firms (van de Walle 2002). During 2001-05 the PWP carried out 1,270 projects (67 percent achievement rate) and about 7.4 million people benefited (over 67 percent female). It provided 5.3 million jobs, of which 60 percent employed unskilled labour (World Bank et al. 2007). Projects are community demand-driven and include small-scale infrastructure such as education and health facilities, water supply and sanitation, road rehabilitation, vocational training and social security (van de Walle 2002). An impact assessment of PWP investments was positive and noted that it compared favourably with similar projects in other countries. The PWP experienced some difficulty in obtaining timely co-financing from communities and its projects suffered from volatile construction costs, weak local contractors and difficult access to certain remote areas (MoPIC 2009). Between January and October 2009, 489 projects were implemented and 41,503 jobs created.

Agriculture and Fisheries Production Promotion Fund

The Agriculture and Fisheries Production Promotion Fund (AFPPF) was launched in 1995 in light of concerns that increases in diesel prices and the possible elimination of the subsidy would affect the poorest population in rural and coastal areas, both as consumers and as producers. The Fund aims to promote agriculture, livestock and fisheries through schemes that subsidize the cost of agricultural inputs, water harvesting, and production marketing schemes. The AFPPF is financed through a system whereby 2.5 Yemeni Rials is deposited for every litre of diesel sold, in addition to general budget and donor grants (van de Walle 2002). During 2006/07 the AFPPF implemented 182 projects at a cost of US$6 million. The Fund's long-awaited restructuring has not been completed and its operations have suffered from outside intervention and a lack of qualified personnel (MoPIC 2009).

Annex 11-16: Social Welfare Fund targeting criteria and food insecurity

	Correlation with **Poverty**	Pearson Correlation with **Food Insecurity** (p=.000)
Characteristics of the Household Head		
Gender: male	0.043	0.104
Age	0.003	No
Able to read & write	0.067	0.171
Attended primary education	0.109	0.023[1]
Attended secondary education	0.169	0.085[2]
Married	-0.064	No
Housing Characteristics		
Floor type: mud	-0.244	*Not asked*
Floor type: flagstone/cement	-0.165	*Not asked*
House type: Apartment/Villa	0.082	0.124[3]
Fuel: Gas	0.024	0.270[4]
Water system	0.057	0.116[5]
Household size	-0.063	0.081
No. of HH members (6-25 yrs) attending school	-0.012	0.060[6]
No. of HH members (6-25 yrs) never attended school	-0.019	*Not asked*
Family property		
Fixed/Mobile telephone	0.234	0.311
TV	0.095	0.285
Washing Machine	0.071	0.292
Sewing Machine	0.032	0.155
Taxi bus	0.302	0.190[7]
House for rent	0.13	*Not asked*
Own agricultural plot	0.098	0.114

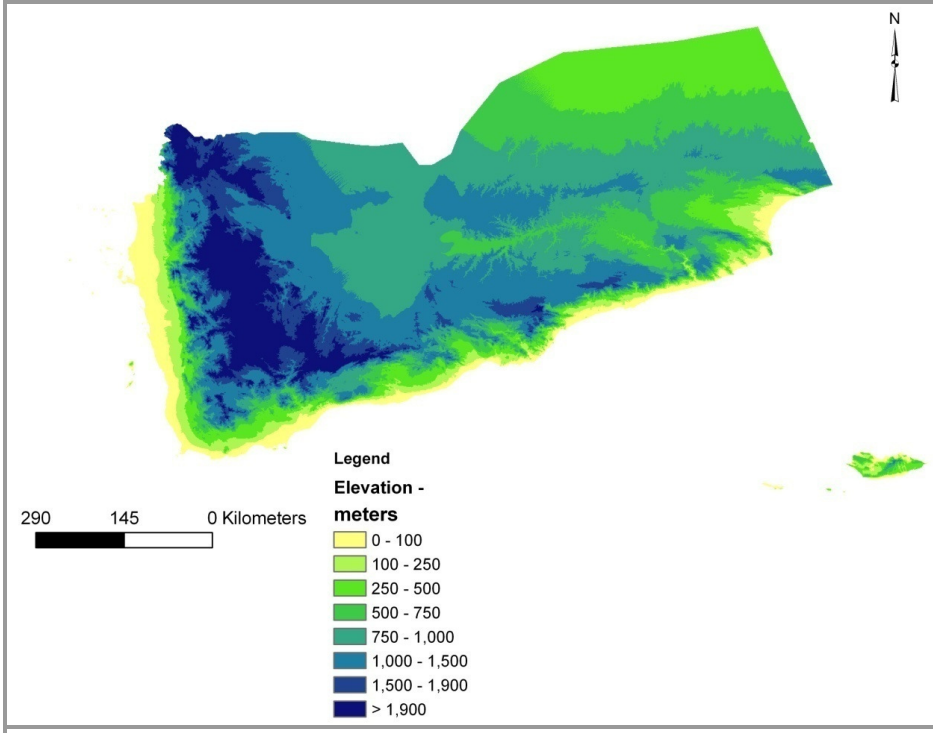
Note:

1) Attained only primary education
2) Attained only secondary education
3) Dwelling type is house or apartmen
4) Cooking fuel is LPG
5) Water sourse is "improved" (WHO 1999)
6) Total number of boys and girls enrolled (7-18 years)
7) Ownership of car/truck

Annex 11-17: Description of agro-ecological zones (AEZs) in Yemen[93]

Yemen has different landscapes and thus very diversified agro-ecological conditions. The landscape of Yemen is divided into three distinct regions: the coastal region, the highlands and the eastern plateau (MoPIC 2008). The coastal region consists of the Tihama plain in the west and the southern plain in the south. It includes the governorates of Abyan, Aden, Al-Hodieda, Al-Mahara, Lahj and part of Hadramout. In the highland region, jagged mountainous highlands reach more than 3,000 m above sea level. This includes all or parts of the governorates of Al-Bayda, Abyan, Ad Daleh, Al-Mahweet, Dhamar, Hajja, Ibb, Saada, Sana'a and Taiz. The eastern plateau, whose elevation is higher than the coastal region, comprises mostly deserts and some *wadis*. The region encompasses all or part of the governorates of Al-Jawf, Hadramout (the interior), Mareb and Shabwa. This so-called ''Empty Quarter" is the rolling sea of sand, which stretches into Saudia Arabia.

Map 11-1: Land Elevations in Yemen



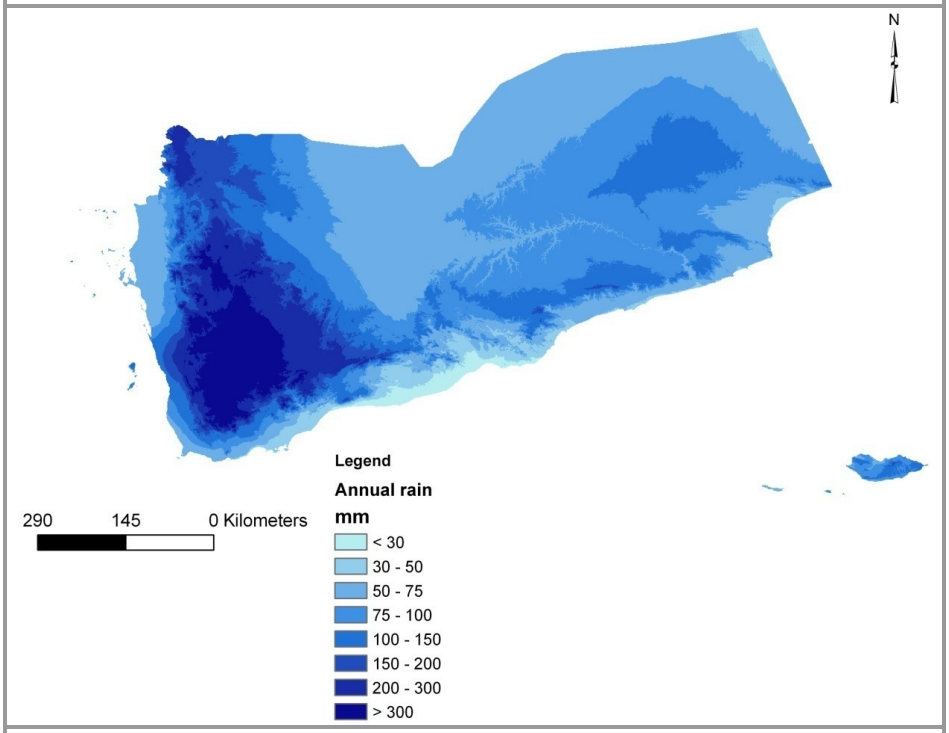
Source: IFPRI 2010

The diverse topography leads to diverse climatic conditions. Monsoon winds carrying rain from the east and west are affected mainly by the topography. Climatic conditions vary from a hot and dry climate in the coastal plains region and low mountain slopes, where precipitation ranges from zero to 400 mm and the temperature rises to 40°C in summer (Al-Hodiedah, Taiz and the southern provinces of Aden, Abyan, Al-Mahara, Hadramout, Laheg and Shabwa), to a temperate climate in the highlands (altitude from 1,800 m to 3,700 m), where precipitation varies from 200 mm to 1,500 mm and winter temperature

[93] CFSAM 2009; IFPRI 2010.

may fall below 0°C. Between these two extreme climates there is a transitional arid subtropical climate, with precipitation from 100 mm to 600 mm and mean monthly temperatures from 16°C to 28°C, which prevails in lower and upper mountain slopes and the eastern plateau (Al-Jawf and Mareb).

Map 11-2: Average Annual Rainfall in Yemen



Source: IFPRI 2010

Agricultural and livestock systems vary greatly according to the geography and climate that characterize the six main agro-ecological zones (AEZs). Farming systems are differentiated by their access to irrigation water. The rainfed farming system dominates in the central and southern highlands, the western uplands and parts of the eastern plateau. The potential for agriculture depends mainly on the quantity and consistency of rainfall during the main season between July to September and the small season between March to May. Areas that receive less than 500 mm per year are considered marginal for agriculture, with unreliable production. Most cereals (barley, millet, maize, sorghum and wheat) are grown under rainfed conditions for home consumption, wheat and maize being cultivated only in areas of high precipitation. The irrigated farming system, which represents about half the cultivated areas, is present in all AEZs of the country. High value crops such as qat, fruits, vegetables and forages are mainly produced under irrigation and also in high rainfed areas. Other lower value crops, such as cotton, coffee, maize and wheat, are also grown to a limited extent under irrigation. Almost four fifths of all areas with some form of water control are irrigated through tube wells, while flood (spate) irrigation provides water to 18 percent and spring irrigation to 3 percent (National Food Security Strategy 2008; Aden Agenda 2000; National Irrigation Program 2008). Below is a description of each of the six AEZs:

Zone 1: The Upper Highlands (above 1,900 m)
The Upper Highlands consists of rough mountainous highlands ranging from 1,900 m up to more than 3,000 m. This is the richest and most fertile zone in the country, with regular rainfall of above 400 mm per year. Terrace cultivation on steep mountains is an old method of soil conservation and water harvesting, and is the typical form of subsistence farming. Most agriculture is rainfed and major crops are sorghum, wheat, barley and lentils. Irrigation is generally applied to high-value crops such as qat and mainly by wealthier landowners. Livestock are fed with cut fodder during the rainy season and are left to graze stubble after harvest. The zone has a temperate, rainy summer and a cool, moderately dry winter when temperatures can fall below 0°C. The Upper Highlands is the most densely populated zone with more than 14 million inhabitants, or 30 percent of the population, living in the central and northern highlands.

Zone 2: The Lower Highlands (below 1,900 m)
These low mountainous highlands reach up to 1,900 m above sea level, and the sandy *wadis* between the mountains are only a few hundred meters above sea level. This region is also highly populated with more than 40 percent of the Yemeni population living within this zone. Precipitation ranges from 0 mm to 400 mm and the temperature in the summer reaches 40°C. Relative to Zone 1, these low mountainous slopes are drier and hotter. Similar to Zone 1, terrace cultivation of the steep mountainsides is the typical form of farming. Over 40 percent of cereals in Yemen is produced in this zone. Most of the cereal production is rainfed, but many farmers supplement this with irrigation. Irrigation is generally applied to high-value crops such as qat, vegetables and fruits. The economy of the area mainly relies on agriculture and livestock (goats and cows), although remittances are also an important source of income for many households.

Zone 3: The Red Sea and Tihama Coast
The Tihama plain stretches along the Red Sea coast in a band of around 45 km width. Its terrain is similar to the African savannah with a tropical, hot and humid climate, while rainfall averages only 130 mm annually and occurs in irregular, torrential storms. Agriculture is irrigated by flash floods originating in distant mountains, while a few wealthy farmers are able to irrigate their land with water pumps. There are some very large farms in the Tihama plain, owned by a handful of absentee landowners. Major food crops are sorghum and millet, while melons, bananas, papaya and mangoes are cash crops. Fodder, in particular sorghum, is locally produced in good quantities and is then traded throughout the country. This zone is known for rearing livestock, mainly goats and cows because of the availability of fodder. Fishing is another form of livelihood. Historically much trade and socio-cultural exchange has taken place between the Tihama plain and the Horn of Africa. This zone accounts for 13 percent of the national population and represents one of the poorest regions in the country.

Zone 4: The Arabian Sea Coast
The coastal plain overlooking the Gulf of Aden has an average temperature of 25°C in January and 32°C in June, with an average annual rainfall of 127 mm. Spate irrigation is still used near Aden, where cotton is grown. Large-scale landowners with access to irrigation cultivate fruits and vegetables, while smallholder farmers often rely on maize, barley and sorghum cultivated on rainfed plots. There is limited livestock because of the scarcity of fodder but camels are common. Fishing is an important source of livelihood. This zone is much more sparsely populated than the north of the country, with only about 8 percent of the Yemen population living here.

Zone 5: The Internal Plateau
The Internal Plateau is predominately characterized by a desert environment with a few lush *wadis*. Agriculture is generally fed by rain and flash floods, although the wealthy landowners irrigate with water pumps from ground wells. In addition to agriculture,

pastoralism is common. This area used to be very wealthy with strong trading ties that once linked Southeast Asia with Zanzibar. This trade is no longer a source of income and the majority of the population relies on remittances. The zone is sparsely populated with around 7 percent of the Yemeni population, most of them concentrated in the *wadis*.

Zone 6: The Desert

The Desert zone, or so-called Empty Quarter, is the rolling sand sea that stretches into Saudi Arabia. Very little agricultural activity beyond pastoralism is possible. It is inhabited by a few nomadic Bedouins who rely on trading goats and camels. Pastoralists stay in traditional grazing areas during summer and migrate to mountain pastures during the extremely dry winter. Around 1 percent of the population lives in the desert.

Annex 11-18: National cereal supply/demand balance in 2010

A disaggregated version of the 2009/10 national grain supply/demand balance, considering separately wheat, rice, barley, maize and sorghum crops, is based on the following estimates and assumptions (which informed the CFSS mission):

- Total cereal production is estimated at 706,000 tons. As this estimate is based on a field assessment carried out during the month of October 2009, final production figures may vary when all crops are harvested by the end of December 2009.
- Food use is estimated at 3.5 million tons, using a 2010 mid-year population of 23.2 million and an apparent average cereal consumption of 151 kg/person/annum. Per capita consumption comprises 112 kg of wheat, 16.5 kg of rice, 12.5 kg of sorghum, 7 kg of maize, 2.5 kg of millet and 0.5 kg of barley. Cereals represent about 60 percent of the daily calorie requirements (2000-2100 kcal/capita/day), the rest being covered by sugar and oils, and to a lesser extent by meat, fruits and vegetables.
- Seed requirements are estimated at about 41,000 tons on the basis of recommended seed rate in the country and a planted area of 756,000 ha of cereals in 2009. The following seed rates have been used: 25 kg/ha for sorghum, 80 kg/ha for maize, 180 kg/ha for wheat, 120 kg/ha for barley and 20 kg/ha for millet.
- Feed use is forecast at about 263,000 tons, mainly through imported maize.
- Post-harvest losses and other uses are estimated at 91,000 tons, with rates ranging from 7 percent for millet to 15 percent for maize and sorghum. Total losses averaged about 13 percent of the total production.
- Cereals stocks, primarily wheat and wheat flour in the silos of the main private traders, are expected remain unchanged between the beginning and the end of the marketing year 2009/10, at an estimated 1.6 months of food consumption.

The cereal import requirement in 2010 is estimated at about 3.2 million tons, including 2.48 million tons of wheat, 383,000 of rice and about 330,000 of maize. This amount is expected to be fully covered through commercial imports.

Annex 11-19: Risks to rainfed crop production

Some insight into the crop calendars can be gained from the community questionnaire. Most rainfed cereals develop during the main rainy season (May to October), with planting taking place mostly during June and July and harvesting in October-November. These are general indications — in the Red Sea and Tihama coast region the calendar can be shifted by one or two months. Crop cycles (from planting to maturity) last 3 to 4 months for most rainfed cereals.

Where water is supplied by means other than rainfall, the crop cycle is not tied to the rainfall regime. Irrigated wheat tends to develop during the cooler times of the year (winter).

Table 11-2: Crop calendars for maize in the various agro-ecological zones and for barley and sorghum where more dominant (Lower Highlands and Upper Highlands respectively).

MAIZE	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Arabian Sea							P	P			H	H
Lower Highlands						P	P			H	H	
Internal Plateau						P	P			H	H	
Red Sea-Tihama Coast							P	P			H	H
Upper Highlands						P	P			H	H	

BARLEY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lower Highlands						P	P			H		

SORGHUM	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Upper Highlands						P	P		H	H		

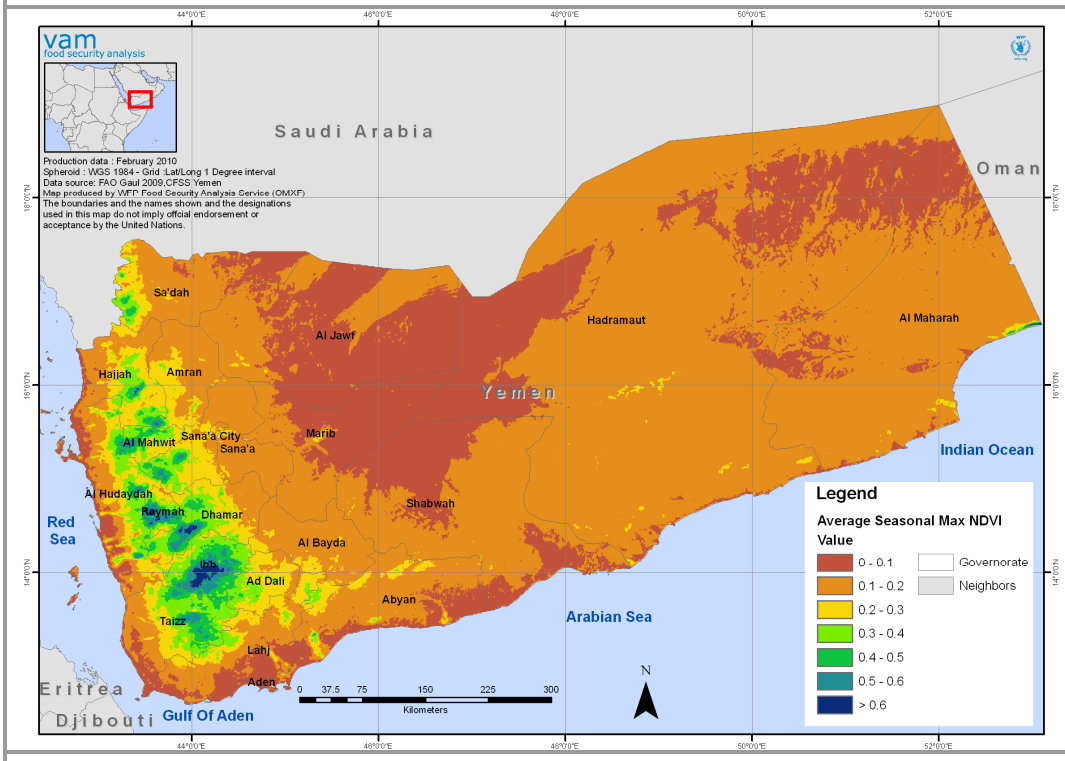
Source: CFSS 2009/10

The period of the development cycle when crops are most susceptible to lack of rainfall is during flowering and grain filling. Considering the broad calendars above, the key rainfall period for rainfed crop development is September for most regions, and October for the Arabian Sea and Red Sea-Tihama regions.

However, the lack of rainfall data (whether as gauges or satellite-derived estimates) for a minimum length of time did not allow a meaningful analysis to be conducted of the variability of rainfall and/or the frequency of occurrence of rainfall amounts that meet crop requirements. The Rainfall Estimate (RFE) dataset from the Famine Early Warning System Network (FEWS-Net) was examined but found to be inconsistent and likely to have severely underestimated actual rainfall, particularly in the later part of the data set (e.g. maximum estimated rainfall in the highlands not exceeding 375 mm for 2007, from all accounts an above average rainfall year and a bumper crop production season).

Alternatively, a satellite-derived indicator of vegetation development (Normalized Difference Vegetation Index or NDVI) was used instead. This is a numerical index that grows with increasing amounts and vigour of vegetation. It has a theoretical range between -1.0 and +1.0 (though in practice most values are confined between -0.3 and +0.9). Values below 0.07-0.10 are typical of bare soil or of extremely sparse/dry vegetation. The index cannot distinguish between vegetation types (e.g. differentiate between crops and pasture) but provides a general vegetation response.

Map 11-3: Average seasonal maximum NDVI (1998-2009)



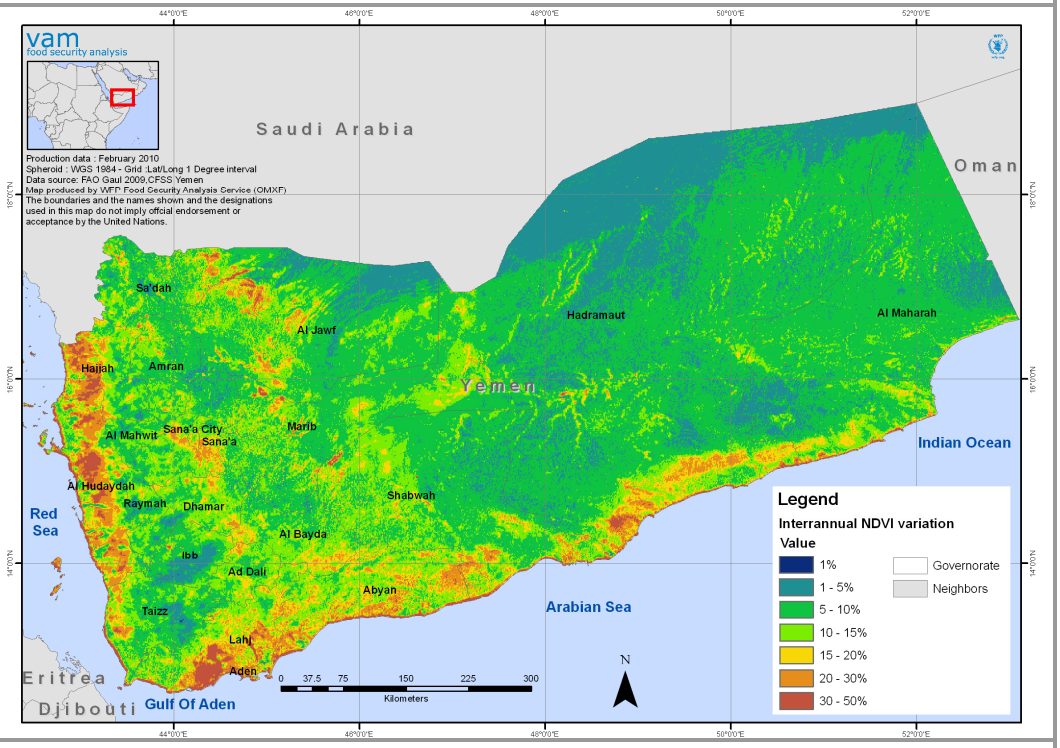
Source: SPOT-VGT NDVI data from FAO/NRCE, processing by ODXF

For each year in the record (1998-2009), the maximum value of the index was derived. This is taken to be representative of the annual maximum vegetation development. The average of the 12 yearly maximum values is presented in Map 11-3. It can be seen that there is a clear link to elevation, with higher NDVI values in the higher ground (in the Upper Highlands and Lower Highlands) and lowest values extending across the remaining agro-ecological zones where vegetation is sparse. In these areas, higher vegetation values are only present in river valleys and where topography promotes accumulation of surface runoff.

Although the available data set covers a short period (1998-2009), areas where vegetation development is most variable from season to season can be identified. This variability is related to variability in the water supply, whether from rainfall or from irrigation.

To quantify how variable the seasonal vegetation development is, a time series of the yearly maximum NDVI (12 values for each pixel) is used to calculate its coefficient of variation (the standard deviation of these values divided by their average). The higher this coefficient of variation, the more irregular/variable the vegetation development is from year to year. The result is presented in Map 11-4.

Map 11-4: Variability(*) of seasonal vegetation development (1998 to 2009)



Source: SPOT-VGT NDVI data from FAO/NRCE, processing by ODXF

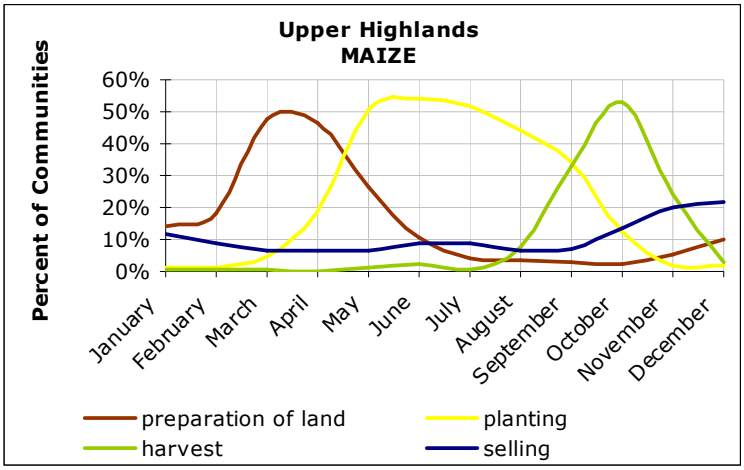
(*) Expressed as coefficient of variation of the seasonal maximum NDVI

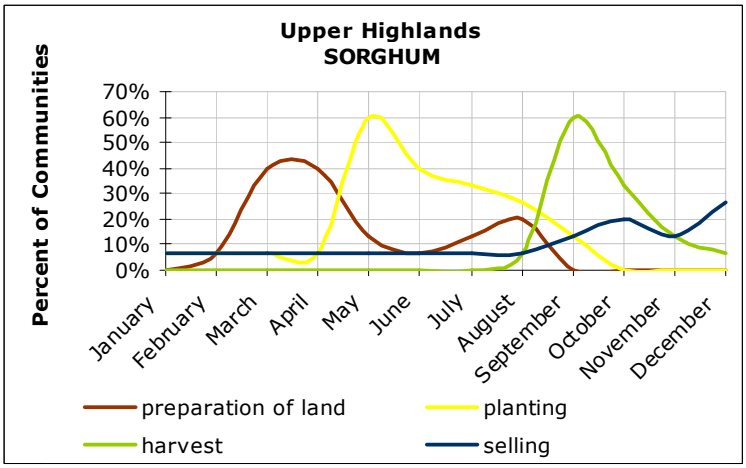
The areas of lowest vegetation variability are those where vegetation is densest and those where it is sparsest. Where vegetation is densest, rainfall is regular and abundant enough to lead to regular and good vegetation development with little variation between one season and the next. Where it is sparsest, rainfall is not enough to allow significant vegetation development to take place and vegetation development is always very low or non-existent (and hence with little variation between seasons).

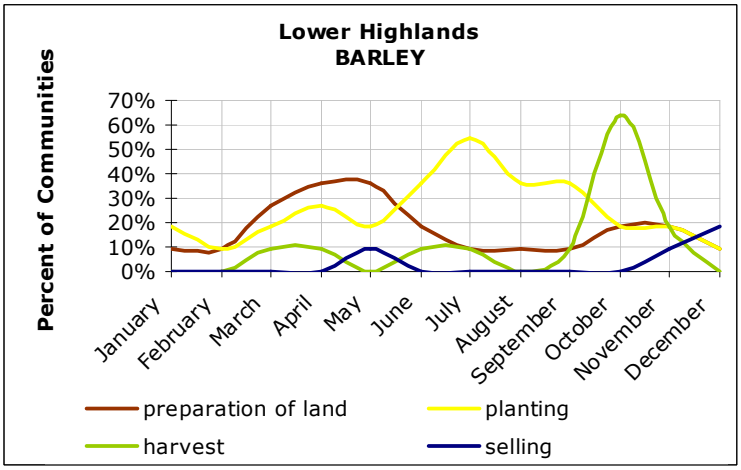
In between these two extremes, vegetation presents a higher degree of variability arising from a more irregular rainfall (or surface runoff) supply. In Yemen, the highest inter-annual vegetation variability occurs in the coastal areas along the mountainous slopes leading to the highlands, particularly in the governorates of Abyan, Al-Hodieda, Hajja and Laheg, and in the coastal areas of Al-Mahara, Hadramout and Shabwa. Hence in the governorates of Abyan, Al-Hodieda, Hajja and Laheg, agriculture relies on water supply from *wadis* draining mountainous areas of higher rainfall (CFSAM 2009).

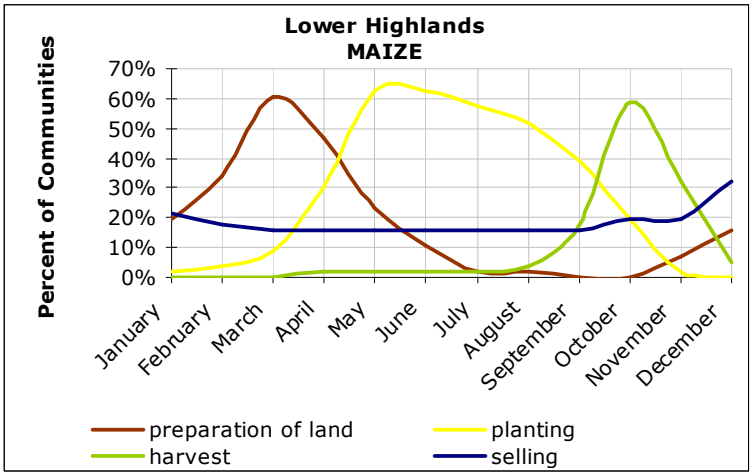
The high variability of vegetation (crop/pasture) development from one season to the next may be a factor in the vulnerability of rural households. The risk of crop failure is higher in these areas and the low stability of crop/pasture production may restrict household options in terms of agricultural diversification. The governorates where seasonal variability is highest also feature high in the ranks of those more affected by poverty.

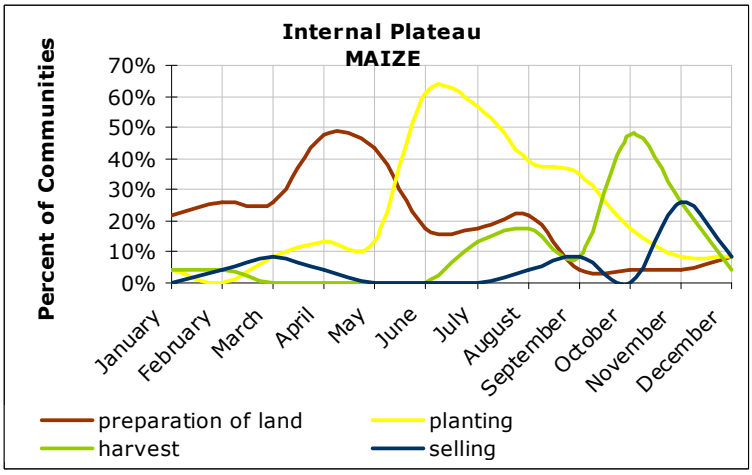
Annex 11-20: Agricultural calendar of the most commonly cultivated crop in five different agro-ecological zones (based on CFSS community interviews)

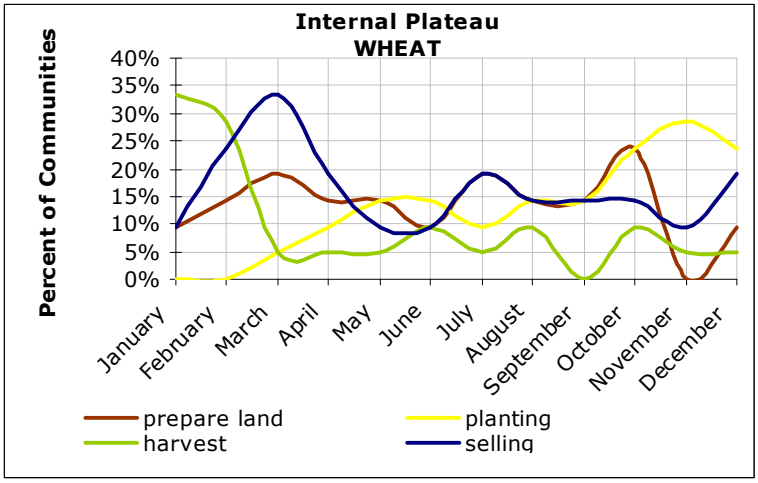


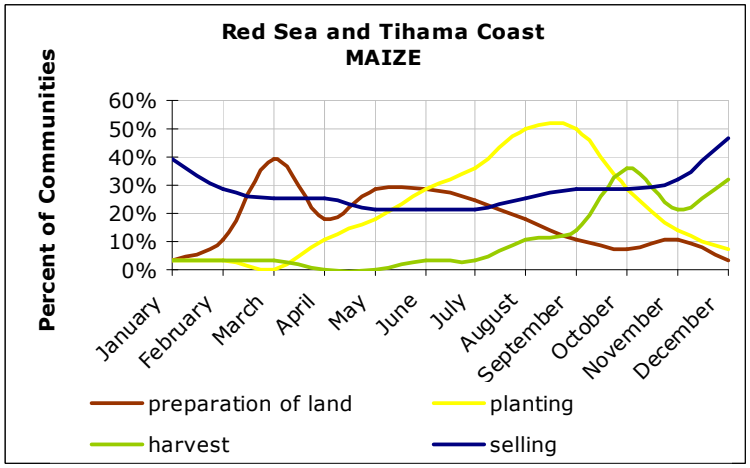


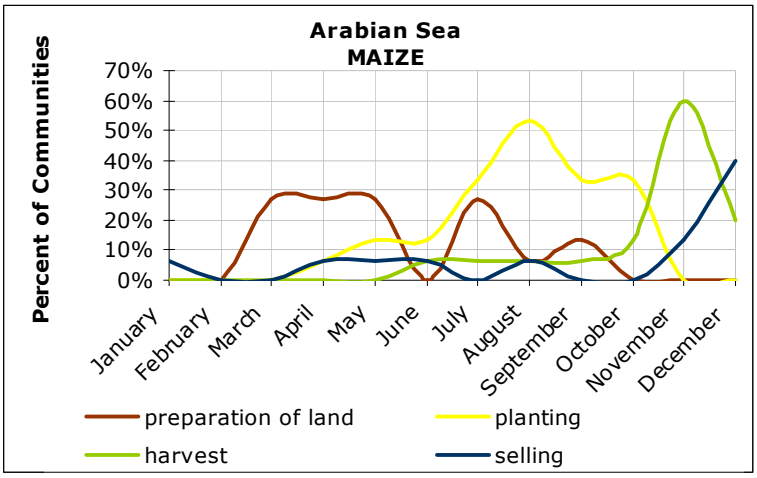



Lower Highlands
MAIZE
Percent of Communities
70%
60%
50%
40%
30%
20%
10%
0%
January
February
March
April
May
June
July
August
September
October
November
December
preparation of land
planting
harvest
selling

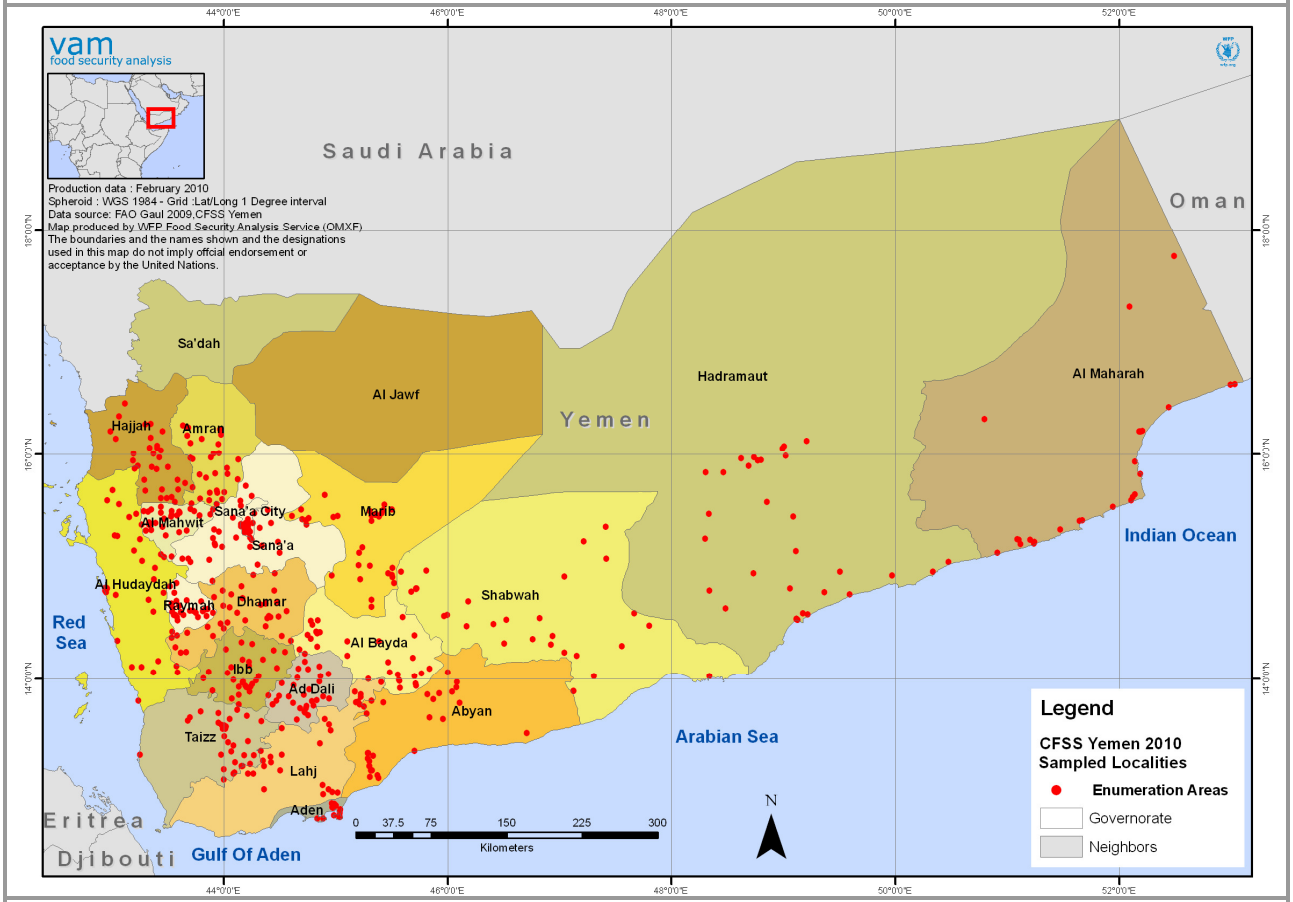

Internal Plateau
MAIZE
Percent of Communities
70%
60%
50%
40%
30%
20%
10%
0%
January
February
March
April
May
June
July
August
September
October
November
December
preparation of land
planting
harvest
selling


Internal Plateau
WHEAT
Percent of Communities
40%
35%
30%
25%
20%
15%
10%
5%
0%
January
February
March
April
May
June
July
August
September
October
November
December
prepare land
planting
harvest
selling


Red Sea and Tihama Coast
MAIZE
Percent of Communities
60%
50%
40%
30%
20%
10%
0%
January
February
March
April
May
June
July
August
September
October
November
December
preparation of land
planting
harvest
selling

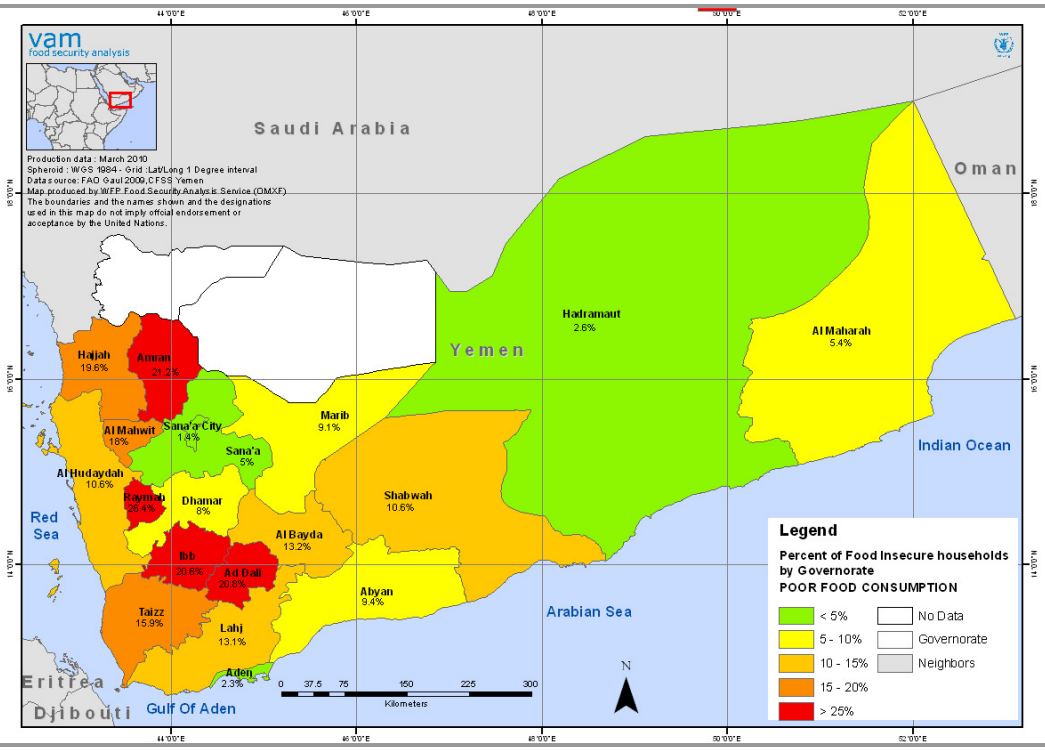

Arabian Sea
MAIZE
Percent of Communities
70%
60%
50%
40%
30%
20%
10%
0%
January
February
March
April
May
June
July
August
September
October
November
December
preparation of land
planting
harvest
selling

Map 11-5: Sample of 570 enumeration areas

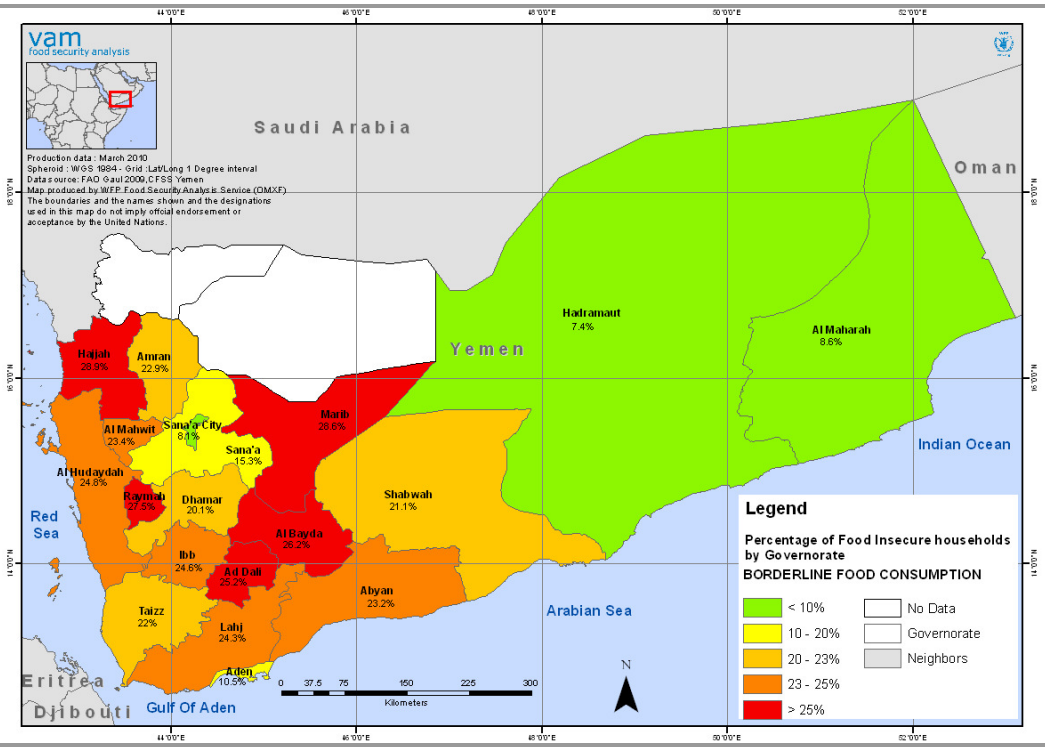


Source: CFSS 2010

Map 11-6: Prevalence of POOR food consumption (severe food insecurity)

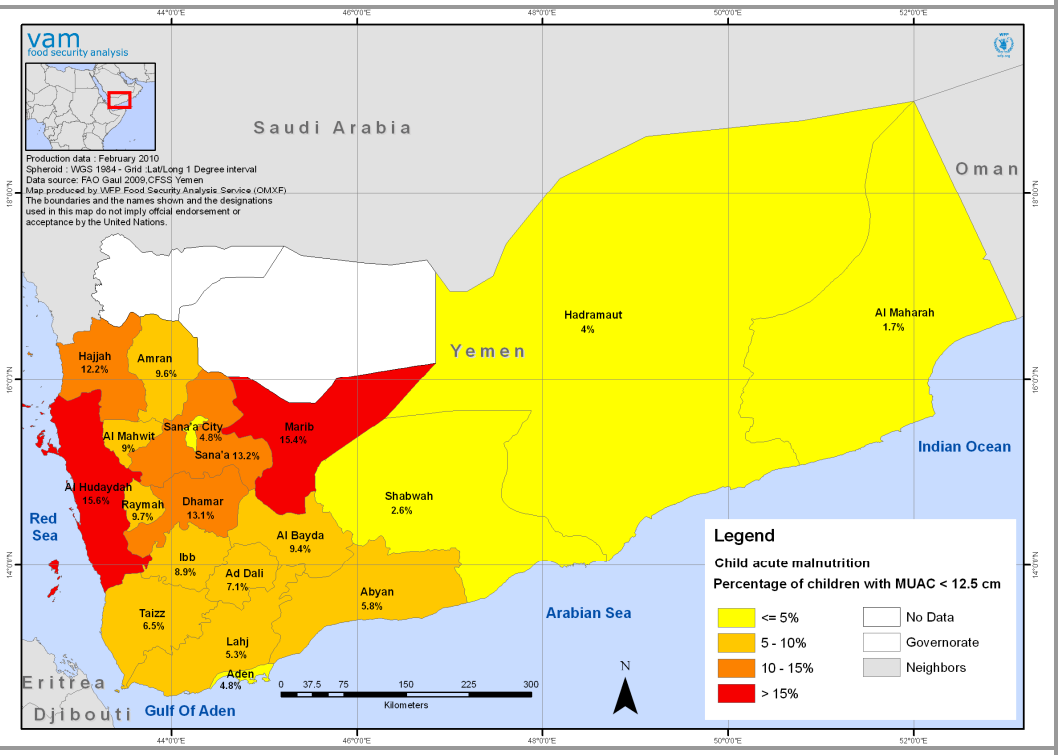


Map 11-7: Prevalence of BORDERLINE food consumption

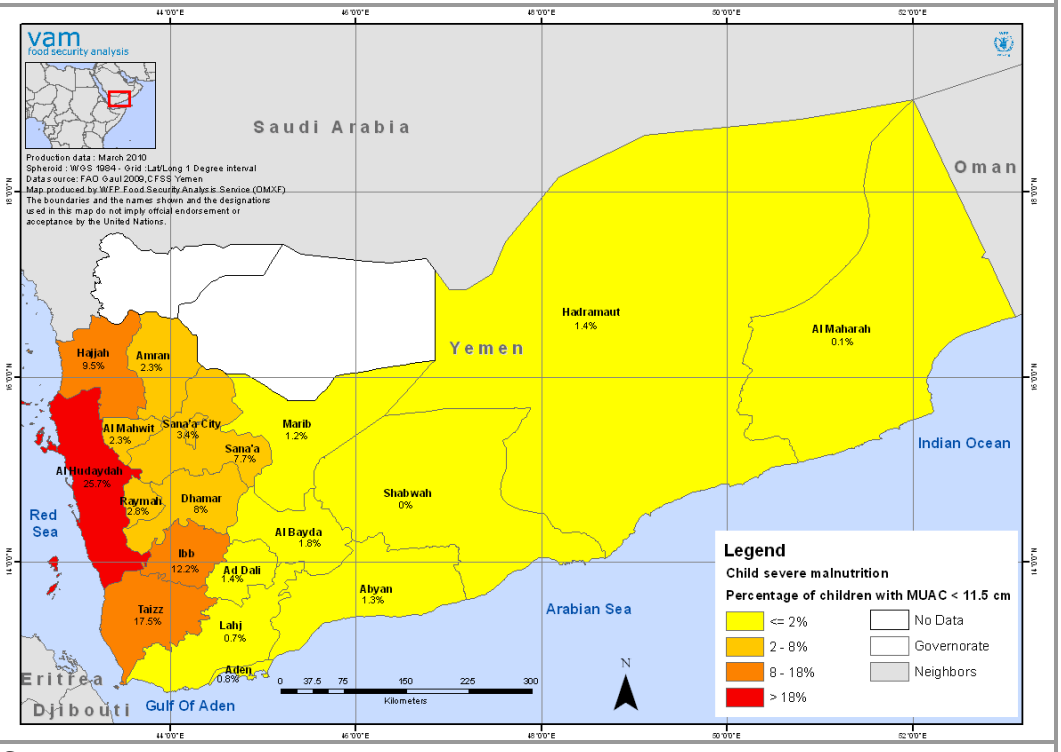


Source: CFSS 2010

Map 11-8: Acute malnutrition in children (MUAC <12.5 cm)

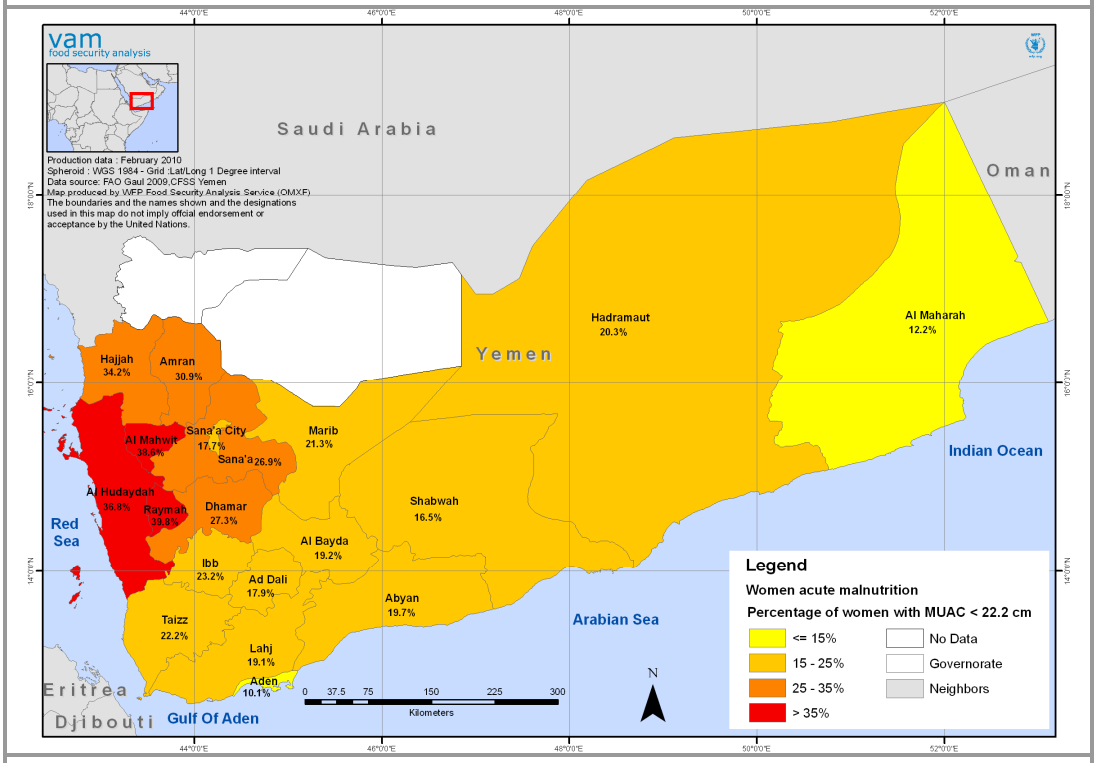


Map 11-9: Severe acute malnutrition in children (MUAC <11.5 cm)

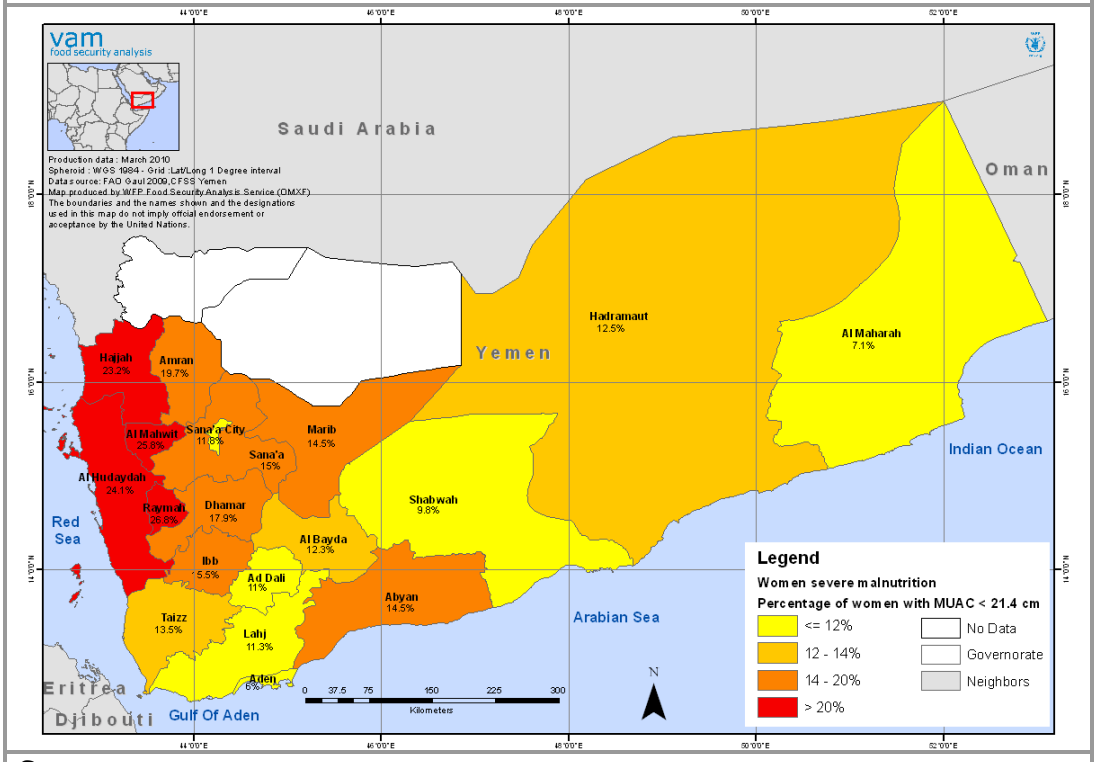


Source: CFSS 2010

Map 11-10: Acute malnutrition in women (MUAC <22.2 cm)



Map 11-11: Severe acute malnutrition in women (MUAC <21.4 cm)



Source: CFSS 2010

12 OUTPUT TABLES

Output Tables 12-1: Food security and Food Consumption Groups, sources of food and coping strategies (percent of households)

	food security categories (28-48) *population weight*		food consumption groups (28-48) *population weight*		
	food insecure	food secure	poor	borderline	acceptable
	Row N %	Row N %	Row N %	Row N %	Row N %
'Rayma'	52.8%	47.2%	24.3%	28.4%	47.2%
'Hajja'	46.3%	53.7%	17.1%	29.1%	53.7%
'Ibb'	44.0%	56.0%	20.1%	24.0%	56.0%
Addahle'	44.0%	56.0%	19.7%	24.3%	56.0%
'Amran'	42.8%	57.2%	21.1%	21.7%	57.2%
'Al-Mahweet'	40.5%	59.5%	16.4%	24.2%	59.5%
'Al-Bayda'	38.3%	61.7%	12.7%	25.6%	61.7%
'Taiz'	36.4%	63.6%	15.9%	20.5%	63.6%
'Laheg'	35.4%	64.6%	12.9%	22.5%	64.6%
'Mareb'	34.0%	66.0%	8.4%	25.6%	66.0%
'Abyan'	33.7%	66.3%	8.4%	25.3%	66.3%
'Al-Hodieda'	33.2%	66.8%	10.1%	23.1%	66.8%
'Shabwa'	26.7%	73.3%	9.8%	16.9%	73.3%
'Dhamar'	23.7%	76.3%	6.8%	16.9%	76.3%
'Sana'a'	15.6%	84.4%	3.1%	12.6%	84.4%
'Aden'	12.1%	87.9%	1.5%	10.6%	87.9%
'Al-Mahra'	10.3%	89.7%	4.8%	5.6%	89.7%
'Hadramout'	9.8%	90.2%	2.2%	7.7%	90.2%
'Sana'a City'	8.5%	91.5%	1.4%	7.2%	91.5%
Rural	38.1%	61.9%	15.1%	23.1%	61.9%
Urban	14.5%	85.5%	3.5%	11.0%	85.5%
Total	31.5%	68.5%	11.8%	19.7%	68.5%

	Sources of food over last 7 days preceding the survey							
	Own production	Hunting/ Fishing	Cash	Credit	Borrowed	Begging	Received as payment	Assistance
	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
'Ibb'	7.96	.00	66.95	20.42	3.73	.43	.18	.33
'Abyan'	3.30	.00	56.69	37.32	1.80	.00	.04	.85
'Sana'a City'	.36	.00	87.96	9.24	.72	.00	.53	1.19
'Al Bayda'	3.76	.03	78.12	14.31	2.25	.00	.13	1.42
'Taiz'	6.54	.00	65.63	23.27	3.02	.18	.21	1.15
'Hajja'	7.21	.08	72.37	16.53	2.30	.11	.80	.62
'Hodeidah'	4.66	.25	75.31	15.98	1.66	.79	.55	.79
'Hadramout'	4.18	.10	76.20	17.97	.59	.29	.38	.29
'Dhamar'	13.19	.03	68.85	11.24	4.56	.37	.72	1.04
'Shabwa'	4.93	.09	65.56	24.82	3.20	.00	.30	1.11
'Sana'a'	9.17	.04	75.80	9.46	4.13	.28	.12	1.00
'Aden'	.08	.15	71.59	25.24	1.75	.22	.18	.79
'Lahej'	5.45	.07	55.15	36.80	1.96	.14	.37	.06
'Mareb'	6.87	.02	71.47	18.60	2.46	.00	.23	.36
'Al Mahweet'	8.82	.07	60.90	21.64	5.23	.41	1.49	1.44
'Al Mahra'	6.27	.97	63.96	25.16	1.73	.19	.34	1.37
'Amran'	9.97	.05	69.29	16.93	2.29	.21	.70	.57
'Ad Daleh'	6.16	.00	71.52	19.45	2.27	.00	.33	.26
'Rayma'	12.55	.06	61.24	21.01	4.01	.04	.48	.59
Urban	.74	.05	80.37	16.42	1.09	.14	.32	.87
Rural	8.64	.08	66.95	19.53	3.22	.33	.49	.77
Total	6.29	.07	70.94	18.60	2.58	.28	.43	.80

	Terciles of Coping Strategy Index			
	no coping	low	medium	high
	Row N %	Row N %	Row N %	Row N %
'Ibb'	73.6%	10.1%	7.4%	9.0%
'Abyan'	70.8%	11.7%	8.3%	9.2%
'Sana'a City'	89.2%	4.2%	3.9%	2.8%
'Al Bayda'	74.2%	8.6%	8.9%	8.3%
'Taiz'	69.5%	11.7%	9.8%	9.0%
'Hajja'	61.8%	8.0%	15.3%	14.8%
'Hodeidah'	73.3%	6.4%	11.8%	8.6%
'Hadramout'	85.9%	6.8%	4.7%	2.6%
'Dhamar'	66.3%	10.0%	14.2%	9.5%
'Shabwa'	81.3%	9.0%	5.0%	4.7%
'Sana'a'	74.2%	10.8%	8.9%	6.1%
'Aden'	78.2%	7.9%	5.1%	8.8%
'Lahej'	72.3%	9.7%	6.1%	11.9%
'Mareb'	65.6%	11.2%	10.8%	12.4%
'Al Mahweet'	61.0%	7.3%	14.6%	17.2%
'Al Mahra'	79.5%	5.8%	7.4%	7.3%
'Amran'	67.1%	10.5%	10.9%	11.6%
'Ad Daleh'	74.5%	12.5%	6.9%	6.2%
'Rayma'	71.9%	6.4%	10.8%	10.8%
Urban	81.0%	7.0%	6.1%	6.0%
Rural	69.9%	9.5%	10.7%	9.9%
Total	73.2%	8.8%	9.3%	8.7%

Output Tables 12-2: Wealth Index Quintiles (percent of households)

	Percentile Group of Wealth Index				
	first	second	third	fourth	fifth
	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	14.5%	19.6%	36.7%	24.7%	4.5%
'Abyan'	17.1%	18.5%	18.3%	25.8%	20.3%
'Sana'a City'	.0%	1.4%	5.9%	28.9%	63.8%
'Al Bayda'	9.9%	16.4%	29.9%	24.3%	19.5%
'Taiz'	9.7%	24.9%	29.6%	20.9%	14.8%
'Hajja'	46.0%	32.0%	12.1%	6.7%	3.1%
'Hodeidah'	45.5%	25.0%	12.2%	9.3%	7.9%
'Hadramout'	1.2%	8.1%	10.2%	21.0%	59.6%
'Dhamar'	23.8%	27.1%	22.3%	17.7%	9.1%
'Shabwa'	13.4%	13.1%	16.9%	29.0%	27.6%
'Sana'a'	8.3%	17.8%	26.4%	29.4%	18.1%
'Aden'	.0%	3.1%	6.3%	19.7%	70.9%
'Lahej'	15.5%	21.5%	19.6%	27.2%	16.3%
'Mareb'	20.6%	20.1%	21.9%	20.0%	17.4%
'Al Mahweet'	37.3%	23.9%	21.0%	15.5%	2.3%
'Al Mahra'	11.5%	7.6%	20.5%	32.2%	28.2%
'Amran'	17.4%	30.9%	21.1%	24.0%	6.5%
'Ad Daleh'	11.4%	20.4%	22.7%	28.3%	17.1%
'Rayma'	56.8%	31.5%	9.4%	2.3%	.0%
Urban	1.4%	4.9%	12.1%	31.3%	50.3%
Rural	27.6%	26.8%	23.3%	15.3%	7.1%
Total	19.8%	20.2%	19.9%	20.1%	20.0%

Output Tables 12-3: Demographics and Education (percent of households)

	Is the head of household male or female?		What is the marital status of the head?					How old is the head of household?
	Male	Female	Single	Married (one spouse)	Married (several spouses)	Divorced/ separated	Widowed	Mean
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	
'Ibb'	83.6%	16.4%	4.2%	85.8%	1.1%	.6%	8.3%	47
'Abyan'	88.8%	11.2%	4.8%	80.9%	4.0%	1.2%	9.2%	49
'Sana'a City'	93.1%	6.9%	4.4%	87.5%	1.1%	.8%	6.1%	45
'Al Bayda'	88.4%	11.6%	3.9%	87.0%	1.9%	1.4%	5.8%	47
'Taiz'	75.2%	24.8%	4.2%	81.6%	2.1%	2.1%	10.0%	48
'Hajja'	93.4%	6.6%	3.9%	87.0%	3.0%	1.4%	4.6%	44
'Hodeidah'	86.1%	13.9%	5.1%	83.0%	1.1%	2.3%	8.5%	47
'Hadramout'	95.0%	5.0%	6.8%	85.0%	2.4%	1.8%	4.1%	51
'Dhamar'	84.4%	15.6%	1.9%	84.5%	1.9%	1.2%	10.6%	49
'Shabwa'	95.3%	4.7%	5.0%	88.3%	3.5%	.3%	2.9%	48
'Sana'a'	93.1%	6.9%	3.3%	87.2%	2.2%	.6%	6.7%	48
'Aden'	82.4%	17.6%	4.8%	78.5%	1.1%	3.7%	11.9%	48
'Lahej'	83.7%	16.3%	4.4%	80.8%	1.4%	1.8%	11.6%	50
'Mareb'	95.0%	5.0%	3.9%	83.9%	6.1%	1.7%	4.5%	45
'Al Mahweet'	83.6%	16.4%	3.3%	82.5%	1.8%	1.4%	11.0%	47
'Al Mahra'	90.8%	9.2%	6.2%	82.7%	2.6%	3.1%	5.4%	49
'Amran'	93.9%	6.1%	2.2%	88.0%	2.6%	1.6%	5.6%	48
'Ad Daleh'	92.3%	7.7%	2.5%	87.0%	2.4%	.5%	7.5%	47
'Rayma'	86.7%	13.3%	4.7%	81.1%	1.9%	1.1%	11.1%	49
Urban	88.8%	11.2%	5.0%	83.9%	.8%	2.4%	7.8%	47
Rural	85.8%	14.2%	3.8%	84.6%	2.3%	1.1%	8.1%	48
Total	86.7%	13.3%	4.2%	84.4%	1.9%	1.5%	8.0%	47

	What is the highest educational level completed by Household head?				
	Illiterate	no formal schooling or incomplete but can read and write	Primary completed	Secondary completed	higher completed
'Ibb'	42.1%	26.7%	12.4%	9.0%	9.7%
'Abyan'	34.3%	28.4%	14.2%	16.2%	6.9%
'Sana'a City'	18.3%	24.2%	12.8%	16.4%	28.3%
'Al Bayda'	46.8%	32.2%	9.8%	7.2%	4.1%
'Taiz'	44.8%	19.5%	8.7%	13.2%	13.7%
'Hajja'	51.8%	23.5%	11.3%	7.8%	5.6%
'Hodeidah'	61.8%	19.4%	9.9%	6.0%	2.9%
'Hadramout'	30.8%	27.8%	20.6%	12.8%	8.1%
'Dhamar'	57.3%	23.0%	8.3%	7.0%	4.4%
'Shabwa'	32.2%	31.5%	16.4%	13.2%	6.8%
'Sana'a'	41.9%	32.5%	10.3%	8.3%	6.9%
'Aden'	21.0%	19.6%	15.1%	24.7%	19.6%
'Lahej'	35.2%	28.8%	10.5%	18.0%	7.5%
'Mareb'	38.2%	26.6%	13.3%	14.0%	7.9%
'Al Mahweet'	59.5%	20.8%	8.1%	6.7%	4.9%
'Al Mahra'	42.3%	26.7%	15.6%	11.4%	4.0%
'Amran'	49.0%	24.6%	9.1%	9.4%	7.8%
'Ad Daleh'	38.0%	21.4%	16.2%	15.5%	9.0%
'Rayma'	57.2%	27.5%	5.1%	7.1%	3.1%
Urban	28.6%	22.9%	14.7%	16.0%	17.8%
Rural	50.3%	24.5%	9.8%	8.9%	6.5%
Total	43.8%	24.0%	11.3%	11.1%	9.8%

	What is the highest educational level completed by Household Spouse?					
	Illiterate	no formal schooling or incomplete but can read and write	Primary completed	Secondary completed	higher completed	No spouse
'Ibb'	72.1%	8.4%	4.8%	2.1%	1.2%	11.5%
'Abyan'	64.9%	10.9%	5.4%	4.3%	3.5%	10.9%
'Sana'a City'	45.5%	16.2%	12.3%	8.4%	5.9%	11.7%
'Al Bayda'	72.8%	11.7%	4.1%	2.5%	.3%	8.5%
'Taiz'	58.8%	11.5%	7.1%	5.4%	3.0%	14.2%
'Hajja'	82.5%	4.2%	2.8%	2.4%	.0%	8.1%
'Hodeidah'	75.3%	4.6%	4.2%	1.4%	.9%	13.5%
'Hadramout'	65.1%	13.8%	8.7%	4.8%	.3%	7.2%
'Dhamar'	77.6%	5.2%	3.0%	1.0%	.0%	13.2%
'Shabwa'	77.6%	10.0%	3.7%	1.5%	.3%	6.9%
'Sana'a'	80.1%	7.0%	3.6%	.6%	.3%	8.4%
'Aden'	31.8%	13.5%	9.7%	20.1%	7.2%	17.8%
'Lahej'	62.3%	13.4%	5.1%	3.4%	2.0%	13.8%
'Mareb'	71.9%	10.1%	4.0%	4.2%	.8%	8.9%
'Al Mahweet'	74.4%	6.9%	2.6%	.6%	.5%	15.0%
'Al Mahra'	61.0%	15.0%	8.7%	2.3%	1.2%	11.8%
'Amran'	80.7%	6.5%	1.8%	1.4%	1.0%	8.6%
'Ad Daleh'	70.8%	14.3%	4.1%	2.2%	.3%	8.5%
'Rayma'	80.4%	3.7%	1.4%	.9%	.3%	13.4%
Urban	48.5%	13.9%	11.8%	8.6%	4.3%	12.9%
Rural	76.2%	7.3%	2.9%	1.7%	.7%	11.2%
Total	68.0%	9.2%	5.5%	3.7%	1.8%	11.7%

	high % of dependents in the hhs (above 70%)	
	no	yes
	Row N %	Row N %
'Ibb'	77.6%	22.4%
'Abyan'	79.8%	20.2%
'Sana'a City'	89.6%	10.4%
'Al Bayda'	80.0%	20.0%
'Taiz'	84.1%	15.9%
'Hajja'	71.1%	28.9%
'Hodeidah'	81.0%	19.0%
'Hadramout'	87.4%	12.6%
'Dhamar'	69.7%	30.3%
'Shabwa'	80.5%	19.5%
'Sana'a'	79.9%	20.1%
'Aden'	88.8%	11.2%
'Lahej'	76.8%	23.2%
'Mareb'	78.0%	22.0%
'Al Mahweet'	71.7%	28.3%
'Al Mahra'	82.2%	17.8%
'Amran'	72.4%	27.6%
'Ad Daleh'	76.4%	23.6%
'Rayma'	70.4%	29.6%
Urban	87.9%	12.1%
Rural	76.1%	23.9%

	Percent males 7-12 enrolled	Percent females 7-12 enrolled	Percent males 13-15 enrolled	Percent females 13-15 enrolled	Percent males 16-18 enrolled	Percent females 16-18 enrolled
	Mean	Mean	Mean	Mean	Mean	Mean
'Ibb'	87.85	83.78	87.38	68.63	66.50	61.26
'Abyan'	79.87	72.06	84.94	39.19	66.56	37.84
'Sana'a City'	93.12	92.59	96.32	88.48	82.65	70.17
'Al Bayda'	92.09	76.59	83.02	50.87	50.86	21.62
'Taiz'	94.30	91.25	84.28	75.74	73.25	61.73
'Hajja'	67.71	57.55	68.77	41.74	60.00	37.52
'Hodeidah'	67.06	52.01	54.85	43.43	35.52	39.29
'Hadramout'	84.42	79.64	86.09	67.13	82.52	49.73
'Dhamar'	89.52	70.27	82.32	41.87	68.47	34.13
'Shabwa'	86.47	72.50	78.83	47.75	67.07	20.39
'Sana'a'	93.20	78.92	90.65	61.26	68.45	34.72
'Aden'	86.68	86.57	92.54	84.38	84.17	72.64
'Lahej'	86.61	81.65	92.10	64.87	77.78	41.46
'Mareb'	91.93	81.72	92.06	63.36	79.32	45.23
'Al Mahweet'	78.85	66.95	76.86	47.27	65.82	30.01
'Al Mahra'	77.47	74.39	74.26	68.46	65.09	53.66
'Amran'	91.36	75.05	81.05	67.54	69.66	46.97
'Ad Daleh'	92.38	82.86	85.45	66.27	79.07	41.12
'Rayma'	79.86	63.63	68.92	43.38	52.16	29.01
Urban	88.82	89.49	88.03	83.60	77.06	70.47
Rural	83.39	71.41	78.59	53.17	63.10	37.85
Total	84.84	76.18	81.29	62.20	67.38	49.03

Output Tables 12-4: Livelihoods (percent of households)

	15 livelihood clusters							
	Regular Salary (Gov.)	Wage Labour (non-agric.)	Self Employment	Wage Labour (agric.)	Remittances (abroad)	Pensions	Regular Salary (private)	Qat Sales
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	19.0%	18.0%	13.5%	7.0%	5.2%	4.4%	1.9%	11.0%
'Abyan'	37.8%	8.6%	9.0%	2.1%	3.2%	12.6%	3.4%	1.8%
'Sana'a City'	35.0%	5.8%	19.4%	.0%	1.9%	8.1%	16.1%	.3%
'Al Bayda'	7.4%	23.1%	14.3%	6.1%	13.8%	2.1%	1.5%	8.7%
'Taiz'	19.5%	19.0%	12.5%	2.1%	4.4%	7.0%	6.1%	5.4%
'Hajja'	11.6%	18.2%	11.1%	11.5%	3.6%	.5%	.8%	11.4%
'Hodeidah'	7.9%	15.6%	17.4%	6.5%	9.3%	2.4%	5.2%	.9%
'Hadramout'	20.9%	12.1%	24.7%	2.9%	7.9%	4.4%	8.8%	.0%
'Dhamar'	19.4%	18.1%	15.5%	9.6%	3.0%	4.0%	.4%	7.2%
'Shabwa'	22.4%	11.1%	13.1%	2.0%	21.6%	1.2%	3.8%	.3%
'Sana'a'	21.9%	12.2%	11.9%	8.1%	.3%	2.5%	.6%	23.9%
'Aden'	41.4%	5.9%	14.2%	.8%	1.1%	17.0%	12.2%	.3%
'Lahej'	32.0%	13.3%	10.9%	2.6%	4.4%	13.5%	4.0%	1.4%
'Mareb'	23.5%	17.9%	17.9%	7.5%	5.0%	1.9%	2.8%	4.2%
'Al Mahweet'	13.7%	21.2%	11.5%	8.3%	4.9%	1.3%	1.2%	10.1%
'Al Mahra'	19.4%	6.9%	18.8%	.6%	8.4%	3.1%	1.5%	.3%
'Amran'	21.0%	16.0%	10.2%	11.6%	1.3%	1.3%	3.9%	16.7%
'Ad Daleh'	21.4%	9.4%	7.4%	5.4%	6.7%	3.9%	1.6%	23.9%
'Rayma'	8.1%	17.2%	10.8%	10.6%	2.8%	1.7%	1.1%	3.6%
Urban	30.3%	9.9%	18.8%	1.0%	3.9%	9.2%	10.1%	1.9%
Rural	15.8%	17.2%	12.5%	7.5%	5.6%	3.2%	2.7%	8.6%
Total	20.1%	15.0%	14.4%	5.6%	5.1%	5.0%	4.9%	6.6%

15 livelihood clusters (continued)							
	Family Support/ Social Benefit	Crop/ Livestock Production	Livestock trading	Petty Trade	Remittances (in country)	Fishing	Qat Production
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	5.8%	1.4%	.5%	3.4%	4.6%	.0%	3.0%
'Abyan'	7.7%	1.4%	5.2%	.0%	2.2%	3.8%	.0%
'Sana'a City'	2.2%	.3%	.0%	4.2%	.8%	.0%	.0%
'Al Bayda'	6.3%	2.9%	1.1%	2.7%	1.4%	.0%	6.4%
'Taiz'	8.8%	4.9%	1.4%	1.8%	4.9%	.0%	.9%
'Hajja'	6.6%	7.3%	5.6%	1.1%	.6%	.0%	3.9%
'Hodeidah'	8.2%	5.9%	8.1%	1.7%	1.9%	3.8%	1.1%
'Hadramout'	4.1%	3.2%	3.5%	3.2%	.3%	2.9%	.0%
'Dhamar'	8.3%	3.2%	1.6%	4.4%	2.1%	.0%	1.3%
'Shabwa'	8.7%	4.1%	4.4%	2.3%	1.2%	2.4%	.0%
'Sana'a'	6.1%	4.4%	.8%	1.1%	.8%	.0%	3.9%
'Aden'	4.0%	.3%	.0%	2.0%	.3%	.6%	.0%
'Lahej'	7.0%	4.2%	2.8%	.3%	1.4%	.3%	.3%
'Mareb'	5.6%	2.2%	4.4%	2.0%	1.9%	.3%	1.1%
'Al Mahweet'	11.3%	5.6%	3.3%	.9%	2.0%	.0%	1.9%
'Al Mahra'	6.3%	3.7%	4.9%	2.6%	.6%	20.2%	.0%
'Amran'	3.5%	5.8%	1.0%	2.5%	2.1%	.0%	1.6%
'Ad Daleh'	5.2%	2.4%	2.2%	1.7%	1.8%	.0%	5.4%
'Rayma'	17.5%	13.3%	2.8%	1.9%	3.6%	.0%	1.1%
Urban	4.6%	.6%	.6%	3.7%	.7%	1.9%	.0%
Rural	7.7%	5.4%	3.7%	1.7%	2.9%	.5%	2.3%
Total	6.8%	4.0%	2.7%	2.3%	2.3%	.9%	1.6%

Output Tables 12-5: Access to agricultural land and irrigation means (percent of households)

	Do you have any agricultural land for cultivation?		How do you access this land?				
	Yes	No	Private Ownership	Rented from government (Wakaf)	Rented from others	Crop-shared	Leased to others
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	57.0%	43.0%	51.1%	5.2%	13.2%	17.8%	0.6%
'Abyan'	38.1%	61.9%	68.1%	0.0%	5.5%	8.8%	2.2%
'Sana'a City'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'Al Bayda'	57.3%	42.7%	72.1%	0.0%	5.8%	14.5%	0.6%
'Taiz'	61.0%	39.0%	48.4%	0.6%	10.6%	21.1%	0.0%
'Hajja'	51.7%	48.3%	61.1%	3.6%	5.4%	13.2%	0.0%
'Hodeidah'	41.3%	58.7%	75.0%	0.0%	7.7%	6.7%	1.0%
'Hadramout'	30.2%	69.8%	72.2%	0.0%	11.1%	13.0%	1.9%
'Dhamar'	64.5%	35.5%	63.6%	3.3%	10.5%	10.5%	0.0%
'Shabwa'	44.2%	55.8%	86.4%	0.0%	0.0%	4.0%	0.0%
'Sana'a'	68.3%	31.7%	68.7%	2.8%	6.1%	19.9%	1.6%
'Aden'	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
'Lahej'	52.6%	47.4%	63.2%	1.1%	1.7%	5.7%	2.3%
'Mareb'	58.0%	42.0%	76.8%	0.0%	0.6%	7.7%	0.6%
'Al Mahweet'	54.5%	45.5%	54.2%	1.1%	13.6%	18.1%	1.1%
'Al Mahra'	14.7%	85.3%	81.5%	11.1%	0.0%	7.4%	0.0%
'Amran'	77.6%	22.4%	68.2%	1.7%	4.1%	12.0%	1.7%
'Ad Daleh'	65.4%	34.6%	52.4%	0.5%	9.1%	12.5%	2.4%
'Rayma'	60.2%	39.8%	63.6%	1.4%	11.5%	9.2%	0.0%
Urban	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rural	55.6%	44.4%	61.2%	2.0%	8.5%	14.1%	0.7%
Total	55.6%	44.4%	61.2%	2.0%	8.5%	14.1%	0.7%

	What is the main way of watering your cultivated land in 2009?				
	Rain-fed	**Irrigated** (groundwater: wells, springs)	**Irrigated** (spate/flood)	**Irrigated** (cistern, pit, reservoir dam)	**Not applicable**
	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	71.3%	21.3%	3.4%	1.1%	2.9%
'Abyan'	85.7%	9.9%	3.3%	0.0%	1.1%
'Sana'a City'	0.0%	0.0%	0.0%	0.0%	0.0%
'Al Bayda'	45.3%	29.7%	0.0%	1.2%	23.8%
'Taiz'	90.7%	5.6%	0.0%	0.0%	3.7%
'Hajja'	80.8%	12.0%	1.8%	1.2%	4.2%
'Hodeidah'	69.2%	21.2%	1.0%	2.9%	5.8%
'Hadramout'	61.1%	29.6%	3.7%	0.0%	5.6%
'Dhamar'	69.9%	26.3%	0.0%	0.0%	3.8%
'Shabwa'	48.4%	34.7%	3.2%	0.0%	13.7%
'Sana'a'	62.2%	33.7%	0.0%	0.8%	3.3%
'Aden'	0.0%	0.0%	0.0%	0.0%	0.0%
'Lahej'	77.0%	6.3%	4.6%	0.6%	11.5%
'Mareb'	39.2%	40.3%	0.0%	0.0%	20.4%
'Al Mahweet'	87.6%	9.0%	1.1%	0.6%	1.7%
'Al Mahra'	59.3%	18.5%	0.0%	0.0%	22.2%
'Amran'	82.6%	15.7%	0.0%	0.0%	1.7%
'Ad Daleh'	47.6%	43.8%	0.0%	1.9%	6.7%
'Rayma'	94.5%	1.4%	0.0%	0.9%	3.2%
Urban	0.0%	0.0%	0.0%	0.0%	0.0%
Rural	74.4%	18.5%	1.2%	0.8%	5.1%
Total	74.4%	18.5%	1.2%	0.8%	5.1%

Output Tables 12-6: Access to markets (percent of households)

	Where does your household mainly buy food for own consumption?			
	Daily market	**Weekly market**	**Super-market/ shop**	**Street vendor**
	Row N %	Row N %	Row N %	Row N %
'Ibb'	54.2%	23.5%	22.3%	0.0%
'Abyan'	58.9%	16.4%	24.4%	0.3%
'Sana'a City'	68.3%	5.3%	26.4%	0.0%
'Al Bayda'	64.8%	22.0%	11.3%	1.9%
'Taiz'	49.0%	14.6%	33.2%	3.2%
'Hajja'	36.8%	57.7%	5.3%	0.3%
'Hodeidah'	58.2%	28.1%	13.8%	0.0%
'Hadramout'	54.1%	9.4%	36.2%	0.3%
'Dhamar'	45.6%	46.2%	7.1%	1.1%
'Shabwa'	68.5%	13.9%	16.5%	1.2%
'Sana'a'	57.2%	36.7%	5.0%	1.1%
'Aden'	60.4%	3.1%	36.5%	0.0%
'Lahej'	63.1%	11.6%	21.5%	3.9%
'Mareb'	66.9%	22.6%	9.4%	1.1%
'Al Mahweet'	33.2%	50.9%	15.1%	0.9%
'Al Mahra'	55.9%	11.5%	26.4%	6.3%
'Amran'	39.9%	54.8%	4.8%	0.5%
'Ad Daleh'	68.7%	9.9%	20.8%	0.5%
'Rayma'	25.1%	54.5%	19.0%	1.4%
Urban	70.2%	4.7%	24.9%	0.2%
Rural	46.4%	35.0%	17.3%	1.3%
Total	53.5%	26.0%	19.6%	1.0%

	How often do you or another member of your HH visit this market?				
	Everyday	**Several times x week**	**Once a week**	**Every other week**	**Once a month**
	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	12.1%	17.3%	30.4%	18.7%	21.5%
'Abyan'	23.8%	12.5%	29.9%	6.7%	27.0%
'Sana'a City'	61.1%	10.3%	20.3%	3.1%	5.3%
'Al Bayda'	28.1%	17.2%	27.4%	9.8%	17.5%
'Taiz'	13.7%	16.5%	29.8%	12.1%	27.9%
'Hajja'	20.1%	5.8%	58.5%	4.7%	11.0%
'Hodeidah'	48.7%	9.5%	25.6%	7.1%	9.2%
'Hadramout'	33.5%	15.3%	25.0%	7.4%	18.8%
'Dhamar'	14.5%	10.6%	47.3%	9.7%	17.9%
'Shabwa'	18.4%	15.3%	29.2%	9.9%	27.2%
'Sana'a'	17.2%	17.2%	43.3%	9.7%	12.5%
'Aden'	51.1%	16.0%	12.0%	6.9%	14.0%
'Lahej'	12.8%	10.2%	31.5%	11.6%	33.9%
'Mareb'	22.3%	13.3%	23.0%	8.8%	32.5%
'Al Mahweet'	16.5%	11.0%	43.4%	13.2%	15.9%
'Al Mahra'	32.8%	19.0%	19.7%	12.4%	16.0%
'Amran'	19.3%	10.8%	47.5%	11.2%	11.1%
'Ad Daleh'	16.8%	10.9%	25.3%	16.9%	30.1%
'Rayma'	15.6%	8.1%	52.9%	10.3%	13.1%
Urban	54.9%	11.9%	18.4%	4.6%	10.3%
Rural	15.0%	13.1%	39.1%	12.1%	20.6%
Total	26.9%	12.7%	33.0%	9.9%	17.5%

Output Tables 12-7: Monthly household expenditures on food

	share (%) food expenditure (out of the total)	**share of food exp. on credit** (out of the credit exp)	**share of expenditure on credit** (out of total exp)	**share of expenditure from auto-consumption** (out of total exp)	**share of food exp. from auto-consumption** (out of the total autoconsumption)
	Mean	Mean	Mean	Mean	Mean
'Ibb'	43.14	70.22	14.40	5.38	75.58
'Abyan'	43.39	76.50	20.74	2.64	91.09
'Sana'a City'	33.87	53.80	7.14	.77	97.32
'Al Bayda'	41.04	54.92	12.90	5.74	64.89
'Taiz'	40.85	70.91	13.52	4.14	72.81
'Hajja'	55.09	61.87	15.07	6.92	64.53
'Hodeidah'	52.40	56.32	11.98	4.83	88.53
'Hadramout'	46.32	68.11	9.46	2.67	98.73
'Dhamar'	48.12	54.19	12.84	10.41	79.81
'Shabwa'	40.11	69.45	13.32	2.23	96.64
'Sana'a'	44.27	49.72	9.34	11.65	47.51
'Aden'	40.91	71.51	11.69	1.47	100.00
'Lahej'	43.18	74.19	22.29	2.34	96.59
'Mareb'	45.68	61.56	15.55	6.40	86.05
'Al Mahweet'	52.16	66.63	22.26	9.38	78.37
'Al Mahra'	43.37	65.59	11.40	3.10	98.87
'Amran'	43.94	51.49	14.55	12.59	64.59
'Ad Daleh'	40.25	66.09	13.72	8.13	40.27
'Rayma'	57.91	69.43	17.29	10.02	85.14
Urban	39.03	60.94	10.16	1.38	97.10
Rural	47.51	64.37	14.60	7.29	71.27
Total	45.00	63.40	13.29	5.54	76.14

Output Tables 12-8: Shocks/problems experienced during the 12 months preceding the survey among households engaged in agricultural activities (percent of households)

	Lack of rainfall/late rainfall	Lack of water for irrigation	Lack of drinking water/poor quality	Livestock diseases	Floods	High food prices	High fuel/transportation prices
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	42.4%	11.0%	51.2%	6.6%	.0%	88.2%	26.0%
'Abyan'	50.4%	9.6%	45.2%	13.7%	.3%	90.6%	16.3%
'Sana'a City'	11.9%	2.2%	16.7%	.3%	.0%	85.8%	33.9%
'Al Bayda'	56.3%	14.0%	43.3%	5.6%	.0%	87.3%	34.2%
'Taiz'	39.0%	7.5%	49.1%	11.3%	.6%	90.5%	17.9%
'Hajja'	69.0%	15.7%	59.8%	13.7%	.3%	83.1%	22.4%
'Hodeidah'	38.2%	11.9%	22.0%	10.9%	2.9%	79.6%	23.3%
'Hadramout'	23.0%	1.2%	12.9%	11.8%	21.8%	77.1%	15.6%
'Dhamar'	58.6%	15.2%	30.7%	8.8%	.0%	86.9%	25.7%
'Shabwa'	44.4%	11.5%	51.3%	14.1%	1.4%	83.6%	16.5%
'Sana'a'	65.8%	25.3%	53.6%	3.1%	.0%	83.9%	34.7%
'Aden'	4.8%	.8%	24.1%	.8%	.0%	94.6%	25.2%
'Lahej'	52.9%	14.3%	49.9%	19.2%	.3%	90.5%	21.3%
'Mareb'	70.1%	16.0%	35.9%	13.0%	1.7%	92.0%	36.7%
'Al Mahweet'	70.7%	16.2%	54.3%	13.8%	.6%	78.3%	17.1%
'Al Mahra'	31.1%	6.7%	36.9%	16.3%	9.3%	81.2%	21.4%
'Amran'	77.1%	17.5%	56.0%	9.3%	.3%	87.4%	28.8%
'Ad Daleh'	50.4%	14.8%	52.0%	10.4%	.0%	87.8%	25.4%
'Rayma'	58.9%	20.3%	55.3%	11.1%	.3%	75.0%	17.8%
Urban	12.2%	2.6%	23.4%	2.2%	2.1%	87.1%	28.5%
Rural	58.2%	14.9%	47.0%	12.2%	1.5%	85.0%	22.4%
Total	44.5%	11.2%	40.0%	9.2%	1.7%	85.6%	24.2%

	Loss of employment/ reduced salary	Reduced remittances	Reduced support from family/ friends	Increased level of diarrhea	Increased level of malaria	Increased level of ARI	High health expenditure
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	2.1%	1.4%	1.7%	13.6%	6.3%	12.0%	35.9%
'Abyan'	1.4%	.3%	2.2%	10.9%	4.8%	10.2%	33.9%
'Sana'a City'	3.1%	2.5%	1.9%	11.7%	3.9%	5.6%	41.1%
'Al Bayda'	1.4%	7.4%	4.6%	20.9%	9.7%	14.2%	51.1%
'Taiz'	3.3%	1.6%	1.1%	11.4%	3.1%	9.1%	36.8%
'Hajja'	2.7%	2.0%	5.9%	30.9%	25.0%	10.3%	46.8%
'Hodeidah'	4.2%	6.9%	6.0%	20.2%	15.5%	7.3%	44.2%
'Hadramout'	4.7%	1.5%	1.8%	6.5%	1.8%	5.3%	21.8%
'Dhamar'	1.1%	1.3%	6.4%	20.8%	10.2%	9.5%	43.0%
'Shabwa'	2.1%	4.1%	2.9%	15.8%	5.9%	7.6%	29.5%
'Sana'a'	.8%	.6%	4.2%	18.1%	5.8%	10.6%	31.9%
'Aden'	10.2%	.3%	2.8%	6.8%	.6%	5.7%	31.7%
'Lahej'	6.2%	.6%	1.0%	12.2%	3.1%	8.3%	33.8%
'Mareb'	2.8%	1.1%	4.2%	19.7%	9.8%	14.0%	37.0%
'Al Mahweet'	.9%	4.3%	7.5%	31.0%	24.2%	12.1%	42.2%
'Al Mahra'	.8%	1.5%	4.1%	14.9%	4.2%	4.9%	31.8%
'Amran'	1.2%	1.0%	5.2%	20.7%	11.1%	10.1%	37.5%
'Ad Daleh'	3.1%	.5%	.5%	10.5%	3.4%	9.3%	36.3%
'Rayma'	1.4%	2.8%	3.3%	23.1%	14.7%	6.4%	34.2%
Urban	5.0%	2.4%	2.4%	11.5%	4.7%	7.3%	40.3%
Rural	2.2%	2.5%	3.9%	18.6%	10.6%	9.6%	37.5%
Total	3.0%	2.5%	3.5%	16.5%	8.8%	8.9%	38.3%

Output Tables 12-9: Acute malnutrition (MUAC) among women and children (percent of women and children)

	Severe (<21cm)	Moderate (<21-22.5cm)	Normal	Not malnourished	Malnourished (<22.2 cm)
Rayma	26.8%	13.0%	60.2%	60.2%	39.8%
Al Mahweet	25.9%	12.8%	61.3%	61.3%	38.7%
Hodeidah	24.2%	12.8%	63.0%	63.0%	37.0%
Hajja	23.1%	11.1%	65.8%	65.8%	34.2%
Amran	19.8%	11.3%	69.0%	69.0%	31.0%
Dhamar	17.8%	9.3%	72.9%	72.9%	27.1%
Sana'a	15.0%	11.8%	73.1%	73.1%	26.9%
Ibb	15.6%	7.7%	76.7%	76.7%	23.3%
Taiz	13.6%	8.7%	77.6%	77.6%	22.4%
Mareb	14.3%	6.6%	79.1%	79.1%	20.9%
Hadramout	12.5%	7.8%	79.7%	79.7%	20.3%
Abyan	14.2%	5.1%	80.6%	80.6%	19.4%
Al Bayda	12.3%	6.9%	80.8%	80.8%	19.2%
Lahej	11.4%	7.7%	80.9%	80.9%	19.1%
Ad Daleh	11.0%	7.0%	82.1%	82.1%	17.9%
Sana'a City	11.8%	5.9%	82.3%	82.3%	17.7%
Shabwa	9.8%	6.8%	83.5%	83.5%	16.5%
Al Mahra	7.2%	5.2%	87.6%	87.6%	12.4%
Aden	6.0%	4.1%	89.9%	89.9%	10.1%
Urban	11.8%	5.9%	82.3%	82.3%	17.7%
Rural	18.4%	10.5%	71.2%	71.2%	28.8%
Total	16.4%	9.0%	74.6%	74.6%	25.4%

	MUAC groups (12-59m)				MUAC groups simplified (12-59 months)		
	Severe malnutrition (<11.5)	Moderate malnutrition/ at risk (11.5 to <12.5)	Mild malnutrition (12.5 to <13.5)	Well-nourished (13.5+)	Malnourished (<12.5)	At risk (12.5 to <13.5)	Well-nourished (13.5+)
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	2.8%	6.1%	17.4%	73.7%	8.9%	17.4%	73.7%
'Abyan'	1.5%	4.3%	13.0%	81.2%	5.8%	13.0%	81.2%
'Sana'a City'	1.2%	3.6%	15.1%	80.1%	4.8%	15.1%	80.1%
'Al Bayda'	1.5%	7.9%	17.2%	73.4%	9.4%	17.2%	73.4%
'Taiz'	3.7%	2.8%	15.5%	77.9%	6.5%	15.5%	77.9%
'Hajja'	3.2%	9.0%	22.8%	65.1%	12.2%	22.8%	65.1%
'Hodeidah'	6.0%	9.6%	22.8%	61.6%	15.6%	22.8%	61.6%
'Hadramout'	.7%	3.3%	13.1%	82.9%	4.0%	13.1%	82.9%
'Dhamar'	2.9%	10.2%	22.3%	64.6%	13.1%	22.3%	64.6%
'Shabwa'	.0%	2.6%	12.4%	85.0%	2.6%	12.4%	85.0%
'Sana'a'	3.9%	9.2%	18.7%	68.1%	13.2%	18.7%	68.1%
'Aden'	.8%	4.0%	16.0%	79.2%	4.8%	16.0%	79.2%
'Lahej'	.5%	4.8%	20.1%	74.6%	5.3%	20.1%	74.6%
'Mareb'	2.5%	12.9%	22.3%	62.4%	15.4%	22.3%	62.4%
'Al Mahweet'	2.2%	6.8%	24.5%	66.5%	9.0%	24.5%	66.5%
'Al Mahra'	.5%	1.3%	9.8%	88.5%	1.7%	9.8%	88.5%
'Amran'	1.3%	8.4%	22.3%	68.0%	9.6%	22.3%	68.0%
'Ad Daleh'	1.4%	5.7%	16.4%	76.5%	7.1%	16.4%	76.5%
'Rayma'	3.5%	6.2%	21.4%	68.9%	9.7%	21.4%	68.9%
Urban	1.7%	4.4%	15.2%	78.6%	6.1%	15.2%	78.6%
Rural	3.1%	7.1%	19.7%	70.1%	10.2%	19.7%	70.1%
Total	2.7%	6.5%	18.6%	72.2%	9.2%	18.6%	72.2%

Output Tables 12-10: Body Mass Index (percent of women)

	BMI groups						BMI groups (simplified)	
	Severe thinness	Moderate thinness	Mild thinness	Normal	Over weight	Obese	Not maln.	Maln. (<18.5)
	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %	Row N %
'Ibb'	1.7%	5.9%	12.7%	58.3%	15.7%	5.7%	79.7%	20.3%
'Abyan'	6.5%	6.1%	12.0%	45.3%	20.5%	9.6%	75.4%	24.6%
'Sana'a City'	1.9%	3.9%	8.6%	46.3%	25.3%	14.1%	85.7%	14.3%
'Al Bayda'	2.1%	3.6%	8.9%	57.3%	20.6%	7.6%	85.4%	14.6%
'Taiz'	4.9%	6.0%	14.2%	56.0%	14.3%	4.5%	74.8%	25.2%
'Hajja'	8.3%	9.8%	22.2%	49.2%	8.1%	2.4%	59.7%	40.3%
'Hodeidah'	13.9%	10.2%	18.9%	42.5%	11.0%	3.4%	57.0%	43.0%
'Hadramout'	3.7%	5.3%	10.9%	47.8%	21.4%	11.0%	80.2%	19.8%
'Dhamar'	2.2%	3.2%	12.4%	65.3%	12.0%	4.9%	82.2%	17.8%
'Shabwa'	2.2%	4.9%	10.4%	58.2%	15.6%	8.7%	82.5%	17.5%
'Sana'a'	2.0%	4.5%	14.7%	61.8%	12.9%	4.1%	78.9%	21.1%
'Aden'	2.7%	1.2%	7.5%	48.4%	23.6%	16.5%	88.6%	11.4%
'Lahej'	3.2%	4.4%	14.8%	50.3%	18.9%	8.4%	77.6%	22.4%
'Mareb'	2.5%	4.8%	11.7%	58.4%	16.3%	6.3%	81.0%	19.0%
'Al Mahweet'	4.8%	10.4%	18.2%	57.1%	6.8%	2.6%	66.6%	33.4%
'Al Mahra'	3.6%	3.0%	6.7%	41.8%	23.2%	21.8%	86.7%	13.3%
'Amran'	2.8%	4.2%	13.7%	64.4%	12.6%	2.3%	79.3%	20.7%
'Ad Daleh'	3.3%	4.4%	9.8%	59.0%	18.7%	4.8%	82.5%	17.5%
'Rayma'	7.1%	6.6%	19.5%	59.9%	5.0%	1.8%	66.8%	33.2%
Urban	3.2%	4.0%	10.2%	46.7%	23.8%	12.1%	82.7%	17.3%
Rural	5.5%	6.8%	15.5%	56.7%	11.6%	3.9%	72.1%	27.9%
Total	4.8%	5.9%	13.8%	53.5%	15.5%	6.5%	75.5%	24.5%

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