



# **SAMPLE VITAL REGISTRATION WITH VERBAL AUTOPSY 2010/12**

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## List of Abbreviations

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AIDS	Acquired Immuno-Deficiency Syndrome
ANC	Antenatal Care
CDC	Centers for Disease Control and Prevention
COD	Cause of Death
CSO	Central Statistical Office
CSAs	Census Supervisory Areas
DNRPC	Department of National Registration, Passports and Citizenship
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
ICD	International Classification of Disease
IMR	Infant Mortality Rate
IPT	Intermittent Presumptive Treatment
ITNs	Insecticide Treated Nets
ISCO	International Standard Classification of Occupations
KIs	Key Informants
MDGs	Millennium Development Goals
MMRate	Maternal Mortality Rate
MMR	Maternal Mortality Ratio
NMCC	National Malaria Control Centre
PDA	Personal Digital Assistant
PMTCT	Prevention of Mother to Child Transmission
PSUs	Primary Sampling Units
SAVVY	Sample Vital Registration with Verbal Autopsy
SEAs	Standard Enumeration Areas
SMAGs	Safe Motherhood Action Groups
USAID	United States Agency for International Development
USA	United States of America
VAIs	Verbal Autopsy Interviewers
WHO	World Health Organisation
ZDHS	Zambia Demographic and Health Survey



## Acknowledgement

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Zambia conducted the Sample Vital Registration with Verbal Autopsy (SAVVY) from 2010-2012. The SAVVY undertaking provided an opportunity to supplement Zambia's vital registration system, as well as provide key vital information on births, deaths and causes of death. This is against a background of a weakened national civil registration system over the years.

This survey benefitted greatly from the unwavering financial assistance of the United States Government (USG). I wish therefore, to thank the American people for their generosity in making available the funds for this survey undertaking. I acknowledge the Centers for Disease Control and Prevention (CDC) both in Zambia and Atlanta for the administrative and technical support rendered to CSO in the survey operations. I wish to also thank the Government of the Republic of Zambia (GRZ) for supplementing the cooperating partner's funds on various aspects of the survey.

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and facility levels for their support in allowing their staff to participate. I thank in particular the Environmental Health Technicians and Nursing staff who participated as Verbal Autopsy Interviewers. My sincere gratitude also goes to Key Informants (community health workers and traditional birth attendants) for their critical role in the creation of easy access to targeted respondents for verbal autopsy interviews. Further, I thank all respondents for their cooperation and providing data on a sensitive issue such as death, which most often is a solemn reminder of the loss of a beloved family member.

Finally, I thank all CSO staff involved in their various capacities in coordinating and conducting various stages of the survey including the data collection, data processing, analysis and writing of this report.



John Kalumbi  
**DIRECTOR OF CENSUS AND STATISTICS**

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## Executive Summary

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Sample Vital Registration with Verbal Autopsy (SAVVY) was first commissioned as a pilot in order to test the feasibility of using a World Health Organisation (WHO) standard methodology for SAVVY to report leading causes of death in Zambia. The pilot SAVVY was conducted in four provinces namely; Central, Luapula, Lusaka and Southern. After the pilot, SAVVY was rolled out to all the nine provinces in selected areas for the period 2010 to 2012.

The SAVVY undertaking provided an opportunity to supplement Zambia's vital registration system, as well as provide key vital information on births, deaths and causes of death. SAVVY was initiated in Zambia in response to the lack of a fully-functioning civil registration system and the growing need for accurate and reliable vital statistics and mortality indicators at various levels (national, provincial, rural and urban). The main objective of SAVVY was to provide nationally representative estimates of age and sex cause-specific mortality fractions in Zambia.

A stratified one-stage sample of segments was selected for the SAVVY. The target population size for the segments was about 1,200 for rural areas and 1,800 for urban areas. The proposed sample population was therefore 109,200. This represented a sample of 76 Census Supervisory Areas (CSAs).

Results of the SAVVY indicate that of the 76,226 respondents, 48.8 percent were males and 51.2 percent

were females. Adults aged 15 years and older accounted for 53.8 percent of the population.

The total number of deaths reported was 2,759. Of these 53.4 percent were males while 46.5 percent were females. There were more deaths in rural areas at 67.4 percent compared to 32.6 percent in urban areas. Overall, 48.0 percent of the deceased, died at home while 34.9 percent died at a hospital. In rural areas, more than half of the deaths occurred at home (56.1 percent) while in urban areas more than half of the deaths occurred in a hospital (53.0 percent).

Most of the deceased persons (75.3 percent) received treatment during the illness that led to death. The majority of persons (62.8 percent) who did not receive treatment for the illness that led to death died at home.

Of the total deaths reported, Human Immuno-deficiency Virus (HIV) was the major cause of death for both males and females at 19.3 and 21.5 percent, respectively.

Malaria was the major cause of death among children aged 0-4 years and 5-14 years at 17.6 and 39.3 percent, respectively. Human Immuno-deficiency Virus was the major cause of death among adults aged 15 years and older at 28.4 percent.

# Chapter 1: Introduction

## 1.1 Overview and Objectives

Civil registration was introduced in Zambia in 1969 and regulatory framework exists through the birth and death registration act CAP 51 of the Laws of Zambia. However, the system of civil registration is weak, fragmented and is characterized by weak linkages between the lead institution (DNRPC) and other stakeholder institutions. Consequently, the existing system does not generate usable vital statistics to inform health policy. Sample Vital Registration with Verbal Autopsy (SAVVY) was initiated in Zambia in response to the lack of a fully-functioning civil registration system and the growing need for accurate and reliable vital statistics and mortality indicators at various levels (national, provincial, urban and rural).

Information on mortality is collected by health facilities throughout Zambia. However, this system does not collect data on deaths occurring at home, which are considered to represent a substantial proportion of deaths in the country. These home deaths are unlikely to be registered for certification, especially in rural areas. Mortality data is also provided through household-based exercises like the Zambia Demographic and Health Surveys (1991, 1996, 2001/2 and 2007) and Censuses (1969, 1980, 1990, 2000 and 2010). Mortality data from these sources do not provide data on cause-specific mortality. Therefore, mortality estimates have not been sufficient for setting health sector priorities or for assessing program progress and impact. The recent Census of Population and Housing (2010) made an attempt to provide cause-specific mortality data by including questions on causes of deaths occurring in the households 12 months prior to the census.

Sample Vital Registration with Verbal Autopsy (SAVVY) was commissioned first as a pilot in order to test the feasibility of using a World Health Organisation (WHO) standard methodology for SAVVY to report leading causes of death in Zambia. This report presents the findings of the Pilot and the full scale survey which was conducted in all selected areas in nine provinces. SAVVY was implemented by the Central Statistical Office in collaboration with the Ministry of Health. Funds for SAVVY undertaking were mainly provided by the US Government through CDC-Zambia and the Government of the Republic of Zambia. MEASURE Evaluation through the Futures Group of the USA provided technical assistance to the survey.

The main objective of SAVVY was to provide nationally representative estimates of age and sex cause-specific mortality fractions in Zambia. Overall, it was expected that the information generated by the SAVVY system would help inform decision making among programme

managers and policy makers. This would lead to evidence-based planning and priority setting in the provision of health services and in the development of health interventions.

### 1.1.2 Objectives

The overall objective of the SAVVY is to produce annual nationally representative estimates of vital statistics and mortality by cause of death. It is also aimed at providing reliable estimates of annual trends in the mortality rates and other indicators, through a longitudinal approach to data collection in sample areas.

#### Short Term Objectives

*To collect detailed, accurate and timely data on births and deaths at national level;*

- To collect data for monitoring national health interventions at national level; and*
- To sensitize and create awareness of the availability and importance of vital statistics data to planners and policy makers.*

#### Long Term Objectives

- To support and strengthen the reporting, recording, compilation, analyses and dissemination of vital statistics in Zambia;*
- To enhance capacity in the collection, compilation, analysis and interpretation of births and mortality surveillance data among staff in key institutions; and*
- To contribute to the development of an effective and efficient national system of vital registration.*

## 1.2 Methodology

The sample for the SAVVY was designed based on the overall project objectives, taking into account statistical efficiency, as well as considerations of the resource and operational constraints.

### 1.2.1 Sample Design

The Census of Population and Housing of Zambia conducted in 2000 provided the sampling frame for selecting a nationally-representative sample of areas for conducting the SAVVY enumeration, surveillance and verbal autopsy (VA) operations. The smallest operational areas delineated in the census cartography are standard enumeration areas (SEAs) and census supervisory areas (CSAs).

The population covered by SAVVY included a sample of all of persons living in individual households

throughout Zambia. This excluded the population living in institutions and other types of group quarters. Certain areas identified as refugee camps during the 2000 Census enumeration in North Western Province were also excluded. It was estimated that this population comprised less than one percent of the population of Zambia.

#### 1.2.1.1 Stratification

A stratified one-stage sample of segments was selected for the SAVVY. In order to increase the efficiency of the sample design for SAVVY, the sampling frame of Primary Sampling Units (PSU), or the CSAs were divided into strata which were as homogeneous as possible. The first stage selection of sample CSAs was carried out independently within each explicit stratum. The nature of the stratification depended on the most important characteristics to be measured in SAVVY, as well as the domains of analysis.

The first level of stratification of the PSUs in a sample survey generally corresponds to the geographic domains of analysis. Therefore, the CSAs in the sampling frame were first stratified by province, rural and urban.

Given the SAVVY objective of measuring mortality rates by major cause, a stratification variable related to mortality was introduced. The 2000 Zambia Census data had been used to calculate indirect estimates of the infant mortality rate (IMR) for the rural and urban parts of each district. These published IMR estimates were used to establish two IMR substrata for the CSAs within the rural and urban strata of each province: code 1 was assigned to the CSAs in districts with an IMR below the national estimate (separately for rural and urban), and code 2 was assigned to the CSAs in districts with an IMR above the national estimate. The CSAs were sorted by IMR substratum and geographic codes (district, ward and CSA) to provide a high level of implicit stratification given the systematic selection of the CSAs (with probability proportional to size) within each stratum.

#### 1.2.1.2 Sample Size and Allocation

The sample size for the SAVVY was determined by the accuracy required for the estimates of key indicators, as well as by the resource and operational constraints. Some of the key indicators from SAVVY were the mortality rate due to HIV/AIDS and other major causes, and as such, the precision of these estimates depended on the number of death events (and VA observations) in the sample base population. It was necessary, therefore to ensure a relatively large sample base population to ensure a sufficient sample of death events.

#### 1.2.1.3 Selection of Sample CSAs

The sampling frame of CSAs from the 2000 Census was used for selecting the sample of 76 CSAs. In order to improve the efficiency of the sample design, the frame of

CSAs within each province, rural and urban stratum, was sorted by Infant Mortality Rate (IMR) substratum and geographic codes, in order to provide a corresponding implicit stratification by these criteria. The sampling frame includes information from the 2000 Census on the number of households and population within each CSA. Within each stratum, the CSAs were selected systematically with Probability Proportional to Size (PPS) using the following procedures:

(1) *Cumulate the measures of size (2000 Census population) down the ordered list of CSAs within the stratum. The final cumulated measure of size is the total population in the frame for the stratum ( $M_h$ ).*

(2) *To obtain the sampling interval for stratum  $h$  ( $I_h$ ), divide  $M_h$  by the total number of CSAs to be selected in stratum  $h$  ( $nh$ ), based on the sample allocation in Table 7:  $I_h = M_h/nh$ .*

(3) *Select a random number ( $R_h$ ) between 0 and  $I_h$ . The sample CSAs in stratum  $h$  are identified by the following selection numbers:*

rounded up,

where  $i = 1, 2, 3, \dots, nh$

#### 1.2.1.4 SAVVY Sample

A nationally-representative sample of 76 census supervisory areas (CSAs) was selected. This consisted of a sample of 46 rural CSAs and 30 urban CSAs. The target population size for the segments was about 1,200 for rural areas and 1,800 for urban areas. The proposed sample population was therefore 109,200. The sample design approach provided more flexibility for expanding the sample in the future for provincial-level results.

The sampled sites were selected to represent different population densities and socio-economic characteristics. The implementation sites were monitored regularly to ensure data quality and resolve problems that could affect implementation of the program.

All seventy six CSAs were enumerated to provide a sufficient number of births and deaths over the implementation period, as well as population figures for denominators. During the baseline census all the SEAs in the selected CSAs were covered and all the households within these SEAs were enumerated.

### 1.3 Preparatory Activities for SAVVY Implementation

Preparatory activities for the SAVVY implementation consisted development of protocol and work plan; adaptation and printing of the standard WHO questionnaires and manuals, procurement of office

and field materials and equipment; publicity; area identification and recruitment of field staff; training of master trainers and field staff.

Another major preparatory activity was the Pilot SAVVY implemented in four provinces, namely Central, Luapula, Lusaka and Southern. In the pilot 33 CSAs were selected based on different socio-economic characteristics and logistical challenges. The pilot was essential in assessing the feasibility of implementing the SAVVY in Zambia.

### 1.3.1 Area Identification

This process involved on site visits to the selected CSAs in the nine provinces. Using 2000 Census maps, selected areas were identified by noting the CSA boundary. The area identification also involved identifying a health facility within the sample area from which personnel involved in the mortality surveillance were selected. In a few cases, these health facilities were located outside the selected sample areas.

The first group of people identified were the Verbal Autopsy Interviewers (VAIs) who were mostly Environmental Health Technicians and in a few cases teachers. The selection criteria for the VAIs were that they lived and worked within the communities and worked closely with community health workers. Ability to understand the field instruments and procedures was an added advantage. Key Informants (KIs) who were members of the community health committees and affiliated to the identified health facility in the sampled area were selected. The Verbal Autopsy Interviewers (VAIs) and Key Informants (KIs) were centrally trained in each province in order to orient them to the data collection instruments and field procedures.

### 1.3.2 Publicity

Publicity is essential for a successful survey undertaking. The publicity strategy adopted included sensitization of communities through interpersonal interaction. SAVVY fliers produced prior to the publicity activities were distributed in the study areas. Communities in the sampled areas were visited to raise awareness through the simplified SAVVY messages and engaging the local leadership (e.g. Chiefs, Headmen, District Commissioners, etc). The publicity provided a good platform for the implementation of the survey.

## 1.4 Fieldwork and Data Collection

There are several phases that constitute the standard implementation of the SAVVY system. The phases are Baseline Census, Surveillance of Vital Events, Verbal Autopsy and Birth Interviews.

### 1.4.1 Baseline Census

The SAVVY in Zambia involved conducting a baseline census in the sampled sites. All households within the

limits of the implementation sites were visited and a total count taken of households, household members and visitors currently in the households. Key demographic and socio-economic characteristics of households and the population in the implementation sites were collected. Information on births was collected from women in the reproductive age group (15-49 years) present in the households at the time of the census. Also collected was information on deaths that occurred in the household in the 12 months prior to the survey. The aim of the baseline census was to provide updated demographic and socio-economic indicators of the sampled population.

During the baseline census each household in the sampled area was listed and given a unique identifier on a sticker. This was used to identify households during verbal autopsy visits and the census update. The identification information was also useful when linking the households from the baseline and update census to the verbal autopsy.

### 1.4.2 Verbal Autopsy

The verbal autopsy and birth interviews formed the core of the SAVVY. All deaths and births occurring in the implementation site were identified through Community Key Informants. The role of the Key Informant was to capture and communicate the occurrence of a death or birth to the Verbal Autopsy Interviewer and further facilitated an appointment for the interview at a time convenient to the household where the event occurred.

In the event of a death, the next of kin or any adult respondent with information and knowledge of the deceased individual responded to the interview using a structured verbal autopsy questionnaire appropriate for the deceased. Data collected about the deceased person include age, sex, marital status, occupation, education level, cause of death, history of illness and place of death.

### 1.4.3 Data Collection Tools and Strategy

Personal Digital Assistants (PDA) and paper questionnaires were used to collect data during field work. Verbal autopsy data was collected using the three WHO standard questionnaires for SAVVY and entered using CSPro 3.3.

## 1.5 Cause of Death Certification and ICD Coding

The verbal autopsy interviews captured detailed information on events leading to the death of the deceased member(s) of households. All completed Verbal Autopsy questionnaires were coded by nosologists (Medical doctors and clinical officers) from the Ministry of Health.

The nosologists were trained on VA questionnaire review, how to produce a death certificate, how to assign

an immediate and underlying cause of death based on International Classification Disease coding system ICD-10 guidelines and coding principles. Two nosologists independently reviewed each VA questionnaire to determine a probable cause of death. They each completed a death certificate for the VA death and assigned an ICD-10 code. The death certificates and ICD-10 codes completed by the two nosologists were then compared. If they agreed, the cause of death assigned was considered final. If they disagreed, they reviewed the VA questionnaire together to reach an agreement. If they failed to reach consensus on the underlying cause, the cause of death for that particular VA death was considered undetermined.

## 1.6 Data Analysis

Analysis of census and verbal autopsy data was done using STATA. The data analysis included descriptive analysis of demographic and socio-economic data

collected during the baseline census. This is presented in Chapter Two. Analysis was weighted taking into account the population size from 2010 national census and baseline population from SAVVY sample, using appropriate survey design techniques.

Mortality and fertility rates for the sampled areas were also calculated. Further, cause-specific mortality data was tabulated by age, sex, geographic and socio-economic strata. This was done by tabulating the coded cause of death from each particular questionnaire. The analysis of the causes of mortality were done and classified for the major groups according to the 10th revision of the International Statistical Classification of Disease and Related Health Problems (ICD-10). The results on mortality and its causes are presented in Chapter Three. Further analysis on the burden of disease and mortality for selected causes is presented in Chapter Four.

## Chapter 2: Demographic and Socio-Economic Characteristics

### 2.0 Introduction

This chapter presents the demographic and socio-economic characteristics of the study population. This includes characteristics of the persons who were found in the household at the time of the census and for the deceased.

### 2.1 Characteristics of the Population

Table 2.1 shows the demographic and socio-economic characteristics of the study population and the deceased persons. Of the 176,226 respondents, 48.8 percent were

males and 51.2 percent were females. Adults aged 15 years and older accounted for 53.8 percent of the population. The population residing in urban areas accounted for 51.9 percent of the total population and 48.1 percent for rural areas. The highest proportion of the respondents were either married/living with a partner at 46.7 percent. This was followed by the never married at 43.1 percent. The separated had the lowest proportion at 1.5 percent.

The population with primary education accounted for 47.9 percent followed by secondary education at 30.6 percent.

Table 2.1: Demographic and Socio-Economic Characteristics of the Study Population and the Deceased Persons, Zambia 2010-2012				
Characteristics	Living Population (Baseline Census)		Deceased Persons (VAs)	
	Number	Percent	Number	Percent
<b>Sex</b>				
Males	85,975	48.8	1,474	53.4
Females	90,251	51.2	1,282	46.5
Missing	-	-	3	0.1
Total	176,226	100	2,759	100
<b>Age (in Years)</b>				
0-4	31,249	17.7	906	32.8
5-14	50,102	28.4	143	5.2
15+	94,875	53.8	1,705	61.8
Missing	-	-	6	0.2
Total	176,226	100	2,759	100
<b>Rural/Urban</b>				
Rural	84,748	48.1	1,861	67.4
Urban	91,478	51.9	899	32.6
Total	176,226	100	2,759	100
<b>Marital Status (12 Years and Older)</b>				
Never married	46,797	43.1	291	16.9
Married	50,624	46.7	863	50.1
Widowed	5,722	5.3	340	19.8
Divorced	3197	3.0	168	9.7
Separated	1594	1.5	51	3.0
Don't know/missing	592	0.5	9	0.5
Total	108,526	100	1,722	100
<b>Education Level (5 Years and Older)</b>				
None	21,003	14.5	354	19.2
Primary	69,446	47.9	827	44.7
Secondary	44,401	30.6	469	25.4
Higher	9,976	6.9	89	4.8
Don't know/missing	151	0.1	108	5.9
Unspecified/missing	7	0.0		
Total	144,977	100	1,847	100

### 2.2 Characteristics of the Deceased

Of the 2,759 deceased persons, 53.4 percent were male while 46.5 percent were female. There were more deaths in rural areas at 67.4 percent compared to 32.6 percent in urban areas. Half of the deceased persons (50.1 percent) were married followed by the widowed at 19.8 percent. Most of the deaths occurred in the age group 15 years and older at 61.8 percent by followed by those aged 0-4 years at 32.8 percent. The age group 5-14 years had the least deaths at 5.2 percent. The highest proportion of the deceased had primary education at 44.7 percent followed by secondary education at 25.4 percent.

Figure 2.1 shows the employment status of the population aged 12 years and older. The Self Employed persons accounted for 30.1 percent followed by full time students at 27.3 percent. The least were the Retired at 0.8 percent.

Figure 2.1: Percentage of Population Aged 12 Years and Older by Employment Status, Zambia 2010-2012

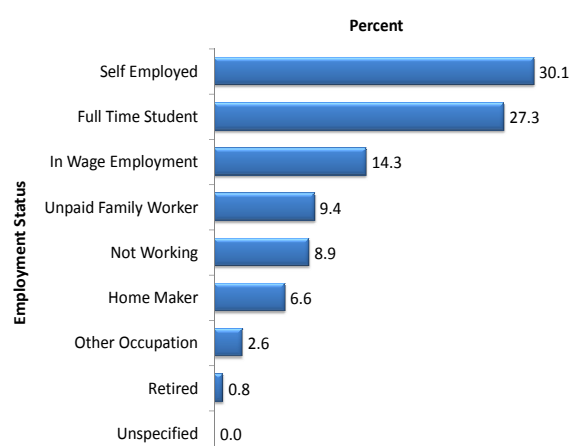


Figure 2.2 shows the percentage distribution of deceased persons (12 years and older) by occupation status. The highest proportion of the deceased was recorded among the Skilled agriculture/ fishery workers at 39.4 percent followed by those in Elementary occupations/Others at 37.0 percent. The least was among Technicians/Associate professionals at 1.4 percent.

**Figure 2.2: Percentage of Deceased persons (Aged 12 Years and Older) by Occupation Status, Zambia 2010-2012**

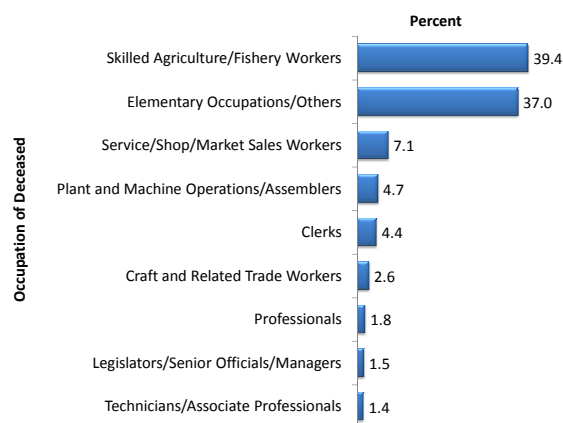


Figure 2.3 shows the percent distribution of the population by age and sex. Population distribution in Zambia has a wide base, indicating that there are more people at younger than older ages.

**Figure 2.3: Population Distribution of Population by Age Group and Sex, Zambia 2010-2012**

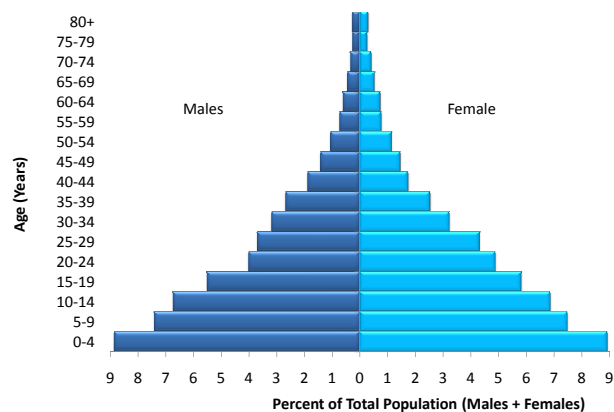
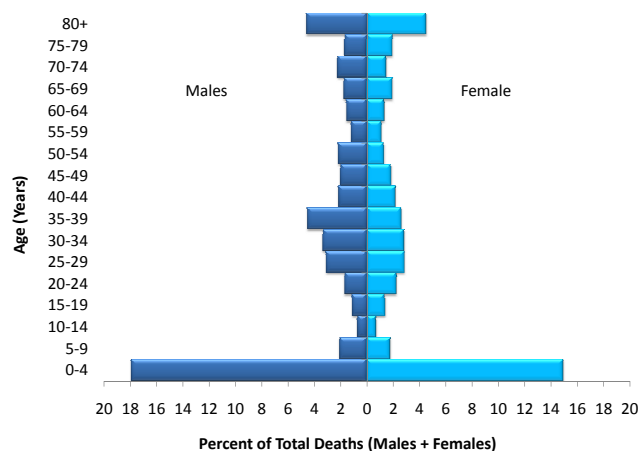


Figure 2.4 shows the percent distribution of deaths by age group and sex. There were more deaths in the 0-4 years age group for both sexes. The figure also shows a bump in the middle ages 15-50 years indicating high mortality in these ages.

**Figure 2.4: Percent Distribution of Deaths by Age Group and Sex, Zambia 2010-2012**



## Chapter 3: Place of Death and Causes of Death

### 3.0 Introduction

This chapter presents findings on place of occurrence of death and the leading causes of death. Background information was collected for both rural and urban areas, sex and age groups. The background information provides observed differentials in the burden of disease profile in Zambia. These findings are presented with a focus on the top 15 underlying causes of death while the remainder of the causes are grouped together to form the category of “All other causes combined”. There is also a category of “Ill-defined & undefined causes of mortality”; a category that represents cases where the cause of death could not be determined by the coders due to insufficient information collected in the verbal autopsy questionnaires to reach an underlying cause of death. Additionally, the “ill-defined” category includes deaths in which the causes could not be determined as a result of the differences among the coders as to what was the likely cause of death. Where differences arose between coders, and a consensus was not reached, such cases were coded as “ill-defined”.

### 3.1 Place of Death

Place of death refers to where the death occurred. The categories include hospital, other health facility, home and other place. Other place describes deaths that occurred for instances on the way to the health facility, accident scene, drowning in a river/stream etc.

#### 3.1.1 Place of Death by Rural/Urban

Table 3.1 shows the place of death by rural/urban. Out of the 2,759 deaths that occurred in Zambia, during the survey period, 48.0 percent occurred at home. About 46 percent of all reported deaths occurred at a health facility; of these 34.9 percent occurred at hospitals while 10.9 percent occurred at other health facilities.

In rural areas, 56.1 percent of deaths occurred at home followed by hospitals at 26.2 percent. In urban areas, 53.0 percent of the deaths occurred in hospitals while 31.1 percent occurred at home.

**Table 3.1: Percentage Distribution of Deceased Persons by Place of Death and Rural/Urban, Zambia, 2010-2012**

Place of Death	Total	Percent	Rural	Percent	Urban	Percent
Hospital	963	34.9	487	26.2	476	53.0
Other Health Facility	299	10.9	217	11.7	82	9.2
Home	1,324	48.0	1,044	56.1	280	31.1
Other place	170	6.1	111	5.9	59	6.6
Not specified	3	0.1	2	0.1	1	0.1
<b>Total Deaths</b>	<b>2,759</b>	<b>100.0</b>	<b>1,861</b>	<b>100.0</b>	<b>898</b>	<b>100.0</b>

#### 3.1.2 Place of Death by Sex

Table 3.2 shows the place of death by sex of the deceased. Deaths from a hospital was higher for males at 53.6

percent compared to females at 46.2 percent. The highest proportion of females died from other health facilities (48.2 percent).

**Table 3.2: Percentage Distribution of Deceased Persons by Sex and Place of Death, Zambia, 2010-2012**

Place of Death	Male	Percent	Female	Percent	Sex Unspecified	Percent	Total
Hospital	516	53.6	445	46.2	2	0.2	963
Other health facility	154	51.4	145	48.2	1	0.4	299
Home	700	52.9	623	47.1	0	0.0	1,324
Other place	103	60.6	67	39.4	0	0.0	170
Not specified	1	33.6	2	66.4	0	0.0	3
<b>Total</b>	<b>1,474</b>	<b>53.4</b>	<b>1,282</b>	<b>46.5</b>	<b>3</b>	<b>0.1</b>	<b>2,759</b>

#### 3.1.3 Place of Death by Age

Table 3.3 shows percentage distribution of deceased by age group. The highest proportion of persons 65.3 percent aged 15 years and older that died from a hospital compared to the younger ones at 29.3 percent. Persons

under five years of age were more likely to die from other health facilities (48.4 percent) than those aged 15 years and older (45.7 percent).

**Table 3.3: Percentage Distribution of Deceased Population by Age Group and Place of Death, Zambia, 2010-2012**

Place of Death	0-4 yrs	Percent	5-14 yrs	Percent	15+ yrs	Percent	Missing Age	Percent	Total
Hospital	282	29.3	52	5.4	629	65.3	0	0.0	963
Other health facility	145	48.4	18	5.9	137	45.7	0	0.0	300
Home	421	31.8	56	4.2	842	63.6	5	0.4	1324
Other places	57	33.8	17	10.4	94	55.3	1	0.6	169
Not specified	0	0.0	0	0.0	3	100.0	0	0.0	3
<b>Total</b>	<b>906</b>	<b>32.8</b>	<b>143</b>	<b>5.2</b>	<b>1,705</b>	<b>61.8</b>	<b>6</b>	<b>0.2</b>	<b>2,759</b>

#### 3.1.4 Place of Death by Province

Table 3.4 shows percentage of deceased persons by place of death and province. Overall deaths from home accounted for 48.0 percent. Provinces with higher proportions of persons that died at home were Central,

Luapula and Western provinces at 52.4 percent, 59.6 percent and 58.2 percent, respectively. North Western Province had the lowest proportion of persons dying from home at 34.7 percent.

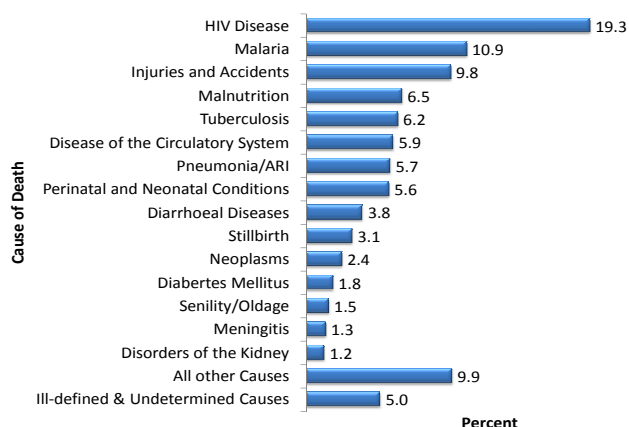
**Table 3.4: Percentage Distribution of Deceased Persons by Place of Death and Province, Zambia, 2010-2012**

Province	Total Deaths	Hospital	Percent	Other Health Facility	Percent	Home	Percent	Other Place	Percent	Don't know	Percent
Central	171	61	35.7	9	5.5	89	52.4	11	6.4	0	0.0
Copperbelt	136	66	48.3	9	6.7	51	37.6	10	7.3	0	0.0
Eastern	628	246	39.2	52	8.2	307	49.0	23	3.6	0	0.0
Lupula	443	76	17.3	74	16.7	264	59.6	29	6.5	0	0.0
Lusaka	443	170	38.3	70	15.7	158	35.6	45	10.1	1	0.2
Northern	181	71	39.1	16	9.1	81	44.6	13	7.2	0	0.0
North Western	95	56	59.0	2	2.5	33	34.7	4	3.8	0	0.0
Southern	340	133	39.2	27	8.0	153	45.0	26	7.5	1	0.3
Western	322	84	25.9	40	12.4	187	58.2	10	3.2	1	0.3
<b>Total</b>	<b>2,759</b>	<b>963</b>	<b>34.9</b>	<b>300</b>	<b>10.9</b>	<b>1,324</b>	<b>48.0</b>	<b>170</b>	<b>6.1</b>	<b>3</b>	<b>0.1</b>

## 3.2 Underlying Causes of Death in Zambia

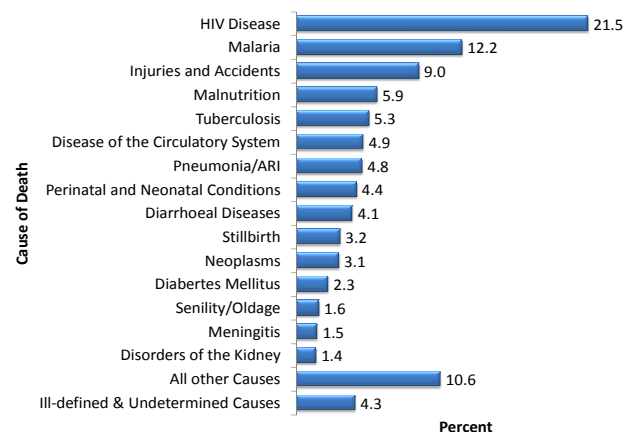
### 3.2.1 Male Deaths

Figure 3.1 shows the percentage distribution of leading causes of death (Top 15) among males of all ages in Zambia. Human Immuno Deficiency Virus (HIV) was the major cause of death for males at 19.3 percent followed by deaths due to malaria at 10.9 percent. Disorders of the kidney were the least causes of death with 1.2 percent. Of all the death among males five percent were undetermined or ill-defined.

**Figure 3.1: Percentage Distribution of Leading Causes of Death (Top 15 among Males, Zambia 2010-2012)**

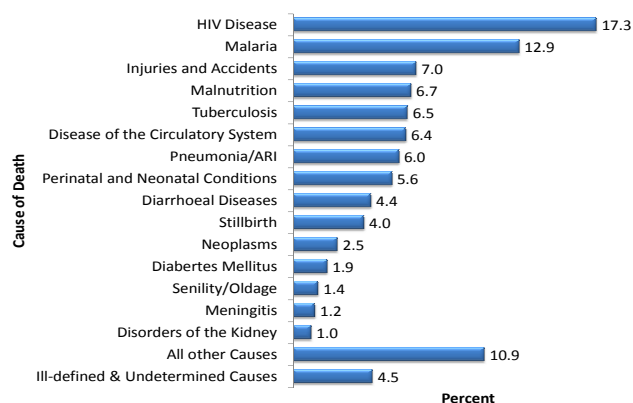
### 3.2.2 Female Deaths

Figure 3.2 presents the percentage distribution of leading causes of death (Top 15) among females of all ages in Zambia. HIV related diseases were the highest cause of death among females with 21.5 percent followed by malaria at 12.2 percent. Injuries and accidents were the third highest cause of death with 9.0 percent while malnutrition was fourth at 5.9 percent. Disorders of the kidney was the lowest cause of death among females at 1.4 percent.

**Figure 3.2: Percentage Distribution of Leading Causes of Death (Top 15) among Females, Zambia 2010-2012**

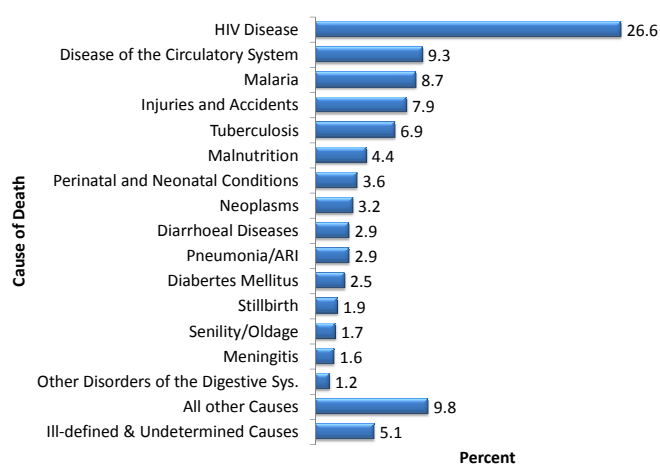
### 3.2.3 Rural Deaths

Figure 3.3 shows the percentage distribution of leading causes of death (Top 15) in rural areas in Zambia. Human Immuno Deficiency Virus was the major cause of death in rural areas at 17.3 percent followed by deaths due to Malaria at 12.9 percent. Disorders of the kidney were the least causes of death with 1.0 percent. All the other remaining causes of death combined accounted for 10.9 percent while deaths due to undetermined causes was 4.5 percent.

**Figure 3.3: Percentage Distribution of Leading Causes of Death (Top 15) in Rural Areas, Zambia 2010-2012**

### 3.2.4 Urban Deaths

Figure 3.4 shows the percentage distribution leading causes of death (Top 15) in urban areas for Zambia. Human Immuno-Deficiency Virus was the major cause of death in urban areas at 26.6 percent followed by deaths due to Diseases of the Circulatory system at 9.3 percent. Other disorders of the digestive system were the least causes of death at 1.2 percent. All the other remaining causes combined accounted for 9.8 percent while deaths due to undetermined causes was at 5.1 percent.

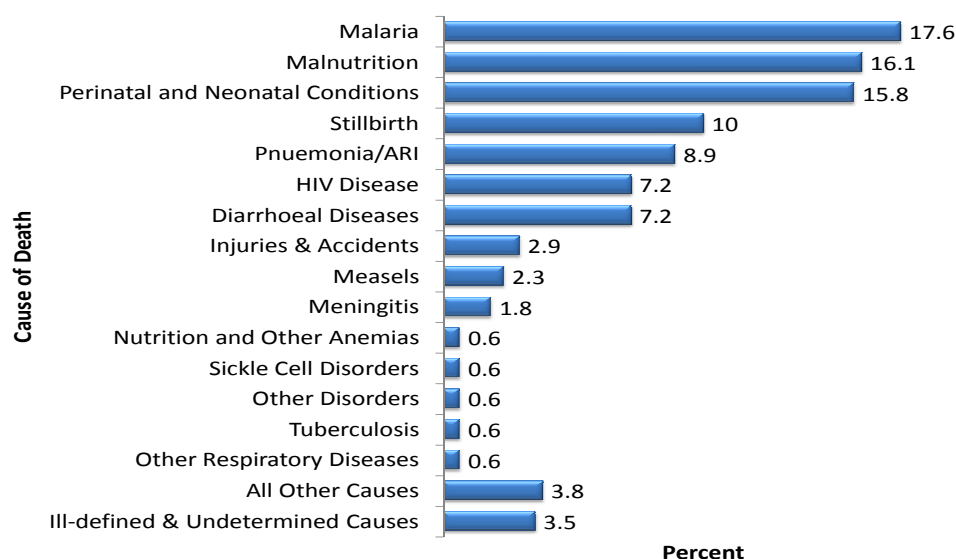
**Figure 3.4: Percentage Distribution of Leading Causes of Death (Top 15) in Urban Areas, Zambia 2010-2012**

### 3.2.5 Under Five Deaths

Figure 3.5 shows the percentage distribution of leading causes of death among children aged 0-4 years in Zambia. Malaria was the major cause of death at 17.6 percent followed by Malnutrition at 16.1 percent. Nutritional and other anemias, Sickle cell disorders,

other central nervous system disorders, Tuberculosis and Other respiratory diseases were the least causes of death, all at 0.6 percent each. All the other remaining causes combined accounted for 3.8 percent while deaths due to undetermined causes was 3.5 percent.

Figure 3.5: Top 15 Leading Causes of Death among Children Aged 0-4 Years, Zambia 2010-2012



### 3.2.6 Still Births

Table 3.5 shows the percentage distribution of leading causes of Stillbirths in Zambia. Fetal deaths of unspecified cause was the leading cause of still births at 77.7 percent followed by fetal deaths due to complications of the

placenta, cord and membranes at 10.7 percent. Fetus affected by maternal conditions that may be unrelated to the present pregnancy was the least cause of still births at 1.1 percent.

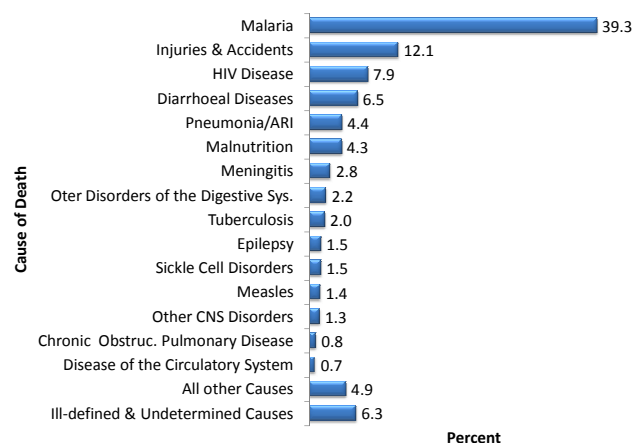
Table 3.5: Causes of Stillbirths in Zambia 2010-2012

Cause of Stillbirth (ICD-10 Code)	Number of Deaths	Percent
Fetal death of unspecified cause (P95)	71	77.7
Fetus affected by complications of placenta, cord and membranes (P02)	10	10.7
Fetus affected by other complications of labour and delivery (P03)	7	8.1
Fetus affected by maternal complications of pregnancy (P01)	2	2.3
Fetus affected by maternal conditions that may be unrelated to present pregnancy (P00)	1	1.1
<b>Total Number of Stillbirths</b>	<b>91</b>	<b>100.0</b>

### 3.2.7 Deaths Among 5-14 Year Old

Figure 3.6 shows the percentage distribution of leading causes of death among children aged 5-14 years in Zambia. Malaria was the major cause of death at 39.3 percent followed by Injuries and Accidents at 12.1 percent. Diseases of the circulatory system were the least causes of death at 0.7 percent. All the other remaining causes combined accounted for 4.9 percent while deaths due to undetermined causes was 6.3 percent.

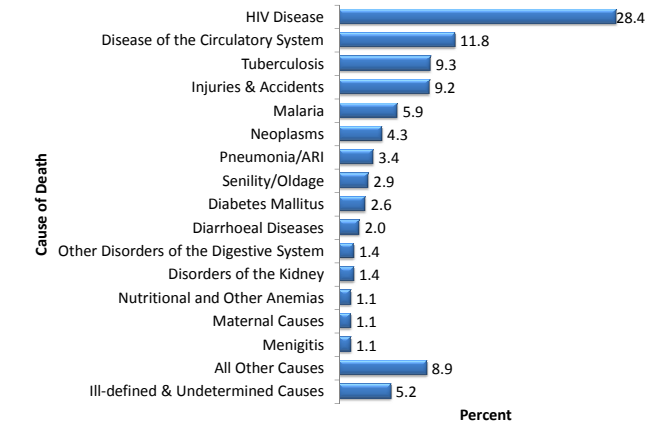
Figure 3.6: Percentage Distribution of Leading Causes of Death (Top 15) among Children Aged 5-14 Years, Zambia 2010-2012



### 3.8 Deaths Among 15 Years and Older

Figure 3.7 shows the percentage distribution of leading causes of death among adults aged 15 years and older in Zambia. Human Immuno Deficiency Virus was the major cause of death at 28.4 percent followed by Diseases of the circulatory system at 11.8 percent. Nutritional and other anemias, Maternal causes and Meningitis were the least causes of death at 1.1 percent each. All the other remaining causes combined accounted for 8.9 percent while deaths due to undetermined causes was 5.2 percent.

Figure 3.7: Percentage Distribution of Leading Causes of Death (Top 15) among Adults Aged 15 Years and Older, Zambia 2010-2012



## Chapter 4: Burden of Disease and Mortality for Selected Causes

### 4.0 Introduction

This chapter presents the burden of disease in Zambia and mortality due to selected causes. It also includes information on health service use and treatment during the period leading to the death.

#### 4.1. Malaria

Malaria is one of the leading causes of morbidity and mortality in Zambia. It is usually associated with seasonal and geographic variations across the country. According to Malaria Indicator Survey 2008, “Malaria accounts for up to forty percent of all infant mortality and twenty percent of all maternal mortality” (MoH, 2008). Malaria poses a severe social and economic burden in communities living in endemic areas. Malaria eradication remains one of the Millennium Development Goals that has to be achieved. In doing so, the health sector through National Malaria Control Centre has put into place strategies’ and interventions aimed at reducing the incidence of Malaria. Some of these strategies are:

- *Scale up of high impact preventive, curative and care interventions.*
- *Use of In-Door Residual Spraying and Insecticide Treated Nets.*
- *Use of Intermittent Presumptive Treatment of Malaria in Pregnancy.*
- *Availability and use of Anti-Malarial drugs.*
- *Introduction of Rapid Diagnostic Tests in all health facilities which do not have Microscopy services.*

#### 4.1.1 Malaria-Related Deaths

Table 4.1 shows the proportion of malaria-related deaths by sex, rural/urban and age in Zambia. Malaria-related deaths accounted for 11.5 percent of all deaths. Female deaths resulting from Malaria were recorded at 12.2 percent while male deaths were at 10.9 percent. There were more Malaria-related deaths in rural than urban areas at 12.9 and 8.7 percent, respectively. About 18 percent of all deaths in children under 5 years (0-4) were due to malaria related causes. Similarly, 39.3 percent of all deaths in children aged between 5 and 14 years were due to malaria related causes while in the age group 15 years and older 5.9 percent of all deaths were related to Malaria.

**Table 4.1: Proportion of Malaria-Related Deaths (Weighted Data), Zambia 2010-2012**

	Malaria Related Deaths (Number)	Malaria Related Deaths (Percent)	Total Deaths (Number)
<b>*Sex</b>			
Males	161	10.9	1,474
Females	156	12.2	1,282
<b>Rural/Urban</b>			
Rural	239	12.9	1861
Urban	78	8.7	898
<b>**Age (in Years)</b>			
0-4	159	17.6	905
5-14	56	39.3	143
15+	101	5.9	1,705
<b>Total</b>	<b>317</b>	<b>11.5</b>	<b>2,759</b>

Note: \*There were 3 deaths (non-malaria) that had no information on sex, that is why total number for all deaths has 3 more cases than total for males and females only.

\*\*There were 6 deaths (1 malaria, 5 non-malaria) that had no information on age. These add up to total of 2,759.

#### 4.1.2 Malaria Related Deaths by Place of Death, Treatment Seeking and Specific Causes of Malaria Deaths in Zambia

Table 4.2 shows the percentage distribution of malaria related deaths by place of death, age, treatment seeking and specific causes of malaria, by sex. Of the total deaths due to Malaria, 32.4 percent occurred in hospitals, 14.7 percent in other health facilities, 41.9 percent at home while 11.0 percent occurred in other places. Disaggregated by sex, 31.9 percent of males and 32.9 percent of females died from the hospital while males (41.3 percent) and females (42.0 percent) died from home.

Of all the Malaria deaths reported in Zambia, 50.2 percent were children under five, 17.8 percent were

children aged 5 -14 years and 32 percent were adults aged 15 years and above. Results on treatment received in the period prior to death show that 85.5 percent received treatment prior to the death. A higher proportion of males received treatment (87.7 percent) compared to females (83.2 percent).

Specific causes of Malaria deaths were also collected. Amongst Malaria deaths the highest proportion (56.9 percent) were caused by Plasmodium falciparum Malaria. About forty percent were due to Unspecified Malaria related deaths, while causes as a result of other parasitologically confirmed Malaria had the least proportion of 0.7 percent.

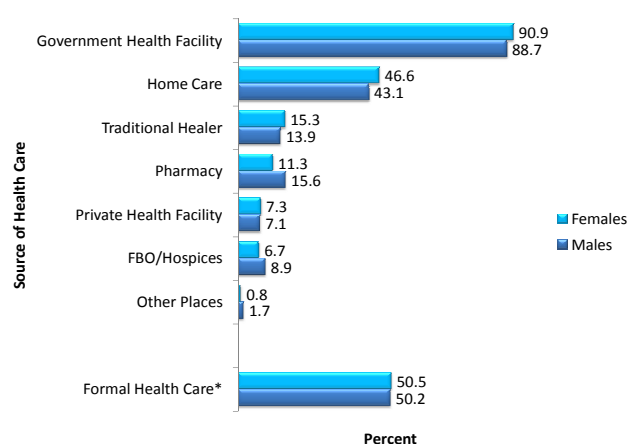
Table 4.2: Malaria related deaths by Place of death, age, sex, treatment and specific causes of malaria, Zambia, 2010-2012						
	Total		Males		Females	
	Number	Percent	Number	Percent	Number	Percent
<b>Place of Death</b>						
Hospital	103	32.4	52	31.9	51	32.9
Other Health Facility	46	14.7	26	16.4	20	13.0
Home	133	41.9	67	41.3	66	42.0
Other Place	35	11.0	17	10.4	18	11.7
<b>Age (in Years)</b>						
0-4	159	50.2	79	49.1	80	51.4
5-14	56	17.8	30	18.9	26	16.7
15+	102	32.0	52	32.0	50	31.9
Received Treatment during illness	271	85.5	141	87.7	130	83.2
<b>Specific Causes of Malaria</b>						
Plasmodium falciparum malaria (B50)	180	56.9	99	61.6	81	52.1
Other parasitologically confirmed malaria (B53)	2	0.7	0	0.0	2	1.5
Unspecified malaria (B54)			62	38.6	73	46.4

### 4.1.3 Health Service use in the Period Leading to Death due to Malaria

Figure 4.1 shows percentage distribution of health service use among individuals who sought treatment in the period leading to death from malaria-related causes by type of facility visited. Persons who died from Malaria received some form of treatment, either formal or informal during the illness. A proportion of 90.9 percent of males and 88.7 percent for females received treatment from government health facilities. Treatment received from home accounted for 46.6 percent for males and 43.1 percent for females while treatment from traditional healers contributed 15.3 percent for males and 13.9 percent for females.

Overall, of all the Malaria deaths that occurred, the proportion of males that sought health services was at 50.5 percent while that of females was 50.2 percent.

**Figure 4.1: Percentage Distribution of Health service use among individuals who sought treatment in the period leading to death from malaria-related causes by Type of Facility visited, Zambia 2010-2012**



*NB: Data sorted on descending order of male proportions. Proportions sum to more than 100% because the deceased may have received treatment from more than one place.*

*\*Formal health care includes government, private, faith-based, pharmacies and hospices*

## 4.2: HIV-Related Deaths

HIV is one of the leading causes of death in Zambia despite the reduce in prevalence from 95.6 percent in 2001 to 14.3 percent in 2007 among the 15-49 years age group (ZDHS 2007).

### 4.2.1 Contribution of HIV and AIDS to all Deaths Causes

Table 4.2.1 shows the proportion of HIV-related deaths as a proportion of the total deaths that occurred. The proportion of HIV-related deaths among males was 19.3 percent while that of females was 21.5 percent. Similarly, HIV-related deaths were more in urban than rural areas at 26.6 and 17.3 percent, respectively. The age group with the highest proportion was 15 years and above at 28.4 percent. The age group 0-4 years had 7.2 percent of deaths related to HIV while the age group 5-14 years accounted for 7.9 percent.

**Table 4.3: Proportion of HIV-Related Deaths (Weighted Data), Zambia 2010-2012**

	HIV Related Deaths	HIV Related Deaths	Total Deaths
	(Number)	(Percent)	(Number)
<b>Sex</b>			
Males	285	19.3	1474
Females	276	21.5	1282
<b>Rural/Urban</b>			
Rural	322	17.3	1861
Urban	239	26.6	899
<b>Age (in Years)</b>			
0-4	66	7.2	906
5-14	11	7.9	143
15+	484	28.4	1705
<b>Total</b>	<b>561</b>	<b>20.3</b>	<b>2759</b>

### 4.2.2 HIV related deaths by Place of Death, Age, Treatment Seeking and Causes of HIV-Related Deaths

Table 4.4 shows the percentage distribution of place of death, age group, treatment seeking and specific causes of HIV related deaths by sex. Of the all HIV related deaths, 43.2 percent occurred in hospitals. Disaggregated by sex, 44.2 percent of males and 42.1 percent of females died from hospitals. This was followed by deaths which occurred at home at 44.4 percent of the total HIV related

deaths. Deaths occurring in other health facilities and any other places, contributed 9.5 percent and 3.0 percent respectively to the total number of HIV related deaths.

Results on treatment received in the period prior to death show that 92.8 percent received treatment prior to the death. A higher proportion of females received treatment (93.1 percent) compared to males (92.4 percent).

In relation to deaths by type of HIV, there were more deaths due to HIV disease resulting in infectious and parasitic diseases at 48.5 percent followed by HIV disease

resulting in other specified diseases at 33.6 percent and Unspecified HIV disease at 15.5 percent. HIV disease resulting in other conditions and HIV disease resulting in malignant neoplasms had the least proportions of 1.2 and 0.9 percent, respectively.

Of all the HIV related deaths reported in Zambia, 11.7 percent were children under five, 2.0 percent were children aged 5 -14 years while 86.3 percent were adults aged 15 years and above. The proportions were higher in the age group 15 years and older accounting for 86.3 percent of the total deaths.

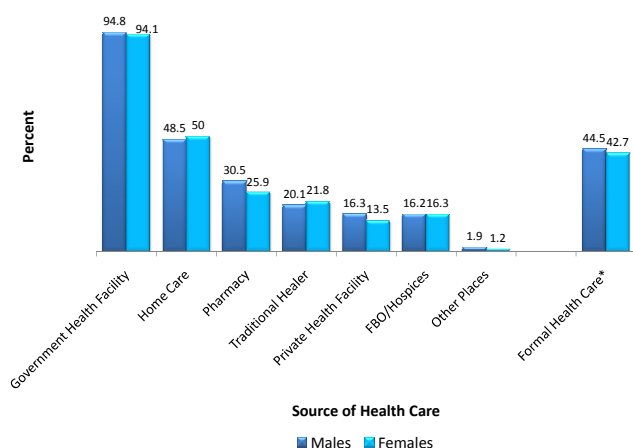
**Table 4.4: Place of death, age distribution, treatment seeking and specific causes of HIV-related deaths, by sex, Zambia 2010-2012.**

	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
<b>Place of Death</b>						
Hospital	126	44.2	116	42.1	242	43.2
Other Health Facility	23	8.0	30	11.0	53	9.5
Home	126	44.0	123	44.7	249	44.4
Other Place	11	3.8	6	2.2	17	3.0
<b>Age (in Years)</b>						
0-4	36	12.7	29	10.6	66	11.7
5-14	4	1.4	7	2.6	11	2.0
15+	245	85.9	239	86.8	484	86.3
Received Treatment during illness	263	92.4	257	93.1	520	92.8
<b>Specific Causes of HIV</b>						
HIV disease resulting in infectious and parasitic diseases (B20)	151	53.1	12	43.8	272	48.5
HIV disease resulting in malignant neoplasms (B21)	3	1.0	2	0.7	5	0.9
HIV disease resulting in other specified diseases (B22)	89	31.2	99	36.0	188	33.6
HIV disease resulting in other conditions (B23)	3	1.1	6	2.1	9	1.2
Unspecified HIV disease (B24)	30	13.6	48	17.4	87	15.5

### 4.2.3 Health Service use in the Period Leading to Death due to HIV

Figure 4.2 shows health service use among individuals who sought treatment in the period leading to death from HIV-related causes. Most individuals sought treatment from a government health facility; 94.8 percent for males and 94.1 percent for females. Home care accounted for 48.5 and 50.0 percent for males and females, respectively. The percentage of males who sought formal health care was 44.5 while that of females was 42.7 percent.

**Figure 4.2: Percentage Distribution of Health service use among individuals who sought treatment in the period leading to death from HIV-related causes by Sex and Type of Facility Visited, Zambia 2010-2012**



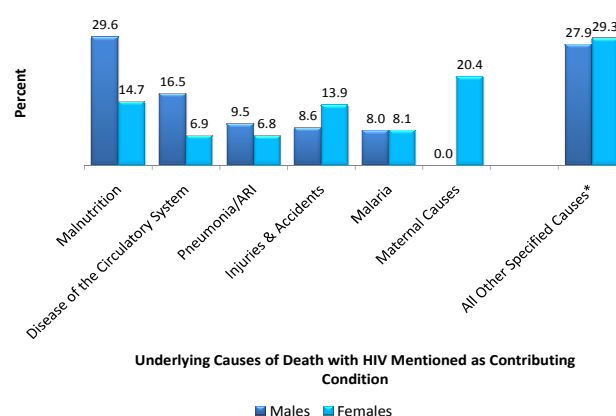
NB: Proportions sum to more than 100% because the deceased may have received treatment from more than one place.

\*Formal health care includes government, private, faith-based, pharmacies and hospices

### 4.2.4 Leading Causes of Death for which Presence of HIV was Mentioned on the Death Certificates as Contributory Condition

Figure 4.3 shows the percentage distribution leading causes of death for which presence of HIV was mentioned on death certificates as contributory condition. Malnutrition and disease of the circulatory system were reported as the cause of death by 29.6 and 16.5 percent, respectively for males with the females accounting for 14.7 and 6.9 percent, respectively. Maternal causes accounted for 20.4 percent. All other specified causes accounted for 27.9 and 29.3 percent for males and females, respectively.

**Figure 4.3: Percentage Distribution of Leading causes of death for which presence of HIV was mentioned on the death certificates as contributory condition, Zambia 2010 – 2012.**



\*All other specific causes include tuberculosis, diarrhoeal diseases, disorders of the kidney, stillbirth, disease of oesophagus, stomach and duodenum and other infectious and parasitic diseases. Numbers are very small.

### 4.3 Injury and Accidental Deaths

Table 4.5 shows the proportion of deaths due to injuries and accidents. The table shows that 9.8 percent of all male deaths were due to injury and accidents while 4.4 percent of all female deaths were due to injury and accidents. In rural areas injury and accidents accounted for 7.0 percent

while in the urban areas it was 7.9 percent of all deaths. The table further shows of deaths in age group 0-4 years at 2.8 percent were due to injury and accidents. In the age group 5-14 years injuries and accidents accounted for 12.0 percent of deaths while in age group 15 years and older had 9.2 percent.

**Table 4.5: Proportion of Deaths Due to Injuries and Accidents (Weighted Data) by Sex, Rural/Urban and Age Group, Zambia 2010 - 2012**

	Deaths due to Injuries & Accidents (Number)	Deaths due to Injuries & Accidents (Percent)	Total Deaths (Number)
<b>Sex</b>			
Males	144	9.8	1474
Females	57	4.4	1282
<b>Rural/Urban</b>			
Rural	129	7.0	1861
Urban	71	7.9	899
<b>Age (in Years)</b>			
0-4	26	2.8	906
5-14	17	12.0	143
15+	158	9.2	1705
Total	561	20.3	2759

#### 4.3.1. Injury and Accidental Deaths by Place of Death, Age, Sex, Treatment and Specific Causes.

Table 4.6 shows the percentage distribution of injury and accidental deaths by place of death, age group, sex, treatment received and specific causes of Injury and Accidental deaths. The highest proportion of deaths due to injury and accidents occurred at home (44.1 percent), while the least proportion occurred in other health facilities at 5.9 percent. A similar pattern was observed

for both males and females. The highest proportion of deaths for both sexes was in the age group 15 years and older, while the least proportion occurred in the age group 5-14 years for both sexes.

Data on specific causes of injury and accidents shows that the highest proportion of deaths were due to transport accidents (24.5 percent) followed by assault (14.5 percent).

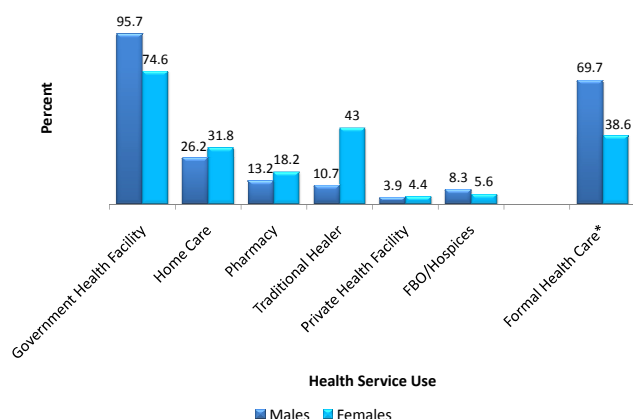
**Table 4.6: Percentage Distribution of Injury and Accidental deaths by place of death, age, sex, treatment and specific causes of Injury and Accidental deaths, Zambia 2010-2012**

	Males		Females		Total	
	Number	Percent	Number	Percent	Number	Percent
<b>Place of Death</b>						
Hospital	36	24.9	11	20.0	47	23.4
Other Health Facility	9	6.1	3	5.4	12	5.9
Home	59	41.1	30	51.9	89	44.1
Other Place	40	28.0	13	22.7	53	26.5
<b>Age (in Years)</b>						
0-4	18	12.7	8	13.2	26	12.7
5-14	11	7.8	6	10.6	17	8.6
15+	115	79.5	43	76.2	158	78.6
<b>Received Treatment during illness</b>						
Yes	45	31.1	24	42.0	69	34.2
<b>Specific Causes of Injuries</b>						
Transport accidents	37	25.8	12	21.3	49	24.5
Assault	18	12.6	13	22.5	31	14.5
Intentional self-harm	18	12.5	3	5.2	21	10.5
<b>Accidental drowning and</b>						
submersion	15	10.4	2	3.6	17	8.5
Falls	5	3.7	7	12.0	12	6.0
<b>Exposure to smoke, fire and</b>						
flames	6	4.1	3	6.0	9	4.3
Accidental poisoning by and exposure to noxious substances	7	4.6	2	3.4	9	4.3
<b>All other external causes</b>	<b>38</b>	<b>26.4</b>	<b>15</b>	<b>25.9</b>	<b>53</b>	<b>26.3</b>

### 4.3.2 Health Service use in the Period Leading to Death due to Injuries and Accidents

Figure 4.4 shows percentage distribution of health service use among individuals who sought treatment in the period leading to death from injuries and accidents by type of institution visited. The graph shows that individuals receiving treatment from a government health facility for 95.7 percent for males and 74.6 percent for females. Treatment received from private health facility was the least for both sexes at 3.9 percent for males and 4.4 percent for females. There were more males (69.7 percent) than females (38.6 percent) who received treatment from formal health care.

**Figure 4.4: Percentage Distribution of Health service use among individuals who sought treatment in the period leading to death from Injuries and Accidents by Type of Institution Visited, Zambia 2010-2012**



NB: Proportions sum to more than 100% because the deceased may have received treatment from more than one place.

\*Formal health care includes government, private, faith-based, pharmacies and hospices

## 4.4 Maternal Mortality

Maternal health is one of the global priorities that form part of the health-related Millennium Development Goals (MDGs). Zambia has high maternal mortality ratio at 591 per 100,000 live births (ZDHS).

### 4.4.1 Distribution of Maternal and Non-Maternal Deaths, by Selected Characteristics

Table 4.7 shows the distribution of maternal and non-maternal deaths, by selected characteristics of women in the reproductive age group 15-49 years. The table shows that of all female deaths in the age group 15-49 years, 5.1 percent were maternal related deaths while 94.9 percent were non maternal deaths. The highest proportion of maternal related deaths occurred in the age group 20-29 years at 43.7 percent.

Maternal related deaths were more in rural areas (73.3 percent) than in the urban areas (26.7 percent). More maternal related deaths occurred in hospitals at 60.1 percent while the least of maternal related deaths occurred in other places at 4.5 percent. Females who died due to maternal related deaths were either married or living together with a partner at the time of death at 74.7 percent, followed by those who never married at 20.7 percent.

**Table 4.7: Distribution of maternal and non-maternal deaths, by selected characteristics for women aged 15-49 years, Zambia 2010-2012**

	Maternal Deaths		Non Maternal Deaths		All Deaths	
	Number	Percent	Number	Percent	Number	Percent
<b>Age (in Years)</b>						
15-19	5	24.5	31	7.6	37	8.5
20-29	10	43.7	130	3.7	140	32.3
30-39	7	31.8	141	34.3	148	34.2
40-49	0	0.0	108	26.4	108	25.1
<b>Rural/Urban</b>						
Rural	16	73.3	232	56.6	248	57.4
Urban	6	26.7	178	43.4	184	42.6
<b>Place of Deaths</b>						
Hospital	13	60.1	167	40.7	180	41.7
Other Health Facility	5	22.0	48	11.7	53	12.2
Home	3	13.4	174	42.5	177	41.0
Other Place	1	4.5	21	5.1	22	5.1
<b>Marital Status</b>						
Never married	5	20.7	82	20.0	87	20.0
Married / Living together	16	74.7	194	47.2	210	48.6
Widowed	0	0.0	49	12.1	49	11.5
Divorced	0	0.0	64	15.7	64	14.9
Separated	1	4.6	17	4.3	18	4.3
Unspecified	0	0.0	3	0.8	3	0.7
<b>Total</b>	<b>22</b>	<b>5.1</b>	<b>410</b>	<b>94.9</b>	<b>432</b>	<b>100.0</b>

#### 4.4.2 Maternal Mortality Rate

Table 4.8 shows the Maternal Mortality Rate (MMRate) per 100,000 Women of Reproductive Age. The Maternal Mortality Rate (MMRate) was recorded at 52.6 per

100,000 females aged 15-49 years. The highest MMRate was recorded in the age group 30-39 years at 69.7, followed by age group 20-29 years at 59.8.

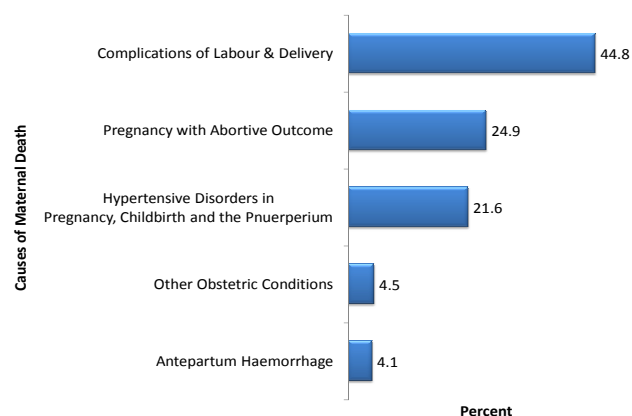
**Table 4.8: Maternal Mortality Rate per 100,000 Women aged 15-49 years (Weighted), Zambia 2010-2012.**

Age	Maternal Death	Number of Women	MMR
15-19	5	10,258	52.9
20-29	10	16,197	59.8
30-39	7	10,108	69.7
40-49	0	5,578	0.0
15-49	22	42,141	52.6

#### 4.4.3 Causes of Maternal Deaths

Figure 4.5 shows percentage distribution of causes of maternal deaths among women of reproductive age. The results show that most maternal deaths were due to complications of labour and delivery at 44.8 percent, followed by pregnancy with abortive outcome at 24.9 percent. The least cause of maternal deaths was antepartum haemorrhage at 4.1 percent.

**Figure 4.5: Percent Distribution of Causes of Maternal Deaths among Women aged 15-49 years, Zambia 2010-2012**

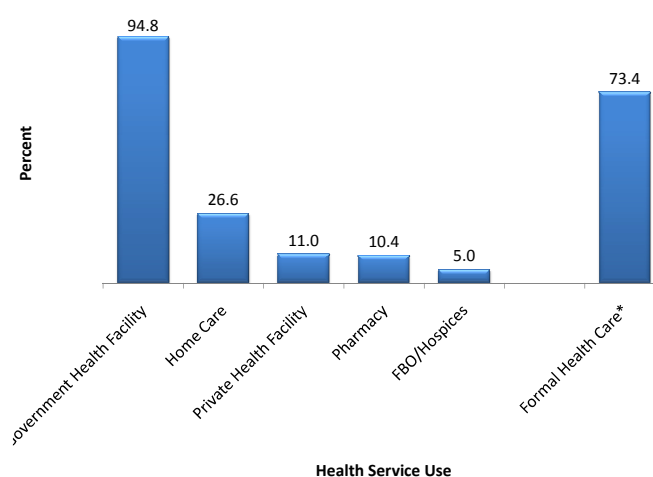


#### 4.4.4. Health Service use among Women who received treatment in the Period Leading to Death from Maternal Causes

Figure 4.6 shows the percentage distribution of health service use among women who received treatment in the period leading to death from maternal causes. Women receiving treatment from a government health facility accounted for 94.8 percent, followed by those

who received treatment from home at 26.6 percent. The least reported health service used in the period leading to death was Faith based health facilities at 5.0 percent. There were 73.4 percent of women who sought treatment from formal health care.

**Figure 4.6: Percent Distribution of Health service use among women who received treatment in the period leading to death from maternal causes by type of facility visited, Zambia 2010-2012**



*\*All other specific causes include tuberculosis, diarrhoeal diseases, disorders of the kidney, stillbirth, disease of oesophagus, stomach and duodenum and other infectious and parasitic diseases. Numbers are very small.*

## Chapter 5: Health Service Use in the Period Leading to Death

### 5.0. Introduction

This chapter presents information on health services used and treatment received in the period leading to death for all deceased persons.

during the illness that led to death at 75.3 percent. A similar pattern was observed for both males and females, although more females (77.3 percent) had received treatment compared to males (73.7 percent).

### 5.1. Treatment received during illness

Table 5.1 shows treatment during illness that led to death by sex in Zambia. Deceased persons received treatment

Table 5.1: Treatment Received During Illness that led to Death by Sex, Zambia 2010-2012						
Received Treatment for the illness that led to death?	Male		Female		Total*	
	Number	Percent	Number	Percent	Number	Percent
Yes	1,086	73.7	991	77.3	2,077	75.3
No	363	24.6	270	21.0	635	23.0
Don't Know	26	1.7	21	1.7	47	1.7
<b>Total</b>	<b>1,474</b>	<b>100.0</b>	<b>1,282</b>	<b>100.0</b>	<b>2,759</b>	<b>100.0</b>

\*Total include 2 individuals who did not have information on sex, but it was mentioned that they did not receive treatment

Table 5.2 shows treatment received during illness that led to death by rural/urban in Zambia. Urban areas had a higher proportion of persons who received treatment

during the illness that led to death at 79.7 percent compared to 73.1 percent for rural areas.

Table 5.2: Treatment Received during illness that led to death by Rural/Urban, Zambia 2010-2012						
Received Treatment for the illness that led to death?	Rural		Urban		Total	
	Number	Percent	Number	Percent	Number	Percent
Yes	1,361	73.1	716	79.7	2,077	75.3
No	467	25.1	168	18.8	635	23.0
Don't Know	33	1.8	14	1.6	47	1.7
<b>Total</b>	<b>1,861</b>	<b>100.0</b>	<b>898</b>	<b>100.0</b>	<b>2,759</b>	<b>100.0</b>

Table 5.3 shows treatment received during illness that led to death by place of death in Zambia. Of the people that received treatment for the illness that led to death, 43.6 and 41.0 percent died at home and hospital, respectively.

The majority of the persons (62.8 percent) who did not receive treatment for the illness that led to death died at home.

Table 5.3: Treatment Received during illness that led to death by Place of Death, Zambia 2010-2012							
Place of Death	Received Treatment for the illness that led to death						Total
	Yes		No		Don't Know		
	Number	Percent	Number	Percent	Number	Percent	
Hospital	851	41.0	97	15.3	15	32.0	936
Other Health Facility	236	11.4	60	9.4	4	8.5	300
Home	905	43.6	399	62.8	19	40.4	1,324
Other Place	84	4.0	77	12.1	8	17.0	169
Unspecified	1	0.0	2	0.3	0	0.0	3
Total	2,077	100	635	100	47	100	2,759

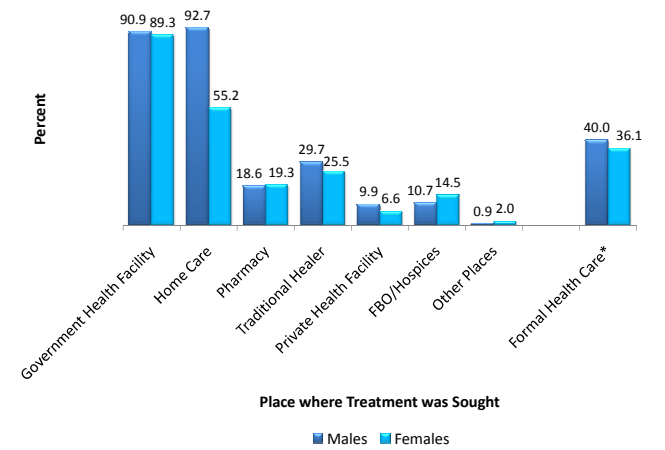
Table 5.4 shows treatment received during illness that led to death by age group in Zambia. The age group 15 years and older had the highest proportion (80.6 percent)

of persons who received treatment for the illness that led to death while the age group 0-4 years had the least proportion at 65.5 percent.

Table 5.4: Treatment Received during illness that led to death by Age Group, Zambia 2010-2012							
Age Group	Received Treatment for the illness that led to death						Total
	Yes		No		Don't Know		
	Number	Percent	Number	Percent	Number	Percent	
0 - 4 years	593	65.5	284	31.4	28	3.1	905
5 -14 years	105	73.5	33	22.9	5	3.7	143
15+ years	1,373	80.6	317	18.6	14	0.8	1,705
Missing	5	83.3	1	16.7	0	0.0	6
Total	2,077	75.3	635	23.0	47	1.7	2,759

Figure 5.1 shows the percentage distribution of health service use among individuals who received treatment in the period leading to death in rural areas. The majority of the deceased who received treatment in the period leading to death in rural areas received treatment in a government health facility. This was followed by home care.

**Figure 5.1: Percentage Distribution of Health Service Use among Individuals who Sought Treatment in the Period Leading to Death - all causes (Weighted data), Zambia Rural 2010-2012**

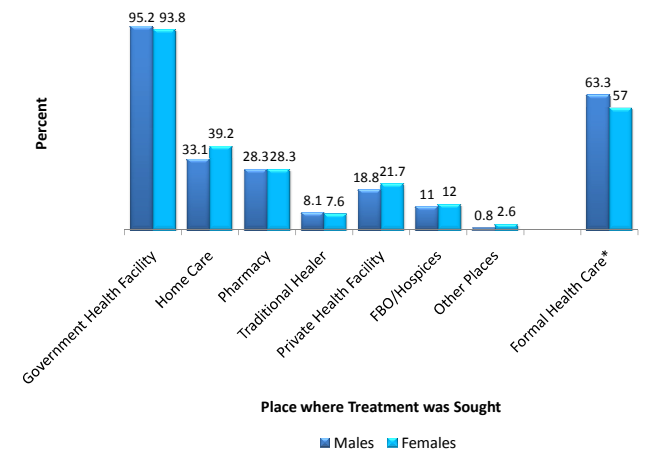


NB: Proportions sum to more than 100% because the deceased may have received treatment from more than one place. Pharmacy category includes drug store. \*Formal health care includes government, private, faith-based, pharmacies and hospices

Figure 5.2 shows the percentage distribution of health service use among individuals who received treatment in the period leading to death in urban areas. Similar

to rural areas, the majority of deceased persons received treatment from a government health facility, followed by Formal health care at 63.3 and 57.0 percent for males and females, respectively.

**Figure 5.2: Percentage Distribution of Health service use among individuals who sought treatment in the period leading to death - all causes (Weighted data), Zambia Urban 2010-2012**



NB: Proportions sum to more than 100% because the deceased may have received treatment from more than one place. Pharmacy category includes drug store. \*Formal health care includes government, private, faith-based, pharmacies and hospices

## **Appendix and References**

Appendix: 3.3.1: Immediate Causes of Death Determined from First Entry in the Death Certificate - Deaths to Children Aged 0-4 years			
ICD-10 Description	ICD-10 Code	Number	Percent
Pneumonia, organism unspecified	J18	121	13.3
Stillbirth	P95	92	10.2
Diarrhoea and gastroenteritis of presumed infectious origin	A09	86	9.5
Plasmodium falciparum malaria	B50	75	8.3
Unspecified malaria	B54	59	6.5
Volume depletion	E86	57	6.3
Other anaemias	D64	42	4.6
Bacterial sepsis of newborn	P36	36	4.0
Other ill-defined and unspecified causes of mortality	R99	26	2.9
Meningitis due to other and unspecified causes	G03	24	2.6
Unspecified protein-energy malnutrition	E46	23	2.5
Birth asphyxia	P21	19	2.1
Other septicaemia	A41	16	1.8
Disorders related to short gestation and low birth weight, not elsewhere classified	P07	15	1.7
Measles	B05	15	1.7
Congenital pneumonia	P23	13	1.4
Kwashiorkor	E40	12	1.3
Respiratory tuberculosis, not confirmed bacteriologically or histologically	A16	10	1.1
Marasmic kwashiorkor	E42	9	1.0
Neonatal aspiration syndromes	P24	9	1.0
Other respiratory conditions originating in the perinatal period	P28	6	0.6
Fetus and newborn affected by other complications of labour and delivery	P03	5	0.6
Fetus and newborn affected by maternal conditions that may be unrelated to present pregnancy	P00	5	0.6
Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases	B20	5	0.6
Respiratory distress of newborn	P22	5	0.6
Meningococcal infection	A39	4	0.5
Sudden infant death syndrome	R95	4	0.5
Acquired haemolytic anaemia	D59	3	0.4
Sickle-cell disorders	D57	3	0.4
Poisoning by and exposure to pesticides, undetermined intent	Y18	3	0.4
Other disorders of pancreatic internal secretion	E16	3	0.4
Fever of unknown origin	R50	3	0.4
Drowning and submersion, undetermined intent	Y21	3	0.4
All other Specified and Unspecified causes of illness in Children under 5**	**	93	10.2
<b>All deaths in children under 5 years</b>		<b>905</b>	<b>100</b>

Appendix: 3.3.2: Immediate Causes of Death Determined from First Entry in the Death Certificate - Deaths to Children Aged 5-14 years			
ICD-10 Description	ICD-10 Code	Number	Percent
Plasmodium falciparum malaria	B50	34	24.2
Unspecified malaria	B54	18	12.3
Pneumonia, organism unspecified	J18	14	9.5
Other anaemias	D64	7	4.9
Other ill-defined and unspecified causes of mortality	R99	6	4.3
Volume depletion	E86	6	4.3
Meningitis due to other and unspecified causes	G03	6	4.3
Diarrhoea and gastroenteritis of presumed infectious origin	A09	5	3.6
Unspecified protein-energy malnutrition	E46	4	2.8
Other septicaemia	A41	3	2.2
Paralytic ileus and intestinal obstruction without hernia	K56	3	2.2
Drowning and submersion while in natural water	W69	3	2.1
Contact with venomous snakes and lizards	X20	3	2.0
Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases	B20	2	1.4
Effects of other external causes	T75	1	0.8
Sickle-cell disorders	D57	1	0.8
Epilepsy	G40	1	0.8
Status asthmaticus	J46	1	0.8
Pedestrian injured in collision with car, pick-up truck or van	V03	1	0.7
Drowning and submersion, undetermined intent	Y21	1	0.7
Unspecified drowning and submersion	W74	1	0.7
Pedestrian injured in other and unspecified transport accidents	V09	1	0.7
Acquired haemolytic anaemia	D59	1	0.7
Congenital malformations of cardiac septa	Q21	1	0.7
Varicella [chickenpox]	B01	1	0.7
Heart failure	I50	1	0.7
Measles	B05	1	0.7
Typhoid and paratyphoid fevers	A01	1	0.7
Falling, jumping or pushed from a high place, undetermined intent	Y30	1	0.7
Exposure to unspecified smoke, fire and flames	X09	1	0.7
Assault by smoke, fire and flames	X97	1	0.7
All other Specified and Unspecified conditions in Children 5-14 years	**	11	7.4
<b>All deaths in children between 5 - 14 years</b>		<b>143</b>	<b>100</b>

Appendix: 3.3.3: Immediate Causes of Death Determined from First Entry in the Death Certificate - Adult Deaths 15+ years			
ICD-10 Description	ICD-10 Code	Number	Percent
Respiratory tuberculosis, not confirmed bacteriologically or histologically	A16	206	12.1
Pneumonia, organism unspecified	J18	110	6.4
Human immunodeficiency virus [HIV] disease resulting in infectious and parasitic diseases	B20	95	5.6
Stroke, not specified as haemorrhage or infarction	I64	78	4.6
Other ill-defined and unspecified causes of mortality	R99	74	4.3
Diarrhoea and gastroenteritis of presumed infectious origin	A09	72	4.2
Other anaemias	D64	62	3.6
Heart failure	I50	61	3.6
Plasmodium falciparum malaria	B50	51	3.0
Meningitis due to other and unspecified causes	G03	51	3.0
Unspecified malaria	B54	45	2.7
Human immunodeficiency virus [HIV] disease resulting in other specified diseases	B22	38	2.2
Hypertensive heart disease	I11	34	2.0
Unspecified human immunodeficiency virus [HIV] disease	B24	29	1.7
Miliary tuberculosis	A19	23	1.4
Other septicaemia	A41	22	1.3
Unspecified diabetes mellitus	E14	19	1.1
Senility	R54	18	1.1
Anaemia in chronic diseases classified elsewhere	D63	17	1.0
Respiratory tuberculosis, bacteriologically and histologically confirmed	A15	17	1.0
Chronic renal failure	N18	16	0.9
Status asthmaticus	J46	16	0.9
Assault by unspecified means	Y09	15	0.9
Volume depletion	E86	14	0.8
Tuberculosis of other organs	A18	13	0.8
Malignant neoplasm of other and ill-defined sites	C76	13	0.8
Essential (primary) hypertension	I10	13	0.8
Acute myocardial infarction	I21	11	0.6
Asthma	J45	11	0.6
Unspecified renal failure	N19	9	0.5
Unspecified fall	W19	9	0.5
Other diseases of digestive system	K92	8	0.5
Poisoning by and exposure to alcohol, undetermined intent	Y15	8	0.5
Abdominal and pelvic pain	R10	8	0.5
Pedestrian injured in collision with car, pick-up truck or van	V03	8	0.5
Intentional self-poisoning by and exposure to other and unspecified chemicals and noxious substances	X69	7	0.4
Motor-vehicle accident, type of vehicle unspecified	V89	7	0.4
Intentional self-harm by hanging, strangulation and suffocation	X70	7	0.4
Malignant neoplasm of prostate	C61	7	0.4
Other and unspecified injuries of head	S09	6	0.4
Acute renal failure	N17	6	0.4
Epilepsy	G40	6	0.4
Tuberculosis of nervous system	A17	6	0.4
Malignant neoplasm of cervix uteri	C53	6	0.3
Encephalitis, myelitis and encephalomyelitis	G04	6	0.3
Pedestrian injured in other and unspecified transport accidents	V09	6	0.3
All other Specified and Unspecified conditions among adult 15+ yrs	**	343	20.1
<b>All adult deaths 15+ years</b>		<b>1705</b>	<b>100.0</b>



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# **SAMPLE VITAL REGISTRATION WITH VERBAL AUTOPSY QUESTIONNAIRES**