Food and Nutrition Security in the Barotse Floodplain System

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CGIAR RESEARCH PROGRAM ON Aquatic Agricultural Systems

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Summary

The CGIAR Research Program on Aquatic Agricultural Systems (AAS) is being implemented in ten communities in the Barotse floodplain of Zambia's Western Province. With a focus on the rural poor and vulnerable, the AAS program aims to reduce poverty and improve food security by harnessing the development potential, productivity and diversity of aquatic and agricultural systems.[1] The development challenge in the Barotse floodplain, as identified by relevant stakeholders, is to make effective use of seasonal flooding patterns and natural resources through more productive and diversified aquatic agricultural management practices that improve the lives and livelihoods of the poor and vulnerable.[2]

Food and nutrition are essential to support the overall AAS program objective and overcome the specific development challenge of the Barotse floodplain. Zambia has very high malnutrition rates, particularly for stunting in children under five. Poor nutritional status, especially of women and children, inhibits individual growth and development, and negatively impacts the overall health, productivity and economic potential of a community. The purpose of this report is to analyze the food and nutrition security situation within the Barotse floodplain. It explores multiple sectors, including nutrition, agriculture, health, and gender, at the national, provincial and community level to provide a comprehensive understanding of food and nutrition in the ten AAS communities in relation to the country as a whole. The analysis will provide informative inputs to the AAS Barotse hub design process to develop an appropriate food and nutrition research-in-development agenda.

Map 1. Zambia
Source: UN, Cartographic Section

[1] CGIAR Research Program on Aquatic Agricultural Systems, 2014
[2] Longley & Thilsted, 2012

Methodology

A literature review was undertaken to understand food and nutrition security in the Barotse floodplain of the Western Province, as well as the overall food and nutrition situation of Zambia. Focus was placed on the ten AAS communities within the districts of Kalabo, Lukulu, Mongu, and Senanga. Thematic areas included in the review were nutrition in women and children; food security and dietary diversity; agricultural production; fish consumption; health; water, sanitation and hygiene; and gender.

The analysis also drew on data collected by the Zambian government, national and international organizations, and the AAS team working with the ten focal communities.

Abbreviations

AARR	Average Annual Rate of Reduction
AAS	Aquatic Agricultural Systems
BFS	Barotse Floodplain System
BHCP	Basic Health Care Package
BMI	Body Mass Index
BRE	Barotse Royal Establishment
DFID	Department for International Development
DHS	Demographic and Health Survey
EPI	Expanded Programme on Immunisation
FAO	Food and Agriculture Organization of the United Nations
LCMS	Living Conditions Monitoring Survey
IMCI	Integrated Management of Childhood Illnesses
INGO	International Non-Governmental Organization
IYCF	Infant and Young Child Feeding
MAD	Minimum Acceptable Diet
MCDP	Most Critical Days Programme
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
NCPG	Nutrition Cooperating Partners' Group
NFNC	National Food and Nutrition Commission
NFNSP	National Food and Nutrition Strategic Plan
NGO	Non-Governmental Organization
NHSP	National Health Strategic Plan
PMTCT	Prevention of Mother-to-Child Transmission of HIV
R-SNDP	Revised Sixth National Development Plan
SIDA	Swedish International Development Cooperation
SUN	Scale-Up Nutrition
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VAD	Vitamin A Deficiency
WHA	World Health Assembly
WHO	World Health Organization
WFP	World Food Programme

Terminologies

Child mortality	The probability of dying between exact ages 1 and 5.
Complementary feeding	The process starting when breastmilk alone is no longer sufficient to meet the nutritional requirements of an infant, and therefore other foods and liquids are need along with breastmilk or a breastmilk substitute. The target range is usually considered to be 6-23 months.
Exclusive breastfeeding	Infant receives only breastmilk and nothing else.
Food Security	When all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
Infant mortality	The probability of dying between birth and the first birthday.
Malnutrition	People are malnourished if their diet does not provide adequate nutrients for growth and maintenance or they are unable to fully utilize the food they eat due to illness (undernutrition). They are also malnourished if they consume too many calories (overnutrition).
Micronutrients	Essential vitamins and minerals required by the body throughout the lifecycle.
Neonatal mortality	The probability of dying within the first month of life.
Obesity	Defined as weight for height about three standard deviations from the median weight for height of the standard reference population. A person with a BMI of 30 or more is generally considered obese.
Overweight	Defined as weight for height about two standard deviations from the median weight for height of the standard reference population. A person with a BMI of 25 or more is generally considered overweight.
Prevalence	The proportion of a population who have (or had) a specific illness or condition in a given time period.
Stunting	Defined as height for age below minus two standard deviations from the median height for age of the standard reference population
1,000 Days	The period of time between pregnancy and a child's second birthday considered the window of opportunity to shape the child's growth and development.
Under-5 mortality	The probability of dying between birth and the fifth birthday.
Underweight	A composite form of undernutrition that includes elements of stunting and wasting, and is defined as weight for age below minus two standard deviations from the median weight for age of the standard reference population
Wasting	Defined as weight for height below minus two standard deviations from the median weight for height of the standard reference population. A child can be moderately or severely wasted.

Introduction

Zambia has experienced a long period of political stability along with economic growth over the last decade. However, with 60.5 percent of the population living below the national poverty line and 42 percent living in extreme poverty, the country has failed to translate economic growth into poverty reduction.[3]

Zambia is divided into ten provinces, which are further divided into districts. According to the 2010 Living Conditions Monitoring Survey (LCMS), eight of the ten provinces have poverty rates greater than the national rate of 60.5 percent. This disparity demonstrates the imbalance found across the country in terms of infrastructure, economic development, and social and health services.[4] Western Province, which is comprised of seven districts,[5] has the second highest poverty rate among the provinces at 80.4 percent.[6] Table 1 allows for comparison between Western Province and the country as a whole. On many indicators, such as literacy rate, poverty rate, and life expectancy at birth, Western Province shows a lower level of development when compared to national figures.

Table 1. Background statistics on Zambia and Western Province

	Zambia	Western Province
Population	13,092,666	902,974
Rural (%)	60	87
Male/female ratio	0.97	0.92
Population growth rate (2000-2010)	2.8	1.7
Average household size	5.2	5.0
Literacy rate (%)	70.2	61.6
Poverty rate (%)	60.5	80.4
Total fertility rate	5.9	6.0
Life expectancy at birth	51	46
Gini coefficient	0.55	0.54

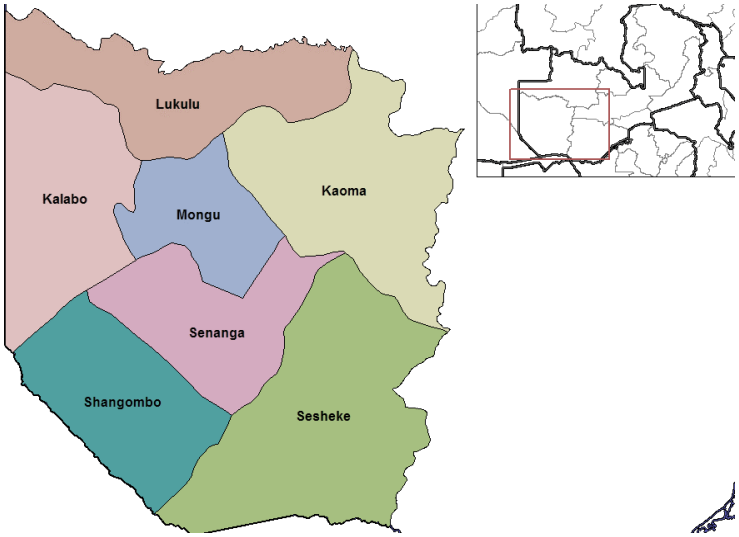
Sources: 2010 Census of Population Summary Report and 2010 Census of Population Brochure

The Barotse floodplain area runs across the districts of Kalabo, Lukulu, Mongu, and Senanga from north to south. The floodplain is mainly occupied by the Lozi people, who control access to the floodplain and its potential for fishing, crop production, and cattle rearing through their traditional governance system, the Barotse Royal Establishment (BRE). The Mbunda and Luvale people occupy the upland areas surrounding the floodplain. Lozi, Mbunda, and Luvale often interact through marriage, land, labor, and access to food. Since the majority of the AAS communities are located near the floodplain, this analysis focuses on the Lozi ethnic group.[7]

The agro-ecological diversity of the Barotse floodplain provides the Lozi people with opportunities to grow food and generate income.[8] However, livelihood strategies among communities and individuals differ depending on access to and availability of natural resources within the Barotse Floodplain System (BFS). These strategies, which include agriculture, fishing, and livestock production, are closely

[3] World Bank, 2014
[4] Republic of Zambia Central Statistical Office, 2012a
[5] Republic of Zambia Central Statistical Office, 2012b
[6] Republic of Zambia Central Statistical Office, 2012a
[7] Longley & Thilsted, 2012
[8] Castine, Sellamuttu, Cohen,Chandrabalan, & Phillips, 2013

linked to the seasonal flooding of the Zambezi River.[9] Flooding occurs annually between December and March[10] and forces seasonal migration of people and livestock to and from the floodplain and upland.[11]



Map 2. Districts of Western Zambia
Source: Rarelibra, Wikimedia Commons, 2006

The seasonality of the environment affects the food and nutrition security of those living in the Barotse floodplain. During the hunger season, which usually occurs between August and December, AAS community members must adapt coping strategies to overcome food shortages. The AAS program, which addresses the relationship between nutrition, agriculture, health, gender, water and sanitation, and the environment, considers the underlying causes of malnutrition in the Barotse floodplain in order to identify opportunities to improve dietary diversity in different seasons while also contributing to environmental health and livelihoods.

[9] Castine et al., 2013
[10] Castine et al., 2013
[11] Baidu-Forson, Phiri, Ngu'ni, Mulele, Simainga, Situmo, Ndiyoi, Wahl, Gambone, Mulanda, & Syatwinda, 2014

The Barotse floodplain

The AAS hub located in the Western provincial capital of Mongu is responsible for implementing the AAS program in the districts of Kalabo, Lukulu, Mongu, and Senanga. There are ten AAS focal communities located throughout the four districts and each community is comprised of a number of villages. Table 2 outlines the breakdown of districts, AAS communities, and villages.

District	AAS Community	Villages
Kalabo	Mapungu	Katata. Loti, Nasilala, Nasioma, Nandala, Kamonga, Sitandabia, Sitongola, and Kasindi
	Mwandi	Litondo, Looke, Mushimbuluko, Kutema, Ndalo, Nasoma, Nakasinde, Kakuli Malilo, and Kakuli II
Lukulu	Kabula	Mutulo, North Katoya, Simbundu, Kapungu, Selozi, Kabula Central, Kahoko, South Mbowela, Kazauli, Lyondo, and Malengaula
	Kapanda	Kapanda
Mongu	Lealui	Imausi, Lwatile, Nasaya, Mashete, Liyala, Maanga, and Siliwa
	Nanikelako	Mashee, Nakambe, Lyatolo, Nangoma, Nalului, and Namatanda
	Situlu	Situlu, Ningili, Litongo, Mabuto, Lubama, Sinda, Tuwee, Inyameko, Tichalo, Lindanda, Nemweti, and Tikuyu
Senanga	Nalitoya	Lyunga, Batton, Katota, Lyomboko, and Nalitoya
	Nembwele	Imbulu, Kobya, Sane, lilunda, and Nembwele
	Sifuna	Kakuna, Musiyalike, Kapumbula, Sichilombo, Samashau, Sakanguya, Ndala Kaunda, Shabiwangu, Shabutete, Shakawewe, Ntamba, Likwasi, Lyundu, Thomasi, Katutu, and Kandendu

Table 2. Administrative units in the Barotse
Source: Dierksmeier, Cole, & Teoh, 2015

The Barotse floodplain, which is mainly inhabited by the Lozi people, holds a vast variety of natural resources that provide households with opportunities to improve food production.[12] However, these households face a growing number of challenges, including climate variability, reduced crop yields, livestock diseases and a diminishing supply of fish, all of which threaten their access to and availability of food.

The three primary livelihood strategies of those living within the AAS communities are crop production, livestock rearing, and fishing.[13] However, the strategy or strategies a household or individual pursues may differ according to proximity to the floodplain, access to natural resources, availability of field types, access to markets, and socio-cultural factors.[14] Therefore, not all communities, households or individuals have equal access to the range of resources within the Barotse floodplain.

Livelihoods and cultural traditions are also closely linked with seasonal flooding of the Zambezi River, which occurs annually between December and March.[15] The maximum flood level is in April and the

[12] Castine et al., 2013
[13] Dierksmeier, Cole, & Teoh, 2015
[14] Longley & Thilsted, 2012
[15] International Union for Conservation of Nature, 2003

water level gradually recedes during May, June and July. Flooding of the river forces seasonal migration as individuals settled on the plains move to and from the floodplain and upland. During the cold season (May – August) and the summer (September – November), the majority of agricultural production and economic activities of the plain's population are focused in the floodplain area. The main crop growing season or rainy season in the floodplain, known locally as *itavola*¸ is between November and April. Cattle follow the migration pattern of their owners. Fishing is highest from May to December and then slows down due to the fishing ban that lasts from December to March. The fishing ban, however, is not well enforced and is cited by community members as the cause for the decrease in fish supply.[16]

Overview of AAS communities

Kalabo District

Kalabo is located to the west of the Zambezi River, across from Mongu District. Of the four AAS hub districts, Kalabo has the highest rural population, lowest literacy rate, and highest fertility rate. The two AAS communities located in Kalabo are Mapungu and Mwandi. Both communities are accessible by boat from Mongu harbor when the flood levels are high (November – July) and by vehicle the rest of the year.

Table 3. Kalabo District overview

Population	128,904
Rural (%)	97.4
Male/female ratio	0.87
Population growth rate (2000-2010)	1.2
Average household size	4.9
Literacy rate (%)	54.2
Total fertility rate	5.8

Sources: Republic of Zambia Central Statistical Office, 2012b & 2013

Mapungu is situated along the Luanginga River. There is one primary school offering grades 1 to 9, one health clinic, and one borehole. An agricultural camp extension officer lives in Mapungu and provides agricultural information in both Mapungu and Mwandi. Natural resources include rivers, lagoons, forests, grazing lands, grass, reeds, papyrus, trees, and wild fruit. While the main livelihood strategies are fishing, cattle rearing, and farming, fishing is considered the most profitable.[17]

The community of Mwandi is divided into upland and lowland regions. There is one primary school but no functioning health center. Safe drinking water is available from boreholes in Mwandi upland but there are no boreholes in the lowland. Natural resources are similar to those found in Mapungu. Fishing is the main livelihood source in Mwandi lowland and agriculture is the main activity in Mwandi upland. Beer brewing is the third primary livelihood strategy.[18]

Community members in both Mapungu and Mwandi have expressed concern over a diminishing supply of fish, which they believe is the result of illegal fishing methods. Rainfall and flood patterns have also changed in recent years. Residents of both communities state that this has resulted in lower yields and changes in the timing of agricultural activities.[19]

[16] International Union for Conservation of Nature, 2003
[17] Dierksmeier et al., 2015
[18] Dierksmeier et al., 2015
[19] Dierksmeier et al., 2015

Lukulu District

Lukulu is located in the northern region of the floodplain and includes the AAS communities of Kabula and Kapanda. It has the smallest population of the four AAS hub districts yet the highest population growth rate, average household size, and total fertility rate. It also has the second lowest literacy rate.

Table 4. Lukulu District overview

Population	86,002
Rural (%)	87.7
Male/female ratio	0.93
Population growth rate (2000-2010)	2.3
Average household size	5.2
Literacy rate (%)	58.6
Total fertility rate	5.8

Sources: Republic of Zambia Central Statistical Office, 2012b & 2013

Kabula and Kapanda, which are 15 km apart, are both accessible by vehicle all year long from Mongu, a drive that takes 8 to 9 hours. There is one primary school and one healthcare center in Kabula. There is also one borehole at the school, but access to it costs ZMW 3.50 per month. In contrast, students in Kapanda must travel to Mbanga and Lukulu for basic and secondary school respectively. Residents of Kapanda access the health center and boreholes in Mbanga. An agricultural camp extension officer resides in Kapanda and provides services in both Kapanda and Kabula.[20]

Natural resources in Kabula include forest, grazing and agricultural lands, timber, wild fruit, and grass. Agricultural production is the main livelihood strategy. Livestock rearing is no longer as common as in the past due to the prevalence of cattle diseases. Other livelihood strategies include carpentry and beer brewing. The changes in rainfall and flood patterns have reduced yields and altered when agricultural activities are undertaken. In Kapanda, the natural environment includes streams, marshes, lagoons, forest, grazing and agricultural lands, waterways, trees, and wild fruit. The primary livelihood strategies are fishing, cattle rearing, and crop production. While fishing is identified as the most profitable activity, residents have stated that the practice of illegal fishing methods has decreased the supply of fish. Few community members practice agriculture in the lowlands due to recent changes in flood patterns.[21]

Mongu District

Mongu is located east of the river and includes the AAS communities of Lealui, Nanikelako, and Situlu. The district has the highest population of the four AAS hub districts, as well as the highest literacy rate. Additionally, Mongu has the smallest rural population, population growth rate, average household size, and total fertility rate.

Table 5. Mongu District overview

Population	179,585
Rural (%)	70.9
Male/female ratio	0.92
Population growth rate (2000-2010)	1.0
Average household size	4.9
Literacy rate (%)	72.2
Total fertility rate	5.1

Sources: Republic of Zambia Central Statistical Office, 2012b & 2013

Lealui, which is the home of the Litunga's[22] palace, is accessible by vehicle from Mongu. The drive takes 20 to 30 minutes. There is one primary school, one health center, and boreholes. Secondary education is available in Mongu. Natural resources include canals, rivers, lagoons, grazing lands, grasses, reeds, and papyrus. In contrast to the other AAS communities, natural resources in Lealui are held by the

[20] Dierksmeier et al., 2015
[21] Dierksmeier et al., 2015
[22] The "litunga" is the king or paramount chief of the Lozi people.

BRE and are therefore not common property. Livelihood strategies include fishing, livestock, crop production, small business, and the harvest of natural resources.[23]

Nanikelako and Situlu are both accessible by boat from Mongu when flood levels are high and by vehicle the rest of the year. In both communities, primary education is available nearby for grades 1 to 7. Further education is available in Lealui, Limulunga, Kalabo and Mongu. There is no health center in either community and residents travel to Lealui for health care services. There are also no boreholes in either community, causing women and girls to retrieve water from unsafe sources like ground wells, rivers, lakes or lagoons. Natural resources include rivers, lagoons, forest, grazing and agricultural land, canals, grass, reeds, papyrus, trees, and wild fruit. The primary livelihood strategies in both communities are fishing, cattle rearing, and farming.[24]

For all three communities, fishing is considered the most profitable activity. However, community members have expressed concern that the supply of fish is decreasing due to illegal fishing methods. Changing rainfall and flood patterns have also reduced yields and affected agricultural activities.[25]

Senanga District

Senanga is located east of the river, south of Mongu District. The three AAS communities situated in Senanga are Nalitoya, Nembwele, and Sifuna. All three communities are accessible yearlong by vehicle from Mongu. Senanga has the second greatest rural population, as well as second highest population growth rate, fertility rate, average household size, and literacy rate.

Table 6. Senanga District overview

Population	126,506
Rural (%)	88.9
Male/female ratio	0.91
Population growth rate (2000-2010)	1.5
Average household size	5.0
Literacy rate (%)	61.6
Total fertility rate	5.7

Sources: Republic of Zambia Central Statistical Office, 2012b & 2013

Students from all three communities in Senanga attend school in Lyangati for grades 1 to 9. Secondary education is available in Senanga, Mongu and Mooyo. Boreholes are located at the clinics and school. However, those who live far from these areas collect water from ground wells, rivers, lakes or lagoons. Natural resources throughout the three communities include canals, forest, agricultural and grazing land, papyrus, trees, wild fruit, reeds, and grass. Canals are considered particularly important for drinking, cooking, transport, and bathing. Individuals who practice agriculture seasonally follow rainfall patterns and therefore move between the upland and floodplain. However, community members have expressed concern that changes in rainfall and flood patterns have caused a reduction in yields and made them alter when they carry out farming activities.[26]

Despite these similarities among the three AAS Senanga communities, some differences exist. For example, Nembwele and Sifuna both have rural health centers, while residents in Nalitoya access a nearby health post in Lyangati or travel to the Itufa Health Center, located 8 km away, for more complicated cases. Residents of Nalitoya and Nembwele practice fishing, cattle rearing, and agricultural production while those of Sifuna consider fishing and agricultural production to be the primary livelihood strategies. In contrast to other AAS communities, community members in Nalitoya prioritized agriculture as the most important livelihood activity. Additionally, changing rainfall patterns have led many community members in Nalitoya to cultivate rice as an alternative to maize,

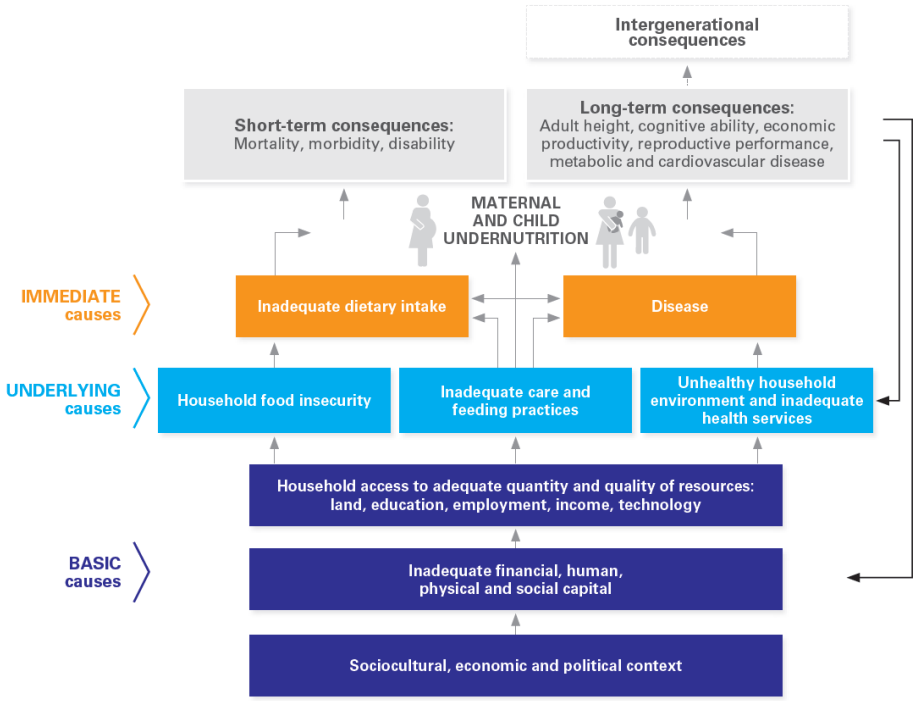
[23] Dierksmeier et al., 2015
[24] Dierksmeier et al., 2015
[25] Dierksmeier et al., 2015
[26] Dierksmeier et al., 2015

which is commonly destroyed by floods or drought. While fishing is a profitable activity in Nembwele, residents of Sifuna stated that the importance of fishing has declined due to the common use of illegal fishing practices.[27]

Malnutrition and its causes

Maternal and child malnutrition are global problems that negatively affect the economic productivity and development of individuals and societies.[28] According to the UNICEF conceptual framework displayed in Figure 1, nutrition status is influenced by three underlying factors: food, health and care. Access to diverse and nutrient-rich foods, appropriate maternal and child-care practices, adequate health services, safe water and sanitation, and good hygienic practices influence nutrient intake and the prevalence of disease. Inadequate dietary intake and disease, the two immediate causes of maternal and child malnutrition, lead to a variety of short-term, long-term, and intergenerational consequences. Undernourished children under five, for example, are more likely to suffer from serious infection and die from diarrhea, pneumonia, measles, and malaria.[29] The basic causes of malnutrition, which include social, economic and political factors, affect food, health and care distinctively in each country.[30] It is therefore essential to understand the basic, underlying and immediate causes of malnutrition within the context of Zambia and the Barotse floodplain in order to implement appropriate interventions that will meet the nutritional needs of women and children.[31]

Figure 1. UNICEF conceptual framework of the determinants of maternal and child undernutrition



The black arrows show that the consequences of undernutrition can feed back to the underlying and basic causes of undernutrition, perpetuating the cycle of undernutrition, poverty and inequities.

Source: Adapted from UNICEF, 1990.

[27] Dierksmeier et al., 2015

[28] Black, Victora, Walker, Bhutta, Christian, de Onis, Ezzati, Grantham-McGregor, Katz, Martorell, Uauy, & the Maternal and Child Nutrition Study Group, 2013

[29] UNICEF, 2011

[30] UNICEF, 2013

[31] UNICEF, 2013

Nutritional status and child development

Nutritional status of children

World Health Organization (WHO) Member States have endorse d global targets, known as the 2025 World Health Assembly (WHA) targets,[32] to monitor progress of maternal and child nutrition.[33] These targets are outlined in Figure 2. According to the 2014 Global Nutrition Report, Zambia is currently off course in reaching the WHA targets for under-five stunting, wasting, and overweight.[34]

Children become stunted when they receive inadequate nutrition over a long period of time. Stunting, measured as height-for-age,[35] therefore represents the chronic or long-term effects of undernutrition in a population.[36] Studies have shown significant associations between stunting and poor motor and cognitive development, thereby demonstrating the severe consequences that stunting has on children as they grow and develop.[37]

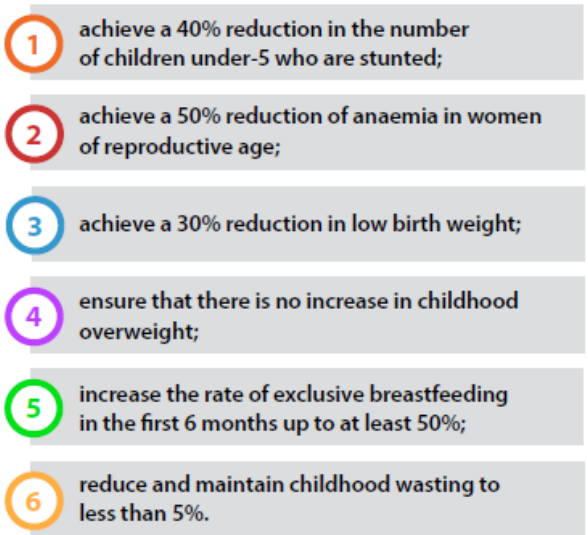


Figure 2. 2025 World Health Assembly (WHA) Targets
Source: WHO, 2014a

Zambia has experienced a persistently high level of stunting over the past two decades.[38] The 2007 Demographic and Health Survey (DHS) reported that 45.4 percent of children under five years of age in Zambia were stunted and 21 percent were severely stunted.[39] The most recent DHS findings from 2013-14 revealed a drop in the national rate of stunting to 40 percent and of severe stunting to 17 percent.[40] Although stunting has decreased by over 10 percent since 2007, the percentage of children under five who remain chronically undernourished is still high and the Annual Average Rate of Reduction (AARR)[41] in stunting is too low to reach the WHA target by 2025.[42] Within Western province, 36.2 percent of children under five are stunted, which is lower than the national percentage. According to the 2007 and 2013-14 DHS reports, this proportion is also among the lowest in the country. However, the proportion of children stunted has remained relatively constant at 36% between 2007 and 2013 demonstrating a lack of improvement within the Western Province. Furthermore, the percentage of children severely stunted increased from 13.9 percent in 2007 to 14.5 percent in 2013.[43]

[32] WHO, 2014a
[33] WHO, 2015a
[34] International Food Policy Research Institute, 2014
[35] UNICEF, 2013
[36] Republic of Zambia Central Statistical Office, Republic of Zambia Ministry of Health, & ICF International, 2014
[37] Black et al., 2013
[38] UNICEF, 2011
[39] Republic of Zambia Central Statistical Office, Republic of Zambia Ministry of Health, Tropical Diseases Research Centre, University of Zambia, & Macro International Inc., 2009
[40] Republic of Zambia Central Statistical Office, Republic of Zambia Ministry of Health, & ICF International, 2014
[41] The AARR is the average relative percent decrease per year in prevalence or rate.
[42] WHO, 2015b
[43] Republic of Zambia Central Statistical Office et al., 2009 & 2014

Wasting, a measurement of acute undernutrition based on a child's weight-for-height, increases the risk of death in children.[44] Children suffer from wasting when they receive inadequate food intake in the short time preceding a survey or if they contract an illness that causes the onset of malnutrition.[45] According to the 2013-14 DHS, 6 percent of children in Zambia are wasted. This is slightly higher than the national proportion reported by the 2007 DHS of 5 percent.[46] The 2013-14 DHS reported that 6.5 percent of children in Western Province are wasted, which is slightly higher than national percentage. However, this is a decrease from what was reported in 2007, which was 10.6 percent.[47] In terms of severe acute malnutrition, 2.2 percent of children under five in Zambia are severely malnourished. This proportion has significantly decreased in Western Province from 5.4 percent in 2007 to 2.5 percent in 2013.[48]

Underweight (weight-for-age) is a composite indicator of undernutrition that includes elements of stunting and wasting. It therefore reflects both chronic and acute malnutrition in a given population.[49] According to the 2013-14 DHS, 15 percent of children under age 5 are underweight in Zambia and 16.2 percent are underweight in Western Province. While the national rate has remained the same since 2007, the provincial rate has increased from the 2007 reported number of 13 percent.[50] It is interesting to note that while Zambia's child underweight prevalence is relatively low at under 20 percent, the country has a high stunting prevalence of 40 percent.[51]

Figure 3. Undernutrition trends in Zambia and Western Province
Sources: DHS, 2007 & 2013-14

Nutritional status of women

Poor maternal nutrition negatively impacts fetal development and contributes to low birthweight, stunting, and other types of undernutrition. Therefore, adequate maternal nutrition is essential to prevent child undernutrition, as well as to ensure health and well-being of the mother.[52] The

[44] UNICEF, 2013
[45] Republic of Zambia Central Statistical Office et al., 2014
[46] Republic of Zambia Central Statistical Office et al., 2009 & 2014
[47] Republic of Zambia Central Statistical Office et al., 2009 & 2014
[48] Republic of Zambia Central Statistical Office et al., 2009 & 2014
[49] UNICEF Nutrition, 2013
[50] Republic of Zambia Central Statistical Office et al., 2009 & 2014
[51] UNICEF Nutrition, 2013
[52] UNICEF, 2013

anthropometric indicators used to evaluate the nutritional status of women within a population are height and body-mass index (BMI).

Short stature in women is considered a risk factor for poor birth outcomes and delivery complications. A woman is at risk if her height is less than 145 cm.[53] Two percent of women in Zambia and 1.3 percent in Western Province are shorter than 145 cm.[54] Women with a BMI below 18.5 kg/m^2 are acutely undernourished and are also at risk for poor birth outcomes and complications during birth delivery.[55] Additionally, stunting is most likely to occur among children whose mothers have a BMI of less than 18.5 kg/m^2.[56] A BMI greater than 25.0 kg/m^2 indicates overweight or obesity.[57]

Low BMIs are most common among women with less education and among those who live in rural areas. According to the 2013-14 DHS, ten percent of women of reproductive age in Zambia have a BMI below 18.5 kg/m^2. Western Province has the highest proportion of women who are undernourished at 20 percent.[58] Nationally, 16 percent of women are overweight and 7 percent are obese while only ten percent are overweight in Western Province. This is the lowest proportion in the country. Trends in nutritional status of women in Zambia from 2001 to 2013 show a decrease from 15 to 10 percent in women who are undernourished. However, the prevalence of overweight and obesity has steadily increased over the same time period.[59] This is indicative of a growing double burden of malnutrition, which occurs when a country experiences growing rates of overweight and obesity and still has the continuing problem of undernutrition.[60]

Nutrition in pregnancy, lactation and early childhood

Micronutrient intake among women and children

The first 1,000 days of a child's life has been emphasized internationally as the window of opportunity to ensure proper nutritional intake and therefore adequate growth and development. This window of opportunity lasts from pregnancy until the child's second birthday.[61]

Adequate micronutrient intake among women and children is essential to improve health, growth, and development.[62] Micronutrient deficiencies, which are prevalent in women and children in low- and middle-income countries, can cause a number of health conditions.[63] Severe vitamin A deficiency (VAD), for example, may cause blindness, reduce immunity, and increase the severity of infections. Iron deficiency can lead to anemia, which is a public health concern in Zambia. Nationally, 36 percent of pregnant women[64] and 58 percent of children under five[65] have anemia.

[53] Black, Allen, Bhutta, Caulfield, de Onis, Ezzati, Mathers, & Rivera, 2008
[54] Republic of Zambia Central Statistical Office et al., 2014
[55] Black et al., 2008
[56] Republic of Zambia Central Statistical Office et al., 2014
[57] Black et al., 2008
[58] Republic of Zambia Central Statistical Office et al., 2014
[59] Republic of Zambia Central Statistical Office et al., 2014
[60] Black et al., 2013
[61] 1,000 Days, 2015
[62] UNICEF, 2013
[63] UNICEF, 2009
[64] World Bank, 2011a
[65] World Bank, 2011b

Adequate micronutrient intake by women is highly beneficial for both women and children, particularly during pregnancy and breastfeeding.[66] In Zambia, women normally receive vitamin A supplements within 60 days of giving birth to increase the level of vitamin A in her breast milk. However, recent WHO guidelines from 2011 on postpartum vitamin A supplementation do not recommend giving vitamin A to postpartum women to prevent maternal and infant morbidity and mortality. Therefore, the 2013-14 DHS recommends that Zambia consider a policy change regarding vitamin A supplementation for postpartum women; that is, there should be a greater focus on ensuring that women consume a healthy and diverse diet.[67]

Since anemia often worsens during pregnancy, women should consume foods rich in iron. Moreover, since their nutrient needs are usually too high to be met only through food consumption, it is recommended that pregnant and lactating women take iron supplements daily throughout their pregnancy and lactating period, beginning at the second trimester and continuing to 45 days after childbirth. Additionally, to enhance the iron status of women, they should prevent against intestinal parasites and infections like malaria.[68] As Figure 4 indicates, a larger percentage of women in Western Province take iron supplements during pregnancy than the national percentage. However, percentages of women who take deworming medication and receive vitamin A postpartum are lower in Western Province than in the country as a whole. Furthermore, according to the First 1000 Most Critical Days (MCD) Three Year Programme 2013-2015, although most women take iron supplements during pregnancy, compliance is low. To overcome poor compliance, as well as low stock supplies, the MCD Programme recommends community distribution of iron supplements.[69]

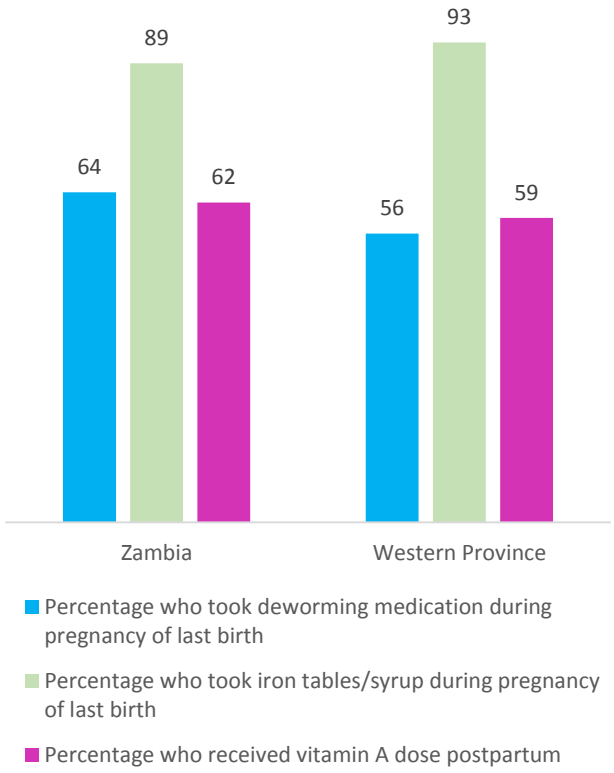


Figure 4. Micronutrient intake among mothers
Source: DHS, 2013-14

Vitamin A supplementation is often employed as an intervention in children age 6-59 months who are at risk of VAD. The government of Zambia promotes biannual mass supplementation of vitamin A and deworming tables.[70] According to the 2013-14 DHS, 77 percent of children age 6-59 months were given vitamin A supplements six months before the survey.[71] Additionally, studies have shown that iron supplementation in children under 2 reduces the risk of anemia by 49 percent.[72] However, there is no national policy on iron supplementation for children. As such, the 2013-14 DHS reported that only 7 percent of children age 6-59 months received iron supplements. Percentages of children who received vitamin A and iron supplements in Western Province were not significantly different from national

[66] UNICEF, 2013
[67] Republic of Zambia Central Statistical Office et al., 2014
[68] Republic of Zambia Central Statistical Office et al., 2014
[69] National Food and Nutrition Commission, 2012
[70] Republic of Zambia Central Statistical Office et al., 2014
[71] Republic of Zambia Central Statistical Office et al., 2014
[72] Bhutta et al., 2013

numbers. In terms of micronutrient intake through food consumption, 75 percent of children age 6-23 months consumed foods rich in vitamin A and 49 percent consumed foods rich in iron the day preceding the 2013-14 DHS in both Zambia and Western Province.[73]

Infant and young child feeding practices

WHO recommends a number of infant and young child feeding practices (IYCF) during the first 1,000 days, including initiation of breastfeeding within one hour of birth, exclusive breastfeeding until 6 months of age, and continued breastfeeding until 2 years of age.[74]

Data from 2013-14 show that 98 percent of children in Zambia are breastfed at some time, 66 percent are breastfed within one hour of birth, and 94 percent are breastfed within one day of birth. The percentage of those who start breastfeeding within one hour is lowest among those whose mothers have no education and those from the poorest households. In Western Province, 98 percent have been breastfed at some time, which is comparable to the national proportion. However, 57 percent start breastfeeding within one hour of birth and 88 percent within one day, both of which are lower than the respective national numbers.[75]

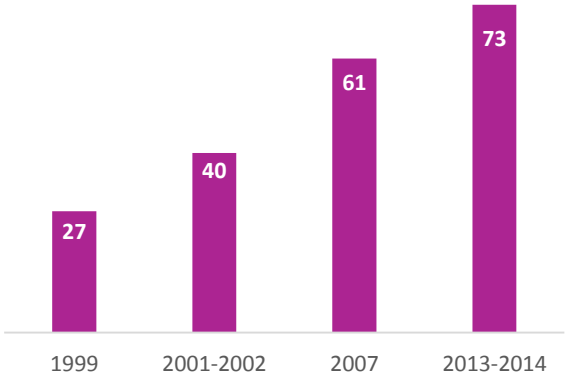


Figure 5. Exclusive breastfeeding of infants under 6 months (%)
Source: UNICEF & DHS, 2013-14

Breastfeeding is nearly universal in Zambia and the proportion of children exclusively breastfed has been steadily increasing (Figure 5). This could be due to the government efforts and supportive policies related to scaling up of exclusive breastfeeding interventions since 1990.[76] The 2011-2015 National Food and Nutrition Strategic Plan, 2013-2015 First 1,000 Most Critical Days Programme, and 2011-2015 National Health Strategic Plan all promote exclusive breastfeeding followed by complementary feeding beginning at six months of age. Zambia's Statutory Instrument No. 48 of 2006 also promotes breastfeeding and regulates the unauthorized or unsolicited sale of breast milk substitutes.[77] In Zambia, consistent with recommendations, 73 percent of children are exclusively breastfed for the first six months of life, an increase from 61 percent in 2007.[78]

In addition to early initiation and exclusive breastfeeding, other IYCF practices include continued breastfeeding up to and beyond age 2 and the introduction of complementary foods at 6 months of age.[79] Complementary feeding involves the introduction of safe, appropriate, and adequate solid and semi-solid food and is required for normal growth.[80] Contrary to WHO recommendations,

[73] Republic of Zambia Central Statistical Office et al., 2014
[74] Republic of Zambia Central Statistical Office et al., 2014
[75] Republic of Zambia Central Statistical Office et al., 2014
[76] Institute for Health Metrics and Evaluation & the Department of Economics at the University of Zambia, 2014
[77] Republic of Zambia Central Statistical Office et al., 2014
[78] Institute for Health Metrics and Evaluation et al., 2014
[79] UNICEF, 2013
[80] Bhutta, Das, Rizvi, Gaffey, Walker, Horton, Webb, Lartey, & Black, 2013

complementary foods are often introduced early in Zambia. Nationally, seven percent of infants age 2-3 months and 40 percent of infants age 4 to 5 months receive solid or semi-solid foods.[81]

Overall, ninety-three percent of breastfed children in Zambia age 6-23 months consume complementary foods. The breakdown of food types consumed by these infants is displayed in Figure 6. As the figure shows, a large percentage of infants age 6-23 percent consume food made from grains and the majority consume fruits and vegetables rich in vitamin A. Less than 40 percent consume meat, fish and protein and less than 20 percent receive legumes and nuts. This indicates that foods rich in protein make up a small portion of the complementary feeding diet of children age 6-23 months.

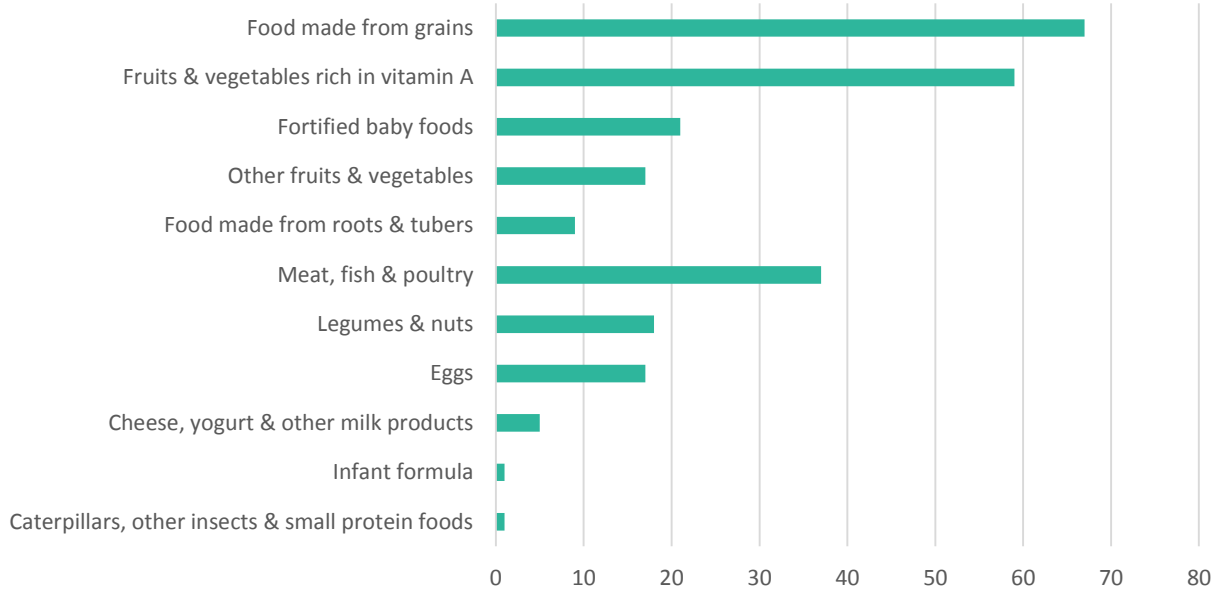


Figure 6. Percentage of breastfed children 6-23 months consuming solid and semisolid food types
Source: DHS, 2013-14

The adequacy of IYCF practices are also assessed through three additional indicators: minimum dietary diversity (MDD), minimum meal frequency (MMF) and minimum acceptable diet (MAD). MDD represents the proportion of children 6-23 months of age who receive food from 4 or more food groups.[82] MMF is the proportion of breastfed and non-breastfed children 6-23 months of age who receive solid, semi-solid or soft foods the minimum number of times or more.[83] Finally, MAD represents the proportion of children age 6-23 months who receive a minimum acceptable diet apart from breastmilk.[84] Figure 7 allows for comparison between Zambia and Western Province on these three indicators. Overall, a lower proportion of children age 6-23 months in Western Province receive diets that meet MDD, MMF and MAD than the country as a whole. Due to changes in the definitions of these three IYCF indicators and possible methodological differences in data collection since the 2007 DHS, it is not possible to make accurate comparisons across time on these indicators.[85]

[81] Republic of Zambia Central Statistical Office et al., 2014
[82] Consumption of foods from at least 4 food groups means that the child has a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food. MDD therefore illustrates the level of dietary diversity in a child's diet (WHO, 2010).
[83] The number of meals that a child needs in a day depends on how much energy the child needs, the amount that a child can eat at each meal, and the energy density of the food (WHO, 2010).
[84] This indicator combines standards of dietary diversity and feeding frequency by breastfeeding statues. It is used to track progress of improving the quality and quantity of a child's diet (WHO, 2010).
[85] Republic of Zambia Central Statistical Office et al., 2014

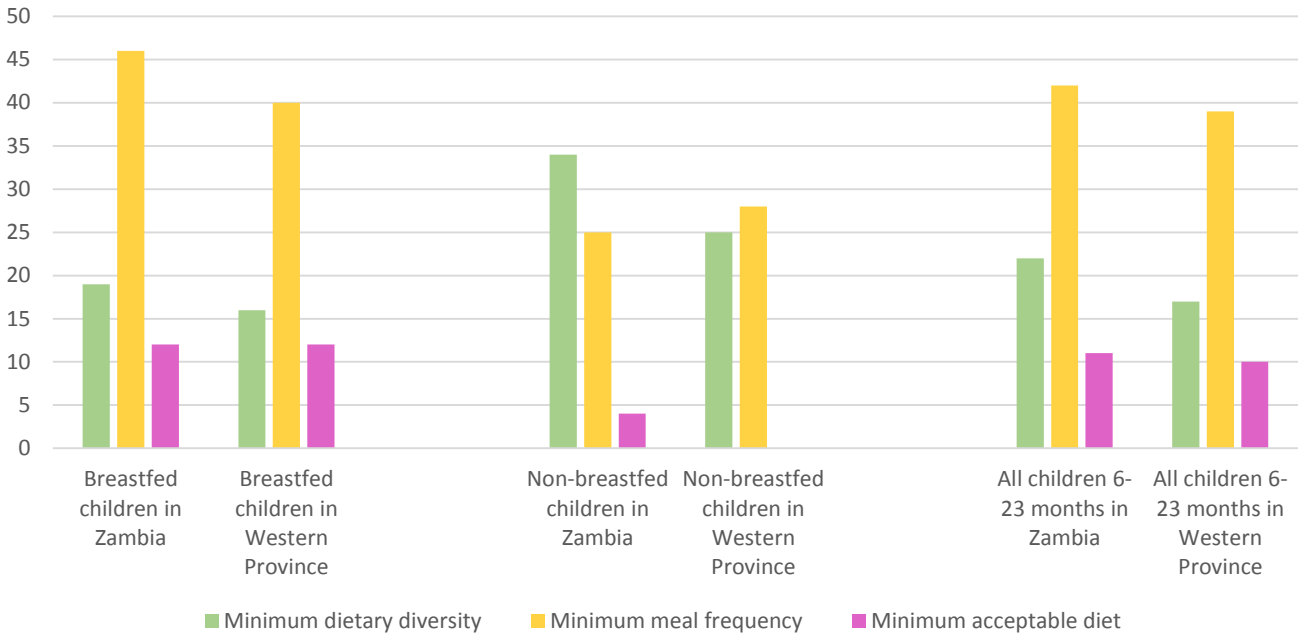


Figure 7. IYCF indicators in Zambia and Western Province
Source: DHS, 2013-14

National nutrition policies and strategies

The Government of the Republic of Zambia has recognized the urgency of improving the country's nutrition situation and is a member of the Scale-Up Nutrition (SUN) Movement, which unites governments, civil society, the United Nations, donors, the private sector, and academia in a joint effort to improve nutrition.[86]

In 1967, Zambia established the National Food and Nutrition Commission (NFNC) as the government body responsible for coordinating nutrition-related activities in the country.[87] The NFNC is supported by the Nutrition Cooperating Partners' Group (NCPG), which includes international development partners like DFID, Irish Aid, UNICEF, USAID, SIDA, World Bank and WFP. The NCPG worked with the NFNC to draft the 2011-2015 National Food and Nutrition Strategic Plan (NFNSP) and the 2013-2015 First 1000 Most Critical Days Programme (MCDP) Framework. [88]

The NFNSP emphasizes multi-sector efforts to strengthen and scale-up nutrition-focused interventions that promote the First 1000 Most Critical Days of a child's life. The NFNSP outlines eleven strategic directions in alignment with the SUN movement to improve food and nutrition in Zambia. These strategic directions are summarized in Figure 8.[89]

Based on strategic direction one of the NFNSP, which calls for the prevention of stunting in children less than two years of age, the NFNC developed a framework for the 2013-2015 First 1000 MCDP with the support of national and international partners. The First 1000 MCDP aims to strengthen and scale

[86] Scaling Up Nutrition, 2013
[87] Scaling Up Nutrition, 2013
[88] WFP, 2013
[89] National Food and Nutrition Commission, 2011

up priority interventions that reduce stunting in children. The framework and implementation plan were drafted to guide stakeholders in undertaking work within five strategic areas.[90]

The 2012 National Health Policy also addresses nutrition and states that the government aims to significantly improve the nutritional status of the population, especially of children, adolescents and women of reproductive age. Measures within the National Health Policy emphasize the strengthening of institutions that manage food and nutrition issues, coordination of nutrition programs, nutrition service delivery in communicable and non-communicable disease programs, micronutrient deficiency prevention and control, and implementation of IYCF programs.[91]

The 2004-2015 National Agricultural Policy does not outline a specific objective dedicated to nutrition. However, a number of its strategies to improve agricultural diversification and production mention the value that achieving such objectives will add to nutrition.[92]

Finally, one of the development goals of the 2013-2016 Revised Sixth National Development Plan (R-SNDP) is to significantly reduce hunger and poverty. The R-SNDP emphasizes inter-sectoral linkages among various ministries and the NFNC to promote nutritional interventions and achieve behavior change through information, education and communication.[93]

Strategic Directions of the NFNSP

1. Prevention of stunting in children under-two years of age: First 1000 most critical days
2. Increasing micronutrient and macronutrient availability, accessibility and utilization through improving food and nutrition security
3. Early identification, treatment, and follow-up of severe acute malnutrition
4. improving nutrition education and nutritious feeding through school
5. Increase linkages among hygiene, sanitation, infection control, and nutrition
6. Food and nutrition to mitigate HIV and AIDS
7. Nutrition related control and prevention measure of diet related noncommunicable diseases
8. Food and nutrition preparedness and response to emergencies
9. Strengthening governance, capacity building and partnerships in support of food and nutrition interventions at all levels
10. Monitoring and evaluating food and nutrition situation, interventions and research to support their improvement and expansion
11. Expanding and developing communication and advocacy support for food and nutrition interventions at various levels

Figure 8. Strategic Directions of the NFNSP
Source: National Food and Nutrition Commission, 2011

Food security and diversity

Agricultural production

Zambia has substantial yet underexploited agricultural potential.[94] Although the national economy is largely dependent on the copper industry, the agriculture sector employs 70 percent of the population.[95] The majority of those who practice agriculture are involved in rain-fed subsistence farming,[96] which is characterized by low levels of productivity.[97] Despite the shift in crop production in the 1990s from maize to other crops like cassava and cash crops, maize remains a predominant

[90] National Food and Nutrition Commission, 2012
[91] Republic of Zambia Ministry of Health, 2012
[92] Republic of Zambia Ministry of Agriculture and Co-operatives, 2004
[93] Republic of Zambia Ministry of Finance, 2014
[94] FAO, 2010
[95] World Bank, 2014
[96] FAO, 2010
[97] FAO, 2009

staple food crop.[98] The primary ten crops produced nationally are shown in Figure 9. This dependence on maize production contributes to the agricultural sector's vulnerability—since maize is commonly grown in Zambia under sub-optimal conditions and in drought-prone areas, it often fails.[99] Livestock rearing is also below its potential due to recurring drought and disease outbreaks.[100] Overall, agricultural productivity remains vulnerable to changing rainfall patterns, weak irrigation systems, short-staffed agricultural extension services, poor access to credit, and underdeveloped infrastructure.[101]

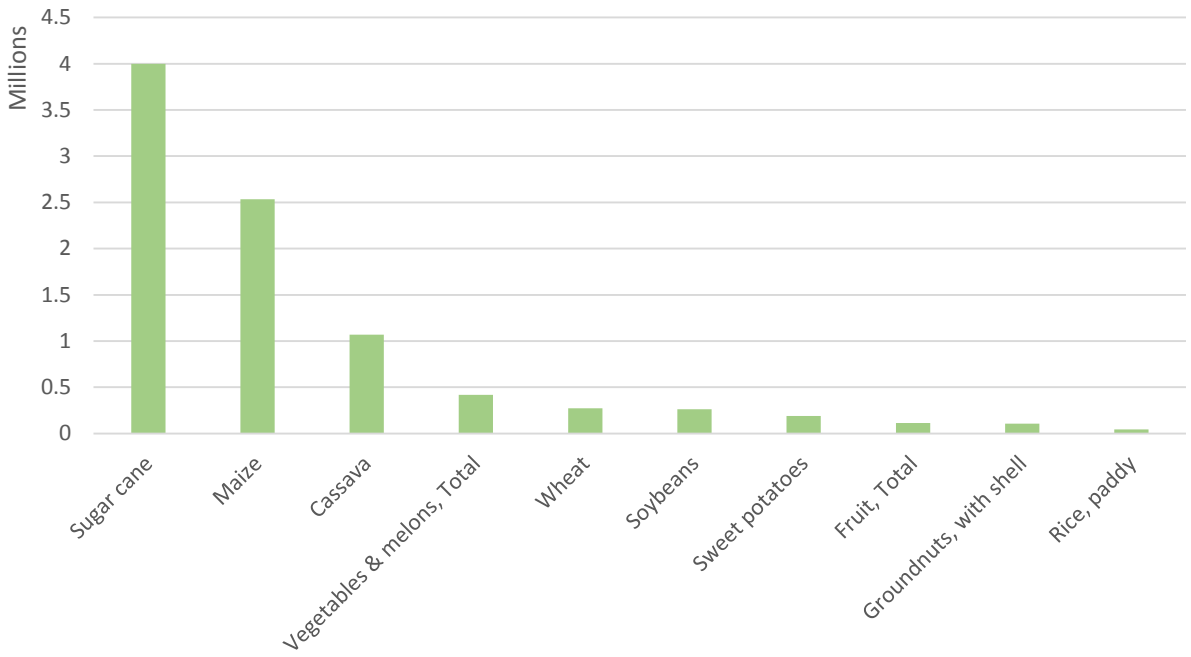


Figure 9. National distribution of the production quantity for primary crops (tonnes)
Source: FAOSTAT, 2013

Map 3. Agro-ecological regions of Zambia
Source: Aregheore, 2009

Zambia is divided into three agro-ecological regions, referred to as Regions I, II, and III in the 2004-2015 National Agriculture Policy. Region II is subdivided into Regions IIa and IIb. Rainfall and the quality of soils differ across the regions. The majority of Western Province is located in Region IIb, but the southern part of the province is covered by Region I.

Region I receives less than 800mm of rainfall annually and is therefore suitable for drought resistant and irrigated crops,[102] small grains, and livestock

[98] FAO, 2010
[99] FAO, 2009
[100] FAO, 2010
[101] FAO, 2009
[102] Republic of Zambia Ministry of Agriculture and Co-operatives, 2004

rearing.[103] Region IIb, which covers the majority of Western Province, receives 800 to 1000mm of annual rainfall and consists of sandy soils.[104] It is considered less productive than its neighbor, Region IIa.[105] Region IIb is considered suitable for the production of cashew nut, rice, cassava, millet, vegetables and timber, as well as beef, dairy and poultry production.[106]

Crop production in the Barotse

The Barotse flood plain is a system of arable land, canals, lagoons and swamps. Annual flooding, soil type, and topography strongly influence the timing and type of agricultural activities undertaken in the plains and upland. Major constraints to agriculture in the Barotse include poor infrastructure development, lack of access to markets, and inadequate inputs.[107]

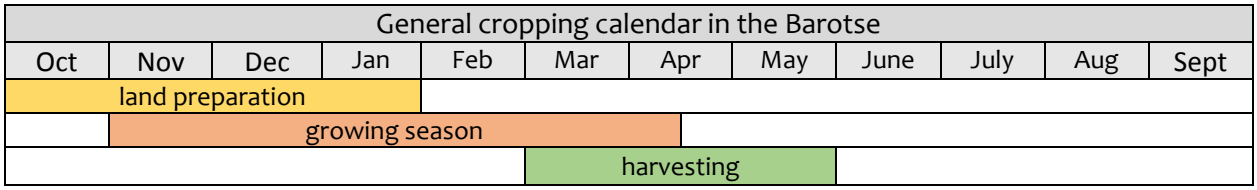


Figure 10. General cropping calendar in the Barotse
Source: Baidu-Forson et al., 2014

Land types are classified in terms of soil properties, risk of flooding or drought, and levels of remoteness. Farmers normally have a number of plots or fields located on different land types.[108] Field types include raised gardens (*Lizulu*), rain-fed village gardens (*Litongo*), seepage gardens (wet *Litongo*), drained seepage gardens (*Sishango*), lagoon gardens (*Sitapa*) and riverbank gardens (*Litunda*).[109] Constraints to agricultural productivity vary depending on the location of plots. The most fertile soils are located close to the river, however, these plots are at a higher risk of failure due to the increasingly unpredictable nature of flooding patterns. Farmers with plots or fields in the floodplain must also deal with high salinity in soil, weeds, floods, pests and predators like birds, livestock and hippopotamuses. In the 'saana', the land worked by farmers in Mapungu, most plots depend on groundwater levels that vary throughout the seasons and years. Those who farm in the upland manage poor canal infrastructure that inhibits the flow of water used for agriculture. When the canals are obstructed by vegetation or debris, water does not flow freely and soil fertility declines.[110]

Despite these challenges, the Barotse's vast agro-ecological diversity allows for a wide range of crops, including maize, rice, cassava, sweet potato, sugar cane, fruits and vegetables .[111] Yet, the lack of crop diversity was expressed as a major concern among community members during focus group discussions. Community members acknowledge that crop diversification would be a key strategy to increase income, overcome the hunger season, and improve nutrition.[112] However, according to

[103] FAO, 2009
[104] Republic of Zambia Ministry of Agriculture and Co-operatives, 2004
[105] FAO, 2009
[106] Republic of Zambia Ministry of Agriculture and Co-operatives, 2004
[107] Baidu-Forson et al., 2014
[108] Del Rio, 2015
[109] International Union for Conservation of Nature, 2003
[110] Del Rio, 2015
[111] International Union for Conservation of Nature, 2003
[112] Dierksmeier et al., 2015

farmers, the lack of seeds, labor, and knowledge about new crops and soil management has inhibited crop diversification.[113] Table 7 illustrates the main crops produced in the AAS communities.

Table 7. Primary agricultural products in the AAS communities

District	AAS Community	Primary agricultural products[114]
Kalabo	Mapungu	Rice, maize, cassava, sweet potatoes, groundnuts, vegetables
	Mwandi	
Lukulu	Kabula	Maize, cassava, rice, sorghum, tomato, vegetables
	Kapanda	Rice, maize, cassava, sweet potatoes, groundnuts, vegetables
Mongu	Lealui	Rice, maize, cassava, sweet potatoes, groundnuts, vegetables
	Nanikelako	Rice, maize, cassava, sweet potatoes, groundnuts, pumpkins, vegetables
	Situlu	Rice, maize, cassava, sweet potatoes, beans, pumpkins, vegetables
Senanga	Nalitoya	Rice, maize, cassava, sweet potatoes, bambara nuts, oranges, bananas, vegetables
	Nembwele	Rice, maize, cassava, sweet potatoes, beans, vegetables
	Sifuna	Rice, maize, cassava, sweet potatoes, beans, bananas, oranges, groundnuts, vegetables

Source: Dierksmeier et al., 2015

Markets in the Barotse

While much of the food that households produce is for their own consumption, agricultural products are also bought and sold within the village, at a nearby town or in the provincial capital of Mongu. These products may include cabbage, tomato, rice, carrot, pumpkin and eggplant.[115] Milk is also commonly sold or exchanged by those who have cattle. Other products that are sold include fish, rice, cassava, cattle, timber and fuel.[116]

However, poor access to markets is a main factor inhibiting the potential of farming systems, income generation, and nutritional status of households within the AAS communities.[117] Transport, distance and poor road or canal infrastructure limit access to markets.[118] Some households, such as those residing in Lealui and Mapungu, do have access to small markets located within their communities. Households situated in close proximity to Mongu, such as those of Lealui, Nanikelako, and Situlu, may also access the main markets in the provincial capital given that transport is available and accessible.[119] However, the overall lack of markets located close to villages is of concern for both women and men who need to travel long distances to sell or buy products.[120] In Kabula, for example, women expressed difficulty selling vegetable crops outside of the community. The lack of nearby markets has also led to

[113] Del Rio, 2015
[114] Dierksmeier et al., 2015
[115] Del Rio, 2015
[116] Longley & Thilsted, 2012
[117] Chapoto, Banda, Haggblade, & Hamukwala, 2011
[118] Dierksmeier et al., 2015
[119] Dierksmeier et al., 2015
[120] Kwashimbisa & Puskur, 2014

exploitation of community members by "briefcase buyers," traders who arrive in the village and buy produce at very low prices.[121] This reliance on "briefcase buyers" makes households vulnerable, particularly during the lean period before the harvest, since they receive rates of exchange that are disadvantageous to local farmers.

During focus group discussions, community members discussed ways to improve access to market during the "community vision" exercise led by the AAS team. These actions included lobbying the government for improved road infrastructure, creating linkages with buyers, facilitating buyer-producer workshops, and facilitating the establishment of information centers for access to market prices.[122]

Market prices fluctuate depending on the availability of food items. For example, during the low season, the prices for vegetables may increase or prices may remain the same while the quantity sold at that price decreases. Market surveys indicate that overall, the price of beans increases between November and February. According to discussions held with vendors at markets in Mongu and Senanga, this is likely due to the increase in demand of beans during the fishing ban as households substitute fish with beans as their source of protein.

Food supply and consumption

The level of hunger in Zambia, as classified by FAO, is very high with over 35 percent of the population identified as undernourished or unable to acquire enough food to meet the daily minimum dietary energy requirements.[123] According to FAO, the four dimensions of food security include availability, access, utilization, and stability.[124] They are each measured within a country based on a number of indicators. In terms of availability, one indicator is "average dietary energy supply adequacy," which represents the dietary energy supply as a percentage of the average dietary requirement of the country and therefore measures how adequate the national food supply is in terms of calories. Figure 11 indicates that as of 2015, Zambia stands at 92 percent on this indicator, signifying that the average dietary energy supply per person does not meet the national average dietary energy requirment, which is 2114 kcal/capita/day.[125] This is an increase of about 7 percent since 2008, at which the indicator was at its lowest at 86 percent.[126] However, the data still indicate that national food supply does not meet the dietary needs of the population. Food supply also lacks diversity and essential micronutrients.[127]

[121] Kwashimbisa & Puskur, 2014
[122] Dierksmeier et al., 2015
[123] FAO, 2015a
[124] FAO, 2015b
[125] FAO, 2015b
[126] FAOSTAT, 2013
[127] FAO, 2010

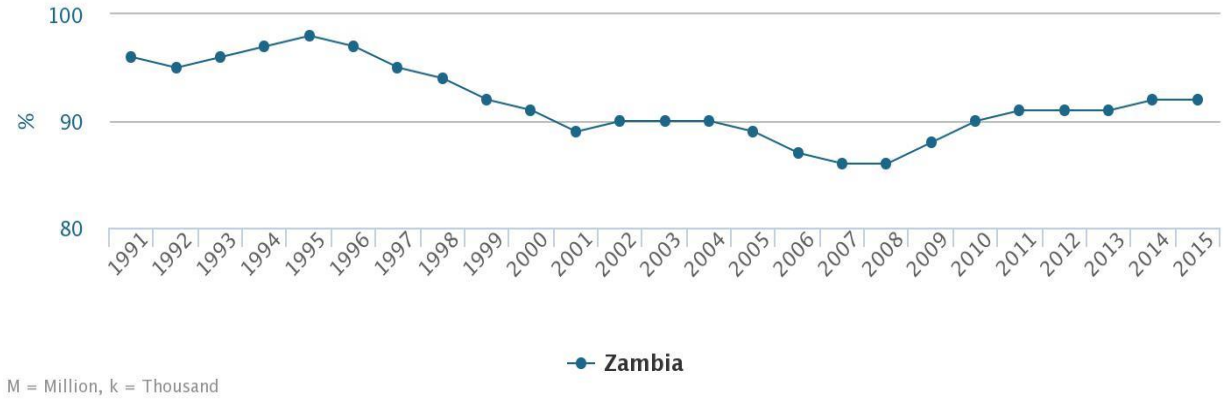


Figure 11. Average dietary supply adequacy (% of caloric needs met by current food supply)
Source: FAOSTAT, 2015

The Zambian diet is composed of cereals, starchy roots, and fruits and vegetables.[128] Maize is consumed by 90 percent of the population and is commonly eaten in the form of *nshima,* which is a thick porridge of maize meal eaten with different types of relish made with vegetables, pulses, meat, or fish. More liquid porridges are often given to children as complementary foods.[129] Since cereals make up about two-thirds of the dietary energy supply,[130] the Zambian diet has little dietary diversity.[131] While the consumption of dark green leafy vegetables is relatively high, that of other nutrient-rich foods like yellow and orange vegetables, animal-source foods, and fruits is small.[132]

Furthermore, since consumption patterns are highly dependent on maize, its production and availability greatly affect household food security especially since maize production has been declining since the 1990s. Efforts have been made to diversify the production of other staple crops like sorghum, rice, wheat, and cassava. However, this diversification has not yet closed the food supply gap that has been created by the reduction in national maize production.[133]

[128] FAO, 2010
[129] FAO, 2009
[130] FAO, 2010
[131] Longley, Thilsted, Beveridge, Cole, Nyirenda, Heck, & Hother, 2014
[132] Longley et al., 2014
[133] FAO, 2009

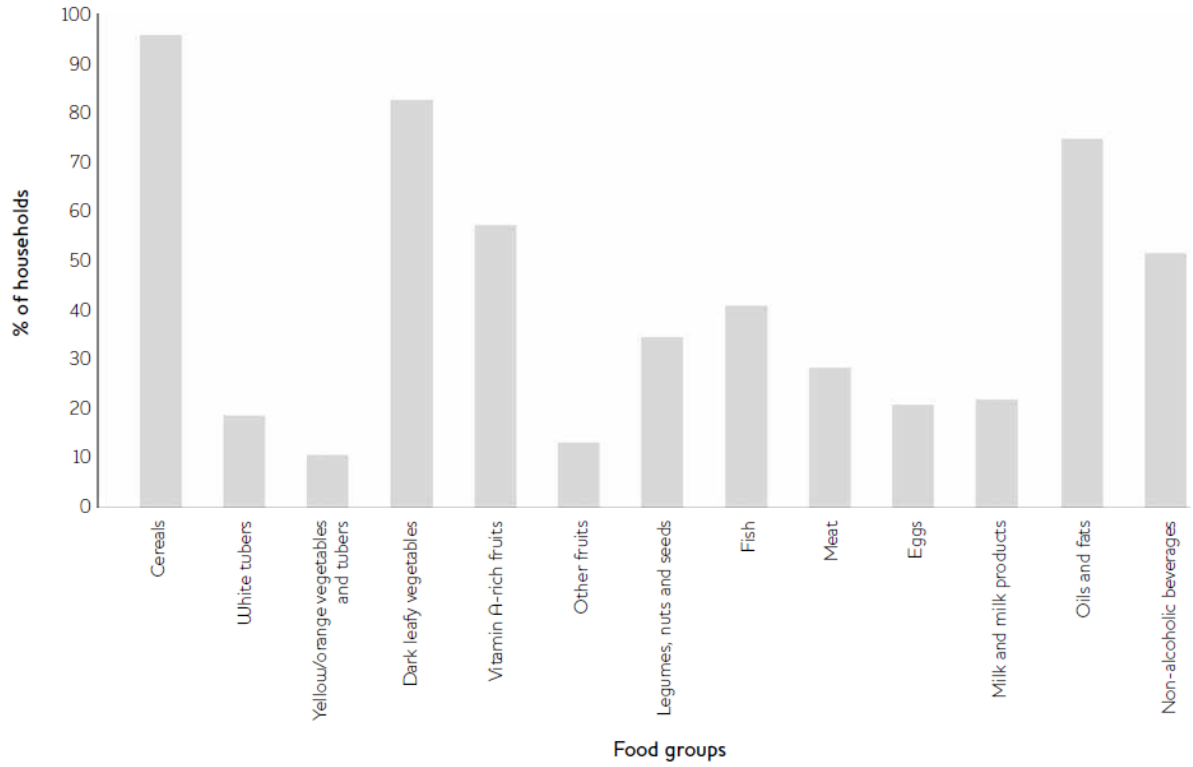


Figure 12. Percentage of household consumption of different food groups

Food consumption and seasonal availability in the Barotse

Households in the Barotse access food through agricultural production, livestock rearing, fishing, gathering wild foods, purchasing from markets, and working for food. Similar to national consumption patterns, carbohydrate-rich and energy-dense foods like maize, cassava and sweet potatoes predominate in diets at the community level. These dishes are eaten with vegetables, fish or meat relish.[134]

Food availability is highly seasonal and very limited during the hunger season, which lasts from August or September to January, as food stored from the previous growing season becomes exhausted. A simplified seasonal food availability calendar is represented by Figure 13 based on data from the communities of Lealui, Nalitoya, Nembwele, Sifuna and Mapungu. Food and nutrition insecurity is particularly intense during food shortages.[135] It is therefore essential to understand the link between biodiversity and diet diversity within the floodplain in order to identify entry points for sustainable and diverse diet options.

[134] Baidu-Forson et al., 2014
[135] Baidu-Forson et al., 2014

Figure 13. Seasonal food availability

District	AAS community	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Mongu	Lealui	Plentiful						Less available			Hunger season		
Senanga	Nalitoya, Nembwele & Sifuna	Plentiful					Less Available			Hunger Season			
Kalabo	Mapungu	Plentiful			Less Available				Hunger Season				

During focus group discussions, community members identified the hunger season and opportunities to improve nutrition when food becomes scarser/food availability declines substantially.

Mongu District: Lealui

During the hunger season, women said they eat nshima, cassava leaves, and amaranthus while men stated they eat papaya, cassava, guava, sweet potatoes, fish, vegetables, milk, and meat. Women identified acquiring more knowledge on food preservation, participating in nutrition education programs, gaining home budgeting skills, learning better ways to cook new foods, promoting fruit trees in the area, and improving veterinarian services for livestock as ways to improve nutrition. Men said they needed more farming implements to grow vegetables and increase wheat production, as well as more fishing nets to fish more. Other opportunities to improve nutrition were identified as rotating animals in the cropping areas, using planting methods learned from MAL, keeping more livestock, and drying food.

Senanga District: Nalitoya

Women said they eat mubula, muzauli, mango, and cassava leaves during the hunger season while men stated they eat fish, mealie meal, cassava, mango, cassava leaves, rape, cabbage, tomato, cowpeas, and mungongo. Women identified clearing the canals, acquiring farming implements, planting on time, and acquiring knowledge on food utilization, food processing, and preservation as ways to improve nutrition. Other opportunities to improve nutrition were identified as acquiring more farming implements and seeds that can grow during the hunger season (specifically tomato, cabbage, vegetables, and cassava), acquiring more fishing nets, and increasing livestock production.

Kalabo District: Mapungu

During the hunger season women said they eat wild fruits, sweet potatoes, cassava leaves, nshima, and mampana while men said they eat mangoes and wild fruit. Men also stated that most people buy food during the hunger season, especially breakfast mealie meal to prepare nshima. Women identified increasing cultivation, using early maturity seeds, improving irrigation facilities, promoting new skills in the villages, increasing chicken production, improving veterinarian service delivery for livestock, and promoting cooking lessons and nutrition education as ways to improve nutrition. Women also stated they wanted to learn what food they can eat in place of nshima and about the nutritional value of different food items. Other opportunities to improve nutrition were identified as requesting improved seed varieties and equipment from government or partner organizations.

Intra-household food allocation

Within households in the Barotse, men and boys are given more food than women and girls due to the perceived nature of their work and assumed energy requirements. Men tend to be given the head of the fish (considered to be the best part), whereas women and children are given the middle and the tail. In the plains communities, children are given priority over adults, though the quantity of food given to children is smaller than that for adults. In contrast, in the upland communities, children are

served after the adult men. It would appear that women prioritize the food needs of others, especially children, above their own, thereby compromising their own nutritional requirements.[136]

Coping strategies for food shortages

Individuals in the AAS communities practice a variety of secondary income-generating activities throughout the year to cope with phases of food insecurity. Some women, for example, run small businesses by selling household, agricultural and food items. In Mwandi lowland, for example, women brew beer as a coping strategy.[137] Individuals who are at the bottom of their community's socioeconomic hierarchy take on piecework like weeding, clearing land, herding cattle, and collecting firewood for wealthier individuals in return for cash or in kind. Piecework activities are generally undertaken as coping strategies for people during the hunger season or an illness.[138]

Other forms of supplementing income include beer brewing, carpentry, house construction, hunting wild animals, selling wild fruits, charcoal-making, and handicrafts. Crafts provide an important source of income for poorer women and include reed mats, baskets, and brooms.[139]

Table 8. Coping strategies

District	Community	Coping strategies
Mongu	Lealui	• Perform piecework • Undertake small business • Cultivate vegetables • Sell reed mats • Buy foodstuffs • Make fences and mats for sale
Senanga	Nalitoya	• Make brooms and mats for sale • Undertake piecework • Buy and sell fish • Brew and sell beer • Grow rape for sale • Undertake canal clearing
Kalabo	Mapungu	• Practice piecework • Small business (sell scones, sour milk, or vegetables) • Brew beer • Sell thatched goods • Sell fish • Fish using fishing baskets • Make reed and papyrus mats for sale

Fish consumption

Fish is an important animal-source food in the Zambian diet. The majority of fish consumed in Zambia is supplied by capture fisheries. While sun-drying fish is the most common post-harvest method, other techniques include dry salting, brining, freezing and mechanical-drying. Data from the 2009 National Nutrition Surveillance Survey report showed that fish was the most commonly and frequently consumed animal-source food at the household level.[140] Dried small fish, eaten as a relish with *nshima*, is considered the most common animal-source food of the poor. It is highly accessible since it can be bought at local markets at low prices and in small quantities. However, the amount of fish and frequency of consumption among the poor, especially among women and children, is relatively small and may be affected by price, location, season, and availability.[141] For example, fish

[136] Longley & Thilsted, 2012
[137] This, along with large numbers of fishers with disposable income, has likely increased the level of alcohol consumption.
[138] Dierksmeier et al., 2015
[139] Longley & Thilsted, 2012
[140] Longley et al., 2014
[141] Longley et al., 2014

consumption patterns have been affected by the decline in fish supply that has occurred over the past 40 years. Per capita fish supply in Zambia has decreased by 50 percent since 1970 due to population growth, declining capture fisheries, and an underdeveloped aquaculture sector.[142]

The Zambezi River delivers a wide range of freshwater fish for those living in the Barotse flood plain.[143] Fish, which provide an important source of both income and protein, are therefore an essential part of household diets. Commonly consumed species include breams, barbell fish, tigerfish, bulldog, "limbala," and "mbundu." Religion,[144] population growth, seasonality, changes in fish, and socio-cultural factors[145] influence fish consumption patterns in the Barotse.[146] Shortages in fish supply occur during the period of flooding and during the annual fish ban that lasts from December to March. Fish is the most available during the months of June and July. To overcome fish shortages for household consumption, some suggestions include developing aquaculture, improving the enforcement of appropriate fishing methods and fisheries governance, and introducing new technologies that reduce fish drying time.[147]

Fish is a rich source of various nutrients; while all species are rich in protein, some are particularly high in fatty acids and micronutrients like calcium, iron, and zinc. According to a survey conducted in the four AAS districts in the Barotse, fish was introduced into the diets of 51.4 percent of children at six months of age and 36.6 percent of children at 7-9 months of age. Six percent of children began eating fish at 3-5 months of age.[148] The nutritional value of fish, combined with dietary patterns in the Barotse, suggest that fish has the potential to make a greater contribution to the essential nutrients needed by pregnant and lactating women and young children. An increase in the consumption of fish, along with other animal-source foods, micronutrient-rich foods, vegetables and fruits during the first 1000 days of a child's life can help fight malnutrition.[149] The NFNC has acknowledged the nutritional value of fish and has nationally promoted the consumption of fish in the diets of young children through the publication and distribution of complementary feeding booklets. The booklets, which promote complementary recipes made from traditional and locally grown foods throughout the country, include recipes that use dried fish in homemade porridges and other dishes for young children.[150]

Health

Disease burden

While communicable diseases make up a major share of the disease burden in Zambia, the prevalence of non-communicable diseases (NCD) has been increasing.[151] Figure 14 shows that HIV/AIDS is the leading cause of death, followed by lower respiratory infections, malaria, birth asphyxia and birth trauma, stroke, and diarrheal diseases.[152] The leading causes of death in children under five include

[142] Longley et al., 2014
[143] Baidu-Forson et al., 2014
[144] For example, seventh Day Adventist adherents do not eat fish without scales.
[145] Pregnant women are prohibited from consuming red-breasted bream and women do not eat the species "mbunda."
[146] Baidu-Forson et al., 2014
[147] Baidu-Forson et al., 2014
[148] Longley et al., 2014
[149] Longley et al., 2014
[150] National Food and Nutrition Commission, 2007
[151] Republic of Zambia Ministry of Health, 2012
[152] WHO, 2015c

malaria, acute respiratory infections, birth asphyxia, prematurity, diarrhea, neonatal sepsis and HIV/AIDS. However, both the under-five mortality rate and maternal mortality ratio have been gradually decreasing since the 1990s.[153]

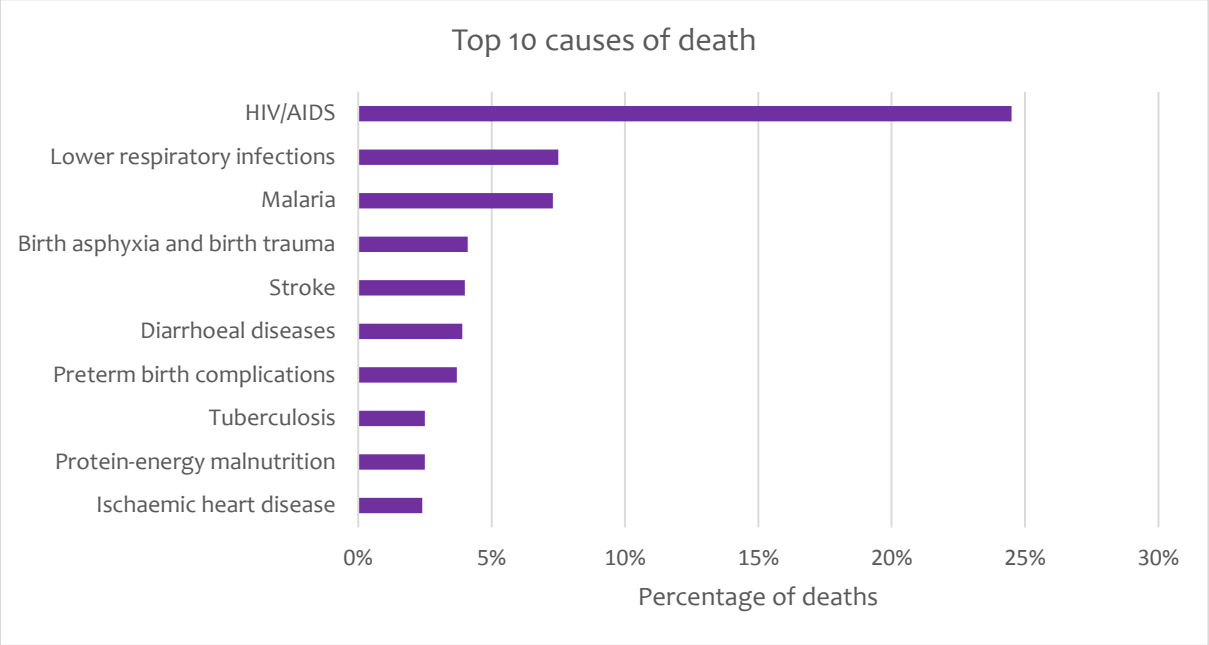


Figure 14. Leading causes of death in Zambia
Source: WHO, 2015c

The overall HIV prevalence rate among women and men age 15-49 has decreased from 14.3 percent in 2007 to 13 percent in 2013,[154] with the prevalence being higher among women due to biological, economic and social factors.[155] The overall decrease reflects progress made in strengthening the institutional and strategic frameworks for multi-sector responses to HIV/AIDS. However, the prevalence of HIV among women and men in Western Province is at 15.4 percent, which is one of the highest percentages among the provinces.[156] Tuberculosis and malaria also continue to be major public health concerns across the country.[157]

National hospital data also indicate that non communicable diseases (NCDs) are an emerging problem in Zambia and account for 23 percent of total deaths nationally.[158] NCDs have similar risk factors attributed to lifestyle choices, including unhealthy diets that lead to overweight and obesity.[159] Leading NCDs include cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes.[160]

[153] WHO, 2015c
[154] Republic of Zambia Central Statistical Office et al., 2014
[155] Republic of Zambia Ministry of Health, 2012
[156] Republic of Zambia Central Statistical Office et al., 2014
[157] Republic of Zambia Ministry of Health, 2012
[158] Republic of Zambia Ministry of Health, 2012
[159] Malik, V.S., Willett, W.C., & Hu, F.B. 2012
[160] WHO, 2014b

Health service delivery system

The health service delivery system in Zambia is designed to focus on primary health care delivered through a decentralized structure, illustrated in Figure 15.[161]

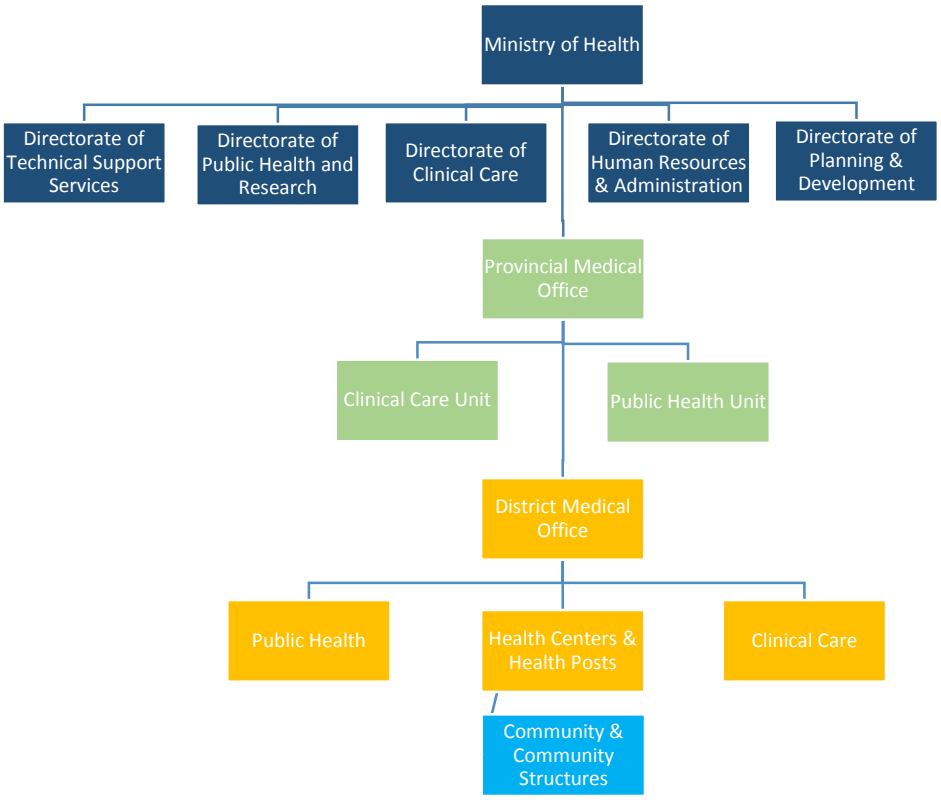


Figure 15. Structure of health service delivery system
Source: African Health Observatory, 2015

Zambia's Vision 2030, a long-term plan to become a prosperous middle-income country by 2030, asserts that equal access to and use of good quality health care is a right for all people. However, differences still exist in health care utilization depending on socioeconomic background—those with a higher socioeconomic status more often frequent public health facilities, especially public hospitals, while the poor more frequently use primary facilities like health posts and clinics.[162] According to the 2012 National Health Policy, health services in Zambia "are fragmented and unevenly distributed, resulting in inefficiency and ineffectiveness." This limits the rural population's access to adequate health care services. Other concerns include shortages of drugs, equipment, and health care workers, as well as poor health infrastructure across the country. In rural areas, for example, 46 percent of families live outside a 5 km radius from a health facility, compared to 1 percent in urban areas.[163]

[161] Republic of Zambia Ministry of Health, 2012
[162] Phin & Ataguba, 2014
[163] Republic of Zambia Ministry of Health, 2012

National health programs and priorities

In 1991, the government began reforming its national health policy with a focus on restructuring primary health care programs and decentralizing the health system. The government has committed itself to ensuring that efficient and cost-effective quality basic health care services are available and accessible to all families through the implementation of the Basic Health Care Package (BHCP). The BHCP currently prioritizes nutrition; environmental health; control and management of communicable diseases; malaria; tuberculosis; epidemic and disaster prevention, preparedness, and response; school health; and oral health.[164] Recognizing that resources and capacity are constrained, the 2011-2015 National Health Strategic Plan (NHSP) also prioritizes interventions of critical importance to reduce the national disease burden. Fostering multi-sectoral responses to reduced malnutrition is identified by the NHSP as a priority, as well as addressing the human resource crises, enhancing health care infrastructure, reducing the prevalence of HIV/AIDS, controlling epidemics, improving health education, and increasing access to clean water and sanitation, electricity, and telecommunication.[165]

The main interventions implemented in Zambia to improve child health are the Expanded Programme on Immunisation (EPI), Integrated Management of Childhood Illnesses (IMCI) programme, and Prevention of Mother-to-Child Transmission (PMTCT) of HIV programme. Other interventions include the scaling up of nutrition through vitamin A and iron supplementation, early initiation of breastfeeding, and appropriate and adequate IYCF practices. These efforts have contributed to improvements in child health and to reductions in child mortality. According to the 2013-14 DHS, infant mortality and under-5 mortality in Zambia have declined by 58 percent and 61 percent respectively over the past two decades.[166] Western Province has experienced reductions in child mortality at greater rates than the national average for infant mortality and under-5 mortality from 2007 to 2013, as displayed in Figure 16. However, Western Province has the second highest neonatal mortality rate among the provinces.[167]

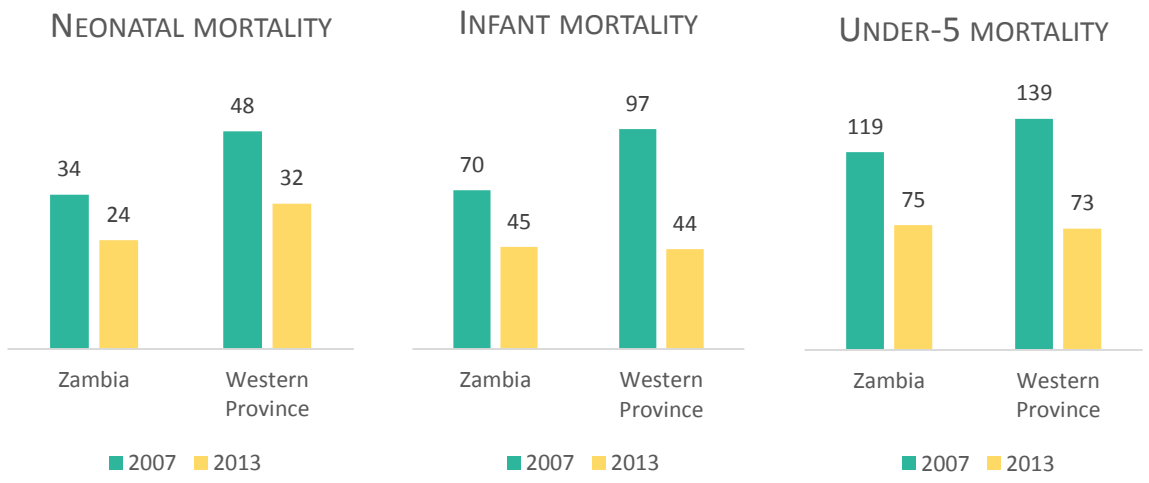


Figure 16. Trends in child mortality rates (as measured as deaths per 1,000 live births)
Sources: DHS, 2007 & 2013-14

[164] Republic of Zambia Central Statistical Office et al., 2014
[165] Republic of Zambia Central Statistical Office et al., 2014
[166] Republic of Zambia Central Statistical Office et al., 2014
[167] Republic of Zambia Central Statistical Office et al., 2014

AAS community-level access to health facilities and services

Kalabo District. Although there is a rural health clinic in Mapungu, focus group participants found the staff and services to be inadequate. Pregnant women who live far from the clinic and/or lack access to transport are prevented from delivering there. Some individuals also expressed difficulty receiving consistent antiretroviral therapy. Those in need of more complicated medical procedures must seek care at hospitals in Kalabo or Mongu through the referral system. There is no functioning health center in Mwandi. Those in need of medical care travel to rural health centers in Tarpo, Shuku or Mapungu, which may take 2 to 4 hours to reach by foot. Focus group participants expressed concern about the availability of medication and care at health centers. Distance, lack of transport, and poor road infrastructure also prevent pregnant women from delivering at clinics.[168]

Lukulu District. There is a primary healthcare center in Kabula that offers services that have improved since the construction of new facilities. There has also been increased access to basic medicines and a greater distribution of mosquito nets. However, focus group participants expressed concern that the center is staffed by community health workers that are not trained. Many travel to Kapanda Rural Health Center or Lukulu Hospital for specialized care. Residents of Kapanda access the Mbanga Rural Health Center, which was recently upgraded and provides maternity services and antiretroviral therapy. Focus group participants expressed satisfaction with the services provided, consistent availability of medicine, and short distance to the health center.[169]

Mongu District. The closest health center for residents of Nanikelako is the Lealui Rural Health Center, a distance of 4 hours by foot. Since upgrades, the health center now has a maternity ward and borehole. However, the long travel time prevents community members from receiving health care services and is especially challenging for pregnant women who lack transport options. Residents of Situlu also travel to the health center in Lealui for services, which is located 10 km from the community. Although focus group participants in Situlu stated that clinic staff and services have been adequate since facility upgrades in 2011 and 2013, the distance causes complications for pregnant women. For those living in Lealui, the rural health center is located in the village of Lwatile.[170]

Senanga District. Residents in Sifuna access a rural health center located in the community, which has adequate staff and services. Additionally, improvements made in road infrastructure and to the clinic have made reaching the clinic easier for pregnant women. A rural health center is also located in Nembwele. Although no qualified nurse works at the center, focus group participants expressed satisfaction with the staff and provision of services since the facility and road infrastructure have improved. Residents of Nalitoya travel to a nearby health post in Lyangati for health care services. Those with more complicated cases are referred to the Itufa Health Center, which is located 8 km from the community. This distance, combined with a lack of transport options, is a challenge for some pregnant women as it prevents them from delivering at the clinic.[171]

[168] Dierksmeier et al., 2015
[169] Dierksmeier et al., 2015
[170] Dierksmeier et al., 2015
[171] Dierksmeier et al., 2015

Water, sanitation and hygiene

Lack of access to clean water and sanitation facilities alongside poor hygienic practices increase the prevalence of the leading preventable diseases in Zambia, which include skin diseases, acute respiratory infections, and diarrheal diseases. [172]

According to data from the 2013-14 DHS, 66 percent of households in Zambia obtain drinking water from an improved source. This is a notable increase from 24 percent in 2007. Improved sources are identified as water piped into a dwelling, yard, or plot; public tap or standpipe; tube well or borehole; protected dug well; protected spring; rainwater; and bottled water. Unimproved sources include unprotected dug well; unprotected spring; tanker truck or cart with small tank; and surface water. The most common improved source of drinking water in rural areas is a tube well or borehole and the most common non-improved source is an unprotected dug well. Sixty-six percent of households do not treat drinking water, with rural households being more likely not to treat water than urban households. Adding bleach or chlorine and boiling water are the most common forms of water treatment.[173]

In terms of sanitation, 25 percent of households have access to an improved facility (such as a toilet or latrine), 20 percent have access to a shared toilet facility, and 55 percent have access to a non-improved facility. Non-improved facilities include not flushing into a sewer, septic tank or pit latrine; pit latrine without slab or an open pit; hanging toilet or latrine; no facility or openly defecating in a bush or field. While 16 percent still defecate in a bush or open field, this is an improvement from 2007 when 25 percent of households had no toilet facility. Rural households more commonly lack a toilet facility than urban households.[174] Table 9 summarizes data collected in the AAS communities and indicates the type of water sources and sanitation facilities available at the community-level.

[172] Republic of Zambia Central Statistical Office et al., 2014
[173] Republic of Zambia Central Statistical Office et al., 2014
[174] Republic of Zambia Central Statistical Office et al., 2014

Table 9. Water and sanitation in the AAS communities

District	Community	Safe drinking water sources	Other water sources	Sanitation facilities	Comments
Kalabo	Mapungu	Boreholes at clinic and school	Ground wells, rivers, lakes and lagoons		
	Mwandi	Boreholes (only upland)	Streams, lagoons and ground wells	Poor soil quality prevents digging proper latrines in the lowland	Water quality and contamination are major concerns
Lukulu	Kabula	One borehole at school	Unprotected ground wells	Most households have pit latrines	Borehole costs ZMW 3.50 per month to use
	Kapanda	Three boreholes		Most households have pit latrines	
Mongu	Nanikelako		Ground wells, rivers, canals and lagoons		Water quality is of concern since some use waterways as toilets and refuse pits
	Situlu		Rivers, lakes and lagoons		Water sources are 400m to 1km from households
	Lealui	Boreholes near palace and health center	Unprotected wells and lagoons	Toilets and rubbish pits (less frequent in outlying villages)	Indunas are responsible for enforcing construction of sanitation facilities
Senanga	Sifuna Nembwele Nalitoya	Boreholes at clinic and school	Ground wells, streams, rivers, lakes, and lagoons		

Source: Dierksmeier et al., 2015

Nationally, only 40 percent of households have a place for washing hands. In Western Province this number is even lower at 24.6 percent. However, among households where a place for hand washing is observed, Western Province has the highest proportion of households that have soap and water.[175]

[175] Republic of Zambia Central Statistical Office et al., 2014

Table 10. Hygiene in Zambia and Western Province

	% of households where a place for washing hands was observed	Among households where place for hand washing was observed, with:					
		Soap and water	Water and other type of cleansing agent	Water only	Soap but no water	Cleansing agent other than soap only	No water, no soap, no other cleansing agent
Zambia	40.2	32.4	1.3	26.4	4.6	1.4	33.3
Western Province	24.6	48.1	0.3	31.5	1.3	0.0	17.8

Source: DHS, 2013-14

Gender

Women make up 65 percent of the national population engaged in agricultural activities. According to a gender situational analysis of the Barotse floodplain, women "as the growers and providers of food and caretakers of their family…hold the key to addressing hunger and malnutrition."[176] Differences in livelihood strategies that women and men pursue in the Barotse are influenced by social norms, beliefs and traditions. Since women normally grow crops for household consumption while men grow cash crops, the division of labor based on gender has strong implications in terms of who is more greatly affected by poverty. Women also face constraints in terms of time, mobility, and involvement in natural resource management due to customary power relations, responsibilities at home, and pressure to maintain a "decent reputation."[177]

Table 11. Livelihood activities for food and income generation

Women only	Men only	Both women and men
Farming cassava, sweet potatoes, groundnuts	Farming millet, cotton	Farming maize, rice and vegetables
Fishing using baskets	Fishing using nets	Selling fish
Selling fruits and seasonal produce	Carpentry	Basket and reed mat making and sales
Bartering cassava for fish	Building houses and fences	Cutting and selling reeds
Making and selling brooms	Blacksmith	Small business
Brewing and selling local beer	Selling logs, fiber and poles	
Selling scones	Charcoal-making and sales	
Wage labor on other people's farms	Carving mortars, canoes	
Knitting	Rearing and selling cattle; loaning of cattle for soil improvement and ploughing in other fields	

Source: Kwashimbisa & Puskur, 2014

[176] Kwashimbisa & Puskur, 2014
[177] Kwashimbisa & Puskur, 2014

Men are considered the leaders of the community and are expected to provide shelter, food and income for their family through farming, cattle herding and fishing. They clear the fields and plough, herd and tend the cattle, transport and sell agricultural produce, and log trees for fuel. Women carry out domestic chores such as cooking, preserving food, cleaning, taking care of family members, collecting drinking water and fuelwood, washing clothes, bathing and feeding children. They also undertake agricultural activities like planting seeds, applying fertilizer, weeding and harvesting, and brewing beer for home consumption or sale. However, during focus group discussions, there was often consensus that men can also cook, fetch fuelwood, and weed while women can herd cattle and plough.[178]

There are also gendered differences with regard to resources that restrict women's access to, ownership of and control over natural, physical and financial resources. The BRE controls and administers land rights, which are determined by residence. However, women can only access land through their father or husband. Therefore, a woman's access to land and other resources, as well as status in the community, is based on marriage, lineage and ability to have children.[179] Women also reported, during focus group discussions, having less access to farming inputs, credit and other financial resources, farmers associations, and agricultural extension information in comparison to men.[180] Community members also expressed other gender-related concerns during focus group discussions about girls becoming pregnant while still in school and young women engaging in transactional sex.[181]

There is however evidence that these norms are changing. For example, focus group discussions in the AAS communities revealed that both men and women have become more business minded, with women selling brooms, mats, fish and beer. Women are therefore becoming less involved solely in household chores, which in turn leads them to gain more independence from men for their livelihoods.[182] Norms relating to how personal and household decisions are made are also changing. For example, in Kabula, women make decisions about water, food preparation and health-related behaviors, all of which significantly impact community sanitation, nutrition and health. Women are also increasingly involved in household decision-making in Kapanda and participate in agriculture and other activities to increase household income. In Mwandi, women's focus groups expressed an awareness about gender and women's rights; both women and men also spoke positively about couples making decisions together. Similarly, women and men in Nanikelako, Sifuna, Nembwele, and Nalitoya discussed couples making joint decisions about household purchases, crop production, and family care. Finally, during community vision exercises in Mapungu, Mwandi, and Lealui, community members composed dream statements for their communities that included activities to promote women's empowerment, such as strengthening women's groups and training women in entrepreneurship and savings.[183]

[178] Kwashimbisa & Puskur, 2014
[179] Kwashimbisa & Puskur, 2014
[180] Kwashimbisa & Puskur, 2014
[181] Dierksmeier et al., 2015
[182] Kwashimbisa & Puskur, 2014
[183] Dierksmeier et al., 2015

Through the AAS program's objective to enhance equity within social, economic and political structures in the Barotse,[184] a gender-transformative approach is applied within participatory action research to create spaces for women and men to reflect upon and question the underlying norms and power relations that exist in their communities. Focus group discussions with women and men in the AAS communities seek to achieve more gender-equitable development outcomes that will transform ways of thinking and socio-cultural practices. These discussions should include women and men in households, as well as reach community leaders, service providers, government and nongovernmental agencies, research organizations and the private sector in order to facilitate positive change towards development that will benefit both women and men in the Barotse.[185]

Priorities of target communities and other stakeholders

Target communities

The AAS team led community vision exercises in all ten focal communities that engaged women and men in reflecting on future goals for their communities. These exercises also sought to identify opportunities for future research-in-development projects in the Barotse. Through the exercise, women and men in each community defined a "dream statement" with strategic areas and proposed actions to implement the community vision plan. Almost all dream statements included a desire to live within a community that is healthy and food-secure and has a clean environment with good homes. Strategic areas included food security, natural resource management, health, nutrition, energy, water and sanitation, improved shelter, socioeconomic issues, gender, HIV/AIDS, infrastructure, fish farming, access to markets, health, education, agro-forestry and orchard gardens.[186]

While all ten communities included food security in their community visions, Mapungu, Lealui, Sifuna, Nembwele, and Nalitoya were the only communities to specifically identify nutrition as a strategic area. The action proposed to improve nutrition in each of these communities was training in dietary requirements. However, within the strategic areas of food security, every community identified the need for greater diversification of crops, livestock, gardening and fishing to improve incomes, food security and nutrition.[187] Furthermore, although nutrition specifically did not come out as a priority in all communities, health, water and sanitation, food security, gender, education, and socioeconomic issues, which all relate to nutrition, were repeatedly identified as strategic areas. All priority areas discussed during the community vision exercise are shown in Table 12.

[184] Cole, van Koppen, Puskur, Estrada, DeClerck, Baidu-Forson, Remans, Mapedza, Longley, Muyaule, & Zulu, 2014
[185] Cole et al., 2014
[186] Dierksmeier et al., 2015
[187] Dierksmeier et al., 2015

Table 12. Strategic areas mentioned in community visions

	Shelter	Water, sanitation & hygiene	Food security	Health	Natural resource mgmt	Infrastructure, market access	Nutrition	Education	Gender	Other
Mapungu										
Mwandi										Entertainment
Kabula										Fish farming
Kapanda										Energy
Nanikelako										Youth employment
Situlu										
Lealui										
Sifuna										
Nembwele										Agro-forestry/ gardens
Nalitoya										

Legend	
	Mentioned in community dream statement & as strategic area
	Mentioned in dream statement
	Mentioned as strategic area
	Not mentioned

Source: Dierksmeier et al., 2015

Other stakeholders and development partners

A number of government and non-governmental organizations work in Western Province in areas of development, such as health, food security, agriculture, nutrition, and water and sanitation. Each entity has its own objectives and goals. The AAS program in the Barotse has already begun building partnerships with these organizations to more effectively and efficiently implement its program.

Table 13. Stakeholders and development partners in Western Province

Stakeholder	Type	Priority areas/objectives
Barotse Royal establishment	Traditional government	Traditional system of governance/monarchy of the Lozi people
Concern Worldwide	INGO	Dedicated to tackling poverty by improving the quality of and access to food, safe drinking water, sanitation, and health
Caritas	INGO	Catholic organization under the Zambian Episcopal Conference with a mandate to promote human development
Catholic Relief Services	INGO	Catholic organization working with the Zambia Episcopal Conference and Zambian dioceses to implement humanitarian projects
Department of Fisheries	Government	Oversees the implementation of national fisheries programs (capture fisheries and aquaculture)
Ministry of Agriculture and Livestock	Government	Designs, implements and manages government activities within the agricultural and livestock sectors
Ministry of Health	Government	Designs, manages and implements government intervention in the health sector. Structure is decentralized with health centers and posts at the local level. Aims to ensure equity of access in health service delivery
Ministry of Community Development and Mother and Child Health	Government	Established in 2012, provides and facilitates socioeconomic empowerment of the poor and vulnerable
Mongu District Farmers Association	CSO	Advocates for smallholder farmers
National Food and Nutrition Commission	Government	Coordinates action on nutrition under the Ministry of Health
People's Participation Service	NGO	Organizes the rural disadvantaged to participate in income generating activities while also promoting capacity building, food security, savings, small scale enterprises and the mitigation of HIV/AIDS
University of Zambia School of Agriculture	Academic	Provides leadership in the development of human resources and technologies and in provision of professional services for agricultural development
Zambia Agricultural Research Institute	Government	Aims to develop and adopt crop, soil and plant protection technologies and to provide services to farmers

Sources: WorldFish, Concern Worldwide, Catholic Relief Services, People's Participation Service

Conclusion

This literature review provides an overview of the food and nutrition security situation in Zambia, with a focus on the ten AAS communities located in the Barotse floodplain of Western Province. The AAS hub in the Barotse aims to address development challenges caused by increasing variability in flooding patterns and rainfall, while capitalizing on the potential to improve productivity in household livelihood strategies. The unpredictable nature of flooding, which forces seasonal migration among many households, remains a constraint to agricultural productivity and consistent food availability. Other constraints include increased salinity in soils, weeds, pests, predators, and poor infrastructure. Community members also expressed concerns over the lack of crop diversity, diminishing fish supply, and frequency of disease outbreak among livestock. Together, these factors inhibit the potential to diversify household diets and improve the nutritional status of the population.

The Zambian diet consists of a large quantity of energy-dense foods, particularly maize, with little variety in terms of nutrient-rich foods. It therefore lacks the essential nutrients needed for optimal pregnancy and lactation and child growth and development. The poor nutritional diversity found in the Zambian diet is reflected in the high prevalence of stunting among children under five. Increasing the accessibility and consumption of micronutrient-rich foods, particularly of fish, leafy green vegetables and fruits, can fight micronutrient deficiencies and improve food and nutrition security. Other factors, like poor health care infrastructure, a lack of clean water sources and sanitation, and socio-cultural norms that enforce gender inequity, also significantly impact the nutritional status of women and children in the Barotse. These factors must be jointly taken into consideration while designing interventions and a research agenda for the Barotse floodplain.

Pursuing partnerships with other institutions, organizations and social structures may offer opportunities to implement interventions in food and nutrition security in the Barotse. For example, the AAS program's close partnership with the BRE can improve governance, access and sustainable management of the floodplains across seasons. Greater community-based fisheries management can enhance fishing practices to increase supply and productivity. Collaboration with health centers to promote training on nutrition, health, hygiene and family planning may raise awareness and behavior change among households. Opportunities to establish partnerships with relevant stakeholders in the area should therefore be further explored to identify entry points for both research and development.

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