NUTRITION COUNTRY PROFILE
THE REPUBLIC OF ZAMBIA

Source: UN, Cartographic Section.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Food Insecurity and Vulnerability Information and Mapping Systems

Acknowledgments

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Summary

The Republic of Zambia is a landlocked country in South-central Africa with a mild tropical climate. It is sparsely populated compared to some of the neighbouring countries. The population is young and predominantly rural. Zambia is severely affected by the HIV/AIDS pandemic, which compromises social and economic gains the country is striving to attain. Mostly as a result of pandemic, life expectancy at birth has dropped sharply.

Zambia's economy has been traditionally dominated by the copper mining industry. However, following a sharp decline in copper earnings, the contribution of the agricultural sector to GDP has increased. Zambia has a huge agricultural potential, still largely untapped. The majority of the population is engaged in rain-fed subsistence farming. Reduced state support in the 1990s has led to a shift in crop production from maize, the staple food crop, to other crops (cassava and cash crops), but maize is still largely predominant. Livestock production remains far below its potential, notably due to recurrent drought and outbreaks of diseases.

Following nearly two decades of decline, Zambia has experienced uninterrupted economic growth since 1999. The incidence of poverty has decreased since the beginning of the current decade, but poverty remains widespread.

The high incidence of infectious diseases and of nutritional deficiencies, the somewhat declining immunization coverage and the limited access to improved water sources in rural areas are the major factors contributing to high morbidity and mortality among young children. Access to health services remains limited, the lack of material and human resources in the health system further constraining the quality of services. Although some progress has been recorded, infant and under-five mortality rates remain high. The maternal mortality ratio is still very high.

The Zambian diet is mainly composed of cereals, predominantly maize, starchy roots and, to a lesser extent, fruit and vegetables. Cereals provide almost two-thirds of the dietary energy supply. Although other food crops are becoming increasingly important, such as cassava, Zambia's dependence on maize remains very high which contributes to making it vulnerable to climatic shocks. In urban areas food consumption patterns are changing: rice and sweet potatoes are gaining importance. A consistent decline in maize production, inadequate production of alternative staple crops, climatic constraints, and poverty contribute to widespread food insecurity. The dietary energy supply is not sufficient to meet population energy requirements; the prevalence of undernourishment has increased to reach 45% in 2003-2005. Quantitatively insufficient, food supplies also lack diversity and are poor in essential micronutrients.

Young child feeding practices are improving. Breastfeeding is universal. The rate of exclusive breastfeeding, although still insufficient, has increased sharply since the early 2000s. The timely complementary feeding rate is high and complementary feeding is relatively diversified. High morbidity, limited access to health services, poverty and food insecurity are the main determinants of malnutrition in children. Stunting (i.e. chronic malnutrition) affects 39% of children under five years of age. The prevalence of stunting has decreased since the early 2000s but remains high. Undernutrition also affects women of childbearing age. At the same time, the country is undergoing a nutrition transition, particularly evident in urban areas where almost a third of women are overweight or obese.

In the early 1990s, iodine deficiency was a severe public health problem in the country. Since the enforcement of legislation on salt iodization in 1996, the percentage of children with low urinary iodine level has decreased considerably. The most recent estimates of the level of urinary iodine are indicative of more than adequate iodine intake among the population. Thanks especially to the up-scaling of vitamin A supplementation coverage, prevalence of sub-clinical vitamin A deficiency has decreased among women. Nevertheless only about half of mothers receive vitamin A supplements during the post-partum period. Among children, prevalence of sub-clinical vitamin A deficiency is decreasing but is still at a very high level despite the coverage by supplementation of almost two thirds of the children. In recent years, coverage seems to have declined slightly. Supplementation needs to be expanded for both mothers and children. Anemia affects more than half of preschool children and almost a third of non-pregnant women. Iron supplementation coverage among pregnant women is very wide but compliance has not been assessed. Various public health programmes are implemented to reduce the high incidence of malaria and of some parasitic infections which contribute to the high prevalence of anemia.

Although short-term interventions such as supplementation still need to be reinforced, investment in sustainable food-based strategies is urgently needed to combat hunger and micronutrient deficiencies.

Zambia Nutrition Profile - Summary Table				
Basic Indicators				*Year*
Population				
Total population		11.478	million	2005
Rural population		64	%	2005
Population under 15 years of age		45	%	2005
Annual population growth rate		1.88	%	2000-2005
Life expectancy at birth		39	years	2000-2005
Agriculture				
Agricultural area		48	%	2003
Arable and permanent cropland per agricultural inhabitant		0.72	Ha	2003
Level of development				
Human development and poverty				
Human development index		0.407	[0-1]	2004
Proportion of population living with less than 1$ a day (PPP)	***MDG1***	64	%	1990-2003
Proportion of population living below the national poverty line	***MDG1***	64	%	2006
Education				
Net primary enrolment ratio	***MDG2***	94	%	2007
Youth literacy rate (15-24 years)	***MDG2***	70	%	2006
Ratio of girls to boys in primary education	***MDG3***	1.01	girl per 1 boy	2007
Health				
Infant mortality rate	***MDG4***	70	‰	2003-2007
Under-five mortality rate	***MDG4***	119	‰	2003-2007
Maternal mortality ratio (adjusted)	***MDG5***	830	per 100 000 live births	2005
Malaria-related mortality rate in under-fives	***MDG6***	721	per 100 000 deaths in under-fives	2000
Proportion of 1-year-old children immunized against measles	***MDG4***	85	%	2007
Environment				
Sustainable access to an improved water source in rural area	***MDG7***	40	% of population	2004
Nutrition indicators				*Year*
Energy requirements				
Population energy requirements		2056	kcal per capita/day	2000
Food supply				
Dietary Energy Supply (DES)		1905	kcal per capita/day	2000-2002
Prevalence of undernourishment	***MDG1***	45	%	2003-2005
Share of protein in DES		10	%	2000-2002
Share of lipids in DES		14	%	2000-2002
Food diversification index		22	%	2000-2002
Food consumption				
Average energy intake (per capita or per adult)		n.a.		
Percent of energy from protein		n.a.		
Percent of energy from lipids		n.a.		
Infant and young child feeding				
Exclusive breastfeeding rate (<6 months)		61	%	2007
Timely complementary feeding rate (6-9 months)		93	%	2007
Bottle-feeding rate (0-11 months)		3	%	2007
Continued breastfeeding rate at 2 years of age		42	%	2007
Nutritional anthropometry				
Prevalence of stunting in children under 5 years		39	%	2007
Prevalence of wasting in children under 5 years		5	%	2007
Prevalence of underweight in children under 5 years	***MDG1***	19	%	2007
Percentage of women with BMI<18.5 kg/m²		10	%	2007
Micronutrient deficiencies				
Prevalence of goitre in school-age children		30	%	2002
Percentage of households consuming adequately iodized salt		77	%	2001-2002
Prevalence of sub-clinical vitamin A deficiency in preschool children		54	%	2003
Coverage of vitamin A supplementation in children		60	%	2007
Coverage of vitamin A supplementation in mothers		45	%	2007
Prevalence of anemia in non-pregnant women		29	%	2003
Coverage of iron supplementation in mothers		84	%	2007

MDG: Millennium Development Goal; n.a.: not available

TABLE OF CONTENTS

List of tables and figures

List of tables

List of figures

Acronyms	
ACC/SCN	Administrative Committee on Coordination/Sub-Committee on Nutrition
AFASS	Acceptability, feasibility, affordability, safety and sustainability
BFHI	Baby friendly hospital initiative
BMI	Body mass index
CSO	Central Statistical Office
DES	Dietary energy supply
EC	European Commission
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	FAO Statistical databases
FEWSNET	Famine Early Warning Systems Network
FFSSA	Forum for Food Security in Southern Africa.
FHANIS	Food, Health and Nutrition Information System
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
GAIN	Global Alliance for Improved Nutrition
GDP	Gross domestic product
GIEWS	Global Information and Early Warning System
GRZ	Government of the Republic of Zambia
HDI	Human development index
HIV/AIDS	Human immunodeficiency virus/Acquired immunodeficiency syndrome
IDA	Iron deficiency anemia
IDD	Iodine deficiency disorders
IFAD	International Fund for Agricultural Development
ILO	International Labour Office
INACG	International Nutritional Anemia Consultative Group
IPC	International Poverty Centre
IPT	Intermittent preventive treatment
ITN	Insecticide treated net
IUGR	Intra-uterine growth retardation
IYCF	Infant and young child feeding
IZiNCG	International Zinc Nutrition Consultative Group
LBW	Low birth weight
LCMS	Living Conditions Monitoring Survey
MCT	Ministry of Communications and Transport
MICS	Multiple Indicator Cluster Survey
MOH	Ministry of Health
MOST	Micronutrient Operational Strategies and Technologies
MTENR	Ministry of Tourism, Environment and Natural Resources
NDH	National Department of Health
NEWS	National Early Warning System
NFNC	National Food and Nutrition Commission
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
OMCT	World Organisation Against Torture
PMTCT	Prevention of mother to child transmission
PPP	Purchase power parity
SCI	Schistosomiasis Control Initiative
SP	Sulfadoxine-pyrimethamine
STI	Sexually transmitted infection
TB	Tuberculosis
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
UNSTAT	United Nations Statistics Division
USAID	United States Agency for International Development
VAD	Vitamin A deficiency
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization
ZDES	Zambia DHS EdData Survey
ZDHS	Zambia Demographic and Health Survey
ZVAC	Zambia Vulnerability Assessment Committee

Part I: Basic indicators

I.1 Geographic information

The Republic of Zambia, located in South-central Africa, is bounded on the north by the Democratic Republic of Congo and the United Republic of Tanzania, on the east by Malawi, on the south-east by Mozambique, on the south by Zimbabwe, Botswana, and Namibia and on the west by Angola. In the north the country touches Lake Mweru and Lake Tanganyika, and in the south it reaches Lake Kariba on the Zambezi River.

Zambia is a landlocked country covering an area of 752 612 km^2.The country consists of a high plateau which lies mostly between 900 and 1 500 m of elevation. Some areas are a little more elevated in the northern part of the country and along the eastern border (FAO, Forestry Division).

Due to the altitude the climate is milder than the tropical latitude would suggest. There are three distinct seasons in Zambia: the cool dry winter from May to August, a hot dry season during September and October and a warm wet season (rainy season) from November to April (CSO et al., 2003). The average temperature in Lusaka during July, the coldest month of the year, is 16°C; the hottest month, January, has an average temperature of 21°C (FAO, Forestry Division).

Zambia is well endowed with water resources, both ground and surface water (MTENR, 2002). The major rivers are the Zambezi, Kafue, Luangwa and Luapula (CSO et al., 2003). In addition to these rivers, the country also has major lakes such as Tanganyika, Mweru, Kariba, Bangweulu, etc. Other sources of surface water include swamps and flood areas (MTENR, 2002). Annual rainfall ranges from 600 to 900 mm in the south to over 1 250 mm in the north (FAO, Forestry Division). The country is divided into three distinct agro-ecological zones differentiated by the rainfall pattern and soil type (see I.3 Agriculture) (FEWSNET, 2004).

Administratively, the country is divided into nine provinces and 72 districts. Seven out of nine provinces (Central, Eastern, Northern, Luapula, North-Western, Western and Southern) are predominantly rural and only two are predominantly urban, namely Lusaka and Copperbelt provinces (CSO et al., 2003).

I.2 Population

Population indicators

The population of Zambia is estimated at 11.5 million (UNPD, reference period 2005). Nearly half of the population (45%) is under 15 years of age and two-thirds of Zambians are under 25 years of age (UNPD).

In comparison with some of its neighbours, Zambia is relatively scarcely populated and most of the population is concentrated in the central part of the country, close to the urban areas that grew around mines and related industries (IFAD, Rural Poverty Portal). The annual population growth rate has declined from 2.6% in 1990-95 to 1.9% in 2000-2005, mainly as a result of rising adult mortality due to the spread of HIV/AIDS (UNPD; CSO et al., 2003; CSO et al., 2009).

Of the total population, 36% was estimated to live in urban areas in 2005 (UNPD). During the 1960s and 1970s, the production and export of copper led to an expansion of the urban economy. As a result, Zambia experienced high levels of rural to urban migration. Lusaka was, and continues to be, the main destination for rural migrants, closely followed by the Copperbelt province (WB, 2002). During the last two decades, the decline in the economy has gradually reduced the proportion of urban population, from 40% of total population in 1980 to 38% in 1990 and 36% in 2000 (CSO et al., 2003).

The most recent estimate (urban population estimated at 36% in 2005) shows that this decrease has stopped (UNPD).

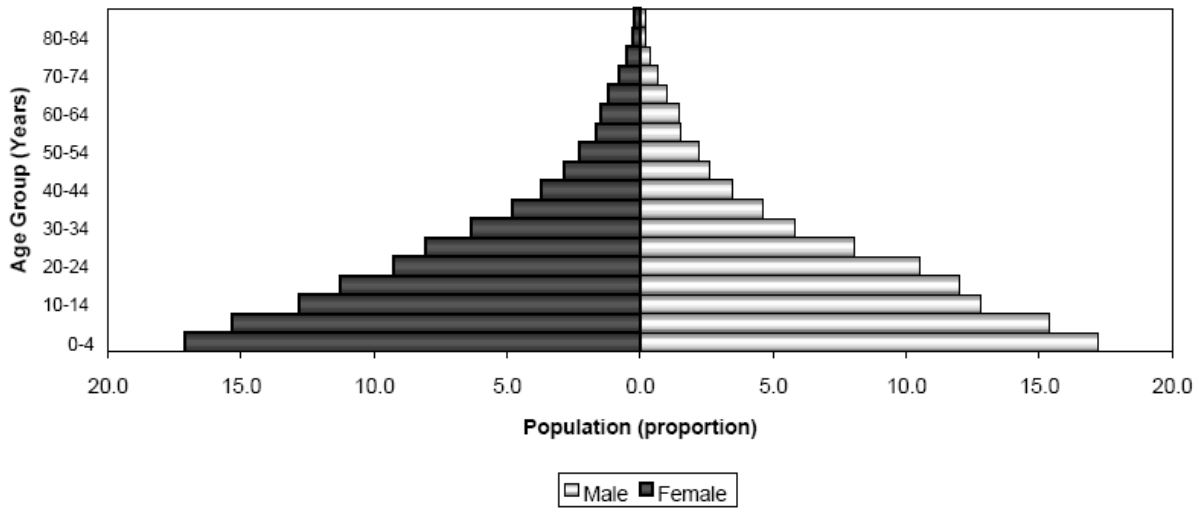
A comparison of the direction of migration between 1998 and 2004 shows that in Zambia there are more rural to rural and urban to urban migrants as opposed to the rural to urban and urban to rural migrants (CSO, 2004). A relatively recent immigration phenomenon is the influx of refugees from neighbouring countries which have experienced or are experiencing conflict (WB, 2002).

Mainly due to the HIV/AIDS pandemic, life expectancy at birth has dropped considerably during the last two decades, from 52 years in 1980-85 to 39 years in 2000-2005 (UNPD).

Table 1: Population indicators

Indicator	Estimate	Unit	Reference period	Source
Total population	11.478	million	2005	UNPD
Annual population growth rate	1.88	%	2000-2005	UNPD
Crude birth rate	41.9	‰	2000-2005	UNPD
Population distribution by age:			2005	UNPD
0-4 years	17	%		
5-14 years	28	%		
15-24 years	21	%		
60 and over	5	%		
Rural population	64	%	2005	UNPD
Agricultural population	67	%	2004	FAO
Population density	15	inhabitants per km^2	2005	UNPD
Median age	17	years	2005	UNPD
Life expectancy at birth	39	years	2000-2005	UNPD
Population sex ratio	99.1	males per 100 female	2005	UNPD
Net migration rate	-1.5	‰	2000-2005	UNPD
Total dependency rate	95	%	2005	UNPD

Population pyramid



Source: CSO, 2000

The population pyramid of Zambia is typical of young population with a high fertility level. In 2001-2002, the total fertility rate was estimated at 5.9 children per woman, a rate that slightly increased in 2007 to reach 6.2 children per woman (CSO et al., 2003; CSO et al., 2009). A deficit of young adult males (20-24 years) is observed in comparison with the proportion of young women, which could be the result of male migration outside the country.

I.3 Agriculture

With a relatively mild climate, abundant water resources and an agricultural area covering 48% of the country's total land area, Zambia has a high agricultural potential (FAO, Faostat – Land use; WB, 2007). However, only 7% of the country's total land area was under cultivation (arable lands and permanent crops) and less than 1% of the total land area was irrigated in 2003 (FAO, Faostat – Land use).

The level of rainfall is the major determinant of crop performance in any given year. The country is divided into three distinct agro-ecological zones differentiated by the rainfall pattern and soil type:

- Agro-ecological zone I covers the valley areas located in the extreme southern and western parts of the country. This is a generally dry area with less than 800 mm annual rainfall and best suitable for production of small grains and livestock rearing. Although maize is unsuitable to this region, it is still grown at the subsistence level. Crop production in this region is mostly for subsistence and households depend on food from outside this region to meet their needs for part of the year.

- Agro-ecological zone II, which covers the central part of Zambia, has an annual rainfall in the range of 800 mm to 1 000 mm and is divided into two sub-regions: region II-a includes the plateau areas of Lusaka, Central, Eastern and Southern Provinces, by far the most productive areas in the country for both food and cash crops. The less productive region II-b covers the Kalahari sand plateau and Zambezi flood plains. It has high potential for cassava and rice production as well as cattle rearing.

- Agro-ecological zone III is a high rainfall area, with amounts exceeding 1 000 mm per year and covers Northern, Luapula, North-Western, Copperbelt and northern parts of Central province. This is a cassava growing and consumption region. Due to the nature of the rainfall pattern, soils tend to be highly acidic, limiting the production potential (FEWSNET, 2004).

The agricultural sector consists predominantly of subsistence farming characterized by low levels of productivity. The subsistence sector is made up of about 430 000 farming households which cultivate about 1–2 Ha for subsistence and occasional marketable surplus. The commercial farming system on the other hand is made up of 250 000 farms, sub-divided into medium and large commercial farmers (WB, 2001). In 2004, the agricultural population was estimated at 67% (FAO, Faostat - Population). Agriculture is the main source of income for the rural population, especially for women, who constitute a high proportion of the rural population and agricultural labour force (ZVAC, SADC/FANR, 2003).

Following a decline in copper earnings (since the mid-1970s), agriculture has become a more important source of economic diversification. In the 1990s, the growth of the agricultural sector accelerated as a result of economic liberalization policies. In addition, the withdrawal of the subsidized credit for maize in 1992 - a credit given to farmers, especially small to medium scale farmers, in order to increase production of maize - caused an important shift in crop production from maize, the staple food crop, to other crops. During the 1990s, the share of maize in cultivated areas and in terms of production declined significantly while production and area planted with high value added crops (cotton, groundnuts, sugar, tobacco) and relatively drought resistant root crops (mainly cassava) increased significantly (WB, 2007; OECD, 2003; FAO/WFP, 2002).

These changes, and mainly the decline in the export earnings of the mining sector in the 1990s, have contributed to an increase in the share of agriculture in the national economy (FAO/WFP, 2002). From 1990 to 2000, agricultural GDP grew at an annual average rate of 4% (WB, 2007). In 2001, the new government set agriculture as a priority sector to promote economic growth. Although the average growth rate of the agriculture sector slowed between 2000 and 2005, mainly due to a series of droughts, the contribution of the agricultural sector to GDP was 22% in 2005, up from about 15-18% in the mid-1990s (OECD, 2003; WB, 2007; WB). Together with the agro-processing industry, the agricultural sector currently accounts for more than 40% of Zambia's GDP (WB, 2007). Between 1990 and 2004, agricultural exports grew on average about 15% a year. Cotton, tobacco and sugar, the three main agricultural exports, have recently shown impressive growth (WB, 2007).

However, agricultural performance remains vulnerable to erratic rainfall patterns because of poor irrigation systems, understaffed agricultural extension systems, lack of access to credit and infrastructural deficiencies (EC, 2004).

Zambia's land tenure is categorized into two main systems: customary and leasehold. Of the total land 94% falls under the customary land tenure system controlled and allocated by traditional authorities which is an additional factor inhibiting the sector's growth potential (OECD, 2003). The government has been working on land reforms aimed at improving the land delivery process.

Land use and irrigation statistics

Table 2: Land use and irrigation

Type of area	Estimate	Unit	Reference period	Source
Total land area	74 339	1000 Ha	2003	FAO
Agricultural area	48	%	2003	FAO
Arable lands & permanent crops	7	%	2003	FAO
Permanent crops	<1	%	2003	FAO
Permanent meadows and pasture	40	%	2003	FAO
Forested land areas	57	%	2005	UNSTAT
Irrigated agricultural land	<1	%	2003	FAO
Arable & permanent cropland in Ha per agricultural inhabitant	0.72	Ha per agricultural inhabitant	2003	FAO

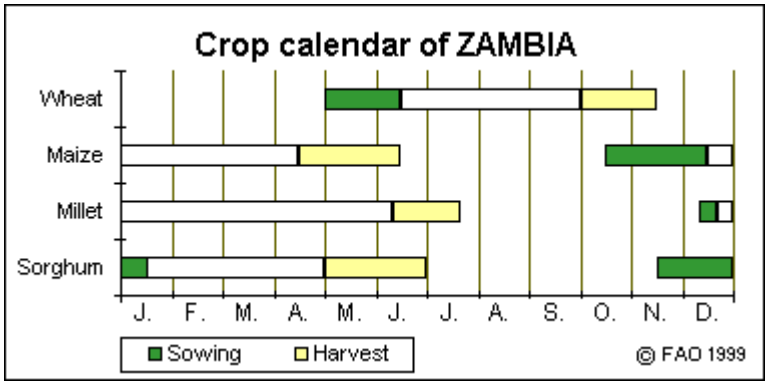
N.B. Percents are calculated on the total land area.

Main crops, agricultural calendar, seasonal food shortage

According to FAO estimates, the five major food and agricultural commodities produced in Zambia are sugar cane, maize, cassava, fresh vegetables and wheat (FAO, Statistics Division). Maize, cassava, fresh vegetables and wheat are mainly for local human consumption. Sugar cane is processed, and sugar is both exported and used for local human consumption (FAO, Faostat).

Zambia's high dependence on rain fed maize production as a staple crop (by the smallholder sector) greatly contributes to the country's vulnerability. Maize production requires fertile soils and good rainfall, but in reality it is frequently grown under sub-optimal conditions and in drought-prone areas, risking failure in years of poor rainfall (EC, 2004). Other crops grown in the country are cassava, wheat, sorghum, millet and sweet potatoes (FAO, Faostat). Millet is produced in Northern and Western provinces. Northern, Luapula and Western provinces are the largest producers of cassava, accounting for almost 90% of the country's total production of this staple (FAO/WFP, 2005). It is however important to note that despite frequent acknowledgements of the superiority of sorghum over maize as a grain crop for the drier areas of Zambia, there has been a slow but steady decline in the area planted with sorghum over the last 20 years.

In addition there is an abundance of horticultural crops both indigenous (wild spinach, African egg plant, Cleome gynandra (cat whiskers)) and non-native crops such as green beans, peas, carrots, green pepper, cabbage, lettuce, rape, baby corn.



Source: FAO/GIEWS.

Stocks of staple food are often depleted before the next harvest, usually by November. This food shortage period lasts until the next harvest in March-April, therefore Zambians may experience 4-5 months of food shortage.

Livestock production and fishery

Livestock is an important agricultural sub-sector, generating 15% of agricultural GDP in 2004 (Thurlow et al., 2008). The main livestock produced are cattle, goats, pigs and poultry (GRZ, 2006). The largest livestock group is poultry birds, which are bred throughout the country and are very important to food security at household level. Oxen and donkeys are used as draft animals in agriculture. Livestock production plays a very important role in the livelihoods in Southern, Eastern, Western and in parts of Central provinces. It is the main source of cash income in some districts. From a nutrition perspective livestock production, particularly ruminants, is important in supplying milk and dairy products.

However, livestock production remains far below its potential due to several factors that include outbreaks of diseases (foot-and-mouth disease, "corridor" disease, etc.) and recurrent drought (GRZ, 2006). In the past, the government ensured that preventive measures were taken to protect livestock from diseases but these services were withdrawn in the 1990s and diseases then spread throughout large parts of the country (IFAD Rural Poverty Portal). Moreover, the recurrence of drought has often depleted animal grazing resources and drinking water, thus affecting the productivity of the livestock sector (GRZ, 2006). The number of livestock has declined by as much as 50% in some areas since 2002, negatively affecting household income and agricultural production, particularly in Southern and Western provinces (FAO/WFP, 2005). Since 2003, the government has launched the livestock restocking program to restore breeding stock and increase animal draught power, and the animal disease control programme to preserve the current population of livestock (FAO/WFP, 2005).

Fish catch from the major rivers has lately diminished as a consequence of over-exploitation and poor fishing methods. Furthermore, the fisheries sub-sector, which has great potential to support livelihoods, is constrained by poor storage and preservation facilities, unreliable transport services and poor infrastructure (GRZ, 2006).

Table 3: Livestock and fishery statistics

Livestock production and fishery	Estimate	Unit	Reference period	Source
Cattle	2 600 000	number of heads	2005	FAO
Sheep and goats	1 420 000	number of heads	2005	FAO
Poultry birds	30 000	thousands	2005	FAO
Fish catch and aquaculture	70 125	tons	2004	FAO

I.4 Economy

Zambia is a small open economy, dependent on the export of a primary commodity, copper, the price of which has been unstable and declining until recently (Chisala et al., 2006). At present the country is undergoing a difficult period of transition from a state-led to a market-based economy.

At independence in 1964, Zambia inherited a strong economy based on copper mining and was one of the most prosperous nations in Africa. The government followed a fairly liberal policy, primarily focused on improving infrastructure and services, before switching to a more restrictive policy environment in the early 1970s; consumption was then heavily subsidised, prices were controlled and agricultural marketing and credit were provided by state agencies. In the mid-1970s, the economy deteriorated due to a sharp decline in copper prices, which was worsened by the oil shock. The country's failure to make positive policy changes in response to the economic decline aggravated the situation (GRZ, 2006; UNDP, 2007; GRZ, 2002).

Between 1983 and 1985, the government attempted a Structural Adjustment Programme (SAP). The programme failed to alter the economic structure and to address poverty. The SAP was abandoned in

1987 after massive food riots in opposition to the removal of food subsidies and was replaced by a local programme. With the change of government in 1991, a more radical reform agenda was adopted and the Economic Recovery Programme (ERP) was launched by the new government (GRZ, 2006; UNDP, 2007; GRZ, 2002). Liberalization of trade and prices, removal of subsidies on consumption, privatisation and reduction of government expenditure were the guiding national policy principles for the new government (Nsemukila, 2001). The immediate impact of these reforms, however, appeared to sink the economy further into crisis. During the 1990s, economic growth was sluggish while poverty continued its upward trend. Over the period 1990-99, the average annual growth rate was only 1%, below the mean rate for sub-Saharan Africa of 2.4% (GRZ, 2002).

In recent years, new policies were applied based on the Poverty Reduction Strategy Paper (2002-2004) and the Transitional National Development Plan (2002-2005). Consequently the performance of the economy improved, boosted by increased production in mining and agriculture, increased activity in construction and service sectors. The external debt burden was reduced. Following nearly two decades of generally declining output, Zambia has experienced uninterrupted economic growth since 1999, and since 2003 the GDP annual growth rate has been over 5% (UNDP, 2007).

Zambia is a hinterland, centrally located in the African continent, and is a transit point with a number of corridors to the sea. The country is rehabilitating its transport infrastructure, mainly trade routes from seaports (MCT, 2006).

Table 4: Basic economic indicators

Indicator	Estimate	Unit	Reference period	Source
Gross Domestic Product per capita	877	PPP US $	2003	UNDP
GDP annual growth	5	%	2005	WB
Gross National Income per capita	490	$	2005	WB
Industry as % of GDP	30	%	2005	WB
Agriculture as % of GDP	22	%	2005	WB
Services as % of GDP	48	%	2005	WB
Paved roads as % of total roads	22	%	2001	WB
Internet users	20	per 10 000 people	2004	WB
Total debt service as % of GDP	9	%	2003	UNDP
Military public expenditure	1	% of GDP	2000	WB

Main non-food exports are metals, copper and cobalt being dominant. Others non-food exports include primary agricultural products such as cotton lint, cotton yarn, flowers and tobacco, and also gemstones, copper wire and electric cables. Major non-food imports are equipment for the mining sector, petroleum and fertilizers (UNDP, 2006a).

I.5 Social indicators

Health indicators

The people of Zambia continue to suffer from a huge burden of preventable diseases. The major causes of death among children under 5 years of age are neonatal causes (23% of deaths in 2000-2003), pneumonia (22%) malaria (19%), diarrhoeal diseases (17%) and HIV/AIDS (16%) (WHO, 2006). HIV/AIDS is increasingly contributing to morbidity and mortality in children (GRZ, 2006). Furthermore, malnutrition and micronutrient deficiencies are important contributing factors to overall morbidity and mortality among young children.

Under-five mortality rate remained high throughout the 1990s: 191‰ in the period 1987-91 and 197‰ in the period 1992-96. Subsequently, it decreased noticeably to 168‰ in the period 1997-2001, then to 119‰ in the period 2003-2007. A similar though less marked pattern was observed for infant mortality: the rate which was estimated at 107‰ in the period 1987-91 and 109‰ in the period 1992-96 decreased to 95‰ in the period 1997-2001 and then to 70‰ in the period 2003-2007 (CSO et al., 2003; CSO et al., 2009). Although declining, infant and under-five mortality rates remain unacceptably high.

Vaccination coverage is not improving: in 1992, 67% of children aged 12-23 months had received all vaccines (BCG, measles, three doses of DPT and polio vaccine) and 78% in 1996; this proportion dropped to 70% in 2001-2002 and to 68% in 2007 (CSO et al., 2003; CSO et al., 2009).

Maternal mortality ratio also remains unacceptably high. In 2005, the adjusted maternal mortality ratio was estimated at 830 per 100 000 live births, but was as high as 1 300 per 100 000 live births in some remote areas (UNICEF, 2009; WHO, 2005). According to Demographic and Health Survey data, the reported maternal mortality ratio was estimated at 649 maternal deaths per 100 000 live births in the period 1990-96, 729 in the period 1995-2001 and 591 in the period 2001-2007 (CSO et al., 2003; CSO et al., 2009). The different data sources are based on slightly different methods and small numbers of reported maternal deaths; therefore it is difficult to assess the trends in maternal mortality with statistical confidence (CSO et al., 2009). Nevertheless it is clear that maternal mortality is high and that there is no significant and consistent downward trend. Limited access to health facilities, poor quality of pre- and post-natal care by insufficiently trained hospital staff, home delivery and lack of medical supplies are among the main factors contributing to the high maternal mortality (WHO, 2005).

Malaria and acute respiratory infections (including pneumonia) remain major public health problems in Zambia (GRZ, 2006). In the whole population, malaria incidence rates tripled over the last three decades, from 121‰ in 1976 to 396‰ in 2003 due predominantly to chloroquine resistance, reduced vector control, limited access to quality care, poor clinical care management and HIV/AIDS (GRZ, 2006). In 2005, it was estimated that malaria caused about 15% of maternal deaths and 40% of infant deaths (WHO, 2005).

Zambia is among the seven countries most affected by HIV/AIDS in sub-Saharan Africa, with a prevalence of 17% in the age group 15-49 years in 2005 (UNDP, 2007; UNSTAT). The HIV/AIDS epidemic is a major obstacle seriously restricting the development of the country. The incidence of illnesses associated with HIV/AIDS has increased. Tuberculosis has increased steeply, from a reported number of new cases of 92 to 112 per 100 000 people in the 1970s, to an estimated incidence of 707 per 100 000 people in 2004 (WHO, 2005; UNSTAT).

Although health reforms have been implemented in Zambia since 1992, progress has been marginal. The lack of financial and human resources has been a major obstacle to improvement of the country's health care system (WHO, 2005; Chisala et al., 2006).

Table 5: Health indicators

Indicator	Estimate	Unit	Reference period	Source
Mortality				
Infant mortality rate	70	‰	2003-2007	ZDHS
Under-five mortality rate	119	‰	2003-2007	ZDHS
Maternal mortality ratio :				
reported	591	per 100 000 live births	2001-2007	ZDHS
adjusted	830	per 100 000 live births	2005	UNICEF
Morbidity				
Malaria-related mortality rate in under-fives	721	per 100 000 deaths in under-fives	2000	UNSTAT
Percentage of under-fives sleeping under an insecticide-treated bed net	29	%	2007	ZDHS
Percentage of under-fives with diarrhoea in the last 2 weeks	15	%	2007	ZDHS
Percentage of under-fives with diarrhoea in the last 2 weeks who receive oral rehydration therapy (ORT)*	74	%	2007	ZDHS
Percentage of under-fives with acute respiratory infections in the last 2 weeks	5	%	2007	ZDHS
Tuberculosis prevalence	707	per 100 000 people	2004	UNSTAT
HIV/AIDS				
Prevalence in adults (15-49 years)	17	%	2005	UNSTAT
Percentage of women (15-24) who know that a person can protect herself from HIV infection by consistent condom use	71	%	2003	UNSTAT
Immunization				
Percent of children aged 12-23 months immunized against tuberculosis	92	%	2007	ZDHS
Percent of children aged 12-23 months fully immunized against DPT (DPT3 vaccine)	80	%	2007	ZDHS
Percent of children aged 12-23 months immunized against measles	85	%	2007	ZDHS
Percent of pregnant women immunized against tetanus	30	%	2007	ZDHS

** ORT includes solution prepared from oral rehydration salt (ORS), pre-packaged ORS packet, recommended home fluids, or increased fluids.*

Water and sanitation

The government's long term vision for the water and sanitation sector is to ensure availability of water resources in order to enhance national socio-economic development for improved quality of life (GRZ, 2006).

Until the 1990s, Zambia's central government was responsible for the delivery of urban water services, except in the Copperbelt. Water tariffs were subsidised. Because of the economic decline of the 1970s and 1980s, however, the government could not sustain the necessary investments and maintenance and commercialisation of water started in the early 1990s. It led to tariff increases of up to seven-fold

in real terms. According to International Poverty Centre estimates, water has become unaffordable for about 40–60% of urban dwellers in Lusaka and the Copperbelt, where most of the urban population lives. It is unsurprising, therefore, that the proportion of the population with access to safe water (national access) declined from 72% in 1992 to 57% in 2002. The quality of access has also deteriorated: about 25% of users lost their piped supply and became dependent on public taps, wells, boreholes, rivers, ponds and lakes (IPC, 2008).

As shown in Table 6, the large disparity in sustainable access to an improved water source between rural and urban areas is a serious concern. The rural population is at high risk of diarrhoeal and other water borne diseases. Disparities are less marked concerning access to improved sanitation: in 2004, in urban areas, 59% of the population had adequate sanitation facilities versus 52% in rural areas (UNICEF, 2007).

Table 6: Access to safe water and sanitation

Indicator	Estimate	Unit	Reference period	Source
Sustainable access to an improved water source				
Urban	90	% of population	2004	UNICEF
Rural	40	% of population	2004	UNICEF
Access to improved sanitation				
Combined urban/rural	55	% of population	2004	UNICEF

Access to health services

In the early 1990s, the quality of health service delivery deteriorated due mainly to increased demand for health services arising from rapid population growth and a declining economy. The government was unable to provide adequate medical supplies, equipment and infrastructure for optimal basic health care services. At the same time the epidemiological situation of the country was also compounded by the development of the HIV/AIDS pandemic. In an effort to improve the quality and provision of health care delivery, the government introduced health reforms in 1992. Since the onset of the reforms, the focus of the government has been on primary health care (GRZ, 2006). Currently, many factors still adversely affect the performance of the health sector. These include a critical shortage of essential health workers, inadequate drugs and medical supplies (recently, more than 50% of essential drugs were out of stock), poor state of health facilities and equipment, inadequate funding and poor physical access, especially in rural areas (MOH, 2005a ; GRZ, 2006).

The health sector is experiencing a human resources crisis, which is undermining capacity to provide basic health care services to the people. The current health sector human resource capacity is estimated at about 50% of staff needs. The extent of the crisis is such that many rural health centres have no staff or are staffed by untrained personnel (MOH, 2005a).

The percentage of births assisted by skilled health personnel is low and has not improved substantially since the 90's : it decreased slightly from 51% in 1992 to 47% in 1996 and then to 43% in 2001-2002 (Gaisie et al., 1993; CSO et al., 1997; CSO et al., 2003). In 2007, still less than half (47%) of births were attended by skilled health personnel. This lack of assistance contributes to high levels of maternal and neonatal mortality, especially in rural areas where only 21% of births were attended by a medically trained provider (83% in urban areas) (CSO, 2009).

In terms of access to health facilities, it is estimated that 99% of the urban households are within a 5 km-distance from a health facility while in rural areas this proportion is 50% (WHO, 2005).

Some measures have been taken to improve access to health care. In early 2006 government abolished user fees for primary health care services with the aim of allowing those unable to pay to access health services (GRZ, 2006).

Table 7: Access to health services

Indicator	Estimate	Unit	Reference period	Source
Health personnel: number of physicians	7	per 100 000 people	1990-2004	UNDP
Percent of births attended by skilled health personnel	47	%	2007	ZDHS
Public expenditure on health	3.1	% of GDP	2002	UNDP
Percentage of children under-fives with fever (in the last two weeks) receiving anti-malarial drugs	58	%	2007	ZDHS

Education

In 2002, the government has declared free education for all for grades 1-7 (primary education) (CSO et al., 2003). This measure, coupled with expansion of school facilities, curriculum development, provision of education materials, provision of bursaries for vulnerable children and orphans (from primary up to tertiary level), and improvement of equity and gender balance, had a positive impact on school enrolment (OECD, 2006). The net primary enrolment ratio has increased for both male and female pupils from 68% in 1999 to 94% in 2007, but disparities remain between male and female rates of progression and completion of education (UNESCO, 2008). In 2005, 89% of boys but only 66% of girls completed a full course of primary education (UNESCO, UIS Statistics in brief, Zambia).

During the Poverty Reduction Strategy Paper/Transitional National Development Plan period (from 2002 to 2004-2005), in order to ensure quality education, priority was given to deployment of better trained teachers and provision of learning materials (particularly textbooks). There was also a marked increase in the number of teachers attending in-service training during this period. Despite these interventions, the gains in the quality of education have not matched the levels achieved in terms of access (GRZ, 2006).

Numerous challenges still remain at the basic education level. The major ones include improving the quality, relevance and delivery of the curriculum; provision of more teaching and learning materials to match the increased enrolment, increasing access to vulnerable children, improving the retention and completion rates for girls, and increasing school places for the 7- year old age group (GRZ, 2006).

Adult and youth literacy rates have virtually not increased since 1990 (65% and 66% in 1990, respectively) (UNESCO, UIS Statistics in brief, Zambia). Gender disparities in adult literacy rate are also marked (UNESCO, 2006).

The School Health and Nutrition (SHN) pilots in Eastern province have proved effective, and are now being scaled out to other provinces (GRZ, 2006).

Table 8: Education

Indicator	Estimate	Unit	Reference period	Source
Adult literacy rate (aged 15 and over)	68	%	2006	UNESCO
Adult literacy rate : females as % of males	78	%	2006	UNESCO
Youth literacy rate (15-24 years)	70	%	2006	UNESCO
Net primary enrolment ratio	94	%	2007	UNESCO
Grade 5 completion rate	89	%	2006-2007	UNESCO
Ratio of girls to boys in primary education*	1.01	number of girls per 1 boy	2007	UNESCO
Public expenditure on education	2.0	% of GDP	2005	UNESCO

** as relates to the Net primary enrolment ratio*

Level of development, poverty

Zambia was once classified as a middle-income country (IFAD Rural Poverty Portal). In the mid-70s, following a sharp decline in copper prices, the economy deteriorated and Zambia's slide into poverty began. Then the country faced more than two decades of economic decline or stagnation, very limited development of infrastructure and services, and rising poverty in the 1990s. Notwithstanding recent economic performances, these conditions have turned Zambia into a "least developed" and extremely poor country (UN, 2008a; IFAD Rural Poverty Portal).

Zambia's Human Development Index (HDI), which takes into account socio-economic and health indicators, has declined during the last two decades. Despite the onset of economic problems, Zambia's HDI had increased between 1975 and 1985 from 0.470 to 0.486 but a sharp reversal occurred thereafter and by 1995 the HDI was 0.425 (UNDP, 2006b). Between 1995 and 2004, the HDI continued to fall, from 0.425 to 0.407 respectively. As a result, Zambia ranked 165th out of 177 countries in 2004 (UNDP, 2006b).

This long-term decline in Zambia's HDI is mainly due to a decrease in per capita income and life expectancy at birth (UNDP, 2003). Between 1975 and 1995 Zambia's per capita income fell by 60% due to the crisis of the metal mining sector and, despite the positive growth in the last ten years, it remains very low (FAO/WFP, 2005). Life expectancy at birth has decreased considerably from 51 years in 1970-75 to 39 years in 2000-2005 (UNPD).

The Living Conditions Monitoring Surveys and Priority Surveys conducted from 1991 to 2006 have shown that the incidence of poverty (proportion of the population living below the national poverty line), after increasing during the 1990s, has been decreasing since the early 2000s. During the 1990s, the incidence of poverty increased from 70% in 1991 to 74% in 1993 and 73% in 1998. It then decreased to 68% in 2004 and 64% in 2006. Over the whole period considered (1991-2006), the gains in poverty reduction can be noticed in rural areas, where the incidence of poverty decreased from 88% in 1991 to 78% in 2006. In contrast, the incidence of poverty in urban areas increased from 49% in 1991 to 53% in 2006. The Western province consistently emerged as the poorest province. In fact, the incidence of poverty in the Western province remained the same (84%) in 1991 and 2006 (CSO, Living Conditions). Poverty in Zambia remains widespread and severe, especially in rural areas.

Social safety nets for the poor are extensively discussed in the Fifth National Development Plan (2006 -2010). However, the proposals are only intents but what remains to be seen is the implementation. Currently the Public Welfare system in the Ministry of Community Development and Social Services is under funded as well as the other social sectors (GRZ, 2006).

Table 9: Human development and poverty

Indicator	Estimate	Unit	Reference period	Source
Human development index (HDI)	0.407	value between 0-1	2004	UNDP
Proportion of population living with less than 1$ a day (PPP)	64	%	1990-2003	UNDP
Population living below the national poverty line	64	%	2006	LCMS
Human poverty index (HPI-1)	46	%	2005	UNDP

Other social indicators

Overall, labour force participation rates in Zambia are high for both men and women. Out of 6.2 million people aged 15 years and above, 80% were economically active in 2005. In terms of gender, 86% of the male population and 74% of the female population were economically active. In terms of residence, 87% of the rural population was economically active versus 67% of urban population. There were more males than females that were economically active in both rural and urban areas (CSO, 2005)

The Zambian society is characterised by patriarchal cultural values, large disparities in status between women and men and a virtual absence of women in positions of power in the socio-economic and

political spheres (OMCT, 2002). Women do not have an equal opportunity to access land in comparison with men. Women's access to, control over and ownership of land are constrained by customary law. Unequal access to land for women continues to be a major hindrance to their effective participation in national development (Keller, 2000).

Concerning children, HIV/AIDS related deaths have resulted in soaring numbers of orphans in Zambia. In 2003, 1.1 million children age 0-17 years were orphans, 630 000 of those children being orphaned by AIDS (UNICEF, 2006). Orphans are forced to work for their survival and that of their families, guardians or siblings. Zambia is said to have one of the highest numbers of orphans and street children in the world and the number of street children is growing, especially in urban areas. In 1998, it was estimated that 75 000 boys and girls were street children, two-thirds of them aged 6 to 14 years (ILO, 2005).

Child labour has been a problem for decades in Zambia, but the HIV/AIDS epidemic has exacerbated the situation. In 1998, it was estimated that 595 000 Zambian boys and girls age 5-17 years were working. Among these, around 90% were engaged in agricultural activities. The number of girl and boy child workers is almost equal (ILO, 2005). New estimates from the 2005-2006 Labour Force Survey show that the number of working children is more than 900 000 (UN, 2008b).

Table 10: Other social indicators

Indicator	Estimate	Unit	Reference period	Source
Gender related development index (GDI)	0.383	value between 0-1	2005	UNDP
Share of women in wage employment in the non-agricultural sector	34	%	2000	UNSTAT
Ratification of ILO Convention 182 on The Worst Forms of Child Labour	ratified		2001	ILO

Part II: Food and nutrition situation

II.1 Qualitative aspects of the diet and food security

Food consumption patterns

The main staple foods of Zambia are maize and cassava.

Maize is consumed by over 90% of the population. It is milled into meal with a desired degree of fineness and consumed as a porridge (Zulu and Kaputo, 2001). *Nshima*, the most common dish, is a thick porridge of maize meal; other more liquid porridges are mainly given to children as complementary foods. *Nshima* is usually eaten with different types of relishes made with vegetables (such as rape, cabbage, pumpkin leaves, etc.), pulses (e.g. beans), meat (poultry, goat meat, beef, pork) or fish. Some beverages, alcoholic and non alcoholic, are also made from maize.

Maize is consumed widely in all regions of the country in both rural and urban areas, while other staples such as cassava, millet and sorghum are consumed in certain regions (Cassava in Luapula, Northern and North-Western provinces, millet and sorghum in the Northern province) and sweet potatoes and rice are common in urban areas.

According to the Central Statistical Office (CSO), 51% of the households can only afford 2 meals per day, 11% afford 1 meal per day and only 36% can afford 3 meals per day (CSO, 2004).

Zambia is experiencing a nutrition transition. Urbanization and globalization are responsible for changes in dietary patterns, as consumption is shifting from fresh and minimally processed traditional foods to imported processed foods acquired from supermarkets (Reddy, 1996-2001). These dietary changes could contribute to overweight and obesity, particularly in urban settings. The main features are a rise in lipid intake, a decline in consumption of complex carbohydrates, excess energy intake, consumption of micronutrient-poor foods, reduced physical activity, and excess salt intake.

Food security situation[1]

Consistent reduction in the production of maize, inadequate availability of alternative staple crops, climatic constraints, and poverty are among the main factors contributing to widespread food insecurity in Zambia. In 2001, it was estimated that 67% of Zambian households were food insecure (UNDP, 2003).

Due to high dependence on maize, its availability has a great effect on household and national food security. In the 1970s and 1980s, the Zambian government was highly interventionist in the agricultural sector, encouraging maize production, guaranteeing the purchase of maize at fixed prices from producers and subsidizing maize for urban consumers. In the 1990s, government intervention was drastically reduced. As a result, maize production has been consistently falling during the last decade, especially after 1996: maize production decreased by 57% between 1996 and 2001 (FAO, Faostat). In 2001, the area under maize cultivation showed a decline of more than 40% from 1988 (UNDP, 2003). In 1996, the Agricultural Sector Investment Programme (ASIP) was launched with the aim of increasing the production of alternative staples (sorghum, rice, wheat, and especially cassava) and achieving national food security despite the drastic reduction in the production of maize (OECD, 2003; WB, 2007). However in 2000-2002 maize still accounted for about 86% of the domestic cereals supply, revealing that Zambia had failed to detach itself from its high dependence on this cereal

[1] Food security is defined as "A situation that exists 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 productive and reproductive life" (FIVIMS). Food insecurity may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household or individual level. Food insecurity may be chronic, temporary, seasonal or transitory.

(UNDP, 2003; FAO, Faostat). Moreover, the increased production of alternative staples had not matched the food gap created by the reduction in maize production at national level (UNDP, 2003; FAO; Faostat).

Weather-related risks have a major impact on agricultural production. Zambia is subject to two major climatic constraints: recurrent droughts and floods, droughts being the more frequent of the two (WFP, 2008). Since 1990, about 3 out of every 5 years have essentially been drought years and the country has faced major drought periods in 1991-92, 1995-96 and 2002 (WB, 2007; UNDP, 2003). Since most of Zambia's farmers are smallholders dependent on rainfed agriculture, they remain highly vulnerable to erratic climatic conditions (WFP, 2008). Overall, instability of agricultural production due to climatic constraints remains a serious threat to national food security in Zambia, as patently demonstrated by the drought that hit the country in 2002 and that determined a food shortage of 635 000 t and exposed 2.3 million people to the risk of famine (OECD, 2003). During the 2006-2007 agricultural season, floods in the north and prolonged drought in the south resulted in a steep drop in maize yields in the affected areas. In the 2007-2008 crop season, extensive flooding has again caused a steep drop in maize yields in most districts, mainly in the Southern, Central, Western and North-Western provinces (WFP, 2008). Overall, due to erratic rainfall, Zambia's maize crop fails to satisfy national consumption requirements, on average, in one year out of three (Dorosh et al., 2007).

These repeated climatic shocks are compounded by the general rise on food prices in domestic and international markets (WFP, 2008). Moreover, the physical dispersion of smallholders throughout the country, the poor state of transport infrastructure, the impossibility to use many rural roads during the rainy season, escalating transport costs due to the steep rise in fuel prices and the lack of direct port access all make the marketing of agricultural products difficult and expensive (WB, 2007; WFP, 2008). These factors further limit economic access to food. In rural areas, drought, insufficient production capacity or market access, and lack of income diversification are the main causes of food insecurity (Nsemukila, 2001). In urban areas, where about 40% of the population reside, the economic deterioration of the past two decades has tended to hit the urban poor particularly hard, given their dependence on wage employment for income, on the market for food supplies, and on the government food subsidy programmes which was completely discontinued after 1992 (Nsemukila, 2001). Moreover, the HIV/AIDS pandemic is compounding the food insecurity situation by reducing the ability of households to earn income and to produce foods, and by increasing expenditures on health services.

The situation is further worsened by structural causes of food insecurity such as lack of agricultural service support, pests, a weak business orientation of Zambian smallholders, incomplete implementation of public policies and limited capacity to manage risks (WB, 2007; ODI, no date).

The main coping mechanisms used in the face of food insecurity include reducing expenditure on health and education, selling livestock and assets, reducing food consumption and eating wild foods (Del Ninno et al., 2005).

Surveys of dietary diversity

No data on dietary diversity are currently available.

II.2 National food supply data

Supply of major food groups

In 2000-2002, the three major food groups in terms of supply for human consumption were cereals, starchy roots and fruit and vegetables (FAO, Faostat).

Table 11: Trends in per capita supply of major food groups (in g/day)

Major food groups	Supply for human consumption in g/day					
	1965-67	1972-74	1979-81	1986-88	1993-95	2000-2002
Cereals (excl. beer)	476	485	506	456	414	396
Other*	327	320	151	110	102	84
Starchy roots	141	128	155	162	229	239
Fruit and vegetables	123	117	118	115	100	92
Milk and eggs	47	61	46	33	35	30
Meat and offals	46	47	40	33	35	35
Sweeteners	21	41	47	44	40	38
Fish	38	38	24	22	23	19
Pulses, nuts, oilcrops	25	29	11	7	10	12
Vegetable oils	6	7	9	6	5	10
Animal fats	1	2	1	1	1	1

Source: FAO, Faostat
** Largely composed of alcoholic beverages*

The main food group in terms of supply for human consumption is cereals, which is comprised mostly of maize, the major food staple. Maize is mainly locally produced but also imported. Other less important cereals are wheat, rice, millet and sorghum. Wheat is both locally produced and imported, while rice is mostly imported. Millet and sorghum are locally produced. The per capita supply of cereals has declined regularly since 1979-81 (FAO, Faostat). This decrease can be attributed to several factors including droughts (especially in 1991-92, 1995-96 and 2002) and floods, but also reduced government price incentives for maize cultivation in the 1990s, which caused a large decrease in maize domestic production.

The per capita supply of starchy roots, which is comprised mainly of cassava (locally produced), has been increasing since the 1980s (FAO, Faostat). This upward trend can be attributed to a large increase in cassava production due to promotion of high yielding and early maturing varieties by FAO, government and NGOs during the last two decades. Following changes in the agricultural sector during the 1990s, major shifts in production patterns have taken place which have boosted cassava production (WB, 2007). Cassava requires no purchased inputs and good yields can be obtained in a wide variety of soil and water conditions (including drought) (WB, 2007). Cassava is contributing significantly to food availability in traditional cassava consuming areas, while sorghum, millet and rice productions continue to provide only marginal contributions to overall cereal availability (FEWSNET, 2005). From a nutritional point of view, this trend does not improve dietary quality because cassava has a low protein content and does not provide any micronutrients.

The per capita supply of fruit and vegetables, a food group rich in micronutrients which is comprised mainly of tomatoes, onions, oranges and mandarines, is low and has steadily decreased since 1965-67. The downward trend in supply could partly be attributed to low production levels mainly due to lack of promotional efforts.

The per capita supply of food of animal origin, which is a vital source of protein and micronutrients, has decreased since the 1970s. The per capita supply of milk and eggs, already initially low, halved between 1972-74 and 2000-2002. After the mid-1970s, the per capita supply of meat and offals has declined regularly until 1986-88 and has remained at a low and steady level since this period, mainly because of diseases that affected cattle (corridor or East Coast Fever) and pigs (African swine fever). Fish catch has decreased in all the major fishing areas. This has been attributed to inadequate fishing methods such as using mosquito nets, explosives and poisoning. As a result, in 2000-2002 the per capita supply of fish, already initially low, was reduced by half compared to that of 1965-67 (FAO, Faostat).

The per capita supply of pulses, nuts and oilcrops has also dropped considerably during the 40-year period considered (FAO, Faostat).

Trade liberalization, which began in the early 1990s, has increased importation of vegetable oils, mainly palm oil and soyabean oil, from countries such as Kenya, Uganda and from Asia. This has led

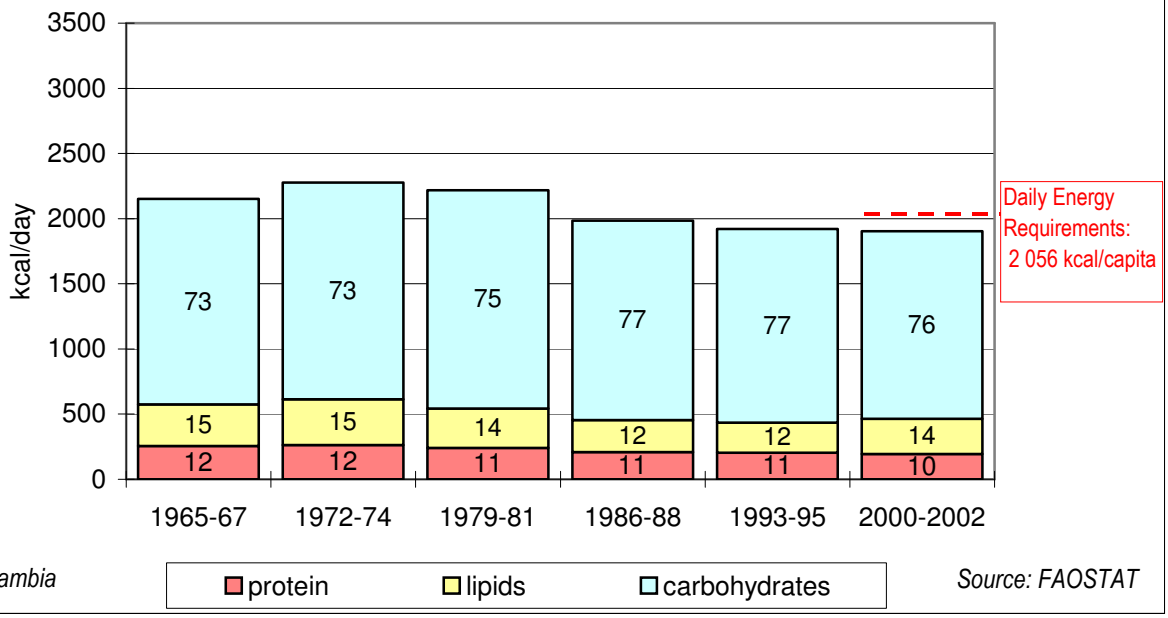
to a significant increase in the supply of vegetable oils during the last period (2000-2002). However, despite this increase, the per capita supply of vegetable oils remains low (FAO, Faostat).

Although a sharp decline has been observed, the per capita supply of the food group "other", which is principally composed of alcoholic beverages, remains relatively high. The per capita supply of alcoholic beverages, mainly locally produced fermented beverages, reached 83 g/per capita/day in 2000-2002 (versus 326 g/per capita/day in 1965-67) (FAO, Faostat).

Dietary energy supply, distribution by macronutrient and diversity of the food supply

- Figure 1: Dietary energy supply (DES), trends and distribution by macronutrient

Figure 1: Trends in DES per capita and percentages from protein, lipids & carbohydrates



In 2000-2002, the dietary energy supply (DES) was 1 905 kcal per capita/day which was insufficient to meet the population energy requirements estimated at 2 056 kcal per capita/day[2] (FAO, Faostat; FAO, 2004).

According to "The State of Food Insecurity in the World" (2008), the prevalence of undernourishment was very high, estimated at 45% in 2003-2005. Furthermore, the prevalence has increased since 1995-97 when 41% of the population was undernourished (and 40% in 1990-92) (FAO, 2008).

The current per capita DES has been stagnating after a period of decline since the 1980s, largely due to the decline in per capita cereal supply. The DES stabilized when the supply of starchy roots reached a level compensating, at least partly, for the decline of cereals.

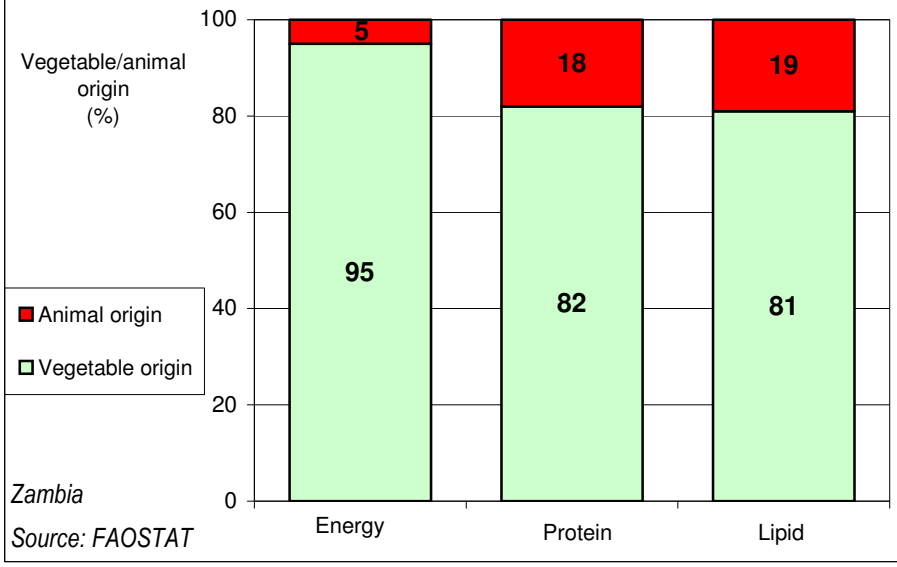
As a result of the importance of cereals and starchy roots in the food supply, carbohydrates are the major contributor to the DES. The share of lipids in the DES has been lower than the recommended level of 15-30% since 1979-81 (WHO/FAO, 2003). The slight increase in the share of energy from lipids during the last period, still insufficient to meet recommendations, is due to an increase in the supply of vegetable oils. The share of energy from protein has regularly decreased and in 2000-2002 was 10%, at the lower limit of recommendations (10-15%) (WHO/FAO, 2003). This trend is mainly due to the increased supply of cassava, a food with very low protein content, and the concomitant decline in the supply of cereals and foods of animal origin.

[2] Energy requirements are for a healthy and active lifestyle. Software default values attribute to 90 % of the urban adult population a light Physical Activity Level (PAL=1.55) and greater than light activity to the remaining 10% (PAL=1.85), and to 50% of the rural adult population a light activity (PAL=1.65) and greater than light physical activity (PAL=1.95) to the other 50%. (FAO, 2004).

Vegetable/animal origin of macronutrients

- Figure 2: Vegetable/animal origin of energy, protein and lipid supplies

Figure 2: Origin of energy, protein and lipid supplies, 2000-2002

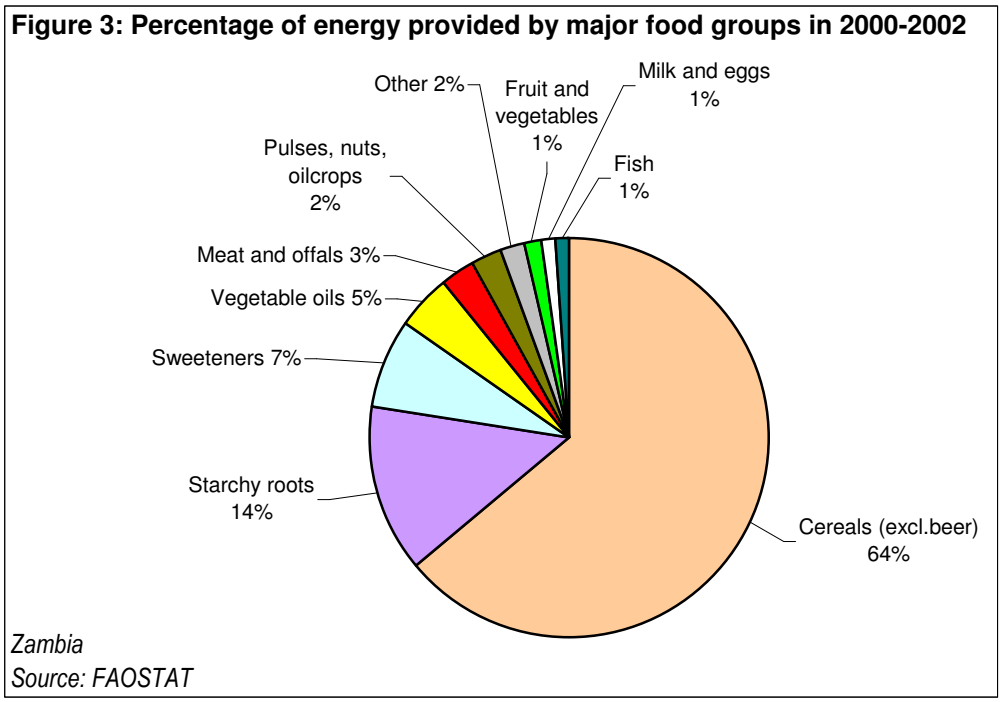


The diet of Zambia is mostly plant-based. In 2000-2002, foods of vegetable origin provided 95% of energy supply and more than 80% of protein and lipid supplies (FAO, Faostat). The low supply of foods of animal origin entails a low intake and bioavailability of micronutrients in the diet, especially vitamin A, iron and calcium.

Dietary energy supply by food group

- Figure 3: Dietary energy supply by food group

Figure 3: Percentage of energy provided by major food groups in 2000-2002



Cereals represent the main source of energy, providing 64% of the DES in 2000-2002. Cereals and starchy roots together represent 78% of the DES. Sweeteners show a relatively large contribution to DES (7%). Animal products such as meat and offals, milk and eggs, and fish provide only 5% of total

DES. Only 1% of the DES is provided by fruit and vegetables (FAO, Faostat). The low contribution of fruit and vegetables and of foods of animal origin to the DES implies that the diet is poor in several essential micronutrients.

Table 12: Share of the main food groups in the dietary energy supply (DES), trends

Major food groups	% of DES					
	1965-67	1972-74	1979-81	1986-88	1993-95	2000-2002
Cereals (excl. beer)	68	65	70	71	66	64
Starchy roots	7	6	8	9	13	14
Sweeteners	4	6	8	8	7	7
Other	6	5	3	2	2	2
Pulses, nuts, oilcrops	5	6	2	1	2	2
Vegetable oils	2	3	4	3	2	5
Meat and offals	4	3	3	3	3	3
Fruit and vegetables	2	2	2	2	2	1
Milk and eggs	1	2	2	1	1	1
Fish	1	1	1	1	1	1
Animal fats	0	1	0	0	0	0

Source: FAO, Faostat

Since the early 1990s, the share of cereals in the DES has slightly declined while that of starchy roots has increased. However, the share of cereals in the DES is still largely predominant (64% in 2000-2002). The contribution of meat and offals, milk and eggs and fish in the DES has remained fairly stable since 1965-67. The share of pulses, nuts, oilcrops in the DES has dropped since 1972-74 while the share of vegetable oils has fluctuated, showing an increase in the last period. The contribution of fruit and vegetables has stagnated at a low level during the entire period (FAO, Faostat).

The food diversification index, i.e. the percentage of DES from food groups other than cereals and starchy roots, is very low, estimated at 22% in 2000-2002. In 1965-67, the index was 25%, which indicates that the diet has become less diversified since then (FAO, Faostat).

Overall the supply data show that, at national level, the diet of Zambia is not only insufficient to fulfil energy needs but is also insufficient in terms of protein availability and quality, and highly deficient in micronutrients.

Food imports and exports expressed as percentage of DES

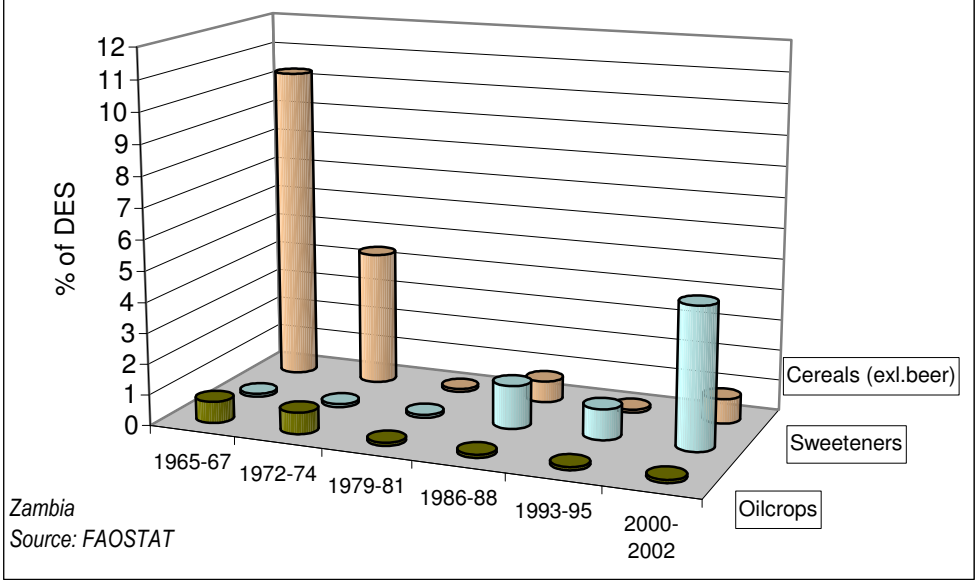
The major food exports of Zambia, in terms of percentage of DES, are cereals (mainly maize), sweeteners (sugar raw equivalent) and oilcrops (soyabeans and cotton seeds) (FAO, Faostat).

Cereals exports, dominated by maize, have steadily decreased since the 1970s. Maize exports dropped from 50 000 t in 1965 to 17 000 t in 2000 (FAO, Faostat). This decrease is mainly attributed to the poor rainfall observed for successive years between 1965 and 2002 in almost all parts of the country (FEWSNET, 2005). Shifts in production patterns following new government policies implemented during the 1990s have also played a role (WB, 2007). The increase in sweeteners (sugar raw equivalent) exports in 2000-2002 is attributed to government efforts in promoting diversification towards high value added crops.

- Figure 4: Major food exports as percentage of Dietary Energy Supply (DES), trends

Note that only the 3 most important food groups are shown.

Figure 4: Food exports expressed as percentage of DES, trends.



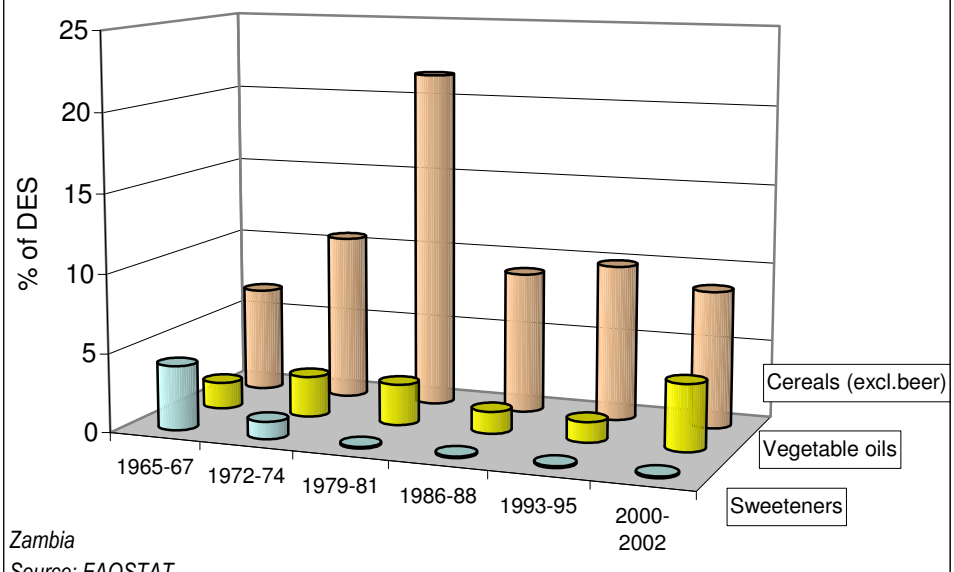
Zambia
Source: FAOSTAT

Zambia's agricultural sector is dominated by subsistence farming and, in most years, total annual agricultural production does not meet the national food needs. Therefore the country is heavily dependent on food imports, especially for cereals (mainly wheat and maize). The country also imports vegetable oils such as palm and soyabean oil (FAO, Faostat).

- Figure 5: Major food imports as percentage of Dietary Energy Supply (DES), trends

Note that only the 3 most important food groups are shown.

Figure 5: Food imports expressed as percentage of DES, trends.



Zambia
Source: FAOSTAT

In good harvest years, Zambia produces a maize surplus, enabling the country to export maize. In bad years, when droughts, reduced planting area, and/or input supply bottlenecks constrict output, Zambia imports maize (Dorosh et al., 2007). The large increase in cereal imports in 1979-81 was due to drought that caused a major shortfall of maize production in 1979-80.

Food aid

In 2006, Zambia received a total food aid of 110 121 t, of which 90 906 t were cereals (mainly coarse grains, wheat and wheat flour) and 19 215 t non-cereals (mainly pulses). This food aid was mainly delivered as emergency food aid[3] (WFP, 2007). Cereal food aid represented approximately 6% of the national cereal supply for human consumption (FAO, Faostat; WFP, 2007).

Food aid deliveries in Zambia have increased substantially since 2003, mainly due to the impact of successive droughts, flooding, loss of assets and livelihoods, compounded by the HIV/AIDS epidemic (WFP, 2007; WFP, 2004). The World Food Programme distributions target the most vulnerable, including the elderly, orphans and vulnerable children, pregnant and nursing mothers, underweight children under the age of five years, and people living with HIV/AIDS and their households, as well as refugees from Angola and the Democratic Republic of Congo (WFP, no date).

Under the previous WFP Zambia Country Programme (2002-2006), through the Assistance to Basic Education component, over 102 000 children were fed each year under a pilot programme at 250 schools in food-insecure and educationally disadvantaged districts in Southern, Western and Eastern provinces. At the request of the government, there is a proposal to expand the activity to an annual average of 210 000 primary school-children at 400 schools in ten districts in Southern, Western and Eastern provinces (WFP, 2006). WFP school-feeding activities currently provide daily meals to over 126 000 schoolchildren (WFP, no date). Girls and orphans also benefit from take-home rations (WFP, 2006).

II.3 Food consumption

National level surveys

Since the national survey of 1970-71 conducted by FAO Zambia through the National Food and Nutrition Commission, no nationwide food consumption survey has been carried out.

II.4 Infant and young child feeding practices

During the last fifteen-year period, three national surveys have been conducted that document infant and young child feeding practices in Zambia: the 2007 ZDHS, the 2001-2002 ZDHS and the 1996 ZDHS (CSO et al., 2009; CSO et al., 2003; CSO et al., 1997).

Breastfeeding is a universal practice in Zambia. According to the 2007 ZDHS, almost all (98%) children under five years of age have been breastfed for some period of time (CSO et al., 2009); similar levels were reported in 2001-2002 and 1996 (CSO et al., 2003; CSO et al., 1997). Differences by background characteristics of gender, residence, province or mother's education were small (CSO et al., 2009).

Among last-born children ever breastfed, 57% were put to the breast within one hour of birth (early initiation of breastfeeding) and 93% within one day after delivery (CSO et al., 2009). These proportions are slightly higher than the 2001-2002 levels, when 51% of children were put to the breast within one hour of birth and 90% were breastfed within one day of birth (CSO et al., 2003).

[3] *Emergency* food aid is destined to victims of natural or man-made disasters; *Project* food aid aims at supporting specific poverty-alleviation and disaster-prevention activities; *Programme* food aid is usually supplied as a resource transfer for balance of payments or budgetary support activities. Unlike most of the food aid provided for project or emergency purposes, it is not targeted to specific beneficiary groups. It is sold on the open market, and provided either as a grant, or as a loan.

Early initiation of breastfeeding varied according to background characteristics. Children living in urban areas were slightly more likely to be breastfed within the recommended one hour of birth (59%) than their counterparts living in rural areas (56%). With respect to provinces, the proportion of infants whose mother practiced early initiation was lowest in North-Western province (43%) and highest in Southern province (66%). Children born to mothers with secondary or higher education were slightly more likely to be breastfed within one hour of birth than those born to mothers with no education or with primary education (CSO et al., 2009).

Prelacteal feeding which may inhibit breastfeeding and expose the newborn infant to pathogens is not widely practiced in Zambia: in 2007, 9% of last-born children (born in the five years preceding the survey) had received a prelacteal feed (i.e. something other than breastmilk during the first three days of life) (CSO et al., 2009). This proportion has dropped markedly since 2001-2002 when 26% of children were receiving prelacteal feeding (CSO et al., 2003).

The median duration of breastfeeding among children under three years was 20 months in 2007, a one-month decrease from 2001-2002 estimates (CSO et al., 2009; CSO et al., 2003).

Table 13: Initiation and duration of breastfeeding

Survey name/date (Reference)	Background characteristics	Sample size (all children under five years)	Percentage of children under five years ever breastfed	Number of last-born children (under five years) ever breastfed	Among last-born children ever breastfed, percentage breastfed within one hour of birth	Among last-born ever breastfed, percentage breastfed within 24 hours of birth[1]	Number of children under three years	Median duration of breastfeeding in children under three years (in months)
Zambia Demographic and Health Survey 2007 (CSO et al., 2009)	**Total**	6435	97.6	4056	56.5	93.1	n.a.	20.3
	Sex							
	M	3204	97.4	2027	55.9	92.7	n.a.	20.1
	F	3231	97.8	2028	57.0	93.5	n.a.	20.4
	Residence							
	Urban	1883	97.0	1310	58.7	94.1	n.a.	18.8
	Rural	4553	97.8	2745	55.5	92.6	n.a.	20.8
	Province							
	Central	632	98.4	401	56.2	94.4	n.a.	19.6
	Copperbelt	880	97.3	591	49.0	92.4	n.a.	19.9
	Eastern	1022	98.3	620	64.7	94.4	n.a.	21.0
	Luapula	577	98.5	342	62.7	92.5	n.a.	19.7
	Lusaka	736	96.2	502	59.8	94.7	n.a.	18.6
	Northern	1042	97.8	619	52.1	95.1	n.a.	21.3
	North-Western	402	98.3	241	42.6	88.1	n.a.	20.7
	Southern	683	97.6	434	66.1	97.0	n.a.	20.2
	Western	461	95.6	307	48.4	82.1	n.a.	21.5
	Mother's education							
	No education	870	97.4	531	57.0	92.1	n.a.	21.6
	Primary	4089	97.8	2487	55.3	93.3	n.a.	20.3
	Secondary or higher	1477	97.0	1039	59.1	93.1	n.a.	n.a.

[1] Includes children who started breastfeeding within one hour of birth
n.a.: not available

In line with the WHO/UNICEF global strategy on infant and young child feeding practices, Zambian women are encouraged to exclusively breastfeed their child for the first six months of life. Appropriate complementary feeding should start from the age of six months with continued breastfeeding up to two years or beyond.

In 2007, 61% of children under 6 months of age were exclusively breastfed. The rate of exclusive breastfeeding dropped sharply with age, from 86% at age 0-1 month to 35% at age 4-5 months (CSO

et al., 2009). Thanks to efforts made by government and collaborating partners in the promotion of breastfeeding, there has been substantial improvement in compliance with the WHO/UNICEF recommendations, as evidenced by the increase in the rate of exclusive breastfeeding from 40% in 2001-2002 to 61% in 2007 (CSO et al., 2009; CSO et al., 2003).

WHO recommends the introduction of complementary foods around the age of 6 months because by that age breastmilk alone is no longer sufficient to support optimal growth of infants. In Zambia, according to the 2007 ZDHS, as many as 93% of children aged 6-9 months were given complementary food; as a matter of fact the rate of timely complementary feeding has increased since 2001-2002 (87%) (CSO et al., 2009; CSO et al., 2003).

In 2007, more than 90% of children were breastfed for at least one year and 42% were still breastfed at 2 years of age (CSO et al., 2009). Continued breastfeeding rate at 1 year and 2 years has been declining since 2001-2002 (97% and 58% respectively in 2001-2002).

Bottle-feeding is discouraged in Zambia even for HIV-positive mothers who choose to use infant formula as their feeding option because bottles are often a source of pathogens due to inadequate cleaning. Bottle-feeding is not a common practice in Zambia: according to the 2007 ZDHS, the bottle-feeding rate was only 3% among infants aged 0-11 months, a proportion similar to that observed in 2001-2002 (CSO et al., 2009; CSO et al., 2003).

Table 14: Type of infant and young child feeding

Survey name/date (Reference)	**Type of feeding in the 24 hours preceding the survey**		
	Indicator by age	Sample size	Percentage of children
Zambia Demographic and Health Survey 2007 (CSO et al., 2009)	**Exclusive breastfeeding rate**		
	0-1 month	201	86.0
	2-3 months	206	64.7
	4-5 months	226	35.0
	<4 months	406	75.3
	<6 months	632	60.9
	Timely complementary feeding rate		
	6-9 months	435	92.9
	Bottle-feeding rate		
	0-11 months	1289	3.3
	Continued breastfeeding rate		
	12-15 months (1 year)	422	93.8
	20-23 months (2 years)	395	41.7

In Zambia, the most common complementary foods are made from cereals (mainly liquid porridge of maize meal) and from fruit and vegetables. Complementary foods are relatively diversified; in particular, a large proportion of children are given fruit and vegetables rich in vitamin A and meat/fish/poultry/eggs, which are vital sources of protein, vitamin A and iron. However, the consumption of animal milk and dairy products, which are also important sources of essential micronutrients, is not widespread even in the older age group.

Moreover, it is worth noting that the percentage of children receiving foods of animal origin (and particularly meat/fish/poultry/eggs) has increased considerably since 2001-2002 (CSO et al., 2003; CSO et al., 2009).

Table 15: Consumption of complementary foods by breastfeeding status and age

Survey name/date (Reference)	Age (months)	Breast-feeding status*	Number of children	Foods consumed by children in the 24 hours preceding the survey						
				Percent of children having consumed the following foods						
				Infant formula	Other milk	Dairy products (cheese, yogurt, other milk products)	Food made from pulses and nuts	Meat/ fish/ poultry/ eggs	Foods with oil/ fat/butter	Fruit and vegetables rich in vit. A
Zambia Demographic and Health Survey 2007 (CSO et al., 2009)	**6-11**	**BF**	623	3.9	12.1	4.8	32.0	52.7	29.7	53.2
	12-23	**BF**	884	0.9	10.8	5.0	46.4	67.1	34.7	77.7
	24-35	**BF+NBF**	757	2.1	13.6	5.8	43.9	71.7	41.5	80.0

* Breastfed children (BF) or non breastfed (NBF) children or breastfed and non breastfed taken together

In conclusion, some young child feeding practices, such as exclusive breastfeeding up to six months of age and diversity of complementary feeding, have improved substantially. However, more efforts are needed, especially regarding early initiation of breastfeeding and continued breastfeeding up to 2 years of age. Inadequate infant and young child feeding practices are immediate causes of malnutrition, morbidity and mortality among young children.

Following the launch of the Baby Friendly Hospital Initiative (BFHI) by UNICEF and WHO in 1991-1992, Zambia adopted the BFHI principles in 1992 and implemented the initiative in a number of health facilities. The initiative led to the designation of 47 facilities as "Baby friendly" by 2002. The BFHI - and the "Ten steps to successful breastfeeding" which is part of the BFHI - were seen as a key strategy for transforming health facility practices to be more supportive of recommended feeding practices, in particular exclusive breastfeeding for the first six months and continued breastfeeding up to two years or beyond with safe and adequate complementary feeding (NFNC, 2006).

In 2002, Zambia adopted the World Health Assembly resolutions that call on governments to invest in Infant and Young Child Feeding (IYCF) practices. These resolutions included the development and adoption of the global strategy on IYCF by all member states and agencies. Zambia has since finalized its Infant and Young Child Feeding Operational Strategy for promoting optimal infant and young child feeding: in addition to the previously described measures, it includes the implementation and monitoring of the International Code of Marketing of Breastmilk Substitutes and the rights of working women to maternity protection (MOH, 2006a). IYCF aspects have also been incorporated into policies and protocols of the National Food and Nutrition Policy, the National HIV/AIDS/STI/TB Policy 2005, the Prevention of Mother To Child Transmission (PMTCT) National Protocol Guidelines (Integrated prevention of Mother to Child Transmission of HIV 2006), PMTCT Training Manuals for Health Workers and Nutrition Care Guidelines for People living with HIV/AIDS (A Manual for Health Care Providers) (MOH, 2006a).

The spread of HIV/AIDS has created another challenge for breastfeeding practices as in some cases early introduction of breastmilk substitutes has resulted from fear of transmitting the virus from the mother to child (CSO et al., 2003). Zambia adopted the UNICEF/UNAIDS/WHO/UNFPA guidelines on issues that need to be considered in relation to infant and young child feeding in the context of HIV/AIDS (WHO, 2003). Guidelines recommend the two feeding alternatives for HIV-positive mothers: exclusive breastfeeding or exclusive replacement feeding (i.e. the baby is given alternative feeds only such as formula and no breastmilk). For each HIV-positive pregnant woman, the Acceptability, Feasibility, Affordability, Safety and Sustainability criteria (AFASS) should be assessed and the woman should be assisted to make the feeding choice that would be most appropriate for her individual situation. For HIV-positive women who do not meet all the AFASS criteria, the health and child survival benefits of exclusive breastfeeding should be emphasised (MOH/NDH, 2008). Given that the majority of pregnant women do not know their HIV status, and that using infant formula may lead to diarrhoea and malnutrition if incorrectly used, policies that support exclusive breastfeeding and prevent the aggressive marketing of breastmilk substitutes (BFHI, International Code of Marketing of Breastmilk Substitutes, etc.) should be enforced (NFNC, 2004). In 2006, the government, through the Ministry of Health, enacted a legislation to regulate the marketing of breastmilk substitutes (MOH, 2006a).

II.5 Nutritional anthropometry

Low birth weight (less than 2500g)

According to the 2007 ZDHS, among children born in the five years preceding the survey for whom the information was available, 9% of neonates had a low birth weight (less than 2 500 g). However, birth weight information was reported for only 48% of the births, presumably due to the large proportion of births taking place at home (52% in 2007). Babies born in urban areas and/or of mothers with higher education were much more likely to be weighed at birth (CSO et al., 2009). As a consequence of the low proportion of babies weighed at birth and lack of representativeness of the recorded birth weights, the prevalence of low birth weight could be under-estimated.

It is not possible to establish reliable trends for the prevalence of low birth weight as the percentage of recorded birth weights increased between the consecutive ZDHS.

According to mothers' own assessment of their child's size at birth, 2% of neonates were considered to be very small and 10% were considered smaller than average in 2007 (CSO et al., 2009).

Low birth weight (LBW) results from preterm birth and/or intra-uterine growth retardation (IUGR), the major attributable causes of IUGR including the mother's low weight gain, low body mass index (BMI), short stature and malaria. LBW is closely associated with neonatal mortality and morbidity, inhibited growth and cognitive development, and chronic diseases later in life (UNICEF and WHO, 2004; WHO, 2002).

Anthropometry of preschool children

Malnutrition has long been recognized as a serious public health problem in Zambia.

During the last fifteen-year period, three national surveys document the prevalence of malnutrition among preschool children: the 2007 ZDHS, the 2001-2002 ZDHS and the 1996 ZDHS (CSO et al., 2009; CSO et al., 2003; CSO et al., 1997).

According to the most recent ZDHS conducted between April and October 2007, the prevalence of stunting among children under five years of age was 39%, the prevalence of wasting was 5% and that of underweight was estimated at 19% (CSO et al., 2009).

According to the threshold defined by WHO, the reported prevalence of stunting places the country at a high level of chronic malnutrition (WHO, 1995). Chronic malnutrition, as seen in Zambia, indicates long-term exposure of children to inadequate nutrition and/or recurrent illness and is notably associated with increasing chronic food insecurity, limited access to health care, and high poverty levels (GRZ, 2006).

At national level, overall 39% of children under five were stunted and 16% were severely stunted (Table 16). As is typical, the prevalence of stunting increased rapidly with age. At age 0-6 months, 12% of the children were stunted, probably as a consequence of intrauterine growth retardation and/or prematurity. Prevalence increased during the first year of life and peaked at 49% in the age group 12-23 months. After 2 years of age, the prevalence of stunting remained very high (> 40%) (CSO et al., 2009). Inadequate infant and young child feeding practices, coupled with high rates of infectious diseases and inadequate access to health care, are the principal proximate causes of the deterioration of the nutritional status after 6 months of age.

The prevalence of stunting was significantly higher among children living in rural areas (42%) when compared to those living in urban areas (33%). Regional variations in prevalence were substantial: prevalence was highest in Luapula (50%), and lowest in the Southern province (30%) (CSO et al., 2009).

Mother's education appears to be linked to nutritional status of children, although the magnitude of this effect is not very large : the prevalence of stunting was 38% among children of mothers with no education and 32% among children of mothers with secondary or higher education (CSO et al., 2009).

This relation should not be interpreted as a direct effect of mothers' education on stunting, as the relationship is confounded by a higher socio-economic status of educated mothers.

In 2007, the prevalence of wasting was 5% and 1% of children were severely wasted (CSO et al., 2009). Acute malnutrition (wasting) reflects the nutritional situation at the time of the survey and hence can be strongly influenced by the period during which data collection took place. Data collection of ZDHS 2007 occurred between April and November (2007), outside the period of food shortage, which generally extends from November to March-April.

According to WHO criteria, the prevalence of wasting places the country at a moderate level of acute malnutrition (WHO, 1995).

The prevalence of wasting was higher in the age group 6-23 months when compared with older children (CSO et al., 2009). This distribution according to age is typical of children's adjustment to the introduction of complementary feeding and exposure to infections. The prevalence of wasting was the same in rural (5%) and urban areas (4%). Differentials among provinces were substantial: prevalence was particularly high in the Western (9%) and North-Western (8%) provinces (CSO et al., 2009).

In 2007, the prevalence of overweight among preschool children was estimated at 5%. This prevalence was similar in both urban and rural areas (CSO et al., 2009).

Comparison of the three national surveys of 1996, 2001-2002 and 2007 shows that the prevalence of stunting increased from 42% in 1996 to 47% in 2001-2002 and then decreased to 39% in 2007. In urban areas, prevalence of stunting decreased by 4 percentage points between 2001-2002 and 2007. In rural areas, prevalence decreased by 10 percentage points over the same period. It is not possible to establish reliable trends for the prevalence of wasting, as the consecutive surveys were not carried out during the same period of the year (CSO et al., 2009; CSO et al., 2003; CSO et al., 1997).

Zambia is experiencing a situation of food insecurity, widespread poverty, poor access to quality nutrition and health care services, and a high disease burden exacerbated by the HIV/AIDS pandemic. All these factors contribute, directly or indirectly, to the high prevalence of chronic malnutrition among preschool children in Zambia. Trends in the prevalence of stunting are encouraging. Nevertheless, extra efforts in addressing nutritional problems in the country are still needed. While during episodes of severe food shortage, such as that which followed the 2002 drought, the population received immediate attention, chronic malnutrition on the contrary is a hidden emergency that is hindering the economic and human development of the country.

Table 16: Anthropometry of preschool children

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Zambia Demographic and Health Survey 2007 (Apr. 2007 - Oct. 2007) (CSO et al., 2009)	**Total**	0-4.99	M/F	5581	15.8	39.2	0.9	4.7	2.9	19.3	5.2
	Sex										
		0-4.99	M	2770	17.3	41.4	0.9	5.1	3.2	20.8	4.7
		0-4.99	F	2812	14.4	37.0	0.9	4.4	2.7	17.8	5.7
	Age										
		0-0.49	M/F	484	2.0	11.7	0.9	4.0	0.3	2.0	15.9
		0.5-0.99	M/F	585	7.0	24.1	1.3	8.2	2.3	15.1	11.2
		1-1.99	M/F	1191	21.4	48.9	0.8	7.0	4.4	27.6	4.6
		2-2.99	M/F	1136	17.4	40.7	1.2	4.7	4.1	22.0	2.7
		3-3.99	M/F	1097	16.5	43.0	0.5	2.3	1.7	17.8	2.4
		4-4.99	M/F	1088	18.1	43.5	0.8	3.1	2.8	18.7	3.3
	Residence										
	Urban	0-4.99	M/F	1594	12.2	33.1	0.7	3.8	2.4	16.5	5.1
	Rural	0-4.99	M/F	3988	17.3	41.7	1.0	5.1	3.1	20.4	5.2
	Province										
	Central	0-4.99	M/F	535	19.0	45.7	0.9	4.8	1.5	20.0	6.9
	Copperbelt	0-4.99	M/F	761	16.0	37.3	0.2	2.6	1.7	19.2	3.4
	Eastern	0-4.99	M/F	857	17.8	44.1	0.4	3.9	2.1	17.1	7.6
	Luapula	0-4.99	M/F	489	26.8	50.4	1.6	5.0	3.5	21.8	9.5
	Lusaka	0-4.99	M/F	622	9.6	31.4	0.1	2.4	2.7	13.7	5.4
	Northern	0-4.99	M/F	916	15.4	42.3	1.2	6.3	4.3	22.2	4.2
	North-Western	0-4.99	M/F	370	15.4	38.8	1.1	7.7	5.9	26.6	3.0
	Southern	0-4.99	M/F	615	12.0	29.8	1.1	4.2	3.5	17.1	3.3
	Western	0-4.99	M/F	417	10.5	30.7	2.4	8.5	2.1	18.6	2.9
	Mother's education										
	No education	0-4.99	M/F	723	17.0	37.7	1.0	6.3	4.6	23.5	5.2
	Primary	0-4.99	M/F	3333	17.8	42.2	0.9	4.8	3.2	20.1	5.4
	Secondary or higher	0-4.99	M/F	1191	10.4	31.5	0.9	4.1	1.6	14.1	5.2

* Category <-2 Z-scores includes <-3 Z-scores
Data based on NCHS/CDC/WHO Child Growth reference (WHO, 1983)

Table 16: Anthropometry of preschool children (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Zambia Demographic and Health Survey 2001-2002 (Nov. 2001-May 2002) (CSO et al., 2003)	**Total**	0-4.99	M/F	5784	22.2	46.8	1.1	5.0	7.1	28.1	n.a.
	Sex										
		0-4.99	M	2898	22.9	47.9	1.4	5.7	7.4	28.3	n.a.
		0-4.99	F	2886	21.5	45.6	0.9	4.3	6.8	27.9	n.a.
	Age										
		0-0.49	M/F	563	1.5	8.5	0.7	3.7	0.2	2.8	n.a.
		0.5-0.99	M/F	589	11.6	31.6	2.1	8.8	8.6	25.8	n.a.
		1-1.99	M/F	1291	26.5	55.6	1.8	9.0	11.4	39.5	n.a.
		2-2.99	M/F	1179	27.4	54.4	1.2	3.9	9.6	34.0	n.a.
		3-3.99	M/F	1062	26.2	51.9	0.7	2.4	4.8	27.2	n.a.
		4-4.99	M/F	1099	23.8	51.1	0.5	2.6	4.4	23.7	n.a.
	Residence										
	Urban	0-4.99	M/F	1813	14.8	36.8	1.0	5.1	5.0	23.4	n.a.
	Rural	0-4.99	M/F	3971	25.5	51.3	1.2	5.0	8.1	30.3	n.a.
	Province										
	Central	0-4.99	M/F	450	19.0	45.9	0.7	4.2	6.5	26.6	n.a.
	Copperbelt	0-4.99	M/F	921	19.1	39.9	1.4	6.5	6.5	29.0	n.a.
	Eastern	0-4.99	M/F	732	29.7	59.4	1.3	5.2	9.9	32.1	n.a.
	Luapula	0-4.99	M/F	542	29.0	57.6	0.6	3.8	10.3	33.0	n.a.
	Lusaka	0-4.99	M/F	710	12.8	35.6	1.3	5.1	4.2	21.7	n.a.
	Northern	0-4.99	M/F	861	33.5	54.8	2.0	7.6	10.4	33.8	n.a.
	North-Western	0-4.99	M/F	340	20.3	44.8	0.2	2.8	6.0	27.1	n.a.
	Southern	0-4.99	M/F	702	17.7	40.2	0.8	3.9	4.4	23.6	n.a.
	Western	0-4.99	M/F	525	14.1	42.6	0.8	2.5	4.2	23.7	n.a.
	Mother's education										
	No education	0-4.99	M/F	786	26.8	53.5	1.2	5.3	10.4	32.9	n.a.
	Primary	0-4.99	M/F	3441	23.7	49.0	1.2	5.0	7.3	28.7	n.a.
	Secondary or higher	0-4.99	M/F	1204	14.2	35.3	0.9	4.8	4.6	23.2	n.a.

* Category <-2 Z-scores includes <-3 Z-scores. Data based on NCHS/CDC/WHO Child Growth reference (WHO, 1983)
n.a.: not available

Table 16: Anthropometry of preschool children (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	< -3 Z-scores	< -2 Z-scores*	> +2 Z-scores
Zambia Demographic and Health Survey 1996 (July 1996 - Jan. 1997) (CSO et al., 1997)	**Total**	0-4.99	M/F	5443	17.5	42.4	0.6	4.2	5.3	23.5	n.a.
	Sex										
		0-4.99	M	2665	18.1	43.1	1.0	5.0	6.1	24.5	n.a.
		0-4.99	F	2778	17.0	41.7	0.3	3.3	4.6	22.5	n.a.
	Age										
		0-0.49	M/F	597	1.5	10.4	0.7	2.3	0.5	3.7	n.a.
		0.5-0.99	M/F	618	7.1	24.4	1.5	7.3	6.7	22.9	n.a.
		1-1.99	M/F	1257	20.2	47.7	1.0	8.8	9.1	34.7	n.a.
		2-2.99	M/F	1116	23.5	52.3	0.4	2.3	6.2	27.6	n.a.
		3-3.99	M/F	963	22.1	50.4	0.2	1.5	4.2	21.4	n.a.
		4-4.99	M/F	892	19.5	47.4	0.3	1.9	2.3	18.2	n.a.
	Residence										
	Urban	0-4.99	M/F	2159	10.1	32.7	0.5	3.1	2.7	16.5	n.a.
	Rural	0-4.99	M/F	3284	22.4	48.7	0.8	4.8	7.0	28.0	n.a.
	Province										
	Central	0-4.99	M/F	458	12.6	38.1	1.3	6.1	4.8	19.9	n.a.
	Copperbelt	0-4.99	M/F	1051	9.3	31.4	0.6	4.3	2.8	17.2	n.a.
	Eastern	0-4.99	M/F	866	22.7	48.1	0.4	2.7	5.6	26.0	n.a.
	Luapula	0-4.99	M/F	498	30.5	57.7	1.3	6.5	7.6	32.7	n.a.
	Lusaka	0-4.99	M/F	786	8.6	30.2	0.3	3.0	2.9	15.5	n.a.
	Northern	0-4.99	M/F	671	29.6	57.3	0.8	4.8	10.4	31.5	n.a.
	North-Western	0-4.99	M/F	224	19.3	47.4	0.7	2.3	4.8	27.1	n.a.
	Southern	0-4.99	M/F	564	13.6	39.5	0.2	3.5	4.5	21.1	n.a.
	Western	0-4.99	M/F	326	19.5	44.9	0.6	5.3	6.8	32.1	n.a.
	Mother's education										
	No education	0-4.99	M/F	757	23.1	50.1	0.8	5.9	7.1	30.9	n.a.
	Primary	0-4.99	M/F	3472	19.3	44.7	0.7	4.2	6.0	24.8	n.a.
	Secondary or higher	0-4.99	M/F	1212	9.2	30.9	0.3	2.8	2.5	14.9	n.a.

* Category <-2 Z-scores includes <-3 Z-scores. Data based on NCHS/CDC/WHO Child Growth reference (WHO, 1983)
n.a.: not available

Anthropometry of school-age children

The Demographic and Health Surveys routinely assess the nutritional status of children under five, but few large-scale surveys have collected data for school-age children. The 2002 Zambia DHS EdData Survey (ZDES), conducted between August and October 2002, was the first education survey of its kind in Zambia. This survey was representative at national level and the sample included all the 2001-2002 Zambia DHS households with children in the eligible child age range. The survey collected and analysed height and weight measurements for 2624 children age 7-9.99 years (CSO and ORC Macro, 2003).

According to the 2002 ZDES, overall 31% of school-age children (age 7-9.99) were stunted and 9% were severely stunted. Differentials in the prevalence of stunting by gender were significant: 35% of boys were stunted versus 26% of girls. Children living in rural areas were twice as likely to be stunted as those living in urban areas (Table 17). The prevalence of stunting was highest in Luapula (51%) and Northern (50%) provinces. Prevalence of stunting was considerably higher among children who had never attended school (49%) or who had attended only pre-primary school (43%) than among children who had attended primary school (23%) (CSO and ORC Macro, 2003). This relation should not be interpreted as a direct effect of education on stunting, as children who attend school are also generally those who live in a more favourable socio-economic environment.

Stunting, which reflects failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness, is likely to have an impact on the level of educational performance. Research has also found that short stature - a result of stunting - is an important factor in parental decisions to enrol a child in school, i.e. leading to late enrolment of children (CSO and ORC Macro, 2003).

The prevalence of underweight among school-age children was 17% in 2002. Boys, children living in rural areas and those living in Luapula and Northern provinces were more likely to be underweight. The prevalence of underweight was also significantly higher among children who had never attended school when compared to those who had attended at least pre-primary school (CSO and ORC Macro, 2003).

Only 2% of school-age children were found to have a weight-for-height index of less than -2 zscores of the NCHS reference, indicating that there is no wasting in this age group (CSO and ORC Macro, 2003). Data collection of the 2002 ZDES occurred between August and October, outside the food shortage season.

In Zambia, chronic malnutrition (stunting) is an important concern among school-age children. The main factors affecting the physical growth of school-age children are environmental factors experienced before puberty. These include poor food consumption patterns, illness, lack of sanitation, and poor health and hygiene practices (UN, ACC/SCN, 2000). Moreover, the high prevalence of stunting among Zambian school-age children can be related to the high prevalence of stunting observed among preschool children as the potential for catch-up growth among stunted children is thought to be limited after the age two years, particularly when the children remain in disadvantaged environments (UN, ACC/SCN, 2000).

Table 17: Anthropometry of school-age children

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Sex	Sample size	Prevalence of malnutrition						
					Percentage of children with						
					Stunting Height-for-age		Wasting Weight-for-height		Underweight Weight-for-age		Overweight Weight-for-height
					< -3 Z-scores	< -2 Z-scores[1]	< -3 Z-scores	< -2 Z-scores[1]	< -3 Z-scores	< -2 Z-scores[1]	> +2 Z-scores
Zambia DHS EdData Survey, 2002 Education Data for Decision-making (Aug.-Oct. 2002) (CSO and ORC Macro, 2003)	**Total**	7-9.99	M/F	2624	9.2	30.8	0.2	2.2	1.6	16.8	n.a.
	Sex										
		7-9.99	M	1355	12.4	35.2	0.3	2.8	2.4	20.0	n.a.
		7-9.99	F	1269	5.7	26.1	0.1	1.5	0.8	13.4	n.a.
	Age										
		7-7.99	M/F	902	10.8	31.7	0.2	1.7	2.2	17.6	n.a.
		8-8.99	M/F	878	7.2	27.3	0.4	3.1	1.3	15.9	n.a.
		9-9.99	M/F	844	9.5	33.6	0.0	1.7	1.4	16.9	n.a.
	Residence										
	Urban	7-9.99	M/F	987	3.4	19.8	0.3	2.8	0.4	9.2	n.a.
	Rural	7-9.99	M/F	1637	12.7	37.5	0.1	1.8	2.4	21.4	n.a.
	Province										
	Central	7-9.99	M/F	189	6.1	26.6	0.3	1.7	0.7	10.6	n.a.
	Copperbelt	7-9.99	M/F	562	3.5	21.4	0.3	3.5	0.0	10.9	n.a.
	Eastern	7-9.99	M/F	338	10.6	38.0	0.0	0.6	0.6	17.6	n.a.
	Luapula	7-9.99	M/F	177	19.3	50.9	0.6	1.2	2.3	24.0	n.a.
	Lusaka	7-9.99	M/F	355	4.3	17.7	0.0	2.2	0.4	6.9	n.a.
	Northern	7-9.99	M/F	377	19.2	50.4	0.2	3.4	6.3	31.1	n.a.
	North-Western	7-9.99	M/F	127	12.6	38.1	1.0	2.6	4.2	22.9	n.a.
	Southern	7-9.99	M/F	317	5.6	19.3	0.0	0.4	0.7	16.4	n.a.
	Western	7-9.99	M/F	183	9.8	31.7	0.0	2.7	1.6	19.7	n.a.
	Child's schooling attainment										
	No schooling	7-9.99	M/F	718	20.5	49.2	0.3	2.1	4.4	31.9	n.a.
	Has only been in preschool	7-9.99	M/F	113	9.0	42.5	0.0	2.1	2.3	17.2	n.a.
	Has been in primary	7-9.99	M/F	1793	4.6	22.7	0.2	2.2	0.5	10.8	n.a.

[1] Category <-2 Z-scores includes <-3 Z-scores
n.a.: not available
Data based on NCHS/CDC/WHO Child Growth reference (WHO, 1983)

Anthropometry of adolescents

Currently no data are available on anthropometry of adolescents in Zambia.

Anthropometry of adult women

The 2007 ZDHS, the 2001-2002 ZDHS and the 1996 ZDHS collected data on anthropometry of women of childbearing age at national level (CSO et al., 2009; CSO et al., 2003; CSO et al., 1997).

According to 2007 ZDHS, only 3% of women had a height below the critical size of 145 cm, a size below which the risks of difficult delivery and of low birth weight increase. The mean body mass index (BMI) of women was estimated at 22.5 kg/m^2 (CSO et al., 2009).

Overall, 10% of women of childbearing age were affected by chronic energy deficiency (CED) (BMI <18.5 kg/m^2). The prevalence of CED was higher among young women aged 15-19 when compared to older women (Table 18). Women living in rural areas were more likely to have CED than those living in urban areas. Differences by provinces were substantial: Western, North-Western, Luapula and Northern provinces had the highest prevalence of CED (13-14%); the prevalence was the lowest in Eastern and Copperbelt provinces (7%). Women with no education or with primary education were more likely to be affected by CED than women with secondary or higher education (CSO et al., 2009).

These data reveal that CED affects a relatively large proportion of women. The prevalence of CED among women of childbearing age could be related to the prevalence of malnutrition among young children.

At national level, the prevalence of overweight and obesity (BMI ≥ 25.0 kg/m^2) among adult women was noticeable, estimated at 19% in 2007. There were marked differences in the prevalence of overweight and obesity between women living in urban areas (30%) and those living in rural areas (11%). It is in Lusaka province that prevalence was highest with about one-third of women being overweight or obese (CSO et al., 2009). In urban areas, the prevalence of overweight and obesity (30%) was considerably higher than that of CED (8%), indicating that Zambia is undergoing a nutrition transition (CSO et al., 2009). The nutrition transition is particularly noticeable in urban areas; however, in rural areas, the prevalence of overweight and obesity is increasing and this prevalence is now similar to that of CED, showing that the nutrition transition is emerging in this sector as well.

Table 18: Anthropometry of adult women

Name/date of survey (month/year) (Reference)	Background charasteristics	Age (years)	Anthropometry of adult women								
			Height			Body Mass Index[1] (kg/m²) (BMI)					
								Percentage of women with BMI			
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	<18.5 (chronic energy deficiency)	18.5-24.9 (normal)	25.0-29.9 (overweight)	≥30.0 (obesity)
Zambia Demographic and Health Survey 2007 (Apr. 2007 - Oct. 2007) (CSO et al., 2009)	**Total**	15-49	7026	n.a.	2.6	6085	22.5	9.6	71.2	13.8	5.4
	Age										
		15-19	1537	n.a.	5.1	1389	21.2	14.6	77.2	7.0	1.1
		20-29	2692	n.a.	2.6	2205	22.3	8.4	75.4	12.8	3.4
		30-39	1773	n.a.	1.2	1493	23.2	8.1	66.3	18.5	7.2
		40-49	1024	n.a.	1.1	998	24.0	7.3	60.9	18.4	13.3
	Residence										
	Urban	15-49	2957	n.a.	1.7	2673	23.7	7.5	62.8	19.9	9.7
	Rural	15-49	4069	n.a.	3.3	3411	21.6	11.2	77.7	9.0	2.1
	Province										
	Central	15-49	644	n.a.	2.0	563	22.2	9.3	74.6	13.4	2.7
	Copperbelt	15-49	1240	n.a.	1.7	1109	23.5	7.4	67.3	14.8	10.5
	Eastern	15-49	960	n.a.	3.0	829	22.2	6.6	79.0	12.2	2.2
	Luapula	15-49	522	n.a.	4.5	421	21.5	13.4	76.9	7.5	2.2
	Lusaka	15-49	1147	n.a.	1.8	1025	23.9	7.8	58.6	23.4	10.2
	Northern	15-49	943	n.a.	4.9	797	21.6	13.1	75.3	9.4	2.2
	North-Western	15-49	362	n.a.	2.3	305	21.5	14.0	73.3	10.9	1.7
	Southern	15-49	719	n.a.	1.2	621	22.7	8.2	70.1	15.7	6.0
	Western	15-49	489	n.a.	2.5	416	21.1	14.3	79.0	5.0	1.7
	Education's level										
	No education	15-49	732	n.a.	3.2	628	21.6	11.6	78.2	7.9	2.2
	Primary	15-49	3813	n.a.	3.3	3221	22.2	10.7	72.7	12.2	4.5
	Secondary or higher	15-49	2481	n.a.	1.3	2236	23.3	7.4	67.1	17.6	7.8

[1] excludes pregnant women and women with a birth in the 2 preceding months.
Note: the sample represents all women aged 15-49.
n.a.: not available.

Table 18: Anthropometry of adult women (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Anthropometry of adult women								
			Height			Body Mass Index[1] (kg/m²) (BMI)					
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	Percentage of women with BMI			
								<18.5 (chronic energy deficiency)	18.5-24.9 (normal)	25.0-29.9 (overweight)	≥30.0 (obesity)
Zambia Demographic and Health Survey 2001-2002 (Nov.2001-May 2002) (CSO et al., 2003)	**Total**	15-49	7529	157.7	2.1	6591	21.6	15.0	72.8	9.2	3.0
	Age										
		15-19	1769	156.0	4.0	1601	20.6	20.0	74.4	5.2	0.4
		20-24	1642	157.5	1.8	1373	21.4	12.0	78.0	8.7	1.3
		25-29	1363	158.4	1.6	1102	21.6	13.9	74.9	9.0	2.3
		30-34	957	158.6	1.5	827	21.8	12.5	74.1	10.7	2.7
		35-39	752	158.9	1.1	682	22.0	15.0	68.4	10.6	6.1
		40-44	588	158.5	1.1	554	22.7	12.5	66.2	14.8	6.5
		45-49	457	157.9	2.0	452	22.8	16.6	58.5	13.9	11.0
	Residence										
	Urban	15-49	3028	158.9	0.9	2751	22.5	11.4	68.9	14.0	5.7
	Rural	15-49	4501	156.9	2.9	3840	20.9	17.5	75.6	5.8	1.1
	Province										
	Central	15-49	550	158.3	1.5	472	21.2	18.7	70.4	8.7	2.1
	Copperbelt	15-49	1531	159.2	1.0	1363	22.1	14.2	69.0	11.1	5.7
	Eastern	15-49	890	156.0	2.7	771	21.3	14.7	76.1	7.4	1.9
	Luapula	15-49	616	155.1	4.7	517	20.8	19.4	73.9	6.1	0.6
	Lusaka	15-49	1113	158.4	1.0	1012	22.9	7.5	69.4	18.0	5.1
	Northern	15-49	1030	156.4	4.0	885	21.1	16.2	75.7	6.4	1.7
	North-Western	15-49	352	157.4	2.7	304	20.9	19.7	71.5	7.4	1.3
	Southern	15-49	793	159.3	0.7	694	21.2	15.8	75.1	6.6	2.5
	Western	15-49	655	157.8	2.6	574	20.6	18.2	77.5	3.2	1.1
	Education's level										
	No education	15-49	906	156.0	4.0	777	20.9	18.4	74.6	4.9	2.0
	Primary	15-49	4371	157.2	2.4	3775	21.3	16.1	73.8	7.9	2.2
	Secondary or higher	15-49	2252	159.3	0.9	2040	22.3	11.7	70.2	13.4	4.8

[1] excludes pregnant women and women with a birth in the 2 preceding months.
Note: the sample represents all women aged 15-49.

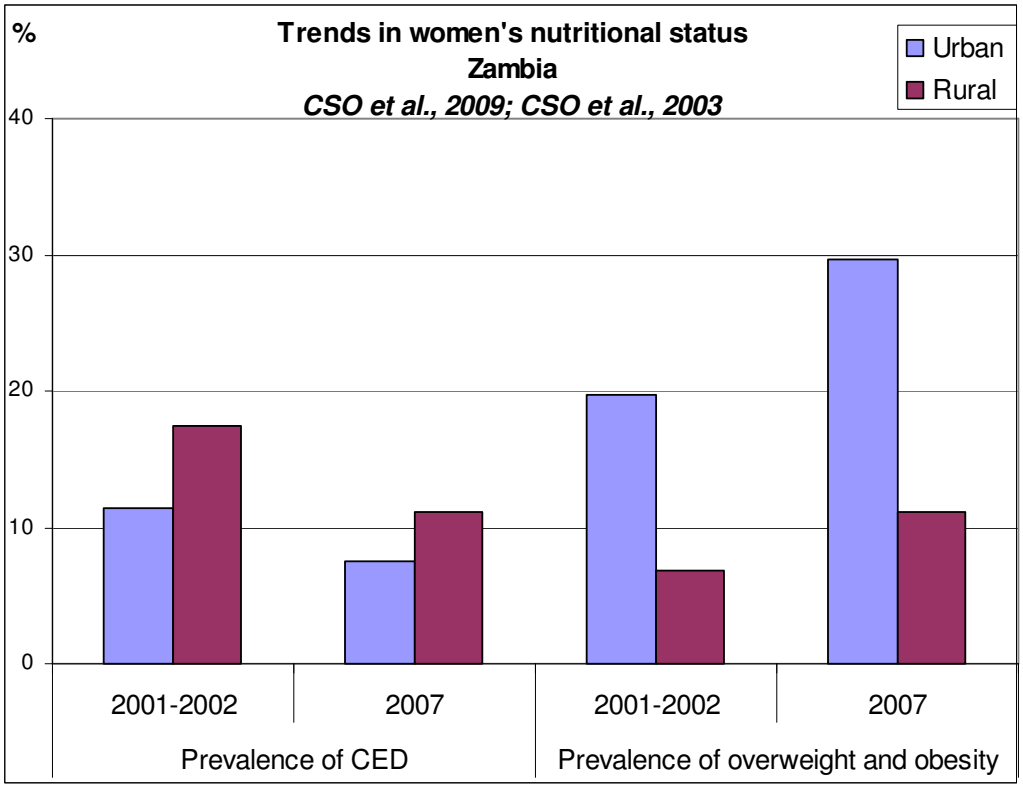
Table 18: Anthropometry of adult women (cont'd)

Name/date of survey (month/year) (Reference)	Background characteristics	Age (years)	Anthropometry of adult women								
			Height			Body Mass Index[1] (kg/m²) (BMI)					
								Percentage of women with BMI			
			Sample size	Mean (cm)	% of women with height < 1.45 m	Sample size	Mean (kg/m²)	<18.5 (chronic energy deficiency)	18.5-24.9 (normal)	25.0-29.9 (overweight)	≥30.0 (obesity)
Zambia Demographic and Health Survey 1996 (July 1996-Jan. 1997) (CSO et al., 1997)	**Total**	15-49	4507	158.1	1.2	3665	21.9	9.1	n.a.	n.a.	n.a.
	Age										
		15-19	473	157.1	1.5	387	21.1	11.0	n.a.	n.a.	n.a.
		20-24	1357	157.4	1.4	1044	21.5	9.5	n.a.	n.a.	n.a.
		25-29	1010	158.7	0.6	797	22.0	8.2	n.a.	n.a.	n.a.
		30-34	817	158.6	1.1	671	22.2	8.0	n.a.	n.a.	n.a.
		35-49	850	158.4	1.5	766	22.7	9.6	n.a.	n.a.	n.a.
	Residence										
	Urban	15-49	1851	159.0	0.5	1543	22.6	7.8	n.a.	n.a.	n.a.
	Rural	15-49	2656	157.5	1.7	2122	21.4	10.1	n.a.	n.a.	n.a.
	Province										
	Central	15-49	363	158.4	0.4	286	21.9	6.7	n.a.	n.a.	n.a.
	Copperbelt	15-49	837	158.8	0.6	681	22.6	7.6	n.a.	n.a.	n.a.
	Eastern	15-49	679	156.9	2.2	536	21.9	6.6	n.a.	n.a.	n.a.
	Luapula	15-49	412	155.7	2.9	331	21.6	9.3	n.a.	n.a.	n.a.
	Lusaka	15-49	705	159.5	1.1	590	22.9	6.5	n.a.	n.a.	n.a.
	Northern	15-49	530	157.3	1.1	433	21.4	10.4	n.a.	n.a.	n.a.
	North-Western	15-49	181	157.0	2.3	149	21.0	13.1	n.a.	n.a.	n.a.
	Southern	15-49	479	159.5	0.4	387	21.3	11.0	n.a.	n.a.	n.a.
	Western	15-49	320	158.3	0.4	271	20.6	19.0	n.a.	n.a.	n.a.
	Education's level										
	No education	15-49	624	156.5	2.2	499	21.5	9.5	n.a.	n.a.	n.a.
	Primary	15-49	2820	157.8	1.4	2245	21.9	8.8	n.a.	n.a.	n.a.
	Secondary or higher	15-49	1062	161.0	0.2	920	22.3	9.7	n.a.	n.a.	n.a.

[1] excludes pregnant women and women with a birth in the 2 preceding months.
Note: the sample represents women with a birth in the five years preceding the survey.
n.a.: not available.

In the 1996 ZDHS, all mothers of children under five were measured while in 2001-2002 and 2007, data refer to all women aged 15-49 years. As a result, data from 1996 ZDHS are not included in the analysis of trends in women's nutritional status. The prevalence of CED decreased from 15% in 2001-2002 to 10% in 2007[4]. In rural areas, prevalence decreased by 6 percentage points (4 percentage points in urban areas). On the other hand, the prevalence of overweight and obesity has increased from 12% to 19% over the same period. While the prevalence of overweight and obesity has increased only by 4 percentage points in rural areas, it has increased by 10 percentage points in urban areas (CSO et al., 2009; CSO et al., 2003).

- Figure 6: Trends in women's nutritional status



These observations show that the population of Zambia has to face a double burden of malnutrition: the persistence - although declining - of undernutrition (chronic malnutrition), especially among preschool and school-age children but also among women, along with an increasing prevalence of overweight and obesity, especially among women living in urban areas.

Overall progress in improving water and sanitation systems as well as the health system has been slow, thereby hampering efforts to reduce undernutrition. Moreover, in Zambia, the HIV/AIDS pandemic and widespread poverty are further major constraints in reducing undernutrition. At the same time, rapid urbanization, liberalization of markets, changes in dietary patterns and lifestyles are contributing to a rise in overweight and diet-related chronic diseases (FAO, 2006).

Anthropometry of adult men

Currently no data are available on anthropometry of adult men.

[4] ZDHS 2007 was conducted outside the period of food shortage while ZDHS 2001-2002 was conducted during this period; thus, trends in women's nutritional status may be influenced by the different periods during which data collection took place.

II.6 Micronutrient deficiencies

Zambia adopted the nutritional goals set by world leaders during the World Summit for Children in New York in 1990 and later endorsed them during the Ending Hidden Hunger conference in Montreal in 1991 and the International Conference on Nutrition in Rome in 1992. These goals included the control and elimination of micronutrient deficiencies by the year 2000 and more specifically, the elimination of vitamin A deficiency and of iodine deficiency disorders and a one-third reduction in iron deficiency anemia among women.

In order to meet the challenges of the World Summit for Children and subsequent conferences, the National Food and Nutrition Commission (NFNC) formed a national task force for the control of iodine deficiency disorders. This was followed by the creation of the National Task Force for the control of vitamin A deficiency and iron deficiency anemia, respectively. In 1993, the three task forces were merged to become the national task force for the control of micronutrient deficiencies. The aim was to harmonise efforts and resources to control the three micronutrient deficiencies (MOH, 2002).

Iodine deficiency disorders (IDD)

Prevalence of goitre and urinary iodine level

Two national surveys document iodine deficiency disorders (IDD) in Zambia: the 1993 IDD Baseline Survey and the 2002 IDD Impact Survey (Table 19) (Lumbwe et al., 1995; Lumbwe et al., 2003).

The 1993 national IDD Baseline Survey investigated IDD among 2 505 pupils from 25 primary schools distributed across the country, chosen at random from a total of 3 601 primary schools. Boys and girls between 7 and 12 years were included in the sample. Among these children, the prevalence of total goitre was 32%, the median level of urinary iodine was 60 µg/L and 72% of children had urinary iodine levels below 100 µg/L (Lumbwe et al, 1995; WHO Database on Iodine Deficiency Disorders). The observed prevalence of goitre at national level was above the threshold defined by WHO (≥ 30%) to consider IDD as a severe public health problem (WHO, 2001a).

Differences in the prevalence of total goitre by province were substantial, ranging from 13% in Luapala province to 54% in Southern province (Table 19) (Lumbwe et al., 1995; WHO Database on Iodine Deficiency Disorders).

In 2002 a total number of 2 504 pupils from the same schools as those of the 1993 IDD Baseline Survey or from near-by schools were surveyed, in order to be able to assess the impact of the IDD programme which was undertaken after the 1993 survey (Lumbwe et al., 2003). These sites were originally chosen at random by systematic sampling and were distributed evenly throughout the country. Two additional sites were added to make a total of 27 sites surveyed. The two sites were deliberately added as these are areas were salt mining takes place, but they were not included in the overall analysis. As was the case in the 1993 national IDD Baseline Survey, the 25 clusters consisted of a primary school and its catchment area. The age range of the sample was the same (Lumbwe et al., 2003).

According to the 2002 IDD Impact Survey, the prevalence of total goitre among school-age children was 30%, similar to that reported in 1993 (32%), while the percentage of school-age children with urinary iodine levels below 100 µg/L considerably decreased from 72% in 1993 to 4% in 2002 (Lumbwe et al., 2003; Lumbwe et al., 1995).

The 2002 survey showed substantial differences in the prevalence of goitre according to provinces (Table 19). Nevertheless there were some inconsistencies in the results, some provinces having a higher prevalence compared to the previous survey while iodization of salt is adequate. These inconsistencies could be due to problems in data collection or differences in sampling between the two surveys (Lumbwe et al., 2003).

At national level, the median level of urinary iodine was estimated at 245 µg/L in 2002, indicative of more than adequate iodine intake at national level, with a potential risk of iodine-induced hyperthyroidism. In Western province, where goitre affected nearly half the school-children, the median level of urinary iodine was high, above 300 µg/L, indicative of excessive iodine intake, with risk

of adverse health consequences (iodine-induced hyperthyroidism, auto immune thyroid diseases) (Lumbwe et al., 2003; WHO Database on Iodine Deficiency Disorders; WHO, 2001a).

The decrease in the percentage of children with low urinary iodine level between 1993 and 2002 may be attributed to a reinforcement of the salt iodization legislation since 1996. Biological indicators (urinary iodine) are much more sensitive to recent changes in iodine intake and therefore more useful for short-term evaluation of programme impact (FAO, 2005). Goitre takes several years to disappear. This may explain that the prevalence of goitre remained steady between 1993 and 2002 whereas the percentage of children with low urinary iodine level dropped considerably.

Although the legislation on salt iodization was developed in 1978 it was not strongly enforced until much later. A national task force for the control of iodine deficiency disorders was created in 1992-93 and in 1994 the legislation was reviewed, but it was only in 1996 that it started being enforced by most government bodies. The legislation established that all salt for both human and animal consumption must be iodized. Moreover, efforts were made to create awareness on the importance of consumption of iodized salt (Besa and Habulembe-Mugode, 2001).

Periodic evaluation of IDD should continue in order to achieve IDD elimination (defined as a total goitre rate < 5% in school-age children) but also to monitor the quality of iodized salt and to prevent potential risk of excessive iodine level in salt.

High prevalence of IDD in Zambia might be related to low consumption of iodine-rich foods such as fish and poor availability of iodine in the soil. Zambia is located on a high plateau and high prevalence of IDD might be related to this ecological condition which influences the availability of iodine in the soil and hence iodine levels of the crops grown in these areas.

Table 19: Prevalence of goitre and level of urinary iodine in school-age children

Survey name/date (Reference)	Background characteristics	Sex	Age (years)	Prevalence of goitre		Level of urinary iodine		
				Sample size	Percentage with goitre [Total Goitre]	Sample size	Median (µg/L)	Percentage with urinary iodine <100µg/L
Report on the 2002 Iodine Deficiency Disorders Impact Survey 2002 (Lumbwe et al., 2003)	**Total**	M/F	7-12.99	2504	30.2	2504	245	4
	Province							
	Central	M/F	7-12.99	200	24.0	200	188	n.a.
	Copperbelt	M/F	7-12.99	200	4.0	200	273	n.a.
	Eastern	M/F	7-12.99	300	33.0	300	198	n.a.
	Luapula	M/F	7-12.99	291	22.8	291	267	n.a.
	Lusaka	M/F	7-12.99	(94)	(1.1)	(94)	(156)	n.a.
	North Western	M/F	7-12.99	302	32.8	302	240	n.a.
	Northern	M/F	7-12.99	398	38.8	398	245	n.a.
	Southern	M/F	7-12.99	419	42.2	419	274	n.a.
	Western	M/F	7-12.99	300	48.3	300	312	n.a.
Iodine Deficiency Disorders in Zambia-1993 survey 1993 (Lumbwe et al., 1995) [1]	**Total**	M/F	7-12.99	2505	31.6	2505	60	72
	Province							
	Central	M/F	7-12.99	200	40.5	200	65	n.a.
	Copperbelt	M/F	7-12.99	200	16.0	200	153	n.a.
	Eastern	M/F	7-12.99	300	23.7	300	75	n.a.
	Luapula	M/F	7-12.99	320	12.9	320	149	n.a.
	Lusaka	M/F	7-12.99	100	46.5	100	44	n.a.
	North Western	M/F	7-12.99	285	36.4	285	28	n.a.
	Northern	M/F	7-12.99	400	30.3	400	76	n.a.
	Southern	M/F	7-12.99	400	53.5	400	37	n.a.
	Western	M/F	7-12.99	300	28.0	300	46	n.a.

[1] Data taken from WHO Database on Iodine Deficiency Disorders.
Data into parenthesis are based on small samples (<100) and therefore should be interpreted with caution.
n.a.: not available.

Iodization of salt at household level

Two national surveys provide information on iodization of salt at household level: the 2001-2002 ZDHS and the 1996 ZDHS (CSO et al., 2003; CSO et al., 1997).

According to the 2001-2002 ZDHS, 77% of households were consuming adequately iodized salt (≥15 ppm). There was little difference in the percentage of households consuming adequately iodized salt between rural and urban areas (79% and 75% respectively). By province, differences were more marked, ranging from 65% of households in Copperbelt province to 93% in Southern province (CSO et al., 2003).

Comparison of these data with those of the 1996 ZDHS is not possible as the thresholds used are different. In 1996, 78% of households were consuming adequately iodized salt at 25 ppm or more (CSO et al., 1997).

Table 20: Iodization of salt at household level

Survey name/date (Reference)	Background characteristics	Total number of households	Percentage of households tested	Iodine level of household salt		
				None (0 ppm)	Inadequate (<15 ppm)	Adequate (≥15 ppm)
Zambia Demographic and Health Survey 2001-2002 (CSO et al., 2003)	**Total**	7126	80.0	3.5	19.1	77.4
	Residence					
	Urban	2437	85.1	1.8	23.8	74.5
	Rural	4689	77.4	4.4	16.5	79.1
	Province					
	Central	490	87.3	1.7	8.8	89.5
	Copperbelt	1221	82.6	2.0	32.8	65.2
	Eastern	999	71.5	1.7	23.8	74.5
	Luapula	652	76.3	8.3	2.1	89.6
	Lusaka	976	85.9	2.2	24.9	73.0
	Northern	1028	79.6	5.3	20.9	73.8
	North-Western	371	83.1	0.4	16.7	82.9
	Southern	734	82.5	1.0	5.9	93.1
	Western	656	74.1	9.8	15.4	74.8

Note: ppm = parts per million

Zambia produces coarse salt from Kasempa and Kaputa. However, this production is not enough to meet salt needs of the country and Zambia therefore imports more than 90% of its salt from neighbouring countries (Besa and Habulembe-Mugode, 2001; Kenji et al., 2003). Efforts are currently made to improve control of imported salt, by building the capacity of law enforcement officers, strengthening the laboratory system and by establishing mini-laboratories in border areas.

Kasempa and Kaputa (located in the North-Western part of Zambia), areas where salt is locally mined, have a significant proportion of households consuming non-iodized salt (Besa and Habulembe-Mugode, 2001). Efforts by the government through the National Food and Nutrition Commission have been made to ensure locally mined salt is iodized. Through the cooperating partners, iodization equipment was provided to local communities in the two districts. However, there has been no active follow-up to determine the effectiveness of the programme.

Vitamin A deficiency (VAD)

Prevalence of sub-clinical and clinical vitamin A deficiency

Two national surveys, conducted in 2003 and 1997, document sub-clinical vitamin A deficiency (based on serum retinol concentration) among preschool children and women: the Report of the national survey to evaluate the impact of vitamin A interventions in Zambia (2003) and the National survey on vitamin A deficiency in Zambia: a random cluster study for children (0-5 years) and mothers attending

national immunization days in August 1997 (MOST et al., 2003; Luo and Mwela, 1997). The 2003 survey also documented clinical VAD among women (MOST et al., 2003).

The 2003 national survey was a non-stratified cluster survey conducted in two phases (July and November 2003), using the same clusters but not necessarily the same households in both phases (MOST et al., 2003; WHO Database on Vitamin A Deficiency). According to this survey, conducted among 659 preschool children aged 6 to 59 months, the prevalence of low serum retinol concentration (<0.70 µmol/L) was 54% at national level (MOST et al., 2003; WHO Database on Vitamin A Deficiency). The prevalence was largely above the WHO threshold of 20 % that defines VAD as a severe public health problem (WHO, 2009).

In 2003, the same study evaluated the prevalence of low serum retinol concentration (<0.70 µmol/L) among 583 non-pregnant women aged 15-49 years who had given birth in the 3 years preceding the survey. Results revealed that the prevalence of low serum retinol concentration was 13% (MOST et al., 2003; WHO Database on Vitamin A Deficiency).

Night blindness during pregnancy, a clinical sign of VAD, was also investigated in the 2003 survey. The sample included 527 non-pregnant women aged 15-49 who had given birth in the 3 years preceding the survey. The prevalence of night blindness during the previous pregnancy was estimated at 2% (percentage adjusted for daytime blindness) (MOST et al., 2003; WHO Database on Vitamin A Deficiency).

In 1997, at national level, the prevalence of low serum retinol concentration (<0.70 µmol/L) among 900 sampled children aged 0 to 59 months was 66%. Among women age 15-49 years (sample size 921), the prevalence of low serum retinol concentration was 22% (Luo and Mwela, 1997; WHO Database on Vitamin A Deficiency).

Although the samples of the 1997 and 2003 surveys are not strictly identical, comparison of the data indicates a decline in the prevalence of sub-clinical vitamin A deficiency among both preschool children and women of childbearing age. Nevertheless, the prevalence of sub-clinical vitamin A deficiency remains high, especially among young children.

The main causes of vitamin A deficiency in Zambia appear to be the low intake of foods of animal origin, which contain high amounts of absorbable retinol, and insufficient intake of fruit and vegetables rich in vitamin A. The high financial cost of animal products hampers households' consumption and the Zambian diet is predominantly based on food of vegetable origin which contains beta-carotene, a provitamin A with lower bioavailability than that of retinol.

Vitamin A supplementation

The Zambian vitamin A supplementation programme, which began in the early 1990s, has been directed at achieving, through the Child Health Weeks, high coverage of supplementation of children age 6-59 months twice a year. In the interest of ensuring adequate concentrations of vitamin A in breastmilk and enhancing the vitamin A status of both breastfed children and mothers, the programme also includes postpartum supplementation of women. However, by 1997 only data reflecting passive distribution through health facilities was available. In 1999, vitamin A supplementation was included in the National Immunization Days (NIDs), and later in the Child Health Week (CHW).

The 2007 ZDHS and the 2001-2002 ZDHS document vitamin A supplementation of children and mothers at national level (CSO et al., 2009 ; CSO et al., 2003). In 2007, 60% of children age 6-59 months had received vitamin A supplements in the 6 months preceding the survey. There were no differences in supplementation by gender or by urban/rural area (Table 21). By province, children from Northern province were less likely to have received vitamin A supplements (48%) than other children (CSO et al., 2009).

Among mothers with a birth in the five years preceding the survey, 45% had received vitamin A supplements within 2 months postpartum. Supplementation of mothers was more common in urban areas (Table 21). Significant regional disparities were observed: in Lusaka province, 56% of mothers received vitamin A supplements while in Northern province only 32% of mothers were supplemented (CSO et al., 2009).

Coverage in vitamin A supplementation of mothers has improved greatly from 2001-2002 to 2007, increasing from 28% to 45%. On the contrary, coverage in vitamin A supplementation of children has declined slightly from 67% in 2001-2002 to 60% in 2007 (CSO et al., 2003; CSO et al., 2009).

Vitamin A supplementation of children and mothers needs to be extended.

Table 21: Vitamin A supplementation of children and mothers

Survey name/date (Reference)	Background characteristics	Children				Mothers		
		Age (months)	Sex	Number of children	Percent of children who received vit. A supplements in the 6 months preceding the survey	Age (years)	Number of mothers[1]	Percent of mothers who received vit. A supplements within 2 months postpartum
Zambia Demographic and Health Survey 2007 (CSO et al., 2009)	**Total**	6-59	M/F	5220	59.7	15-49	4136	44.7
	Sex							
		6-59	M	2561	60.5	15-49	-	-
		6-59	F	2659	58.9	15-49	-	-
	Residence							
	Urban	6-59	M/F	1509	59.8	15-49	1347	54.2
	Rural	6-59	M/F	3711	59.6	15-49	2789	40.1
	Province							
	Central	6-59	M/F	515	55.1	15-49	405	35.9
	Copperbelt	6-59	M/F	711	62.9	15-49	606	49.7
	Eastern	6-59	M/F	812	61.4	15-49	629	46.5
	Luapula	6-59	M/F	474	64.5	15-49	346	51.8
	Lusaka	6-59	M/F	591	58.7	15-49	520	55.8
	Northern	6-59	M/F	835	47.8	15-49	629	31.7
	North-Western	6-59	M/F	339	57.9	15-49	243	33.8
	Southern	6-59	M/F	559	66.6	15-49	446	44.9
	Western	6-59	M/F	385	68.8	15-49	312	50.9

[1] Women with a birth in the 5 years preceding the survey. For women with two or more births during that period, data refer to the most recent birth.

Besides routine supplementation with vitamin A, interventions for ensuring a more adequate intake of vitamin A-rich foods are being developed in Zambia.

The Ministry of Health, Ministry of Education, and Ministry of Agriculture and Cooperatives have made extensive educational efforts to improve awareness of the importance of a diversified diet. Additionally, the agricultural research institutions have made efforts in coming up with improved varieties of crops like sweet potatoes and other vitamin A rich food crops. Several efforts have also been made to improve crop and livestock production and utilization practices to facilitate dietary improvements. More specifically, two sources of vitamin A - red palm oil and yellow-fleshed sweet potatoes - have been promoted as a mean to improve vitamin A status through small-scale projects in selected districts. However, there has been limited adoption of these practices and consumption of vitamin A-rich foods remains low.

Food fortification in Zambia is one of the key interventions for the control of micronutrient deficiencies including vitamin A deficiency. Today, three food items are by law being fortified in Zambia: salt, sugar and margarine. Margarine is fortified with vitamin A and D since 1978, sugar is fortified with vitamin A since 1998 and salt is fortified with iodine since 1978. Moreover a programme for maize meal fortification is envisaged (MOH, 2005b). The products of 32 commercial maize mills, producing 60% of the national maize flour, would be fortified with vitamin A, B1, B2, B6, niacin, B12, folic acid, zinc and

iron. The objective is to reach six million persons, that is 60% of the total population or nearly 50% of the vulnerable and deficient population in the country (GAIN, no date).

Sugar produced in Zambia as well as sugar imported from other countries is fortified with vitamin A. However, according to the 2001-2002 ZDHS, only 24% of households had sugar at home at the time of the survey (45% of urban households and only 14% of rural households), indicating that consumption of fortified sugar was therefore not widespread (CSO et al., 2003).

Iron deficiency anemia (IDA)

Prevalence of IDA

Two national surveys investigated the prevalence of anemia in preschool children and in women: the 2003 Report of the National survey to evaluate the impact of vitamin A interventions in Zambia and the 1998 National baseline survey on prevalence and aetiology of anemia in Zambia: a random cluster community survey involving children, women and men (MOST et al., 2003; NFNC, 1999).

The 2003 national survey was a cluster survey conducted in two phases (July and November 2003), using the same clusters but not necessarily the same households in both rounds (MOST et al., 2003; WHO Database on Anaemia).

According to this survey, among 724 sampled children aged 6 to 59 months, the prevalence of anemia (hemoglobin concentration <11.0 g/dL) was 53% at national level (MOST et al., 2003). Prevalence of anemia by background characteristics and overall prevalence of severe anemia were not given. According to WHO criteria, anemia can be defined as a severe public health problem in Zambia, as it is above the 40% cut off point (WHO, 2001b).

In 1998, among 1427 sampled preschool children (up to 59 months of age), overall 65% of children were found to be anemic (hemoglobin concentration <11.0 g/dL) and 15% were affected by severe anemia (hemoglobin concentration <7.0 g/dL). The prevalence of anemia was highest among children aged 6-18 months (82%) when compared to older children (19-59 months of age) (NFNC, 1999).

Although the samples of the 1998 and 2003 surveys are not strictly identical (children aged 59 months and under in 1998, 6-59 months in 2003), comparison of the data shows that the prevalence of anemia in preschool children decreased by 12 percentage points between 1998 and 2003 (NFNC, 1999; MOST et al., 2003). Despite this downward trend, the prevalence of anemia remains high in Zambia.

Table 22: Prevalence of anemia in preschool children

Survey name/date (Reference)	Background characteristics	Age (months)	Sex	Sample size	Percentage of children with	
					Any anemia (Hb<11.0 g/dL)	Severe anemia (Hb<7.0 g/dL)
Report of the national survey to evaluate the impact of vitamin A interventions in Zambia (July and November 2003) (MOST et al., 2003)	**Total**	6-59	M/F	724	53.0	n.a.
National baseline survey on prevalence and aetiology of anemia in Zambia: a random cluster community survey involving children, women and men (1998) (NFNC, 1999)	**Total**	<6- 59	M/F	1427	65.0	14.5
	Age					
		<6	M/F	(52)	(59.6)	n.a.
		6-18	M/F	402	81.6	n.a.
		19-59	M/F	973	57.9	n.a.

Hb: Hemoglobin
n.a.: not available
Data into parenthesis are based on small samples (<100) and therefore should be interpreted with caution.

The report of the national survey to evaluate the impact of vitamin A interventions in Zambia assessed the prevalence of anemia in women of childbearing age in 2003. The sample was constituted of 623 non-pregnant women aged 15-49 years and anemia was defined as hemoglobin concentration <12.0 g/dL (MOST et al., 2003). According to this national survey, the prevalence of anemia in non-pregnant women was estimated at 29% (MOST et al., 2003). Results by background characteristics and overall prevalence of severe anemia were not given.

In 1998, a national baseline survey on prevalence and aetiology of anemia in Zambia reported a prevalence of anemia[5] of 39% in women of childbearing age (15-49 years, sample size 1498). The prevalence of anemia among non-pregnant women was 38% and among pregnant women it was 47% (NFNC, 1999).

During pregnancy, iron deficiency is associated with multiple adverse outcomes for both mother and infant, including an increased risk of haemorrhage, maternal mortality, perinatal mortality and low birth weight (WHO, 2001b).

The prevalence of anemia in women of childbearing age remains high and more efforts are needed to combat IDA among this vulnerable population group.

Table 23: Prevalence of anemia in women of childbearing age

Survey name/date (Reference)	Background characteristics	Age (years)	Sample size	Percentage of women with	
				Any anemia (pregnant women Hb<11.0 g/dL; non pregnant women Hb<12.0 g/dL)	Severe anemia (all women Hb<7.0 g/dL)
Report of the national survey to evaluate the impact of vitamin A interventions in Zambia (July and November 2003) (MOST et al., 2003)	**Total (non-pregnant women)**	**15-49**	623	29.1	n.a.
National baseline survey on prevalence and etiology of anemia in Zambia: a random cluster community survey involving children, women and men (1998) (NFNC, 1999)	**Total**	**15-49**	1498	39.1	1.2
	Pregnancy/Breastfeeding status				
	Pregnant	**15-49**	n.a.	46.9	n.a.
	Breastfeeding	**15-49**	n.a.	n.a.	n.a.
	Non-pregnant/ Non-breastfeeding	**15-49**	n.a.	38.3	n.a.
	Residence				
	Urban	**15-49**	750	39.1	n.a.
	Rural	**15-49**	748	39.0	n.a.

Hb: Hemoglobin
n.a.: not available

The results of the 1998 national baseline survey on prevalence and aetiology of anemia in Zambia indicate that anemia is also a major health problem among men. The sample was constituted of 1 498 men aged 20-59 years. Results revealed that 26% of men were anemic (hemoglobin concentration < 13.0 g/dL) (NFNC, 1999). Trends cannot be assessed since the more recent survey did not include a sample of adult men.

The high prevalence of anemia in Zambia may be attributable to the high levels of chronic infections, including malaria and HIV/AIDS, parasitic diseases, sub-clinical infection present among the population and asymptomatic malaria. Secondly, the Zambian diet, based on cereals and starchy roots and poor in foods of animal origin, is deficient in bioavailable iron (MOST et al., 2003). Heme iron found in meat, fish and poultry is effectively absorbed, while the bioavailability of non-heme iron from plants is determined by the presence in the same meal of dietary factors that enhance absorption

[5] Non-pregnant women with hemoglobin <12.0 g/dL have anemia, pregnant women with hemoglobin <11.0 g/dL have anemia.

(heme iron or vitamin C present in fruit and vegetables) or inhibit it (phytates present in cereal bran and cereal grain; phenolic compounds present in tea or coffee, etc.) (INACG, 2002). In Zambia, the supply of foods of animal origin (meat, fish, poultry) remains low and the high cost of these products limits their consumption by households. Therefore, the low dietary intake of bioavailable iron is one of the major causes of the high prevalence of anemia in Zambia together with parasitic and infectious diseases. Other nutritional deficiencies such as folate, vitamin B12 and vitamin A are also contributing causes (INACG, 2002).

Interventions to combat IDA

The ZDHS of 2007 and of 2001-2002 document iron supplementation of mothers during pregnancy (CSO et al., 2009; CSO et al., 2003).

In 2007, at national level, 84% of mothers with a birth in the five years preceding the survey had taken iron supplements during pregnancy. Although eight in ten women reported having taken iron tablets during their pregnancy, only 44% took them for 90 or more days, as recommended (CSO et al., 2009).

Coverage of iron supplementation in mothers has increased dramatically between 2001-2002 to 2007, from 62% to 84% (CSO et al., 2003; CSO et al., 2009).

In Zambia, antenatal supplementation has been a policy for a long time, and iron/folate tablets are part of the essential drug kit used by all health facilities. Nevertheless, sustained compliance - proportion of pregnant women who take iron supplements for 90 days or more during pregnancy and/or after pregnancy without defaulting - still has to be improved.

Table 24: Iron supplementation: percentage of mothers who took iron tablets/syrups during pregnancy

Survey name/date (Reference)	Background characteristics	Number of mothers with a birth in the 5 years preceding the survey	Percent who took iron tablets/syrups during pregnancy
Zambia Demographic and Health Survey 2007 (CSO et al., 2009)	**Total**	4136	84.3
	Residence		
	Urban	1347	80.4
	Rural	2789	86.2
	Province		
	Central	405	74.2
	Copperbelt	606	76.1
	Eastern	629	84.3
	Luapula	346	91.0
	Lusaka	520	82.9
	Northern	629	88.4
	North-Western	243	82.5
	Southern	446	93.5
	Western	312	88.5

Note: For women with two or more live births in the five-year period, data refer to the most recent birth.

Besides iron supplementation, other strategies are implemented throughout the country to combat anemia. These include long-term food-based strategies and non-nutritional interventions.

As mentioned earlier, a maize meal fortification programme is under discussion which would be implemented by the Ministry of Health. Several nutrients will be added including iron. The other food-based approach to increase iron intake is the promotion of dietary diversification with consumption of iron rich foods.

Malaria, which is endemic in Zambia, is a major factor contributing to the high prevalence of anemia. Malaria prevention, which includes the distribution of treated bed-nets, is part of the Child Health Week (CHW) programme (MOH, 2005b). These efforts are complemented by specific interventions for

pregnant women - namely provision of insecticide treated nets (ITNs) at antenatal clinics and provision of intermittent preventive treatment (IPT)[6] (MOH, 2006c).

According to the 2007 ZDHS, 33% of pregnant women slept under an ITN (CSO et al., 2009). Although still insufficient, significant progress has been done since 2001-2002 when only 8% of pregnant women slept under an ITN (CSO et al., 2003).

Intermittent Preventive Treatment (IPT) for prevention of malaria during pregnancy is offered as a package through focused antenatal care. The package includes a course of SP/Fansidar, an ITN, and iron supplementation. Women with geographical access barriers receive IPT through traditional birth attendants or during health centre outreach activities (CSO et al., 2009). According to ZDHS 2007, 82% of women reported receiving at least one dose of SP/Fansidar for malaria during an ANC visit (antenatal care visit), while 63% reported receiving the recommended two doses of SP/Fansidar (CSO et al., 2009).

Schistosomiasis (bilharziosis) is prevalent in rural districts especially those close to lakes and rivers. It is estimated that almost 2 million people in Zambia are infected with bilharzia. Prevalence is as high as 90% in some communities (GRZ, 2006). The Zambia National Bilharzia Control Programme (ZBCP) was launched by the Ministry of Education in 2005 (SCI, no date). Infections with intestinal helminths (hookworm, ascaris and whip worm) are also very common and found throughout the country (GRZ, 2006). Deworming continues to be part of the Child Health Week (CHW) activities. According to 2007 ZDHS, 60% of children age 6-59 months received deworming medication in the six months prior to the survey (CSO et al., 2009).

Zambia has implemented various interventions to combat anemia. Nevertheless, long-term food-based strategies need to be reinforced to ensure adequate iron intake in a sustainable way.

Other micronutrient deficiencies

According to the International Zinc Nutrition Consultative Group (IZiNCG), on the basis of the prevalence of stunting among underfives and the apparent low bioavailability of zinc in the national food supply, Zambia is classified at high risk of zinc deficiency (IZiNCG, 2004). Nevertheless, a national survey should be conducted in order to assess the magnitude and the severity of zinc deficiency in the population. Moreover zinc deficiency frequently co-exists with iron deficiency as these micronutrients are found in many of the same foods and the dietary components that modify their absorption are similar (IZiNCG, 2004).

Zambia has experienced some pellagra cases in the Southern province of the country, following the 1992-93 drought. Pellagra is a disorder due to inadequate dietary intake of niacin (vitamin B3) and/or tryptophan. Maize, the staple in Zambia, is deficient in tryptophan and the niacin in maize is in a form of low bioavailability (WHO, 2000). Unfortunately, no scientific studies have been conducted to determine the prevalence of niacin deficiency countrywide. The fortification of maize with niacin could prevent the recurrence of pellagra, while diversification of the diet would be the most sustainable solution.

II.7 Policies and programmes aiming to improve nutrition and food security and monitoring activities

In April 2005, the Government adopted the National Food and Nutrition Policy which aims to provide a framework for guiding the development and implementation of food and nutrition interventions that would ensure a well nourished, healthy and productive nation and indeed eliminate all forms of malnutrition and enhance food security.

[6] IPT is defined as having taken at least two treatment doses of an effective antimalarial drug (sulfadoxine-pyrimethamine -SP- in Zambia) during routine antenatal care visits (MOH, 2006c).

The vision of the Policy is to achieve optimum nutritional status of the Zambian population. It includes fourteen main policy concerns which are: the elimination of all forms of malnutrition; food security; care for the nutritionally vulnerable; gender and nutrition; nutrition, health and environment; nutrition and HIV/AIDS; training and capacity building; research and surveillance; emergency preparedness and mitigation; institutional framework; legal framework; financing of nutrition activities; implementation; and monitoring and evaluation (MOH, 2006b).

In order to implement the National Food and Nutrition Policy, the Ministry of Health in collaboration with other partners is finalizing the policy implementation Plan. The Implementation Plan concentrates on key outcomes and specific activities where progress can be readily and accurately measured. The Plan identifies what will be done, when it will be done and how implementation will be evaluated. These elements are drawn from important goals of the Policy and include the proposed response, timing, responsibility, cost and performance measures.

Despite the fact that the Policy Implementation Plan is yet to be finalized, the Ministry of Health, through the National Food and Nutrition Commission has in place the Infant and Young Child Feeding Operational Strategy (MOH, 2006a), the Micronutrient operational strategy (MOH, 2005b) and Nutrition guidelines for care and support of people living with HIV/AIDS (NFNC, 2004). The Growth monitoring and promotion strategy is being finalized.

Fortification of foods with micronutrients has in the recent past received great attention in Zambia, especially following the success of sugar fortification with vitamin A in 1998. With the universal declaration of salt iodization, all the salt entering Zambia is iodized. It was expected that maize fortification would start in 2007 but implementation has been delayed (MOH, 2005b).

The Food Reserve Act 1995 of the Zambian government established the Food Reserve Agency which is a parastatal body funded by the government that falls under the Ministry of Agriculture and Cooperatives. It is in charge of securing national food reserves and stabilizing market prices of designated crops (maize, cassava, rice, soy beans, and groundnuts). The Agency purchases and stocks crops from small scale farmers in rural Zambia; releases these stocks through community sales and to millers to respond to food emergencies caused by natural disasters and to local shortfalls in supply; it collects marketing information on grain trading, processing, stocks and prices on the local and international market. The Food Reserve Agency also produces estimates of import requirements and harvest forecasts[7]. However, given chronic underfunding and inappropriate specification of the scope of activities, the Food Reserve Agency has failed to maintain an adequate strategic food reserve (USAID, 2003).

Under the Vice-Presidents office, a Disaster Management Unit (DMU) is tasked with coordination responsibilities for all sectors that deal with food security. It coordinates and networks with all governmental and non-governmental institutions in the implementation of food security programmes and coordinates the management of food shortage disasters. The government has also established a unit responsible for the overall management of emergency response to food crisis (FFSSA, 2003).

The Food, Health and Nutrition Information System (FHANIS) has an advocacy role with the objectives of strengthening design and implementation of food and nutrition programmes, and improving the focus of food relief and supplementary feeding programmes. FHANIS collects information on food security, health and nutrition, water and sanitation, and food consumption. However, this system lacks adequate government funding to operate in an effective and timely manner (FAO, 2000).

Information systems related to food security situation and nutrition include:

- the Zambia National Early Warning System (NEWS), established in 1982, which provides government with information on crop prospects over time, food supply/demand situations, food availability, stock levels of agricultural inputs and regional cereal stocks. The role of the NEWS is to assist government in the planning and execution of food production and supply management programmes in order to ensure and safeguard the food security of the population.

- the Zambia Vulnerability Assessment Committee (ZVAC) focuses on household food security (by examining the access of different population groups to food and cash income in relation to their food

[7] Source: Food Reserve Agency Zambia website (http://www.fra.org.zm/)

needs, shocks and stresses experienced by households and coping strategies) and provides adequate and timely information for responding to various forms of food insecurity.

- the National Food and Nutrition Commission (NFNC), established in 1967, advises government on food and nutrition policy and coordinates food and nutrition activities. With the responsibility of reducing malnutrition and improving the nutrition of the country, NFNC is involved in food and nutrition surveys, nutrition education, field research, etc. The NFNC has undertaken several activities (National Breastfeeding Programme, vitamin A supplementation programme, sugar fortification, etc.). However, NFNC's mandate has not had adequate support and resources for effective operationalisation and there is a need to strengthen its institutional capacity (FFSSA, 2003).

The Ministry of Health through the National Food and Nutrition Commission has in 2007 reintroduced the National Nutrition Surveillance System which is being piloted in the four districts of the Lusaka province namely Kafue, Lusaka, Chongwe and Luangwa districts (NFNC, 2007).

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