Mid-Term Review of the

Zambia National Health Sector Plan 2017-2021:

Analytical Report (workstream 1)

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Countdown to 2030 for Women's, Children's
and Adolescents' Health and University of Manitoba,
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Table of contents

Table of tables

Table of figures

List of abbreviations

ACT	Artemisinin-based combination therapy
ANC	Antenatal care
ARI	Acute respiratory infection
ARV or ART	Anti-retroviral therapy
BCG	Bacille Calmette Guérin
BMI	Body mass index
BP	Blood pressure (SBP: Systolic blood pressure, DBP: diastolic blood pressure)
CBR	Crude birth rate
CCI	Composite coverage index
CP	Community paramedics
CO	Clinical officer
CRVS	Civil registration and vital statistics
CSA	Child sexual assault
CSO	Central statistical office
CYP	Couple years of protection
DHIS2	District health information system 2
EHR	Electronic health records
EmONC	Emergency Obstetric Neonatal Care
FP	Family planning
GBV	Gender-based violence
HF	Health facility
HIA	Health impact assessment
HIV/AIDS	Human immune-deficiency virus/ Acquired immune deficiency syndrome
HMIS	Health management information system
HRIS	Human resource for health information system
ICD	International classification of diseases
IDSR	Integrated disease surveillance and response
IPD	In-patient department
IPT	Intermittent preventive treatment
IPV	Inactivated polio vaccine
IRS	Indoor residual spraying
IUD	Intra-uterine device
IYCF	Infant and young child feeding
JRF	Joint reporting form
LARC	Long-acting reversible contraceptive
LBW	Low birth weight
(LL)ITN	(Long lasting) insecticide treated net
LF	Lymphatic filariasis
MDA	Multiple drug administration
MIS	Malaria indicator survey
MMR	Maternal mortality ratio
MNC	Maternal and newborn care
MO	Medical officer
MOH	Ministry of health
MOU	Memorandum of understanding
MR	Measles-Rubella
MTR	Mid-term review
NCD	Non-communicable diseases
NHA	National health accounts

NHFC	National health facility census
NHSP	National health sector plan
NMR	Neonatal mortality rate
NTD	Neglected tropical diseases
OECD	Organisation for Economic Co-operation and Development
OOP	Out-of-pocket
OPD	Out-patient department
OPV	Oral polio vaccine
ORS	Oral rehydration salts
PCV	Pneumococcal conjugate vaccine
PLHIV	People living with HIV
PMTCT	Prevention of mother to child transmission
PNC	Postnatal care
PEP	Post-exposure prophylaxis
RATSA	Road transport and safety agency
RDT	Rapid diagnosis test
RMNCAH(&N)	Reproductive, maternal, newborn, child and adolescent health (and nutrition)
RTA	Road traffic accident
SARA	Service availability and readiness assessment
SAVVY	Sample vital registration with verbal autopsy
SBA	Skilled birth attendance
SP	Sulphadoxine-pyrimethamine
STH	Soil-transmitted helminth
STI	Sexually transmitted infection
SWAp	Sector Wide Approach
TB	Tuberculosis
TFR	Total fertility rate
TT	Tetanus toxoid
U5MR	Under-five mortality rate
UNAIDS	Joint United Nations Programme on HIV/AIDS
UTH PCOE	University Teaching Hospital, Paediatric Centre of Excellence
WHO	World Health Organization
WVZ	World Vision Zambia
ZAMPHIA	Zambia population HIV assessment
ZDHS	Zambia demographic and health survey
ZNBTS	Zambia national blood transfusion service
ZNPHI	Zambia national public health institute

Executive summary

This report is based on a desk review and further analysis of all data from multiple data sources including those made available by the Ministry of Health, to inform the midterm review of the National Health Sector Plan 2017-2021. Extensive use was made of the Zambia Demographic and Health Surveys in 2013/14 and 2018, other national surveys, as well as data from the national health management information system. The analyses focused on the extent to which progress was made towards the targets for the national health plan, the levels and trends in inequalities by place of residence, province and socioeconomic characteristics.

The analyses show an overall positive picture in the first half of the NHSP, as there has been progress in improving many maternal and child health outcomes, coverage of preventive interventions, and prevalence of communicable diseases, as well as strengthening health sector performance. In particular, life expectancy among men and women has increased. Mortality rates among children under-five and adults (including pregnancy-related deaths) reduced noticeably by 2018, except among newborn infants. Fertility rates declined over time, and coverage of modern family planning methods increased, fastest among people in rural areas and lower socioeconomic groups.

There were notable increases in coverage of 4 or more antenatal care visits, skilled birth attendance, and postnatal care visits within 48 hours after birth, with the greatest improvements occurring among lower socioeconomic groups. Immunization rates among children were high, and there was continued improvement in childhood nutritional status. The rates of adolescent marriage and childbearing did not change, but there was some reduction in HIV prevalence among those aged 15-19.

Malaria prevalence and incidence reduced overall, and coverage of preventive interventions improved most in higher prevalence provinces. HIV prevalence remained high, particularly among women, but declined slightly. ART coverage was over 80%, while effective coverage (i.e. viral load suppression among all people living with HIV) was around 70%. TB incidence declined, and there were high treatment success rates, but case detection rates were still below 60%. Prevalence of neglected tropical diseases and risk factors for non-communicable diseases were not found to decline.

There were some improvements in health system governance and domestic health financing, as well as health workforce and infrastructure, and information systems. Compared to other countries in the region, Zambia had an intermediate position on child mortality, child stunting and fertility levels, and was among the top three countries with the lowest maternal mortality ratio and highest coverage of RMNCAH interventions by 2018.

Summary of results in the Mid-Term Review Analytical Report

MORTALITY: child mortality continues to decline but at a slower pace, because neonatal mortality is stagnant at a low level; adult mortality declined strongly

- According to ZDHS 2018, under-five mortality declined from 74 in 2013/14 to 61 per 1,000 live births, but the pace of decline was slowing, and the target was not met.
- Neonatal mortality was higher in the ZDHS 2018 than in ZDHS 2013/14 (from 24 to 27 per 1,000 live births, though not statistically significant) and is now 44% of all under-five deaths.
- The adult mortality rate 15-49 years declined by 43% for women and 29% for men between the last two ZDHS surveys in 2013/14 and 2018.
- The cause of death data from the Ministry of Home Affairs using the ICD codes for 2018, and the verbal autopsy results for 2015/16 (SAVVY), show that major infectious diseases (malaria, TB and especially HIV) were still leading causes of death. NCDs were also prominent in the top 10 causes, especially diseases of the circulatory system.
- Perinatal-related issues of prematurity, low birth weight, birth asphyxia and trauma, and other conditions caused the most child deaths, together with malnutrition and infectious diseases.

Legend: Neonatal Mortality, Infant Mortality, Under-Five Mortality

Under-Five Mortality: 191, 197, 168, 119, 75, 61
Infant Mortality: 107, 109, 95, 70, 45, 42
Neonatal Mortality: 43, 35, 37, 34, 24, 27

1992 ZDHS 1996 ZDHS 2001-02 ZDHS 2007 ZDHS 2013-14 ZDHS 2018 ZDHS
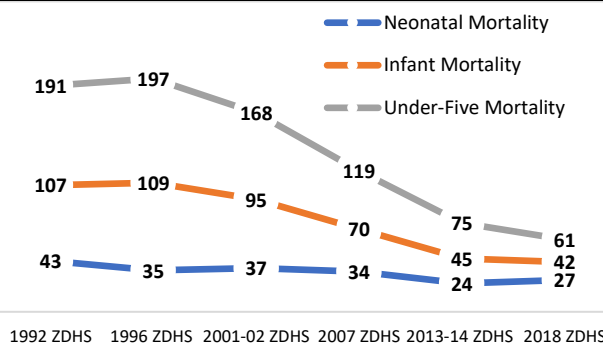
Top 10 causes of death, all ages, both sexes, SAVVY 2015/16

Cause	Value
HIV related diseases	15.2
Malaria	12.6
Disease of the circulatory system	12.1
Injuries & Accidents	9.7
Tuberculosis	6.5
Pneumonia/ARI	5.8
Diarrhoeal diseases	5.5
Perinatal and neonatal condition	4.1
Neoplasms	3.5
Diabetes mellitus	2.1
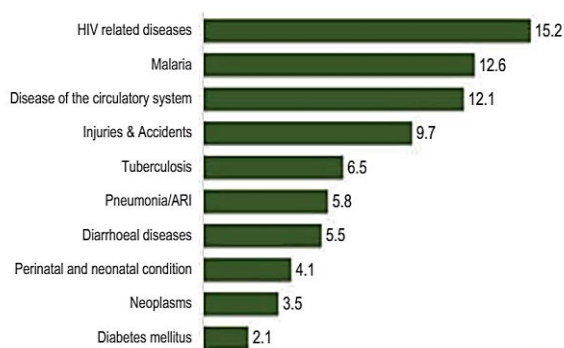
FERTILITY AND FAMILY PLANNING: fertility continued a gradual decline since 2007 to 4.7 children per woman and the demand for modern family planning methods increased to 69% of married women by 2018

- Total fertility declined from 5.3 to 4.7 children per woman between ZDHS 2013/14 and 2018. Rural fertility declined faster (from 6.6 to 5.8 children), but the gap with urban fertility (3.3 children) was still large.
- Adolescent fertility declined only modestly and well short of the target; 29% of adolescent girls 15-19 years had begun childbearing or were pregnant.
- Modern contraceptive use continued to increase from 45 to 48% and the demand satisfied from 64% to 69%, among married women between 2013/14 and 2018 (ZDHS). Injectables were consistently the most popular method, followed by implants.
- Inequalities in family planning coverage decreased: there were greater increases in modern contraceptive use among women living in rural areas and in poorer households or having less education, and in most provinces with lower coverage at baseline.

Total Fertility Rate (per woman)

Legend: National, Urban, Rural

Rural: 7.1, 6.9, 6.9, 7.5, 6.6, 5.8
National: 6.5, 6.1, 5.9, 6.2, 5.3, 4.7
Urban: 5.8, 5.1, 4.3, 4.3, 3.7, 3.4

1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018

Proportion of demand satisfied by modern methods among married women (%)

Legend: ZDHS 2018, ZDHS 2013/14

Province	ZDHS 2018
Northern	58.1
Muchinga	71.4
Luapula	59.6
Western	52.0
North Western	67.8
Central	73.2
Southern	64.2
Copperbelt	72.3
Eastern	71.8
Lusaka	74.6
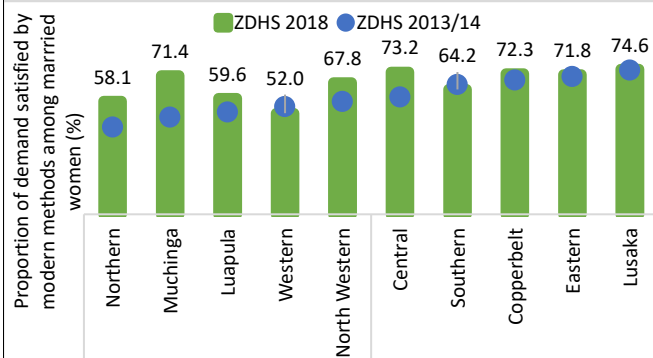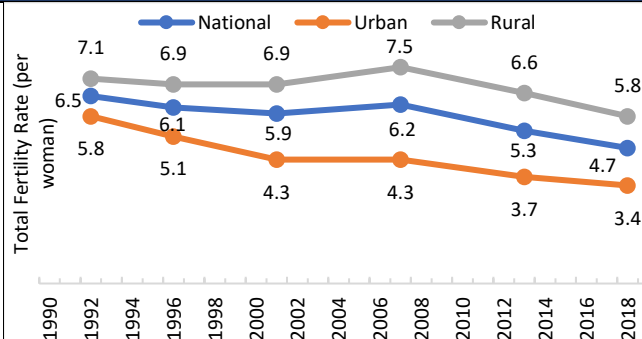
Lower baseline coverage (<60%)   Higher baseline coverage (>60%)

MATERNAL AND NEWBORN CARE: continued decline in maternal mortality but not newborn mortality; increases in coverage for skilled birth attendance (80%), 4 or more ANC visits (64%) and PNC visits within 48 hours (70%) with reduced socioeconomic inequalities

- Pregnancy-related mortality ratio reduced from 398 to 278 between 2013/14 and 2018 ZDHS.
- During 2014–2018, having 4 or more ANC visits increased from 56 to 64%. However, too few pregnant women had their first ANC visit during the first trimester (37%).
- There are few good indicators of quality of care, but the DHIS2 data showed small improvements in anaemia testing (85 to 89%) and syphilis testing (44 to 56%) among women attending ANC.
- Delivery and postnatal care reached the 2018 targets: skilled birth attendance care went from 64 to 80%, and postnatal visits within 48 hours after delivery from 63% to 70%. The increases occurred in all regions.
- Socioeconomic inequities also reduced, as an increasing number of women in the poorest wealth quintile reported skilled birth attendance and postnatal care visits within 48 hours.
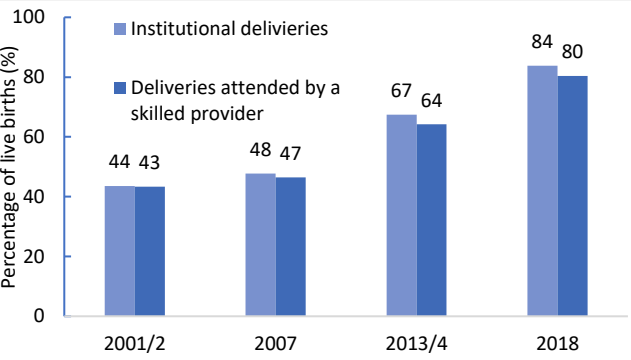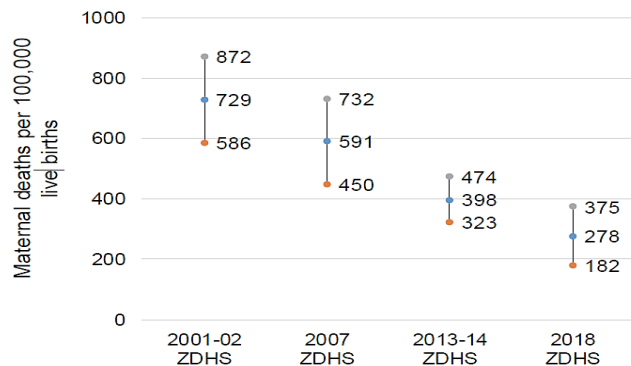
IMMUNIZATION COVERAGE: Sustained high levels of child immunization coverage

- Immunization coverage levels among infants remained high, with 9 out of 10 children receiving the recommended vaccines. Full immunization coverage increased from 68% to 75% by 2018 (ZDHS) but did not reach the target of 79%.
- Drop-out rates for BCG-Measles, OPV and Penta declined overall.
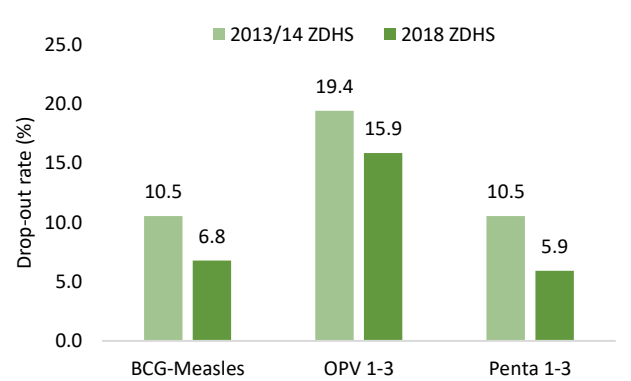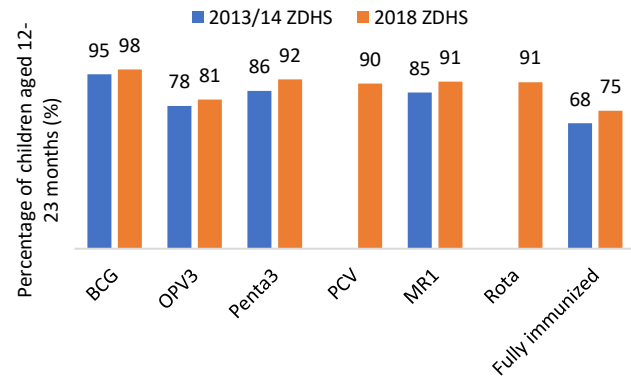
CHILD NUTRITION: continued gradual improvement in child anthropometric status but still 35% of children under-five were stunted by 2018, and little change in infant and young child feeding practices

- Child nutritional status indicators improved during 2013/14 at the same pace as in the preceding decade. Stunting reduced at a 1% absolute, or 2.4% relative, decline per year but was still 35% in 2018.
- Inequalities in child stunting by wealth quintiles remained the same between 2007 and 2018 ZDHS: the poorest group had a 15-percentage point higher rate than the richest group.
- Early initiation of breastfeeding within one hour after birth steadily increased, from 66% in 2013/14 to 76% in ZDHS 2018. Exclusive breastfeeding for six months remained around 70% in 2018 (ZDHS), similar to the previous survey in 2013/14.
- Less than 1 in 4 children under-five received a minimally adequate diet (22%), with no improvement over time.
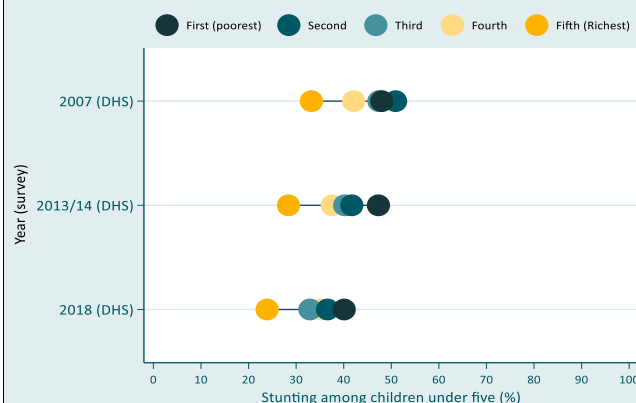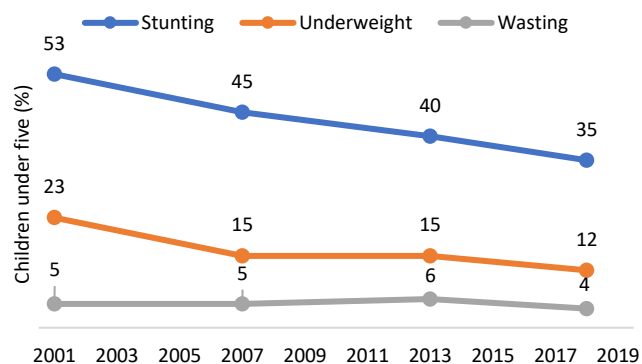
ADOLESCENT SEXUAL AND REPRODUCTIVE HEALTH: little change in the reduction in adolescent childbearing or child marriage, but slight decline in HIV prevalence among adolescents

- Childbearing before age 20 remained common (29% of girls 15–19 years), and was 37% in rural Zambia
- HIV prevalence reduced slightly and remained higher among girls (2.6%) than boys (1.2%) (ZDHS 2018).
- Comprehensive right knowledge of HIV prevention did not improve between 2013/14 and 2018 ZDHS among boys or girls aged 15-19 years.
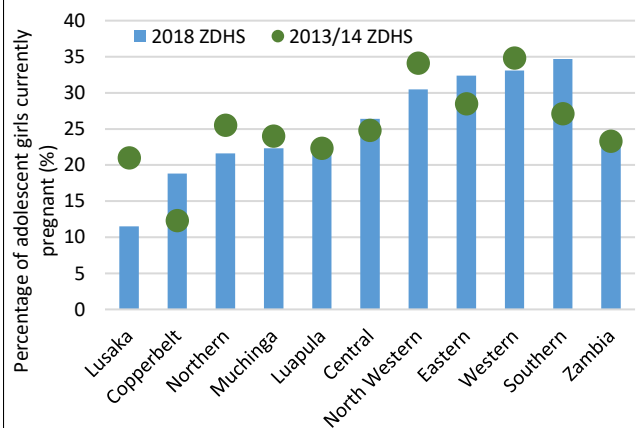
MALARIA: decline in malaria prevalence and increasing intervention coverage, focused on higher prevalence provinces

- Malaria has declined in Zambia between 2015-2018, most prominently shown by a halving of the parasite prevalence rate in children from 15.5 to 7%, but major provincial differences remained.
- All malaria intervention coverage indicators showed positive trends, and several reached the 2018 NHSP targets. There were increases for use of LLITN, IPT3 and IRS, as well as diagnostic testing by blood slide or rapid test in children and use of ACT for treatment of malaria.
- Intervention coverage increased in provinces with higher prevalence between 2015-2018 (ZMIS), and generally reached lower socio-economic groups as much or more than higher socio-economic groups.
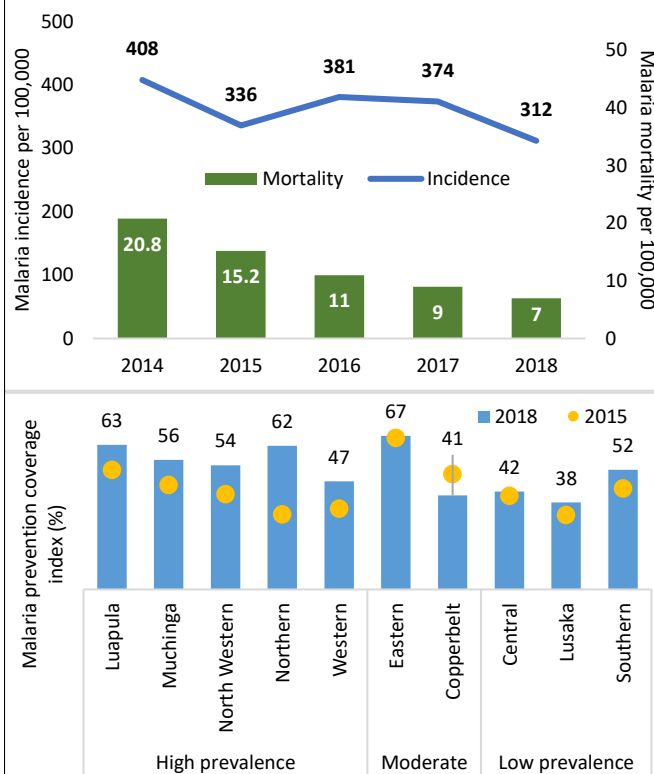
HIV/AIDS: HIV prevalence still high but declining slightly; increasing and high ART coverage but effective coverage still only 59%

- There has been a long-term trend towards reduction in HIV/AIDS mortality (by 37 percentage points since 2010) and to a lesser extent HIV incidence (by 13 percentage points since 2010). However, HIV incidence still significant, with nearly 50,000 new infections per year and 1.2 million living with HIV in 2018.
- Coverage of ART has increased to 78% in 2018, due to more widespread HIV testing since 2017 and more rapid initiation of treatment. However, effective coverage (i.e. viral load suppression among all people living with HIV) was still 59% in 2018.
- PMTCT is universal and almost 9,000 new infections are averted every year.
- The indicators on sexual behaviour related to the prevention of HIV and STI showed little progress (except male circumcision).
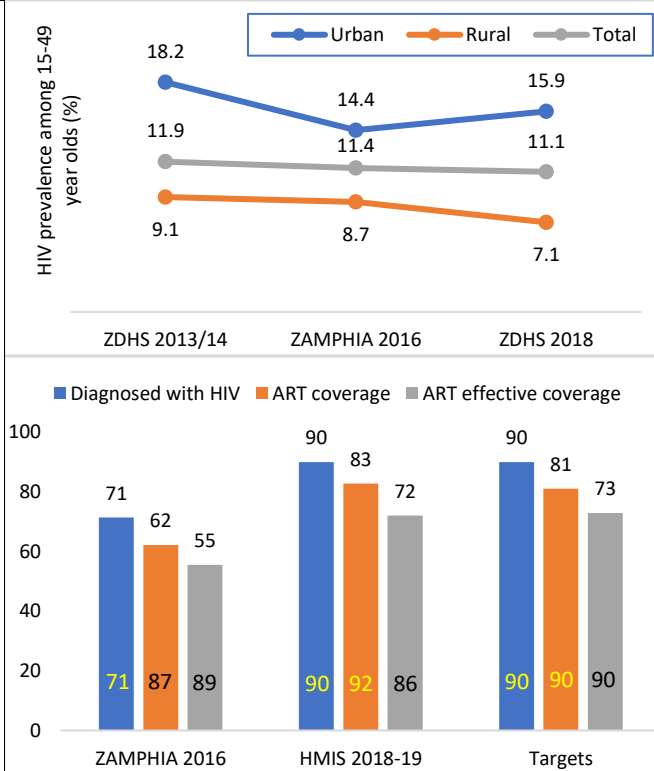
TUBERCULOSIS: declining TB incidence and high treatment success rates, but case detection rates still below 60%

- Most TB indicators progressed during NHSP, including declining TB incidence and notification rates, high TB treatment success rates (90%), increasing treatment success rates among MDR-TB patients and nearly all TB/HIV patients on ART.
- Yet, effective coverage of TB treatment remained low (52%) as TB case detection / treatment initiation rates did not increase and were still below 60%.
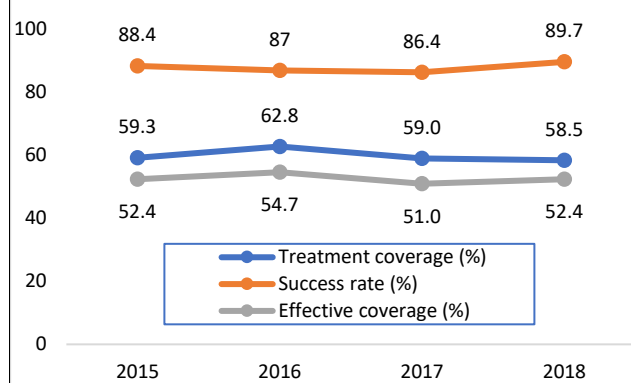
NEGLECTED TROPICAL DISEASES: still endemic in most districts and no strong increase in preventive chemotherapy

- Neglected tropical diseases (NTDs) are endemic in many of the 117 districts in Zambia: lymphatic filariasis (LF) in 85 districts, soil-transmitted helminths (STH) in 103, schistosomiasis (SCH) also in 103, and trachoma in 50 districts.
- Cases of human African trypanosomiasis rhodesiense declined from over 700 cases in 2005 to 53 cases in 2016.
- Coverage of preventive chemotherapy for applicable NTDs varied greatly, being high for lymphatic filariasis and soil-transmitted helminths, moderate for trachoma, but low for schistosomiasis.
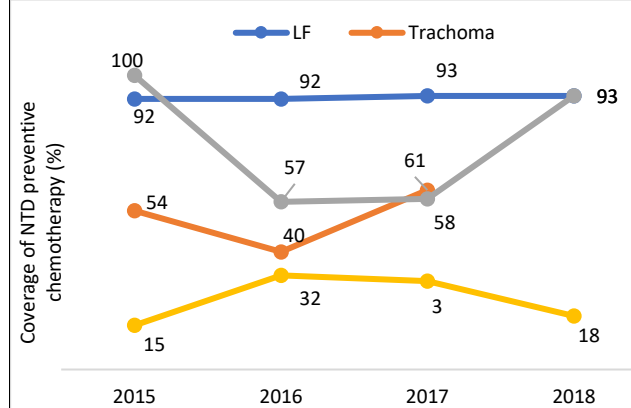
NON-COMMUNICABLE DISEASES: rises or elevated levels in NCD and its risk factors such as obesity, diabetes, high blood pressure, alcohol use (men), high salt intake, and tobacco use (men, steady at 20%)

- Numerous risk factors for NCDs had high levels and unfavourable trends, particularly among urban residents.
- Obesity and overweight prevalence among women increased from 23% in 2014 (15-49 years, ZDHS) to 33% in 2017 (18-69 years, STEPS survey). Long term trends accelerated rapidly. Among children under-five, there was almost no overweight and no increase over time.
- One-tenth of adults did not engage in adequate physical activity in 2017, especially urban women.
- Alcohol use was high among regular users (one-third of men and one-ninth of women).
- Tobacco use was low for women (1%), and remained fairly constant among males (20.2% to 19.6%), but lower than the targets for 2018.
- About 6% of adults in 2017 reported having raised blood glucose levels or were currently on medication for diabetes.
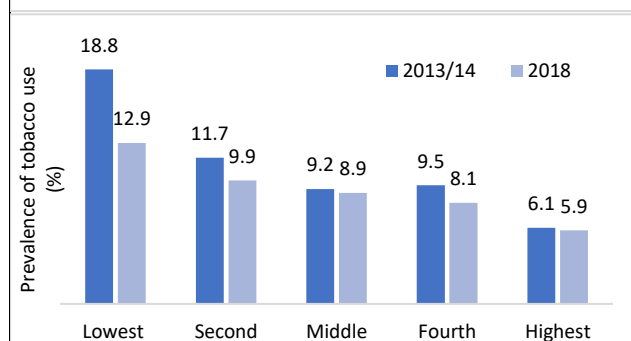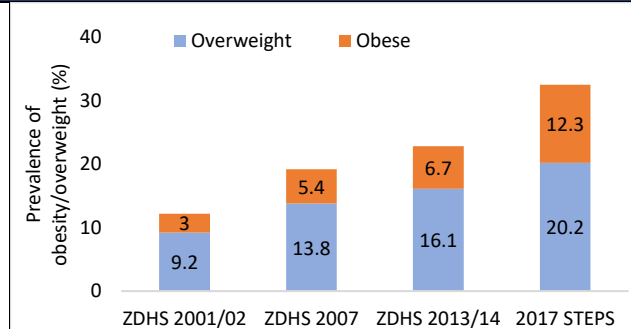
- The prevalence of raised blood pressure among males and females in 2017 was 20.5% and 17.6%, respectively.
- Average daily salt intake of 9.5 grams in 2017 was almost two times higher than the WHO threshold of 5 grams per day.
- Only 21% of women 18-69 years had ever been screened for cervical cancer.

HEALTH SYSTEM: some improvements in governance and domestic health financing, as well as health workforce and infrastructure and information system

- **Financing**: The coordination and implementation management structures for NHSP are in place and functioning. Program-specific plans are generally well-aligned with NHSP. The health sector budget has increased during NHSP but the percent of government remained the same at just under 10%. Health care financing for public health institutions has been largely tax based, the implementation of the National Health Insurance Scheme commenced in October 2019.

Legend: MoH Budget as proportion of National Budget (%) / MoH Budget Trend (K'billion)

Year	MoH Budget as proportion of National Budget (%)	MoH Budget Trend (K'billion)
2012	9.3	2.5
2013	11.3	3.6
2014	9.8	3.6
2015	9.9	4.2
2016	9.7	4.7
2017	8.3	5.7
2018	9.5	6.8
2019	9.3	7.5
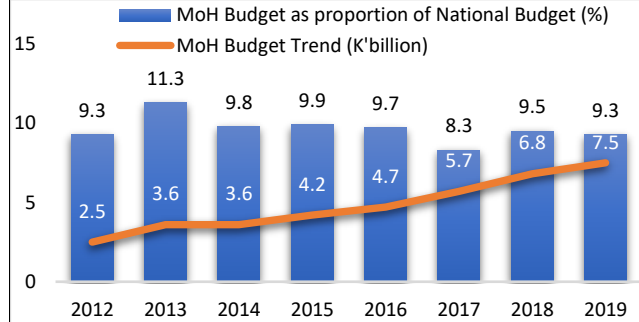
- **Workforce**: The total health workforce requirement in the country as per the established positions at the end of 2019 was 126,389, however the filled positions were 60,332 (a gap of 52%). The core health workforce density (medical officers, nurses, midwives, clinical officers) increased to 16.5/10,000 in 2019 but still well short of the target. There was variation across the provinces. All facilities had 80% of professional staff at all levels of health care.
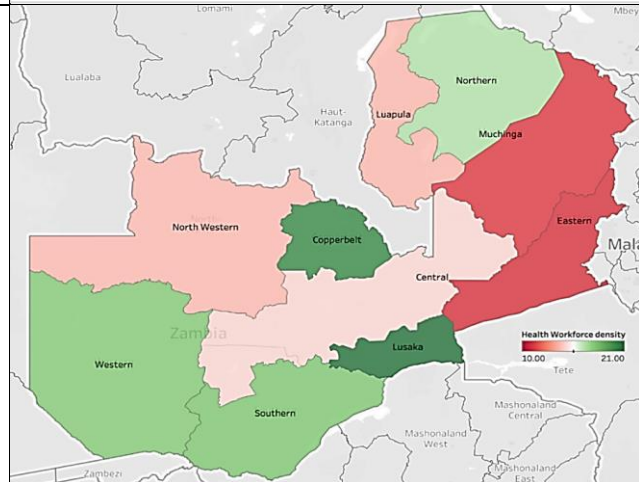
- **Utilization and infrastructure:** The facility density was surpassed with 15 public health facilities per 100,000 population. Bed density per 10,000 population in Zambia declined by 15% from 20 in 2015 to 17 in 2018, but beds in the private sector are heavily underrepresented, and were less dense in less populated rural provinces. The average number of outpatient visits was 1.3 visits per year with little change between 2015-2018. The blood donation rate declined from 7.8 to 7.4, well below the target of 10 per 1000 persons.

Number of inpatient beds per 10,000 population:

Province	Beds
Central	14
Copperbelt	18
Eastern	16
Luapula	20
Lusaka	14
Muchinga	13
Northern	13
North Western	32
Southern	19
Western	24
National	17
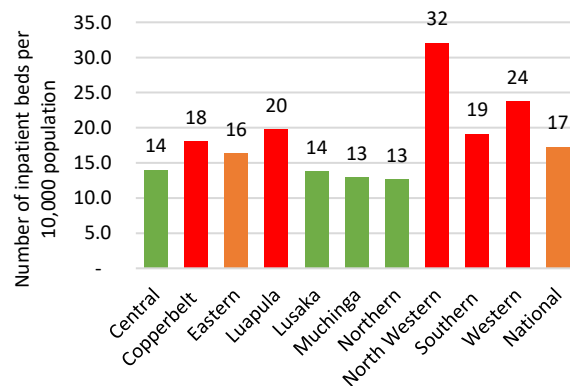
- **Health information system:** Regular surveys are conducted including DHS every five years, malaria and HIV surveys and a recent NCD survey, as well as a national health facility census in 2017 (public sector). Completeness of reporting in HMIS, using a single form for each facility, is high (> 90%), but data element completeness could not be assessed. Private sector reporting is very poor and also larger health facilities tend to underreported.
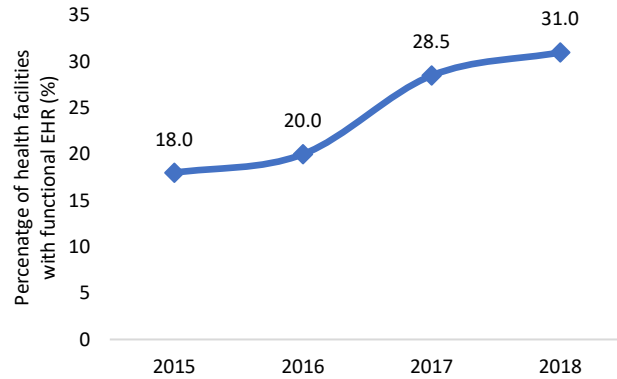
SOCIOECONOMIC AND REGIONAL COMPARISONS: reductions in the urban rural coverage gaps, gaps between rich and poor, but substantial gaps between better-off more urbanized provinces and poorer provinces remained; Zambia is an intermediate performer compared to other countries in the region

- **Rural-urban residence:** The urban-rural gap in Zambia remained for under 5 mortality, stunting in childhood and coverage of RMNCH interventions, but there is some evidence of a reduction of the gap between the ZDHS 2013/14 and ZDHS 2018. For malaria interventions the urban-rural gap increased.
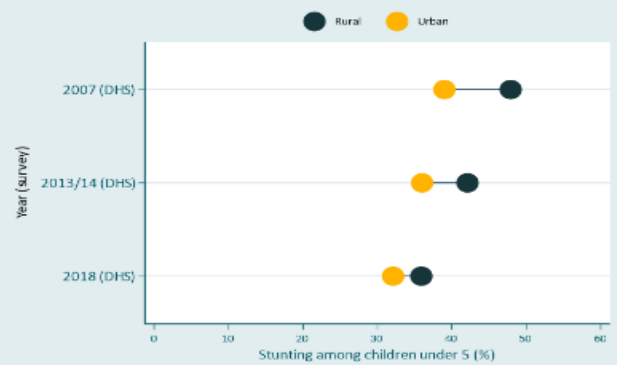
- **Socioeconomic status**: Comparing women and children in the poorest and richest households, there was a smaller gap in neonatal and under-five mortality in 2018 than 2013/14, but a consistently large gap in stunting. Surprisingly, stunting was not evidently correlated with provinces' level of socioeconomic development.
- The malaria parasite prevalence remained persistently higher among the poorest children, while the richest continued to have higher prevalence of HIV prevalence.
- RMNCAH intervention coverage improved more among the poorest wealth groups. Still, the greatest improvements occurred in the more socioeconomically developed provinces of Lusaka and Copperbelt, as well as Eastern.
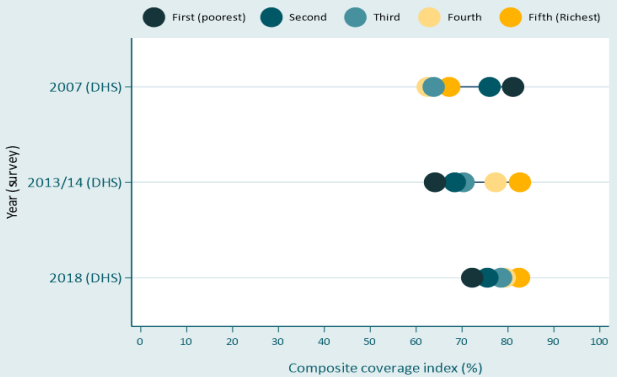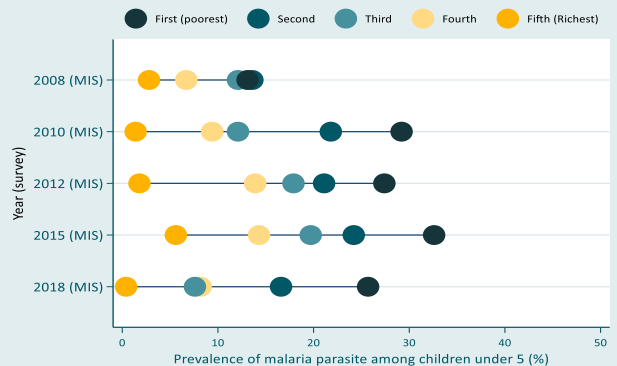
- **Health system strength by province**: OPD utilization rates generally improved in provinces with lower socioeconomic status (Western and Eastern, but also Southern with a higher socioeconomic status). Conversely, health workforce density was higher in provinces with higher socioeconomic status (Lusaka and Copperbelt), except Western province with lower socioeconomic status.
- Infrastructure strength (density of beds and facilities) was higher in provinces with higher population density and socioeconomic development (Lusaka and Copperbelt).
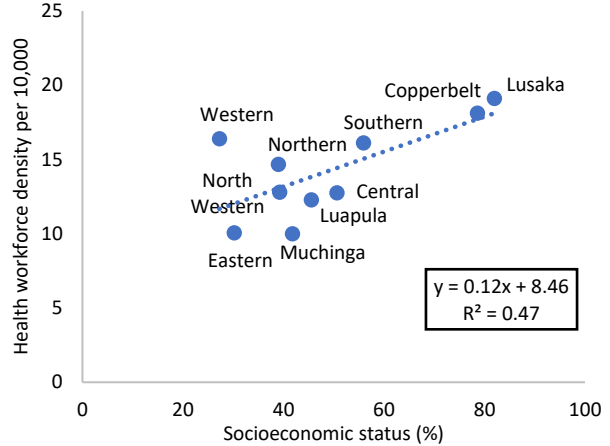
- **Comparison to countries in Eastern and Southern Africa sub-region**: Zambia had an intermediate position on child mortality, child stunting and fertility levels and was in the top three for lowest maternal mortality and highest coverage (using composite coverage index) of RMNCAH interventions.
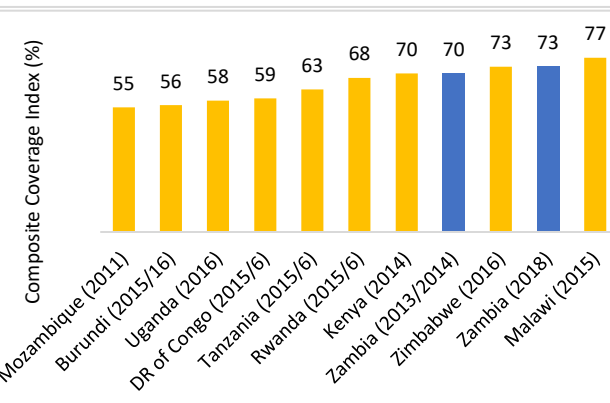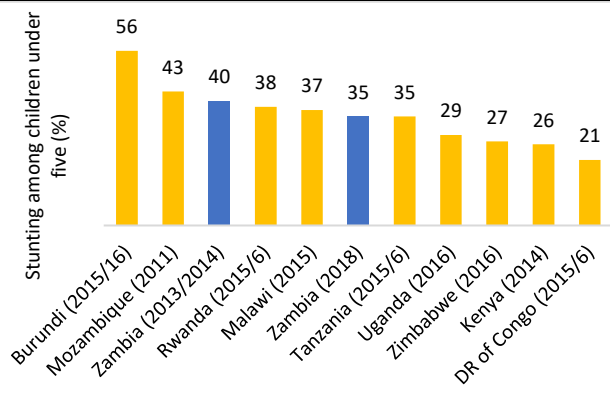
Summary of NHSP targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Life expectancy and Mortality				
Life expectancy at birth (years)	Males: 49.2 (2010 Census) Females: 53.7 (2010 census)	52.2 56.8	Males: 60.2 (WHO estimates 2018) Females: 64.4 (WHO estimates 2018)	Life expectancy at birth has increased significantly for both males and females.
Under-5 mortality rate per 1000 live births	75 (ZDHS 2013/14)	59	61 (ZDHS 2018)	Estimate based on the previous five years. Good progress, still below target.
Neonatal mortality rate per 1000 live births	24 (ZDHS 2013/14)	18	27 (ZDHS 2018)	Mortality has increased though not statistically significant.
Infant mortality rate per 1000 live births	45 (ZDHS 2013/14)	30	42 (ZDHS 2018)	Modest decline.
Maternal mortality ratio per 100,000 live births	398 (2013/14 ZDHS)	250	278 (2018 ZDHS)	Estimate based on the previous 7 years. Good progress; however, still above target. The maternal mortality ratio was estimated at 252 per 100,000 live births.
Adult mortality rate 15-49 years per 1000 population	8.4 (ZDHS 2013/14)	8.1	5.1 (ZHDS 2018)	Large decline, below target. Age-adjusted mortality rate is 4.3 for women, 5.9 for men, and 5.1 for both women and men, aged 15-49.
Morbidity				
Morbidity burden contributed by the 10 top causes ill-health (%)	N/A	N/A		Indicator had no baseline or targets set.
RMNCAH				
Reproductive health				
Total fertility rate (per woman)	5.3 (ZDHS 2-13/14)		4.7 (ZDHS 2018)	Larger decline in rural areas.
Fertility rate (per 1000 women 15-49)	152 (2014)	132	134 (ZDHS 2018)	Fertility rate declined by 18 points, nearly reaching the target.
Fertility rate among adolescents (per 1000 girls 15-19)	141 (2014)	121	135 (ZDHS 2018)	Rate among adolescents declined less, not quite halfway to the target.
Married women with FP need satisfied with modern methods (%)	63.8 (ZDHS 2013/14)	76	68.5 (ZDHS 2018)	5 percentage point increase-steady progress.
Contraceptive prevalence rate (% modern)	32.5 (ZDHS 2013/14)	56	34.1 (ZDHS 2018)	Far below the target for all women. Modern contraceptive prevalence rate among married women was 47.5%.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Contraceptive prevalence among adolescents (% modern)	10.2 (2013/14)	38	12.0 (ZDHS 2018)	Target not reached.
Percentage of clients accessing Long Acting Reversible Contraceptives	4 (2016, HMIS HIA 2)	N/A	4.5 (HMIS, HIA 2)	Indicator not available in the NHSP and M&E framework.
Couple Years of Protection Rate (CYP)	33.3 (2016, HMIS HIA 2; 2018 CSO Pop. Proj.)	N/A	35.6 (2018, HMIS HIA 2; 2018 CSO Pop. Proj.)	Indicator not available in the NHSP and M&E framework.
Maternal and Newborn Care				
Pregnancy outcomes				
Pregnancy-related Mortality Ratio (per 100,000 live births)	398 for 2007-2014 (ZDHS 2013/14)	250	278 for 2012-2018 (ZDHS 2018)	Estimate based on the previous 7 years. Good progress; however, still above target. The maternal mortality ratio was estimated at 252 per 100,000 live births.
Low Birth Weight (% of live births)	9.7 (HMIS, 2016)	7.8	11.4 (HMIS 2018)	Low birth weight has increased in health facility births.
Antenatal care				
First ANC Coverage (Total 1st Antenatal visits) (%)	95.7 (2013/14 ZDHS)	97	97 (ZDHS 2018), near 100% (HMIS 2018)	Decline in First ANC. Might be due to the incompleteness of the data in routine data collected.
1st Antenatal Visit before 14 weeks (%)	24.4 (2013/14 ZDHS) 12 (HMIS 2016)	45	36.7 (ZDHS 2018) 22 (HMIS 2018)	Increase during 2016-2018, but short of target.
4+ Antenatal visits before delivery (%)	55.5 (2013/14 ZDHS) 42 (HMIS 2016)	65	63.5 (ZDHS 2018); 52 (HMIS 2018)	Inconsistencies between HMIS and ZDHS but increase in both.
Syphilis screening coverage of 1st ANC clients (%)	44 (HMIS 2013)		56.3 (HMIS 2018)	Increase of about 12 percentage points.
Anaemia screening coverage of 1st ANC clients (%)	85.2 (HMIS 2013		89.5 (HMIS 2018)	Increase of 4 percentage points. No target set.
Delivery and postnatal care				
Percentage of institutional deliveries (%)	67.4 (ZDHS 2013/2014)	N/A	83.8 (2018 ZDHS)	Increase of 23%. No target set in the M and E plan.
Percentage of skilled deliveries (%)	64.2 2013/14 ZDHS	79	80.4 (2018 ZDHS)	Target has been achieved and surpassed by 1 percentage point.
Caesarean section rate (%)	3.5 (2015 HMIS) 4.4 (2013/14 ZDHS)	7.0	5.6 (2018 HMIS); 5.0 (2018 ZDHS)	Increased by over 2 percentage points but still lower than target.
Postnatal care visit within 48 hours after delivery (%)	63.4 (2013/14 ZDHS)	74	69.7 (2018 ZDHS)	

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Child health and nutrition				
Nutritional status and treatment of childhood illnesses				
Percentage of children underweight	15 (2013/14 ZDHS)	9.8	12 (2018 ZDHS)	Important reduction but ambitious target no reached
Percentage of children stunted	40 (2013/14 ZDHS)	29.6	35 (2018 ZDHS)	Long term reduction since 2001 continuing.
Percentage of children wasted	6 (2013/14 ZDHS)	4	4 (2018 ZDHS)	Target achieved.
Percentage of children with minimum dietary diversity	22 (2013/14 ZDHS)	N/A	23 (2018 ZDHS)	Minimum dietary diversity did not increase in the past five years.
Exclusive breastfeeding 0-6 months	72.5 (2013/14 ZDHS)	75.8	69.9 (2018 ZDHS)	Target not met.
Breastfeeding initiated within 1 hour of birth (%)	65.8 (2013/14 ZDHS)	79	76.6% (2018 ZDHS)	Target almost reached.
Percentage of children with diarrhoea receiving Oral Rehydration Solution (ORS, and Zinc supplements) (%)	64.1 (2013/14 ZDHS)	79	66.8 (2018 ZDHS)	Zinc was not offered previously, thus ratios compared were for ORS only.
Percentage of caregivers with appropriate care-seeking for symptoms of pneumonia (%)	71.9 (2013/14 ZDHS)	82	74.5 (2018 ZDHS)	No major change over time.
Immunization of children				
BCG coverage (%)	94.9 (2013/14 ZDHS)	90	97.5 (2018 ZDHS)	Target achieved.
BCG to Measles 1 dose dropout rate (new) (%)	10.5 (2013/14 ZDHS)	N/A	6.8 (2018 ZDHS)	Reduced by three points.
OPV coverage, 3rd dose (%)	77.6 (2013/14 ZDHS)	90	81.2 (2018 ZDHS)	Target achieved.
OPV1 to OPV3 doses drop-out rate (%)	19.4 (2013/14 ZDHS)	N/A	15.9 (2018 ZDHS)	Reduction by nearly 5 percentage points.
Pentavalent vaccine, 3rd dose (%)	85.8 (2013/14 ZDHS)	90	92.1 (2018 ZDHS)	Target achieved.
Penta 1 to Penta 3 drop-out rate	10.5 (2013/14 ZDHS)	N/A	5.9 (2018 ZDHS)	Reduced by almost 5 points.
PCV 3 coverage rate	92.9 (2016, HIA 2)	90	90.6 (2018, HIA 2) 89.8 (2018 ZDHS)	Newly introduced vaccines following ZDHS 2013/14.
Rota 2 coverage rate	N/A	90	90.6 (2018 ZDHS)	Newly introduced vaccines following ZDHS 2013/14.
Measles- Rubella first dose coverage rate (%)	84.9 (2013/14 ZDHS)	90	90.9 (2018 ZDHS)	Target achieved.
Full immunization coverage (%)	68.3 (2013/14 ZDHS)	79	75 (2018 ZDHS)	Improved noticeably but not quite reached the target.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Adolescent Health				
Adolescent birth rate per 1,000	141 (2013/14 ZDHS)	133	135 (2018 ZDHS)	Slight reduction.
HIV prevalence among adolescents (%)	0.9 (10-14 yrs, 2016 ZAMPHIA) Overall: 2.5 (15-19 yrs, 2016 ZAMPHIA) Male: 1.6; Female: 3.3 (15-19 yrs, ZAMPHIA 2016)	N/A	Overall: 1.9 (15-19 yrs, ZDHS 2018) Male: 1.2; Female: 2.6 (15-19 yrs, ZDHS 2018)	ZDHS 2018 shows slightly lower levels.
Percentage of districts with minimum adolescent health package	42 (Programme report)	N/A	48 (Programme report)	
Percentage of adolescents with comprehensive right knowledge of HIV Prevention	Male: 39 Female: 42 Overall: 39.5 (2013/14 ZDHS)	60	Male: 41 Female: 43 Overall: 42 (2018 ZDHS)	Young people age group used (15-24 years). Minimal progress made.
Percentage of women aged 20–24 who were married or in a union before age 15 and before age 18 (%)	Before 15: 5.9 Before 18: 31.4 (2013/14 ZDHS)	N/A	Before 15: 5.2 Before 18: 29 (2018 ZDHS)	Slight decline.
Gender-Based Violence and Child Sexual Abuse				
Proportion of individuals seeking PEP as a result of sexual assault		N/A	601 (2015, World Vision Zambia)	No baseline.
Number of children seeking health services as a result of sexual violence at a given period	3790 (HIA 2, 2016; UTH PCOE, 2016)	N/A	1565 (HIA 2, 2018; UTH PCOE, 2018)	Huge disparity in the figures from HIA 2 for 2018.
Malaria				
Malaria mortality rate per 100,000 population	15.5 (HMIS 2016)	13.3	7 (HMIS 2018)	Baseline was adjusted with new data; decline, target achieved based on health facility data.
Malaria incidence per 1,000 population	336 (HMIS 2015)	168	312 (2018 HMIS)	No major decline, large differences by province.
Prevalence of malaria parasitaemia (children 6–59 months) (%)	17 (ZMIS 2015)	9.0	9.1 (ZMIS 2018)	Major decline since 2018, in all provinces.
Slept under LLITN previous night: all pregnant women (PW) 15–49, children under 5 years) (%)	All: 55.0 PW: 58.2 Under 5: 59.0 (ZMIS 2015)	All: 73.0 PW: 74.9 Under 5: 75.4	All: 63.6 PW: 71.1 Under-5: 69.0 (ZMIS 2018)	Good progress during 2015-2018, but short of 2018 target.

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Proportion of treated malaria cases that were lab confirmed (%)	83 (HMIS 2016)	N/A	96 (HMIS 2018)	Nearly all cases now lab confirmed.
IPT3 dose to pregnant women (%)	44.7 (ZMIS 2015)	N/A	67.3 (ZMIS 2018)	Major increase while IPT2 remained at about 80%.
IRS for households in past 12 months (%)	28 (2015 ZMIS)	57.4	35 (ZMIS 2018)	Increase in coverage by one-fifth, but far off 2018 target.
HIV/AIDS				
HIV deaths per 100,000 population	126 (HMIS, 2016)	110	N/A	
HIV incidence per 1,000 population	6.1 (2016, ZAMPHIA)	0.5	N/A	Only UNAIDS/Spectrum predicted estimates available.
HIV prevalence among 15-59 years (%)	12.0 (2016, ZAMPHIA)	10.0	11.1 (ZDHS 2018, 15-49 years)	15-59 is slightly higher than 15-49; no decline.
ART coverage among eligible persons living with HIV infection (M/F) (%)	85.1 86.2 (M) 84.4 (F) (ZAMPHIA 2016)	87.1 87.7 (M) 86.6 (F)	92 (HMIS Q2 2019) 84 (COP Q3 2018)	Indicator refers to those who have been diagnosed, not coverage; progress according to HMIS.
Viral load suppression among PLHIV (%)	89.2 87.7 (M) 90.1 (F)	89.5 88.6 (M) 90.1 (F)	86.3 (HMIS Oct18- Sep19) 88 (COP Q3 2018)	Only data for both sexes, just short of target and baseline.
ART retention at 12 months (%)	75 (HMIS 2015)	78	N/A	No data.
HIV-positive women receiving ART for PMTCT (%)	65 (NACP, 2012)	90 by 2017 (NACP)	>90 (UNAIDS) 88.5 (HMIS 2018)	
PMTCT: children testing positive within 18 months (%)	5.0 (HMIS 2016)	3.4	3.8 (HMIS 2018)	Good progress but short of target
Awareness of HIV positive status among 15-59 years (%)	71 69 (M) 73 (F) (ZAMPHIA 2016)	75.7 73.4 (M) 77.0 (F)	90 (HMIS, Q2 2019)	Baseline corrected with ZAMPHIA data. Target achieved by 2019.
Condom use at last sex among those with 2+ partners in last year (%)	27.4 (M, 15-59) 29.7 (F, 15-49) (ZDHS 2013/14)	50 (M) 50 (F)	26.5 (M) 38.2 (F) (ZDHS 2018)	No progress for men, not sufficient for women to reach target.
Knowledge of HIV among 15-19 years (%)	39.5 (ZDHS 2013/14)	60	42 (ZHDS 2018)	Knowledge of four prevention methods.
Tuberculosis				
TB incidence rate / TB cases per 100,000	391 (2015 WHO)	335	346 (WHO 2018)	Incidence rates estimated by WHO.
TB death rate per 100,000 population	115 (2015WHO)	115	102 (2018 WHO)	Death rates estimated by WHO.
TB notification rate (per 100,000 population)	231 (2015 TB prevalence survey)	N/A	202 (TB prevalence survey 2018)	Substantial decline.

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
TB treatment coverage / case detection per 100 incidence cases	59.3 (2015 WHO)	N/A	58.5 (2018 WHO)	No progress, major impact on effective coverage.
TB treatment cure rate (success rate) (%)	84 (HMIS, 2015)	86	90 (2018 HMIS)	Target surpassed in 2018, but effective coverage not progressing.
Multi-drug resistance: successfully treated cases (%)	30 (2015 HMIS)	65 (2018)	71 (2016 cases)	Target surpassed.
TB/HIV patients on ART (%)	76 (2015 HMIS)	77	91 (2018)	Target surpassed.
Neglected tropical diseases				
Coverage of preventive chemotherapy for applicable NTDs (%)	92.6 (2015)	95.2	Ranging from 18 to over 90% (NTD programme, 2018)	LF and STH doing well, but schistosomiasis coverage is low.
Non-communicable diseases (NCD)				
Obesity and overweight prevalence among adults (M/F) (18–69 years) (%)	M: NA; F: 22.8 (15-49 years, 2013/14 ZDHS)	N/A	M: 16.2; F: 32.5 (18-69 yrs, STEPS 2017)	Prevalence of obesity and overweight has worsened among women.
Adults with insufficient physical activity (%)	N/A	17.8	10.4 (STEPS 2017)	Lower than the target for which the basis is not clear.
Prevalence or raised blood glucose among adults 25–64 years (%)	N/A		Male: 6; Female: 6 (2017 STEPS)	No baseline and target.
Age-standardized prevalence of current tobacco use among persons aged 15+ years (%)	Male: 20.2 (2013/14 ZDHS) Female: 1.6 (2013/14 ZDHS)	Male: 21 Female: 3	Male: 19.6 (ZDHS 2018) Female: 0.9 (ZDHS 2018)	Good progress among females. Tobacco use increasing among males.
Adults with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg), %	N/A	N/A	All: 19; M: 21; F: 18 (STEPS, 2017)	
Mean salt intake among adults (in grams)	N/A	<5[1]	All: 9.5; F: 8.5; M: 10.5 (STEPS, 2017)	Salt intake in Zambia is almost two times higher than the recommended daily allowance.

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[1] WHO recommendation for daily salt intake.

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Health system				
Governance & financing				
Service (HP, HC & Hospital) and management (province, district) units with functional governance structures for implementing, coordinating and monitoring NHSP 2017-21 (%)	(Administrative Reports, 2016)	100	100	Governance structures are virtually present in the institutions.
Service units with planning and reporting tools relevant to each level of care (policies, strategy, operational plans, M&E framework (%)	(Administrative Reports, 2016)	100	100	The target was achieved, although there is a need to better define the indicator.
Presence of functional coordination and partnership mechanism from community to national level	(Administrative Reports, 2016)	TBA	Yes	The target was achieved, although there is a need to better define the indicator.
Appropriate steward stability to implement policies				Field work results awaited.
Programmes implemented according to NHSP (annual reports, performance reports etc.) (number)				Field work results awaited.
Out of Pocket (OOP) health expenditure as percent of current expenditure on health	12.2 (2016 NHA report)	17.6	No Data	The target is higher than baseline; OOP estimates by WHO are much higher.
Total current expenditure on health (%) of gross domestic product	4.5 (2016 NHA report)	9.0	No Data	
Household Health Expenditure as percent of Total Health Expenditure (%)	11.5 (2016 NHA report)		No Data	
Government expenditure on health as percent of total current expenditure (%)	38.3 (2016 NHA report)	13.4	No Data	
External source of current spending on health as percent of current expenditure on health (%)	42.5 (2016 NHA report)	43.4	No Data	
Total capital expenditure on health as a percent of current plus capital expenditure on health (%)	5.1 (2016 NHA report)	8.8	No Data	
Population covered by health insurance (%)	4 (2016 NHA report)	50	4	The target was not met.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Health workforce				
Health worker density (MO, CO, nurses, and midwives)	12 per 10,000 population	35	16.5 (2019)	Major increase but the 2018 target is still far.
Percent of approved posts filled by skilled personnel (doctors, medical licentiates, clinical officers, nurses, other) by the 6 levels of care (%)	69.2 (WHO AFRO)	73.5	47	This indicator was well below the target and baseline.
Health facilities with at least 80% of professional staff on establishment filled (by the 6 levels of care) (%)	73 (HRIS year)	85	100	Every facility in Zambia has qualified personnel.
Health facilities with at least one qualified health worker (%)	88	90	>95	Performance above target.
Health Workers trained annually as percent of total professional workforce gap	N/A	N/A		No data.
Proportion of health workers recruited annually as percent of the workforce gap (%)	N/A	N/A	16	Significant achievements were made during 2018-19 with deficits of 16% in 2018.
Health infrastructure, medicines, utilization				
Health facility density (by type and distribution) per 100,000 population	4.3 (2016, NHFC)	11.8	15.1 (NHFC, 2019)	Target achieved and exceeded. Significant variations across provinces.
Bed density and distribution (Inpatient, maternity, infant, isolation) per 10,000 population	20 (2015, WHO AFRO)	16	17.3 (NHFC, 2019)	Decline from the baseline value but density remains higher than the NHSP target.
Blood donation rate per 1,000 persons	7.8 (2015, WHO AFRO)	10.7	7.4 (2018 ZNBTS)	Indicator regressing.
OPD attendances by the catchment population in a period of time (outpatient)	4.2 (2016, HMIS)	3.5 (2018)	3.8 (2018 HMIS)	Given the uncertainty of catchment populations the indicator is difficult to interpret.
Health information system				
Coverage of birth registration (%)	14	20.4	14.8	Computed with the estimated births in 2018; need to strengthen the Civil registration system.
Coverage of death registration (%)	N/A	N/A	13	
Existence of a functional integrated data repository	N/A	N/A	Available	Data warehouse is not fully operational; other service areas not stored in data warehouse must be included.
Proportion of hospitals using correct ICD coding (%)	N/A	20	13	Inadequate ICT equipment has contributed to the low use of ICD10 coding.
Coverage of IDSR surveillance systems (%)	25	55	100	All districts are using IDSR for reporting weekly and monthly.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Presence of comprehensive country health database for the past five years	N/A	N/A	Available	MoH has implemented the DHIS2 for routine health information system. Other databases: HRIS, Logistimo, EMLIS, planning and budgeting tool and NAVISION for expenditure reporting.
Completeness levels of facility reporting (%)	80	84	90.3	The report completeness has shown improvement due to enhancement systems that monitor data entry; timeliness still remains a challenge.
Data accuracy levels of facility reporting (%)	50	54	N/A	Accuracy is partly established by verification of data in site visits to selected health facilities; indicator difficult to capture but estimates can be obtained from programmes such as HIV, TB and Maternal Health.
Proportion of health facilities with functional EHR (by level of care (%)	20	32	31	879/2698 are using EHR while 228/879 facilities are E-first facilities.

Summary of progress towards the 10 legacy goals of NHSP 2017-2021 by mid-2019 based on quantitative data analyses

Goal		Progress
1	**Reduction in Maternal and Child Mortality**	• Maternal mortality is declining and estimated at 200/100,000 live births by 2018, on track to reach the 2021 target; this is supported by increases in service coverage such as antenatal care visits (64%) and skilled birth attendance (80%). • Child mortality is declining but the pace of the decline is slowing down and falling behind the NHSP target. This is mainly due to stagnation in neonatal mortality, which now comprises 44% of all under-5 deaths. This is occurring in spite of increasing levels of institutional deliveries and postnatal care visits, as well as immunization coverage. Quality of care issues may play an important role.
2	**Elimination of Malaria**	• Malaria has declined in Zambia between 2015-2018, most prominently shown by a halving of the parasite prevalence rate in children from 15.5 to 7%, but major provincial differences remained. • Malaria mortality and incidence also declined according to health facility data but the elimination target is still far away, especially for incidence. • All malaria intervention coverage indicators showed positive trends, and several reached the 2018 NHSP targets. There were increases for use of LLITN, IPT3 and IRS, as well as diagnostic testing by blood slide or rapid tests among children, and use of ACT for treatment of malaria. • Intervention coverage increased in provinces with higher prevalence between 2015-2018 (ZMIS), and generally reached lower socio-economic groups as much or more than higher socio-economic groups.

3	Achieve HIV Epidemic Control, Reduce HIV new infections from 48,000 to less than 5,000	• There has been a long-term trend towards reduction in HIV/AIDS mortality (by 37% since 2010) and HIV incidence (13% lower since 2010), but HIV incidence is still significant with nearly 50,000 new infections every year and 1.2 million people living with HIV in 2018. • PMTCT and ART for pregnant women is nearly universal, and almost 9,000 new infections are averted every year. • Coverage of ART has increased to 78% in 2018, due to more widespread HIV testing since 2017 and more rapid initiation of treatment. However, effective coverage, or viral load suppression among all people living with HIV, was still 59% in 2018. The indicators on sexual behavior related to the prevention of HIV and STI showed little progress (except male circumcision).
4	Reduce TB incidence towards elimination	• Most TB indicators progressed during NHSP, including declining TB incidence and notification rates, high TB treatment success rates (90%), increasing treatment success rates among MDR-TB patients and nearly all TB/HIV patients on ART. • Yet, effective coverage of TB treatment remained low (52%) as TB case detection / treatment initiation rates did not increase and were still below 60%. Elimination is still far from being achieved.
5	Halt and reduce Non-Communicable Diseases	• High-quality recent data on NCD mortality and incidence trends are lacking but the risk factors for NCD showed unfavourable levels and trends, especially among urban residents. • Obesity and overweight prevalence increased rapidly according to data for adult women, physical inactivity was very common, alcohol use was high among regular users (one-third of men and one-ninth of women), the prevalence of diabetes and hypertension were as high as one-fifth of the adult population, and salt intake was twice the recommended thresholds. • Only tobacco use declined slightly, but was still higher than the target for men in 2017. • NCD interventions appeared to have low coverage. For instance, only 21% of women 18-69 years had ever been screened for cervical cancer.
6	Recruitment of 30,000 health care workers	• In 2017 and 2018, over 13,000 new core health professionals (doctors, nurses, midwives, clinical officers) were recruited, significantly expanding the workforce.
7	Train 500 specialists by 2021	• 280 new physicians were recruited 2017-2018. • No data by specialization were analysed.
8	Construction of 6 new specialised hospitals and 500 health facilities in the next 5 years	• No facility specific data were analysed. • The target for 2018 was 12 facilities per 100,000 population by 2018. There are currently 15 public facilities per 100,000 population in Zambia or one facility for about 7,000 people.
9	Introduction of Health Care Insurance to increase coverage from 4 percent to 100 percent	• No new data on the coverage of health insurance were available at the time of this analysis.
10	Introduction of Alcohol and Drug Abuse Policy and Programme	• Not included in the qualitative analysis.

1.   Introduction

The National Health Sector Plan (NHSP) 2017-2021 is the key Ministry of Health document that provides the guiding framework for the detailed planning and implementation of health sector activities. NHSP is accompanied by a monitoring and evaluation (M&E) framework 2017-2021 (published in May 2019). This is a comprehensive plan with a logical framework and over 200 indicators which almost all have baselines (for 2015, 2016 mostly if available), and annual targets from 2017 onwards. The M&E framework also specifies the key M&E products at community, facility, district, provincial and national levels. The midterm review (MTR) is one of the key outputs.

The NHSP 2017-2021 outlines the important of the M&E component: "The NHSP interventions, which are aimed at reaching desired outcomes and targets, will be measured using a set of annual and periodic indicators that have been developed through consultations with all stakeholders. These indicators, which are important for measuring the sector's performance, are consistent with 7NDP indicators and have been informed by the country's long-term vision and strategic direction (Vision 2030 and SDGs). These indicators will also form the basis of M&E of the NHSP 2017-2021."

Annual health sector reviews are conducted, informed by a health sector performance profile, to assess progress towards the targets for the indicators of HSSP IV. This report provides an analysis of the progress and performance of HSSP IV to inform the midterm review of HSSP IV, which was conducted in the middle of 2019.

In addition to NHSP, there are programme-specific strategies and plans which are key contributors to achieving the targets of the NHSP and have more detailed monitoring plans. The programme specific plans are generally well aligned with the overall NHSP, timewise and in terms of indicators. Usually, the NHSP indicators are a subset of the programme-specific indicators.

The primary objective of this analytical report is to review statistical progress and performance of Zambia's health sector during the first half of NHSP in comparison to the goals and targets. It provides a synthesis of relevant data, including health and other household surveys, census, health facility and disease surveillance data, facility assessments, administrative resources data, policy data and research studies.

The analytical review was carried as a desk review of technical reports including population surveys, programme evaluation reports, policy documents and research studies, as well as analysis of existing survey and health management information system (HMIS) data. A core analytical team conducted the analyses and prepared the report. The team consisted of the Ministry of Health, University of Zambia, Countdown to 2030 for Women's, Children's and Adolescents' Health and University of Manitoba, and World Health Organization.

2. Data and methods

The analytical report is based on analysis and synthesis of existing data. All existing reports and analyses were brought together. While the focus is on the period 2016–2018, in several instances, attention was also paid to the trends prior to 2016 to help interpret more recent data. The main sources of data are:

Population health surveys
- Zambia Demographic and Health Surveys (ZDHS) 2018[2], 2013/14, 2007, 2001/02
- Zambia Population HIV Assessment (ZAMPHIA): 2016
- Zambia Malaria Indicator Surveys (ZMIS) 2018, 2015, 2012, 2010, 2008, 2006
- STEPS for NCD risk factors 2017
- National TB prevalence survey 2014

Health facility data and reports
- HMIS database/DHIS2: 2014–2018
- Programme databases and annual/analytical reports of disease programmes
- Hospital mortality patterns and causes of death: Ministry of Home Affairs, Sample Vital Registration with Verbal Autopsy (SAVVY) 2016

Facility assessments
- National Health Facility Census 2017

Administrative data
- Financing: National health accounts 2016 (for 2013-2016)
- Human resources: national data base
- Infrastructure: national database of health facilities and beds (DHIS2)

The two most important data sources are the Zambia Demographic and Health Surveys (ZDHS) 2018 and the health facility data from the District Health Information System 2 (DHIS2). The ZMIS 2018 and ZAMPIA 2016 provide additional data on malaria and HIV.

The health facility reports, often referred to as Health Management Information System (HMIS), provide critical information on a range of indicators and can be disaggregated to district and regional level on an annual basis. The recording and reporting by health facilities is paper-based in almost all health facilities but districts are using the national DHIS2 and results are more standardized and easily accessible through this web-based electronic system. The DHIS2 had full coverage from 2014 and data for 2014–2018 were used for this analysis. Appendix A describes how this report used the health facility data, including a data quality assessment. The results of the data quality assessment of DHIS (completeness, consistency) are also presented in the section on health information systems.

Each section includes an assessment of progress against targets for key NHSP indicators. Since reducing inequalities and poverty is one of the main objectives of the health and development plans, special attention was given to the extent to which inequalities by gender, socioeconomic status or province have changed over time. Detailed analyses by district were beyond the scope of this report. While DHIS2 allows analysis by district, many programme data were not available in this format. Further analyses at the district level will be done in the future to inform the NHSP situation analysis and provide local statistical profiles.

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[2] This analytical report was updated in March 2020 when the ZDHS final report was released.

Using DHIS2 data for coverage statistics for NHSP indicators: **t**he DHIS2 is a key source of data to assess progress during NHSP 2014–2018. The national surveys provide critical parallel information and this analysis benefitted from having such a recent survey in addition to the DHIS2 data. Coverage rates have been computed both from ZDHS and DHIS2 data.

Reported data in DHIS2 for 2014–2018 is good for most indicators: the first step is to ensure that the quality of the reported data is acceptable for the statistics. Data quality was assessed by completeness of reporting, the presence of extreme outliers, consistency of reported data over time and internal consistency between the numbers such as ANC and immunization, all at the provincial and national levels. Health facility reporting rates were good (over 90% in 2018), extreme outliers were none, and the consistency checks gave satisfactory results in most cases. The only concern was a decline in services reported in 2018 for ANC first visit and immunization. It is not likely that these are true declines, as coverage of these interventions has been near 100% in all provinces for the past decade. This was considered in the analysis.

*National level and trends in coverage based on DHIS were plausible***:** to assess the coverage of interventions a population denominator or target population is needed, such as total population in need of the service, live births, pregnancies, children eligible for immunization. The Central Statistical Office (CSO) population projections provide the overall mid-year population and are also used to obtain an estimate of the number of live births. These figures were very different from what was obtained by using the total population projection by CSO and the crude birth rate from the ZDHS. The use of the CSO projected denominators result in unsatisfactory coverage results. Therefore, we also explored alternative methods to obtain coverage estimates for NHSP indicators based on DHIS2 data (see Appendix).

Where feasible, we used all data sources. The survey-based estimates however were given priority in the assessment of progress towards the NHSP targets.

3.   Mortality and morbidity

Main points

- According to the ZDHS, the under-five mortality rate declined from 75 in 2013/14 to 61 per 1,000 live births in 2018, but the pace of decline the target was not met.
- Neonatal mortality increased from 24 to 27 per 1,000 live births between the 2013/14 and 2018 ZDHS and is now 44% of all under-five deaths.
- ZDHS also shows that female adult mortality rate among women has declined strongly between the last two surveys in 2013/14 and 2018.
- The cause of death data from the Ministry of Home Affairs using ICD-10 for 2018, and the verbal autopsy results for 2015/16 (SAVVY), show that major infectious diseases (malaria, TB and especially HIV) were still leading causes of death, that NCD were prominent in the top ten causes, especially diseases of the circulatory system, and that neonatal causes were a leading cause of child deaths together with the infectious diseases.

NHSP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Life expectancy and Mortality				
Life expectancy at birth (years)	Males: 49.2 (2010 Census) Females: 53.7 (2010 census)	52.2 56.8	Males: 60.2 (WHO estimates 2018) Females: 64.4 (WHO estimates 2018)	Life expectancy at birth has increased significantly for both males and females.
Under-5 mortality rate per 1000 live births	75 (ZDHS 2013/14)	59	61 (ZDHS 2018)	Estimate based on the previous five years. Good progress, still below target.
Neonatal mortality rate per 1000 live births	24 (ZDHS 2013/14)	18	27 (ZDHS 2018)	Mortality has increased, though not statistically significant.
Infant mortality rate per 1000 live births	45 (ZDHS 2013/14)	30	42 (ZDHS 2018)	Modest decline.
Maternal mortality ratio per 100,000 live births	398 (2013/14 ZDHS)	250	278 (2018 ZDHS)	Estimate based on the previous 7 years. Good progress; however, still above target. The maternal mortality ratio was estimated at 252 per 100,000 live births.
Adult mortality rate 15-49 years per 1000 population	8.4 (ZDHS 2013/14)	8.1	5.1 (ZHDS 2018)	Large decline, below target. Age-adjusted mortality rate is 4.3 for women, 5.9 for men, and 5.1 for both women and men, aged 15-49.
Morbidity				
Morbidity burden contributed by the 10 Top Causes ill-health (%)	N/A	N/A		Indicator had no baseline or targets set.

Data sources and quality: Data for child and adult female mortality indicators were obtained from the ZDHS in 2013/14 and 2018. These data are retrospective and refer to the 5-year period before the survey. Because there is a declining trend, the actual level in 2018 is expected to be lower than the most recent survey result. Cause of

death data were obtained from the Ministry of Home Affairs database where a major attempt has been made to use the ICD for certification rules and coding. The data were analysed with ANACOD and show that there is still considerable scope for improvement, but the system is an important step forward. Data were also used from the verbal autopsies conducted in 2016 (SAVVY). The HMIS does not yet have an ICD-based system of hospital reporting of the causes of death.

Indicators: The NHSP monitoring plan includes a large number of mortality and morbidity indicators, including 9 age-sex specific mortality indicators and 10 cause-specific indicators. The disease specific indicators (e.g. HIV, malaria, maternal mortality) are discussed in the respective sections in the report. This section focuses on the general mortality and morbidity indicators.

Under-five, child mortality, infant and neonatal mortality

Under-5 mortality declined to from 75 to 61 per 1,000 live births according to the ZDHS 2018. These data refer to the 5-year period preceding the survey which is 2014-2018 and therefore only partially reflect achievements during NHSP 2017-2021. The main change between ZDHS 2013/14 and ZDHS 2018 occurred among children 1-4 years where mortality dropped from 31 to 19 per 1,000 children aged 1 year. At these ages, HIV, malaria and other infectious diseases, combined with malnutrition, are usually the most common causes. Child mortality has been declining since the mid-1990s (Figure 3.1). The pace of decline in the most recent period has been slowing down. The average annual rate of reduction was 5.7% between ZDHS 2001/02 and ZDHS 2007, 7.7% between ZDHS 2007 and ZDHS 2013/14, and 4.1% between ZDHS 2013/14 and ZDHS 2018 (Figure 3.2).

Neonatal mortality did not decline between the last two surveys: 2013/14 ZDHS and 2018 ZDHS. In fact, neonatal mortality increased from 24 to 27 per 1,000 live births between the last two ZDHS surveys. This however is not a statistically significant increase.[3] Neonatal mortality is far off the target for 2021 (12 per 1,000 live births which is also the 2030 SDG target globally). Neonatal deaths were 44% of all under-five deaths in ZDHS 2018, up from 32% in ZDHS 2013/14 (Figure 3.2).

Figure 3.1: Neonatal, infant and under-five mortality Zambia, ZDHS, 1992-2018

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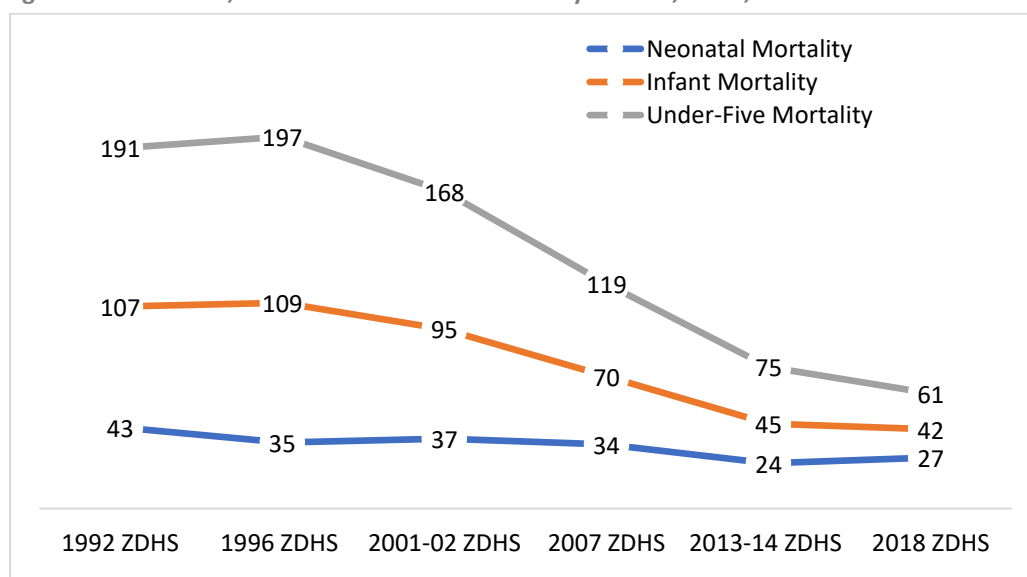
[3] The ZDHS 2013-14 reported a neonatal mortality of 24.2 per 1,000 live births (95% confidence interval: 20.7-27.7) and the ZDHS 2018 27.4 per 1,000 live births (23.1-31.8), which is not a statistically significant difference at the 95% level.

Figure 3.2: Under-5 and neonatal mortality per 1,000 live births, with percent of under-5 deaths that are neonatal mortality and the average annual rate of reduction (AARR) in under-5 mortality between the surveys, Zambia, ZDHS 2001/2-2018
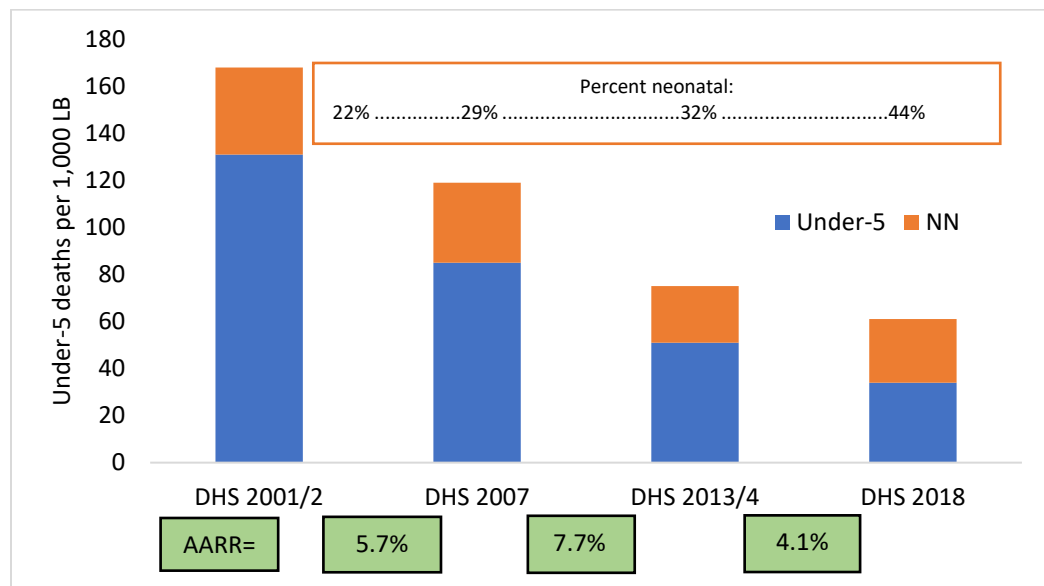
Adult mortality

The adult mortality rate was 5.1 (age-adjusted) for women and men aged 15-49, which was lower than the NHSP target of 8 per 1,000 population. The adult mortality rate for men declined from 8.8 to 5.9 per 1,000, (a 33% decline) and declined for women from 8.0 to 4.4 per 1,000 (45% decline) between ZDHS 2013/14 and 2018 respectively. Age-specific adult female mortality rates for five-year age groups in 2013/14 and 2018 are shown in Figure 3.3. At all ages, especially over age 25, dramatic reductions in mortality have occurred. HIV treatment is likely to have played a critical role. The probability of a 15-year-old girl to die from any cause before age 50 decreased from 294 to 169 per 1,000 among women aged 15-49.

Figure 3.3: Adult female mortality 15-49 years, Zambia, ZDHS 2013/14 & ZDHS 2018
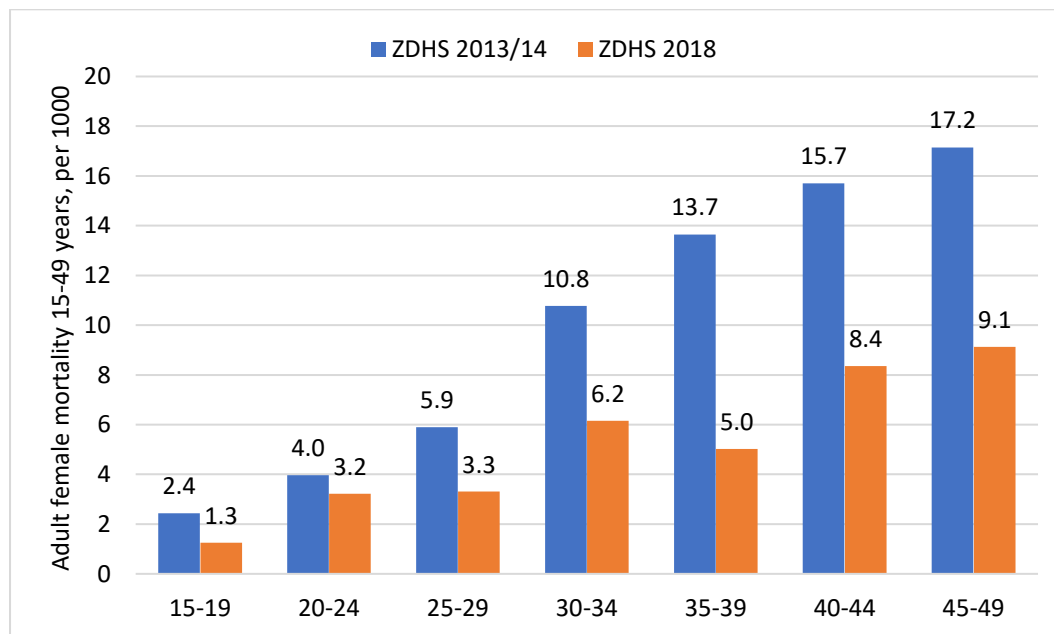
Cause-specific mortality rates are presented in the respective sections of this report, including maternal mortality, HIV and TB mortality. The quality of the health information system regarding causes of death is discussed in the section on the health information system.

Life expectancy

Life expectancy at birth is the number of years a person can expect to live based on current mortality rates. In last national census conducted in 2010, life expectancy was estimated at 49.2 and 53.7 years for males and females, respectively. Because of declining under-5 mortality and adult mortality (especially with high coverage of ART), life expectancy has improved considerably according to WHO estimates for 2018 (62.3 years for both sexes combined). When disaggregated by sex, the estimated life expectancy at birth was higher among females (64.4 years) than males (60.2 years). The (low) targets were exceeded.

Causes of mortality

The civil registration and vital statistics (CRVS) system in Zambia compiled information on the possible cause of death in 2016, 2017 and 2018. The total number of deaths recorded were 40,884, 39,150 and 29,085 deaths in 2016, 2017 and 2018, respectively. It is not clear why in 2018 more than 10,000 fewer deaths were reported than in previous years. At a 10 per 1000 crude death rate, one would expect about 160,000 deaths in Zambia annually. This implies that only about 25% of deaths are captured by the system. Yet, this is a significant number of deaths in the CRVS and much higher than is for instance generated through the hospitals and DHIS2. Furthermore, there is no use of the ICD in the DHIS2 which further limits the utility of those data.

WHO's ANACOD tool was used to analyse the causes of death. The top causes of death for all ages are shown in Table 3.1. No cause of death could be ascertained for 19% of all deaths in 2018. HIV is still by far the leading cause with 20% of deaths, in spite of high treatment coverage. Other major infectious diseases are tuberculosis in 4th place, other infectious diseases in 5th and lower respiratory infections in 9th place. Surprisingly, malaria did not show up in the leading causes. Noncommunicable diseases such as cerebrovascular disease (2nd), other digestive diseases (7th), diabetes mellitus (8th), other cardiovascular diseases (10th) and other malignant neoplasms (11th) were also leading causes. Finally, neonatal deaths were common including other conditions arising during the perinatal period, prematurity and low birth weight. It must be noted that the list of top causes carries considerable uncertainty, as cause-grouping affects the rankings and the quality of ICD certification and coding is not known.

Table 3.1: Leading causes of death in CRVS system, all ages, both sexes, 2018

Ranking	Causes of death at all ages	N	% Total
1	HIV	3635	19.9
2	Cerebrovascular disease	817	4.5
3	Other conditions arising during the perinatal period	701	3.8
4	Tuberculosis	654	3.6
5	Other infectious diseases	632	3.5
6	Prematurity and low birth weight	526	2.9
7	Other digestive diseases	509	2.8
8	Diabetes mellitus	419	2.3
9	Lower respiratory infections	412	2.3
10	Other cardiovascular diseases	389	2.1
11	Hypertensive disease	381	2.1
12	Other malignant neoplasms	331	1.8
13	Protein-energy malnutrition	316	1.7
14	Nephritis and nephrosis	304	1.7
	Ill-defined diseases (ICD10 R00-R99)	3500	19.1

Among children under 5, more than one-fifth of recorded deaths could not be classified. Neonatal causes took the first three places, with birth asphyxia and birth trauma in 3rd place, after other conditions arising during the perinatal period, and prematurity and low birth weight (see Table 3.2). Surprisingly, malaria only appears in 12th place. Malnutrition, lower respiratory diseases, HIV and diarrheal diseases were higher in the rankings.

Table 3.2: Leading causes of death in CRVS system among children under 5 years, both sexes, 2018

Ranking	Causes of death among children under 5	N	% Total
1	Other conditions arising during the perinatal period	701	19.3
2	Prematurity and low birth weight	526	14.5
3	Birth asphyxia and birth trauma	261	7.2
4	Protein-energy malnutrition	252	7.0
5	Other infectious diseases	135	3.7
6	Lower respiratory infections	130	3.6
7	HIV	98	2.7
8	Other Congenital anomalies	96	2.6
9	Fires	93	2.6
10	Diarrhoeal diseases	55	1.5
11	Other neuropsychiatric disorders	52	1.4
12	Malaria	45	1.2
13	Endocrine disorders	43	1.2
14	Congenital heart anomalies	41	1.1
	Ill-defined diseases (ICD10 R00-R99)	765	21.1

In order to highlight data quality concerns relating to capturing cause of death, we can compare cause of data from the CRVS to data from the SAVVY 2015/16 report. Figure 3.4 shows the top 10 causes of deaths for all age groups from the 2015/16 SAVVY report. As in the CVRS, HIV-related diseases are the leading cause of deaths followed by malaria. Surprisingly, malaria now ranks relatively highly in second place. This reflects the fact that cause of death ranking may vary significantly depending on the source of data. Other leading causes of deaths include diseases of the circulatory system, injuries and accidents, tuberculosis, and pneumonia.

Figure 3.4: Percentage distribution for the top 10 causes of death for all age groups, Zambia, SAVVY 2015/16
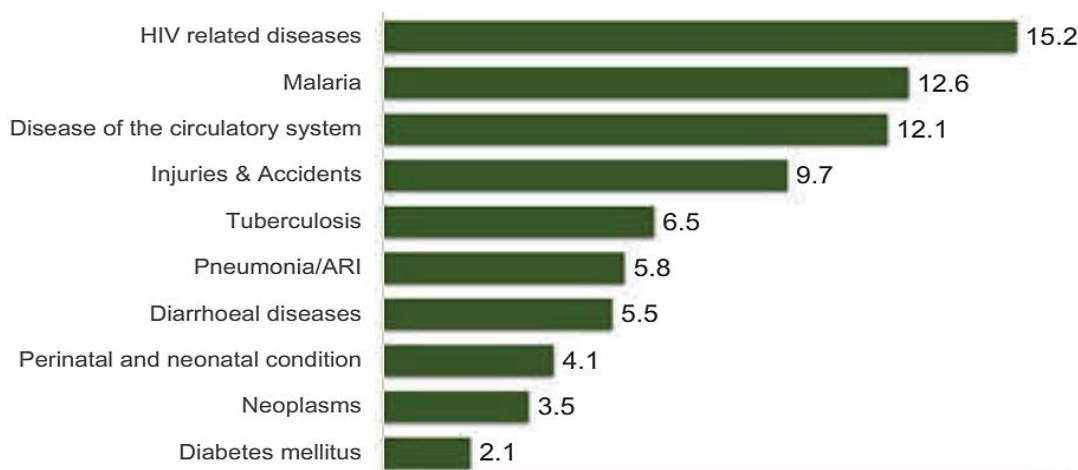
Among children aged below five years, data from the SAVVY, malaria is the leading cause of death. It did not feature in the top ten causes of deaths according to the CVRS data. Perinatal and neonatal conditions were the second leading cause of death among children aged 0-4 after malaria. However, as in the CVRS data, these conditions rank relatively highly as leading causes of death among under-fives (see Figure 3.5).

Causes of morbidity

For several indicators, morbidity data (incidence and/or prevalence) were obtained from population-based surveys or special reporting systems. Examples include HIV, TB, diabetes, and hypertension. These are presented in the respective sections of the report.

The overall picture of morbidity can be obtained from outpatient department (OPD) visits and from inpatient admission/discharge records. The quality of the diagnosis is often an issue as ICD rules are generally not used. In addition, these data do not capture cases which are not reported to health facilities. Nevertheless, OPD data may provide a rough picture of causes of morbidity in the Zambian population, as on average a person makes 3.8 visits per year. Table 3.3 shows the top diagnosis of illness in 2018, based on OPD data. Respiratory Infection (non-pneumonia) was the most common diagnosis of illness made by clinicians. Malaria was the second most common cause of morbidity. However, as a dedicated section on malaria shows, there has been a slight reduction in the number of cases observed since 2016. Among other reasons for the decline, malaria diagnosis has improved significantly with over 95 percent of the cases being confirmed in 2018 compared to 83% in 2016[4]. This improvement is a result of the use of rapid diagnosis tests (RDTs) and is likely to be an important factor in the decline in numbers of malaria cases. Noncommunicable conditions such as musculoskeletal disorders and digestive disorders appear in the top 10, but not cardiovascular conditions.

Table 3.3: Top 10 diagnoses of causes of illness within OPD, Zambia, HMIS 2018

Ranking	Causes of illness	N cases
1	Respiratory Infection: non-pneumonia	7,259,738
2	Malaria Cases	5,196,570
3	Diarrhoea (non-bloody)	1,679,368
4	Muscular skeletal and connective tissue (not trauma)	1,378,168

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[4] Malaria Indicator Survey, 2018

5	Digestive system: (not infectious)	945,342
6	Skin Diseases (not infectious)	428,071
7	Dental Carries	398,335
8	Throat Diseases	391,835
9	Respiratory Infection: pneumonia	361,888
10	Trauma: Other Injuries, wounds	310,492

There are however challenges with analysing the top ten causes of morbidity with certainty in the country as there is limited diagnostic equipment to attribute causes of illness. Clinicians in many cases make clinical diagnosis for most conditions without laboratory confirmation.

4. Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCAH)

4.1 Reproductive health

Main points

- To improve reproductive health, NHSP 2017-2021 aims to scale up family planning (FP) services with a focus on community-based distribution, long-acting reversible contraceptives (LARC), and post-partum family planning, especially in underserved areas.
- Total fertility has declined from 5.3 to 4.7 between ZDHS 2013/14 and 2018 respectively. Rural fertility declined faster than in urban areas, but was still 5.8 children per rural woman, compared to 3.3 for urban women.
- Use of modern contraceptives has increased among all women, including adolescents, mainly due to more married women using injectables followed by implants (LARCs). By 2018, 48% of married women were using modern contraceptives.
- FP coverage (the proportion of married women with family planning demand satisfied) increased by 5 percentage points between ZDHS 2013/14 and 2018 to 69%.
- Inequalities in FP coverage decreased: there were greater increases in modern contraceptive use among women living in rural areas and in poorer households or having less education, and in most provinces with lower coverage at baseline.

NHSP Targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Reproductive health				
Total fertility rate (per woman)	5.3 (ZDHS 2-13/14)		4.7 (ZDHS 2018)	Larger decline in rural areas.
Fertility rate (per 1000 women 15-49)	152 (2014)	132	134 (ZDHS 2018)	Fertility rate declined by 18 points, nearly reaching the target.
Fertility rate among adolescents (per 1000 girls 15-19)	141 (2014)	121	135 (ZDHS 2018)	Rate among adolescents declined less, not quite halfway to the target.
Married women with FP need satisfied with modern methods (%)	63.8 (ZDHS 2013/14)	76	68.5 (ZDHS 2018)	5 percentage point increase- steady progress.
Contraceptive prevalence rate (% modern)	32.5 (ZDHS 2013/14)	56	34.1 (ZDHS 2018)	Far below the target for all women. Modern contraceptive prevalence rate among married women at 47.5%
Contraceptive prevalence among adolescents (% modern)	10.2 (2013/14)	38	12.0 (ZDHS 2018)	Target not reached.
Percentage of clients accessing Long Acting Reversible Contraceptives	4 (2016, HMIS HIA 2)	N/A	4.5 (HMIS, HIA 2)	Indicator not available in the NHSP and M&E framework.

Couple Years of Protection Rate (CYP)	33.3 (2016, HMIS HIA 2; 2018 CSO Pop. Proj.)	N/A	35.6 (2018, HMIS HIA 2; 2018 CSO Pop. Proj.)	Indicator not available in the NHSP and M&E framework.

Data sources and quality: Data on fertility were derived from the ZDHS 2001, 2007, 2013/14 and 2018, and the Census of Population and Housing in 2010. Fertility rates are presented for the three-year period prior to the survey. Data on contraceptive use and family planning demand satisfied were collected in the ZDHS in 2001, 2007, 2013/14 and 2018. Data on family planning demand satisfied was also computed from the HIA 2 using the couple years of protection method. This provides a picture of the levels and trends in contraceptive use and coverage rates over the past two decades.

Indicators: Zambia's NHSP aimed to scale up family planning (FP) services with a focus on community-based distribution, long-acting reversible contraceptives (LARC), and post-partum family planning; and with particular focus on underserved areas. The NHSP includes 3 FP-related indicators in its M&E framework. The indicators include fertility rates, proportion of women in a union with FP demand satisfied with modern methods, and the contraceptive prevalence rates (overall and with modern methods), and coverage rates in terms of FP demand satisfied.

Fertility rates

Between ZDHS 2013/14 and ZDHS 2018 the total fertility rate (TFR) declined from 5.3 to 4.7 children per woman, keeping a similar pace of decline as between ZDHS 2007 and ZDHS 2013/14. (Figure 4.1). The TFR was consistently higher among women living in rural compared to urban areas, but declined in both, from 7.5 to 5.8 children per woman and 4.3 to 3.4 children per woman respectively.

Figure 4.1: Trends in total fertility rate, national, urban and rural Zambia, ZDHS 1992-2018 (for three years preceding survey)
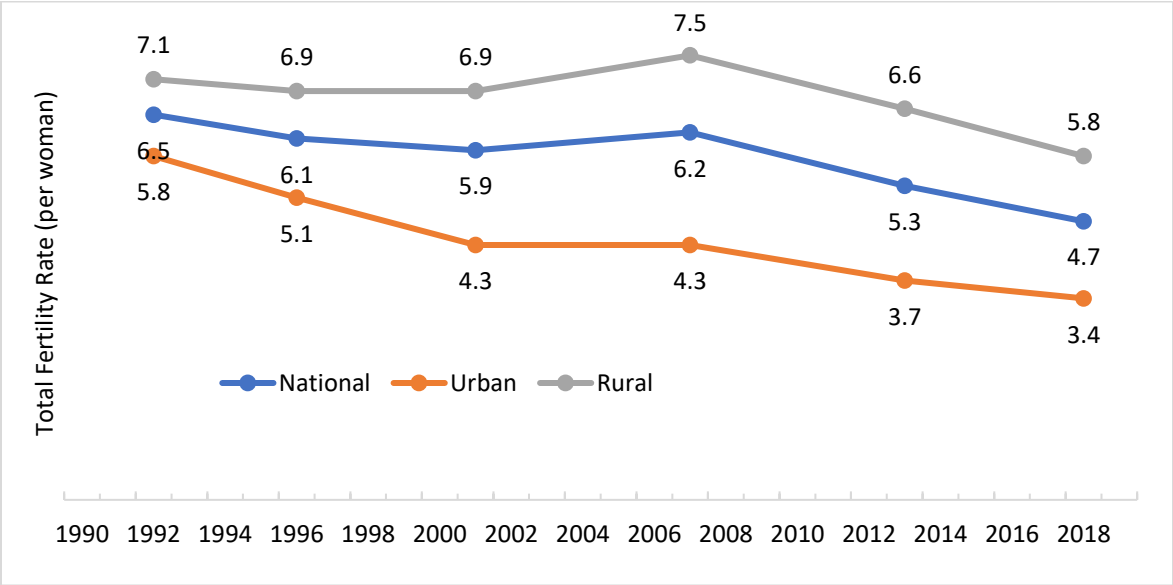
Fertility rates among adolescent girls aged 15-19 have slowly declined since 2001, going from 141 to 135 between 2013/14 and 2018 according to ZDHS data (Figure 4.2). The fertility rate among adolescents remained much higher in rural than urban areas, at 174 versus 88 per 1000 women respectively in 2018. The percent of girls 15-19 years who had begun childbearing or were pregnant was 29% in ZDHS 2018, comparable to 28.5% in ZDHS 2013/14. Adolescent childbearing was twice as common in rural girls (37% compared to 19% in urban girls).

Figure 4.2: Fertility among adolescent girls aged 15-19 years, national, urban and rural Zambia, ZDHS surveys 2001/2, 2007, 2013/14 and 2018 (for three years preceding each survey)
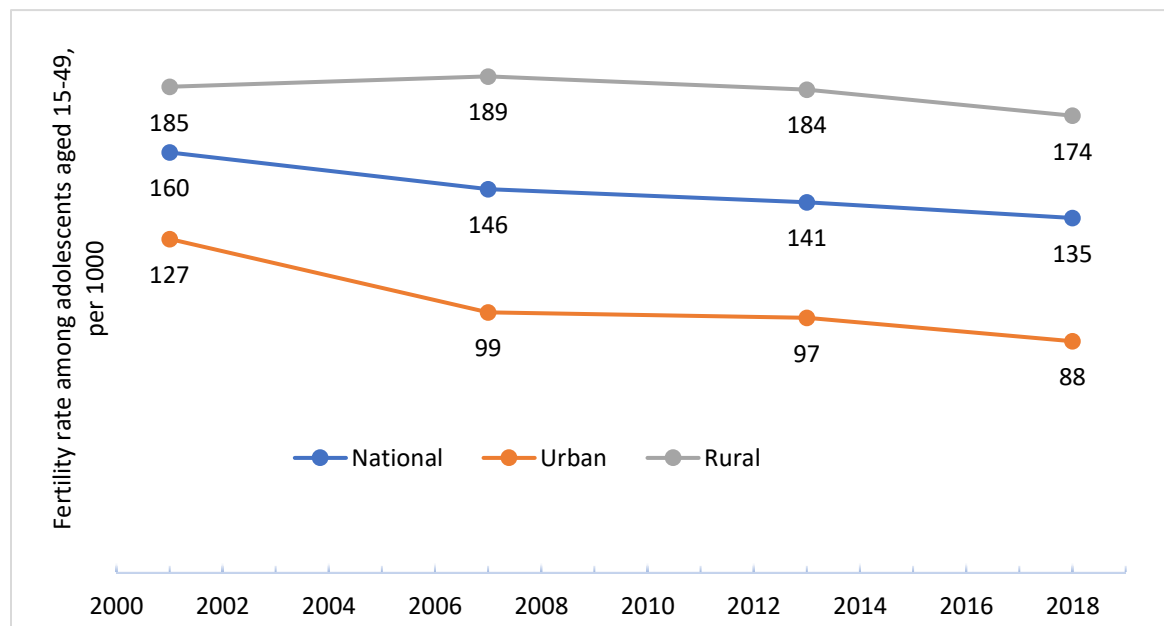
Contraceptive prevalence rate and FP coverage by modern methods

Current use of all contraceptive methods among married women has more than doubled since 2001/2, but increased less than two percentage points to 49.6% between the 2013/14 and 2018 ZDHS rounds (Figure 4.3). Current use of modern methods accounted for an increasing proportion of all contraceptive use at 47.5% in 2018, compared to 44.8% in 2013/14. Among all women, and not only those married, the ZDHS 2018 showed a modern contraceptive prevalence rate still much below the targets for adults (34.1% versus 56% as target in 2018), and adolescents between 15-19 (12.0% versus 38%). However, the NHSP targets were unrealistically high (e.g. 90% contraceptive prevalence rate by 2021).

Family planning methods can be used to space or limit childbearing. In the ZDHS, women who are currently using a family planning method are considered to have a met need for family planning. Women with unmet need for family planning and those who are currently using contraception together constitute the total demand for family planning. This information is important not only to determine the total demand for family planning but to measure the percentage of that demand satisfied. The proportion of married women with FP demand satisfied by modern methods is calculated as a measure of FP coverage by dividing the percentage of women using modern contraceptive methods by the sum of unmet need and total contraceptive use. The coverage of family planning (demand satisfied by modern methods) among women in a sexual union increased from 57.4% to 71.6% since 2001 (Figure 4.3). In 2018, the proportion of FP demand satisfied by modern methods was 68.5%. This represents an increase since ZDHS 2013/14 when the demand satisfied with modern methods was 63.8%.

In addition, current use of modern contraceptives among married women increased more in rural areas than urban areas, such that the gap reduced from 24.8 percentage points in 2001, to 14.4 and then 8.6 percentage points in 2013/14 and 2018 respectively (Figure 4.4).

Figure 4.3: Trends in rates of contraceptive use (all methods and modern methods) and coverage (demand satisfied) among married women 15-49 years, ZDHS 2001/2, 2007, 2013/14, 2018
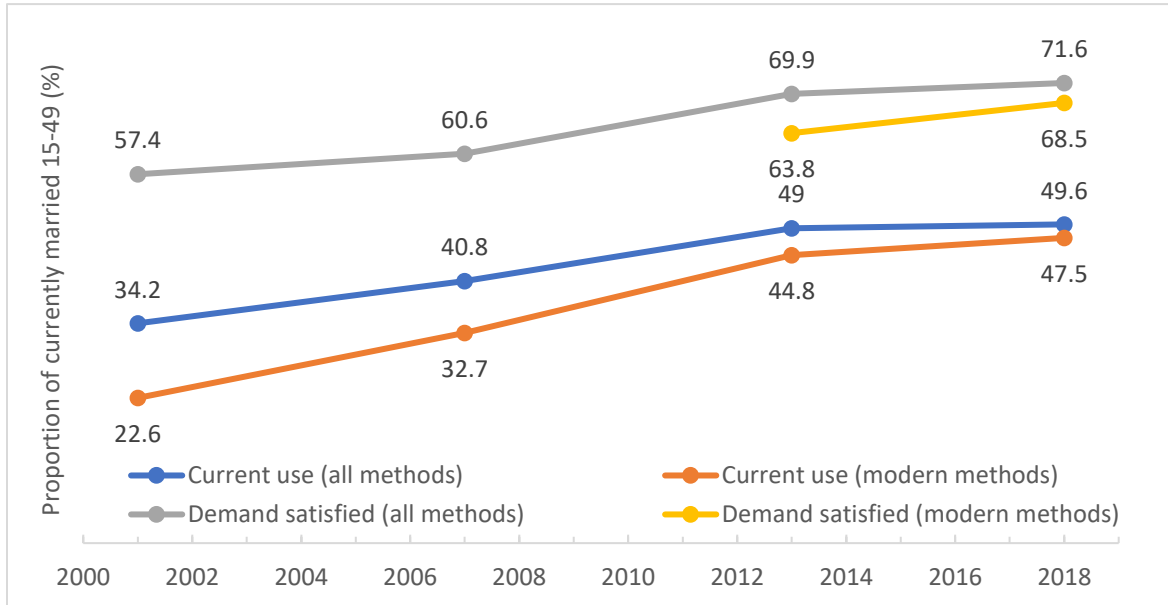
Figure 4.4: Trends in current use of modern contraceptives among married women 15-49 years by urban and rural residence, Zambia, ZDHS 2001-2018
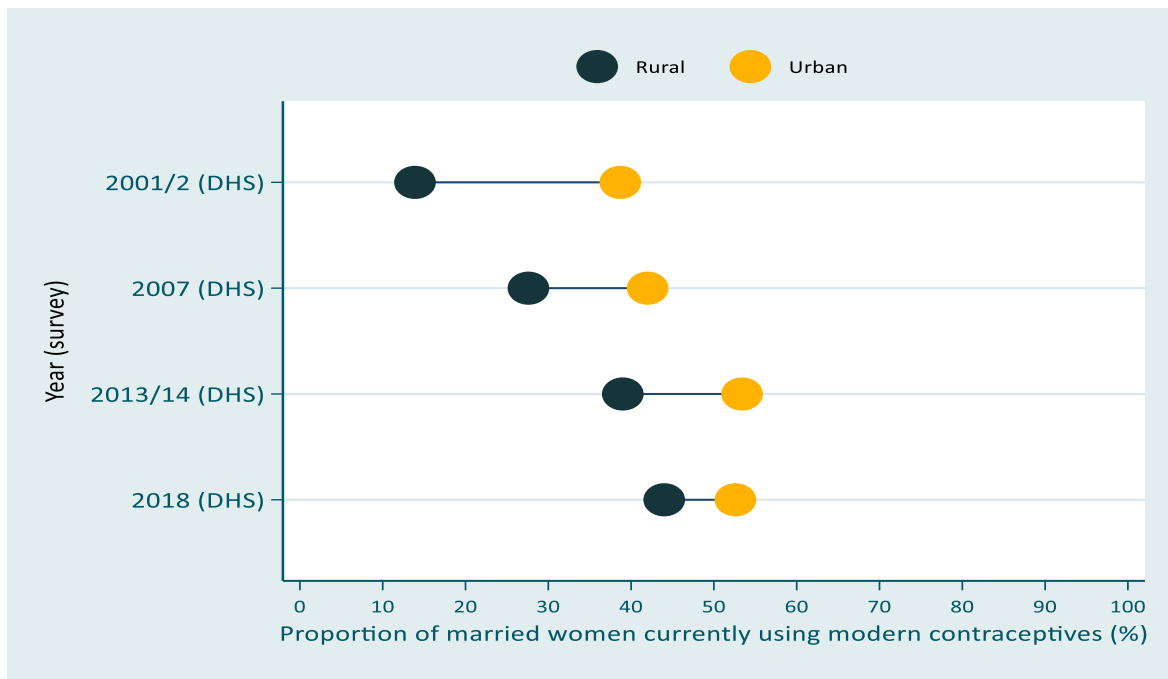
Improvements in FP coverage (demand satisfied by modern methods) among married women between 2013/14 and 2018 varied between regions (Figure 4.5). Among provinces with lower baseline levels of coverage by modern methods in 2013/14, the proportion went up most in Northern, Muchinga, Luapula and North Western provinces but went down slightly in the Western province. Among those with higher FP coverage (modern methods) in 2013/14, the level of coverage only increased notably in Central province.

14

Figure 4.5: Coverage rates (demand satisfied by modern methods) among married women 15-49 by province, ZDHS 2013/14 and 2018
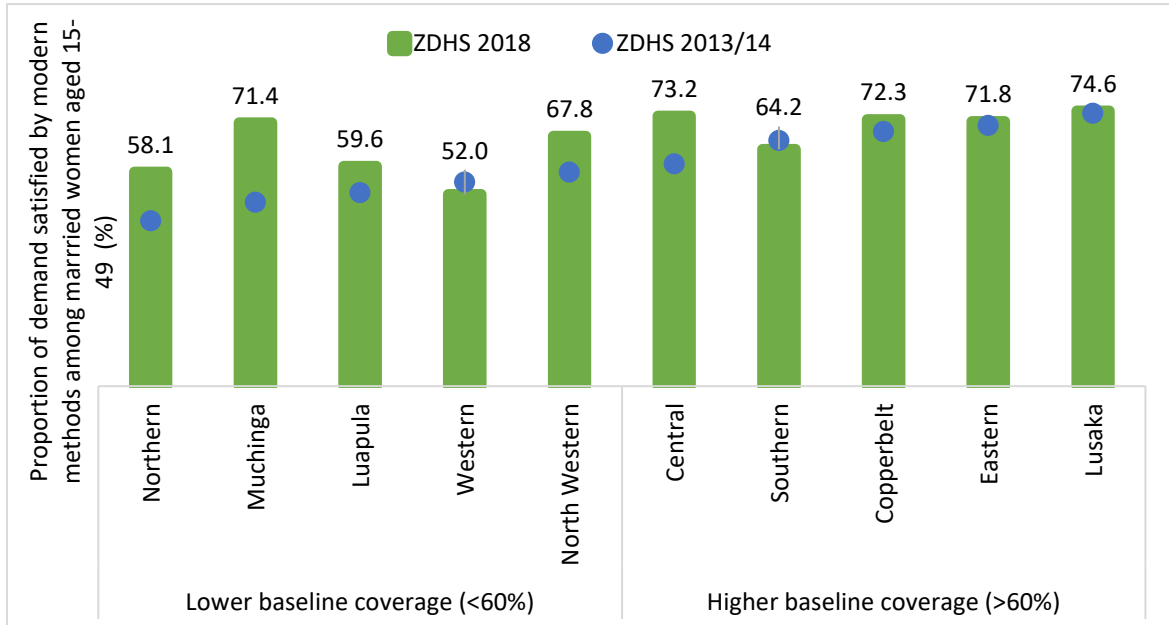
FP coverage (demand satisfied by modern methods) among married women also appeared to become more equitable between socioeconomic groups over time (Figure 4.6 and Figure 4.7). FP coverage increased more among poorer than wealthier groups between 2007 and 2018. In 2013/14, the absolute difference was 22.6 percentage points, and in 2018 it was nearly halved at 12.3 percentage points. The equity gap in modern contraceptive use between education groups also reduced between 2001/2 and 2018 ZDHS. Most recently, the difference between the highest and lowest education groups reduced from 25.3 to 16 percentage points between 2013/14 and 2018.

Figure 4.6: Equity in FP coverage among married women 15-49 years by wealth quintile, Zambia, ZDHS 2007-2018
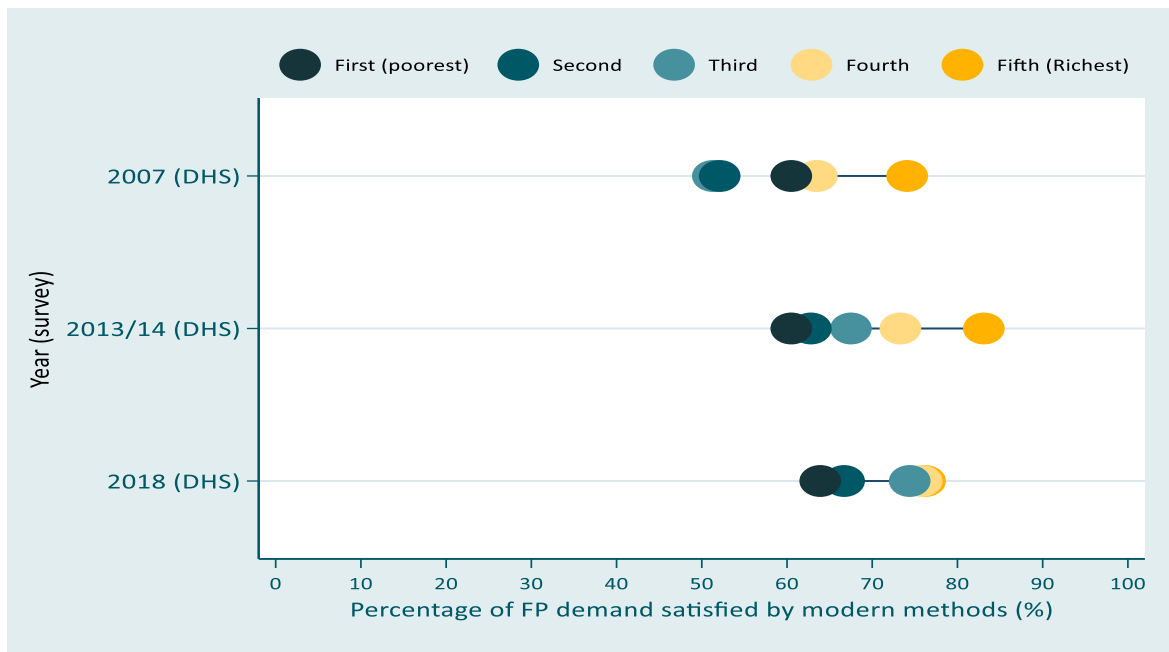
Figure 4.7: Equity in FP coverage among married women 15-49 years by education group, Zambia, ZDHS 2001/2-2018
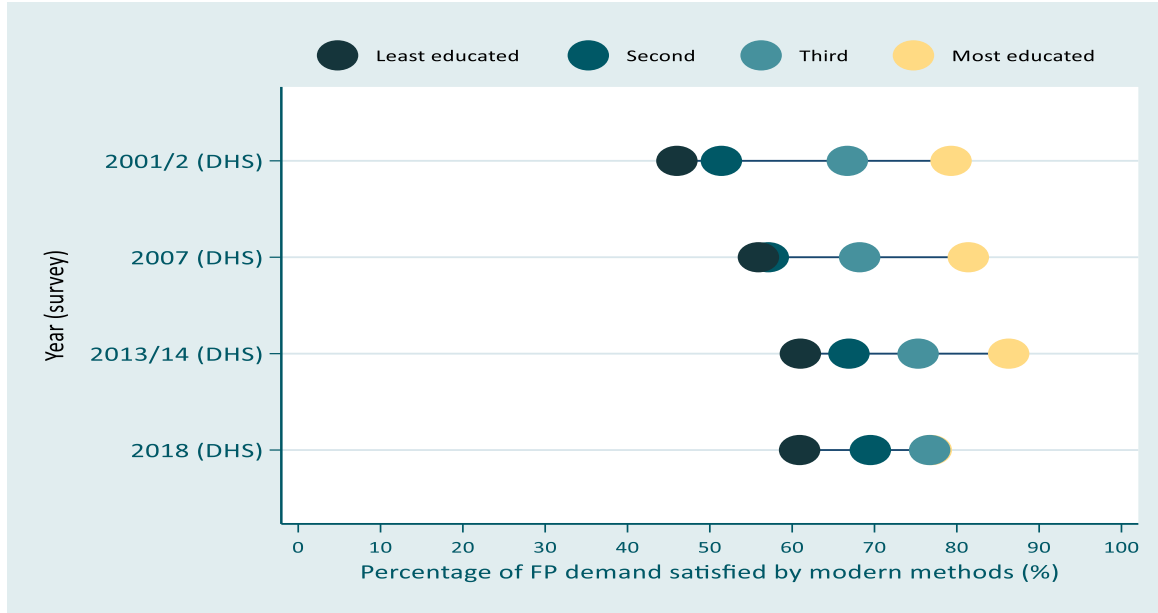
Use of Long Acting Reversible Contraceptives (LARCs)

Long-acting reversible contraceptives (LARC) are methods of birth control that provide effective contraception for an extended period without requiring user action. These include intrauterine contraceptive device (IUDs), implants, and injectables. The indicator is important to track as it has a direct impact on the Total Fertility Rate, and the NHSP aimed to increase the proportion of contraceptive use by LARCs. However, no target has been set for this indicator as it is not available in both the NHSP 2017-2011 and the M&E Framework. ZDHS and HMIS data show somewhat different rates of LARC use (Figure 4.8). In ZDHS 2013/14, 6.7% of women used IUDs and implants, while in 2015, the HMIS showed this to be lower at 3.7%. By 2018, the ZDHS showed an increase to 8.6% of women while the HMIS showed a smaller increase to 4.5% of women who were married aged 15-49. The use of injectables was higher than IUDs and implants, and together these methods were reportedly used by 26% of married women in 2013/14, increasing to 34.2% in 2018 based on ZDHS data.

Figure 4.8: Proportion of women using LARCs among married women 15-49 years, Zambia, ZDHS 2013/14 and 2018 & HMIS - HIA 2 data 2015-2018
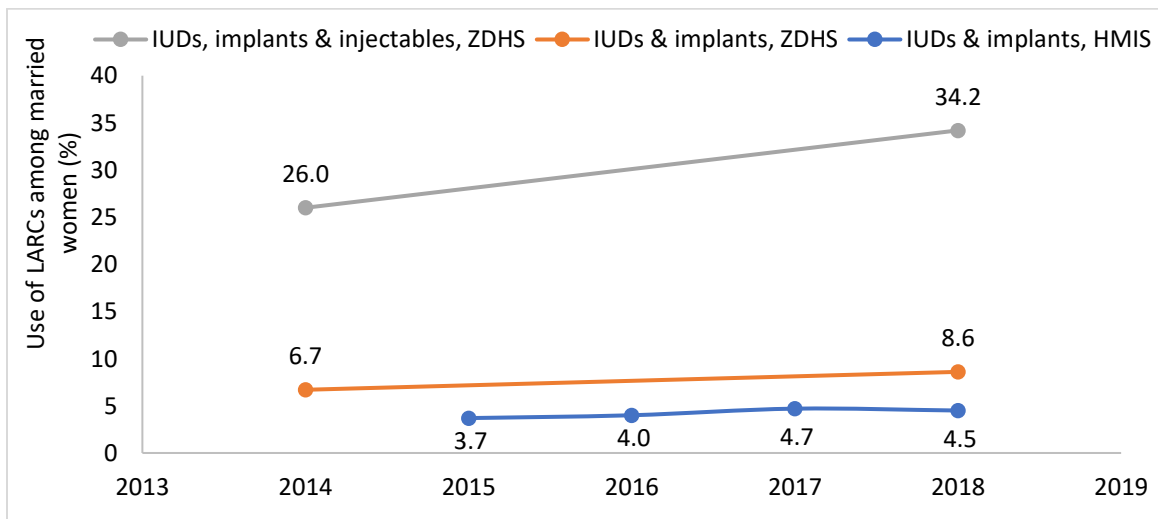
The rates of contraceptive use of each method among married women varied between 2001/2 and 2018 according to ZDHS data (Figure 4.9). The largest increase between 2013/14 and 2018 was in use of injectables (19.9% to 25.6%) and implants (5.5% to 7.9%), though IUDs remained an uncommon method (below 1%). The proportion of married women using any traditional methods has been decreasing over time (4.3% to 2.1% in between recent ZDHS). Pill cycles declined noticeably (11.8% to 7.8%), while male condom use also declined from 4% to 3%, between 2013/14 and 2018. Female sterilization made up a similarly low proportion over time (2% to 1.5%).

Figure 4.9: Trends in current contraceptive use, by method, among currently married women ages 15-49, Zambia, ZDHS 2001/2, 2007, 2013/14, 2018
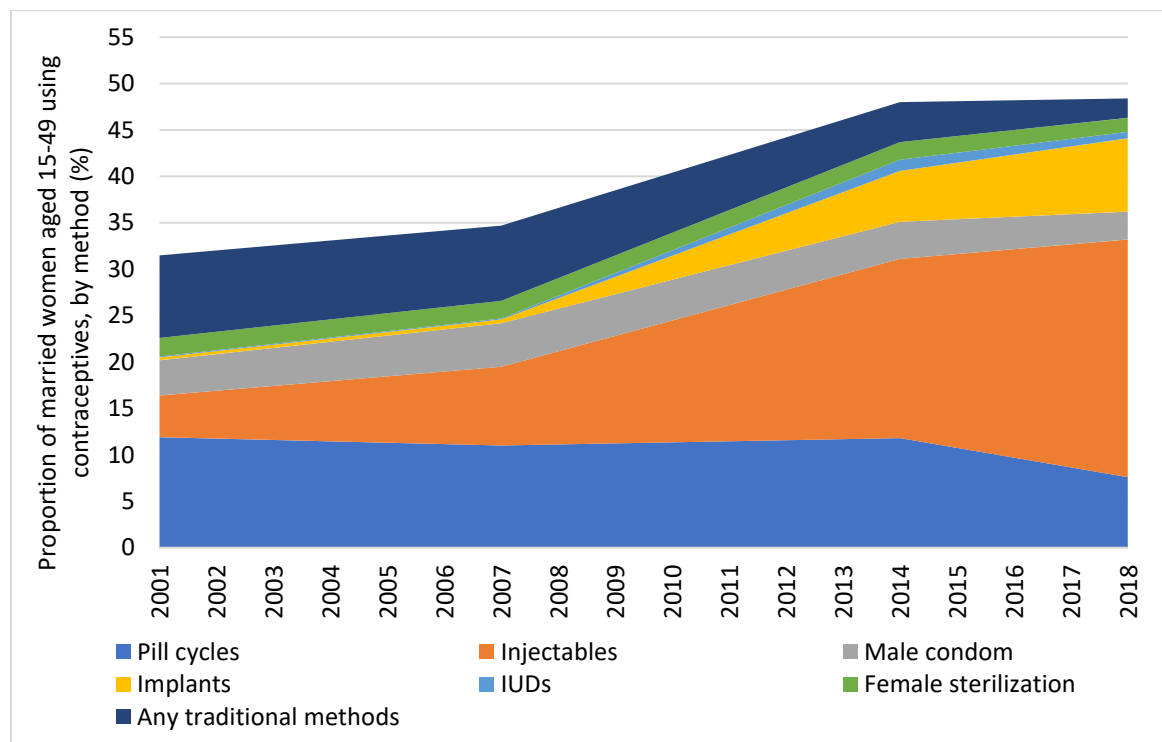
Couple Years of Protection

Couple years of Protection (CYP) is the estimated protection provided by contraceptive methods during a one-year period, based upon the volume of all contraceptives sold or distributed free of charge to clients during that period. It is calculated by multiplying the quantity of each method distributed to clients by a conversion factor, to yield an estimate of the duration of contraceptive protection provided per unit of that method. The CYP for each method is then summed for all methods to obtain a total CYP figure. CYP conversion factors are based on how a method is used, failure rates, wastage, and how many units of the method are typically needed to provide one year of contraceptive protection for a couple. The calculation takes into account that some methods, like condoms and oral contraceptives, for example, may be used incorrectly and then discarded, or that IUDs and implants may be removed before their life span is realised. The indicator has no target set as it is not available in both the NHSP 2017-2011 and the M&E Framework. The CYP rate increased slightly by 2 percentage points between 2016 and 2018 from 33.3 to 35.6 according to the HMIS data.

4.2 Maternal and newborn care

Main points

- The pregnancy-related mortality ratio in Zambia declined from 398 to 278 per 100,000 live births between 2013/4 and 2018 (ZDHS). The maternal mortality ratio was estimated at 252 per 100,000 live births in 2018 ZDHS.
- The proportion of newborn babies with low birth weight (<2500 grams) increased in the past five years slightly to 11% of facility births.
- Coverage of any ANC is high overall (97%), yet the proportion with four or more visits is lower (64%) and appeared to have declined somewhat from previous years. Rates of four or more ANC visits was higher among pregnant women in urban areas in 2001/2, but higher in rural than urban areas by 2018 (65% versus 61% respectively). The proportion of women having their first ANC visit before 14 weeks of pregnancy increased but was still only 37%.
- The number of women tested for syphilis and anaemia during ANC did not increase greatly.
- The NHSP targets have been achieved for delivery care indicators, including the proportion of women having a supervised delivery (80%), and nearly reached for postnatal care visits within 48 hours (70%).
- Socioeconomic inequities have also reduced, as an increasing number of women in the poorest wealth quintile have reported supervised deliveries and postnatal care visits.

NHSP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Maternal and Newborn Care				
Pregnancy outcomes				
Pregnancy-related Mortality Ratio (per 100,000 live births)	398 for 2007-2014 (ZDHS 2013/14)	250	278 for 2012-2018 (ZDHS 2018)	Maternal mortality has declined and is likely to be on target.
Low Birth Weight (% of live births)	9.7 (HMIS, 2016)	7.8	11.4 (HMIS 2018)	Low birth weight has increased in health facility births.
Antenatal care				
First ANC coverage (Total 1st Antenatal visits) (%)	95.7 (2013/14 ZDHS)	97	97% (ZDHS 2018), near 100% (HMIS 2018)	Near universal coverage of ANC1
1st Antenatal visit before 14 weeks (%)	24.4 (2013/14 ZDHS) 12 (HMIS 2016)	45	36.7 (ZDHS 2018) 22 (HMIS 2018)	Increase during 2016-2018, but well short of target.
4+ Antenatal visits before delivery (%)	55.5 (2013/14 ZDHS) 42 (HMIS 2016)	65	63.5 (ZDHS 2018) 52 (HMIS 2018)	Inconsistencies between HMIS and ZDHS but increase in both.
Syphilis screening coverage of 1st ANC clients (%)	44 (HMIS 2013)		56.3 (HMIS 2018)	Increase of about 12 percentage points.
Anaemia screening coverage of 1st ANC clients (%)	85.2 (HMIS 2013		89.5 (HMIS 2018)	Increase of 4 percentage points. No target set.
Delivery and postnatal care				
Percentage of institutional deliveries (%)	67.4 (ZDHS 2013/2014)	N/A	83.8 (2018 ZDHS)	Increase of 23%. No target in the M&E plan.
Percentage of skilled deliveries (%)	64.2 2013/14 ZDHS	79	80.4 (2018 ZDHS)	Target has been achieved.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Caesarean section rate (%)	3.5 (2015 HMIS) 4.4 (2013/14 ZDHS)	7.0	5.6 (2018 HMIS) 5.0 (2018 ZDHS)	Increase but still lower than target.
Postnatal care visit within 48 hours after delivery (%)	63.4 (2013/14 ZDHS)	74	69.7 (2018 ZDHS)	Modest increase, just short of the target.

Data sources and quality: Data on coverage of key maternal and newborn care (MNC) indicators was available from the HMIS and ZDHS data. Data on many of the MNC indicators were available in both the HMIS since 2013 and the ZDHS between 2001 and 2018. Denominators for the ANC content indicators in the HMIS was the total number of women attending any ANC.

Indicators: The NHSP and its M&E framework included indicators on MNC that related to pregnancy outcomes (maternal mortality rate and low birth weight), antenatal care (coverage of any visit, four or more visits, and syphilis and anaemia testing), delivery care including institutional and skilled attendance at delivery and caesarean section rates, and postnatal care within the first 24 hours.

Pregnancy outcomes

Maternal mortality

The 2018 ZDHS reported a maternal mortality ratio of 252 deaths per 100,000 live births (95% CI: 158, 347), based on 67 maternal deaths reported for the 7 years period preceding the survey (2012-2018). The maternal deaths represented 9.8% of all female deaths at 15-49 years, which was very similar to the ZDHS 2013-14 (9.5%).

To analyse long-term trends, pregnancy-related mortality is used. The preceding ZDHS reports included not only maternal deaths due to maternal causes but also those due to accidental causes: this is referred to as pregnancy-related mortality. Figure 4.10 shows a decline in pregnancy-related mortality from 729 in 2001, to 398 in 2013/14, and down to 278 in 2018, with a confidence interval of 182 to 375. All mortality ratios refer to the 7-year period before the surveys. Hence, the ZDHS 2018 statistic has a midpoint of 2015. If the decline continues at the same pace as between 2010-2015 (average annual rate of decline of 7.2% per year), then the pregnancy-related mortality ratio would be 222 by 2018, and the maternal mortality ratio would be 201 per 100,000 live births (222 * 252/278).

Figure 4.10: Pregnancy-related mortality ratio, Zambia, ZDHS 2001-2018
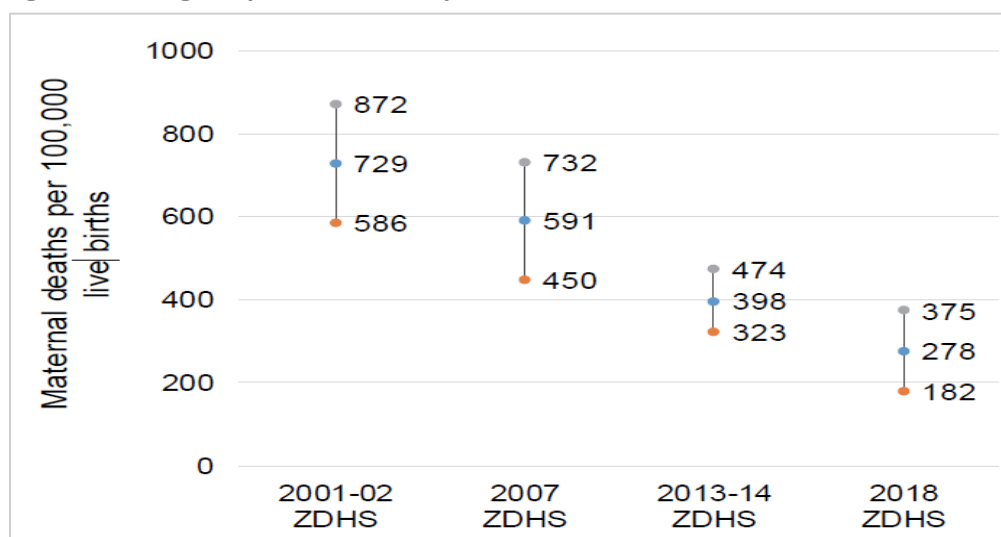
Low birth weight

Low birth weight (LBW) among newborn babies, defined as being less than 2500 grams, was computed from the HMIS data from 2013-2018 (Figure 4.11). The level of low birthweight increased somewhat in 2018 (11.4%) compared to the previous two years but remained lower than in 2013-2015. It is noted that the heaping at 2.5 kg (no grams recorded) tends to be common and may affect data quality.

Figure 4.11: Percent of newborn babies with low birth weight (less than 2500 grams) per 1000 live births, Zambia, HMIS 2013-2018
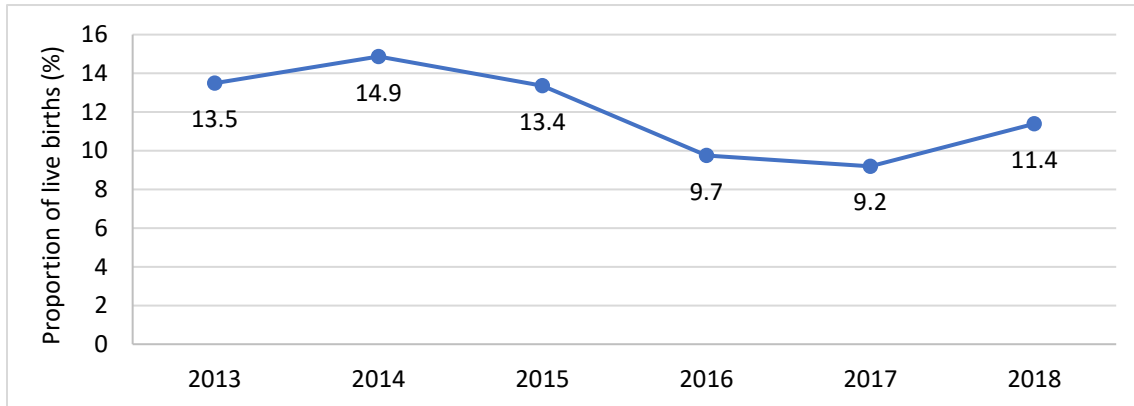
Comparing newborn infants who were low birth weight by region in Zambia in 2014 and 2018 from the HMIS data, Figure 4.12 shows that the proportion was initially higher in Lusaka (17%) and Copperbelt (13%) provinces. The proportion of newborn with low birth weight declined in all regions between 2014 and 2018, but particularly in Southern and North Western provinces.

Figure 4.12: Percentage of newborn babies who had low birth weight (<2500 grams) by region, Zambia, HMIS 2014 and 2018
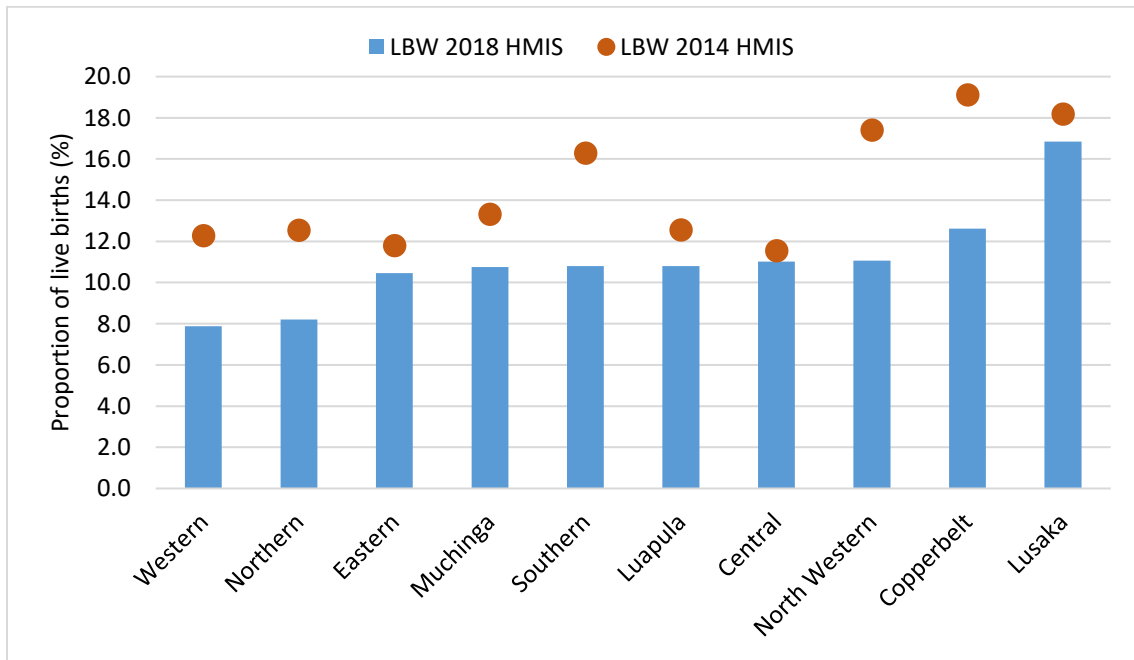
Antenatal care

ANC attendance

The attendance of pregnant women for antenatal care (ANC) among those who had given birth in the five years preceding the survey was available in the ZDHS 2001-2018 as shown in Figure 4.13. Nearly all women had any ANC visit by 2018, which increased from 96% in 2013/14. The proportion who had 4 or more ANC visits was lower, at 64% in 2018; this was higher than 2013/14 (56%). However, less than a quarter of pregnant women had their first visit during the first trimester of pregnancy in 2013/14 ZDHS. This increased to just over a third of women had received their first ANC in the first trimester in 2018.

Figure 4.13: Coverage of antenatal care: first visit, four or more visits and timing of the first visit (<14 weeks of pregnancy), Zambia, ZDHS 2001–2018
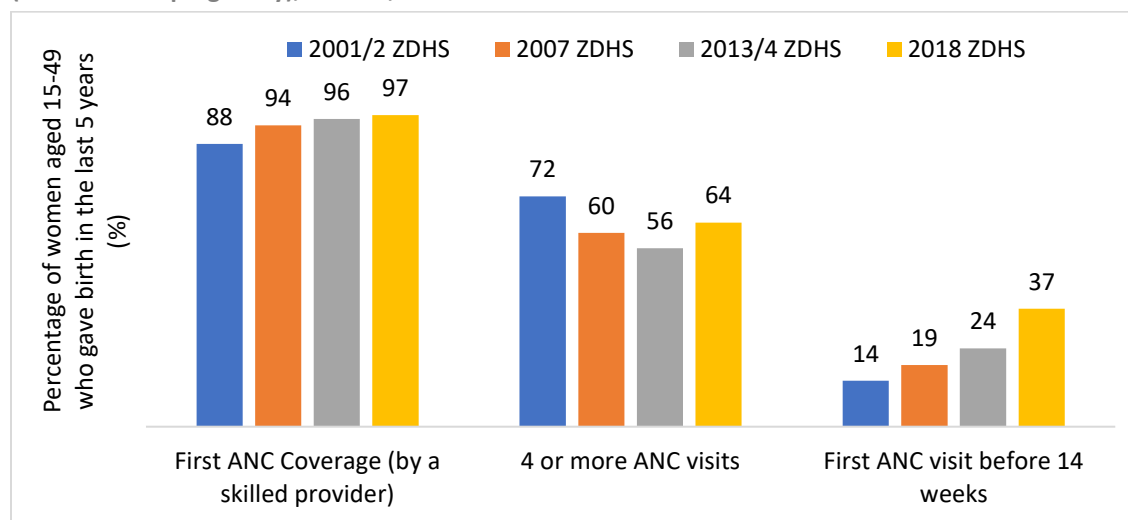
As shown in Figure 4.14, the HMIS data showed similar rates of having the first ANC in the first 14 weeks (22% in 2018, versus 24% in 2013/14 ZDHS) in 2014 to 2018, but lower rates of having four or more ANC visits (52% in 2018, versus 64% in ZDHS 2018), which tends to be less reliably tracked.

Figure 4.14: Coverage of antenatal care: first trimester ANC visits and 4 or more visits, Zambia, HMIS 2014-2018
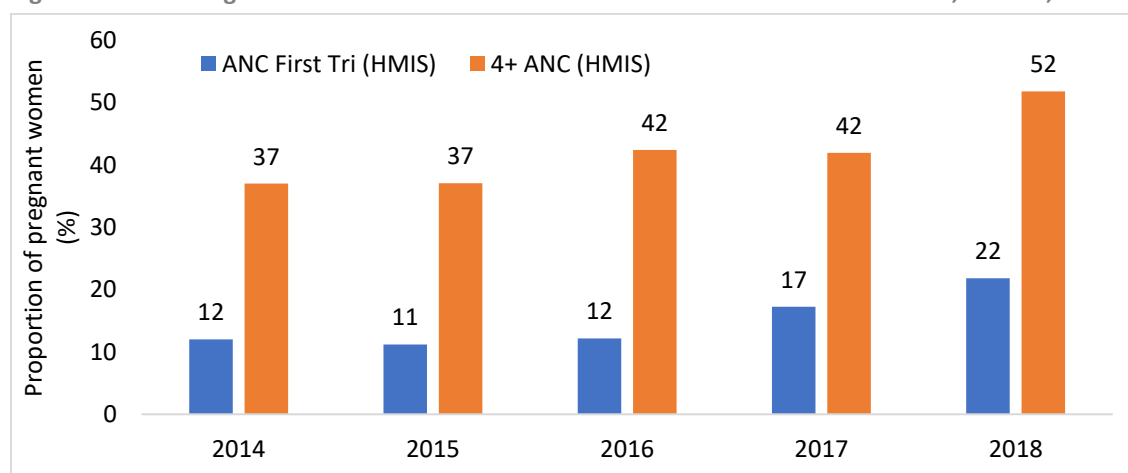
Gaps in receipt of four or more ANC visits between urban and rural areas narrowed and reversed since 2001 according to the ZDHS (Figure 4.15), although the rates also appeared to be somewhat lower by 2018. Having four or more ANC visits was over 10 percentage points higher among women in urban than rural areas in 2001/2 (80

versus 68%), while in 2013/14 it was nearly the same at 55%, and in 2018, 61% of women in urban and 65% of women in rural areas had received four or more ANC visits.

Figure 4.15: Coverage of four or more ANC visits among women who delivered in the past five years, rural and urban Zambia, ZDHS 2001/2, 2007, 2013/14 and 2018
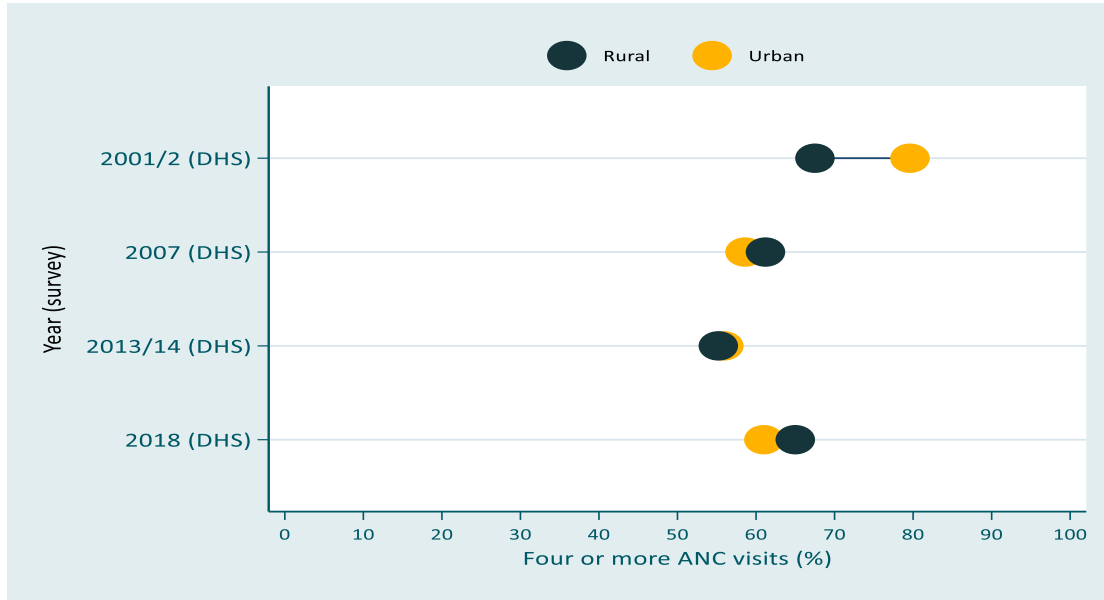
Trends in coverage of four or more ANC visits among women who had given birth in the preceding five years varied somewhat between regions of Zambia between 2013/14 and 2018 ZDHS. The rates were lower in the HMIS 2018, with an adjustment for underreporting by some facilities (Figure 4.16). The rates were highest in North Western, Muchinga and Southern (around 70%) according to the ZDHS, but highest in Copperbelt and Lusaka (49% and 46%) in the HMIS data. They were lowest in Lusaka and Western in the ZDHS (59%), but lowest in Western, Northern and Luapula in HMIS (around 35%). The reason for the differences between survey and HMIS are not immediately obvious. There may be underreporting in the HMIS, but also overreporting in the survey is possible.

Figure 4.16: Coverage of ANC 4+ visits among women aged 15-49 who gave birth in the last 5 years by region, Zambia, ZDHS 2018 and HMIS 2014-2018
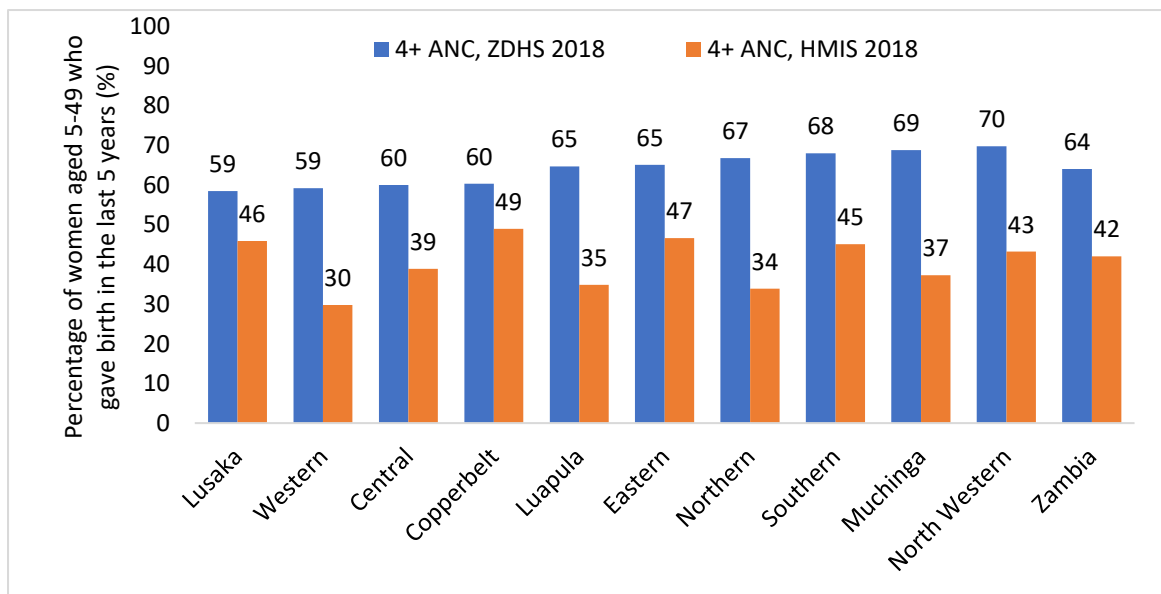
ANC contents: syphilis and anaemia screening during first visit

The contents of an ANC visit were also tracked using national surveys and facility data, most reliably anaemia and syphilis screening. Figure 4.17 shows the trends in syphilis and anaemia screening among pregnant women who attended any ANC between 2013-2018 according to HMIS data. There was an increase in testing for syphilis from 33.1% to 56.3% in that time period. The percentage of women attending ANC who were tested for anaemia (defined as having low levels of haemoglobin (<8.5g/dL)) on their first ANC visit was higher, at nearly 90% in 2018, which increased from 82% in 2013.

Figure 4.17: Syphilis and anaemia screening during first ANC visit among women aged 15-49 who gave birth in the last year, Zambia, HMIS 2013-2018
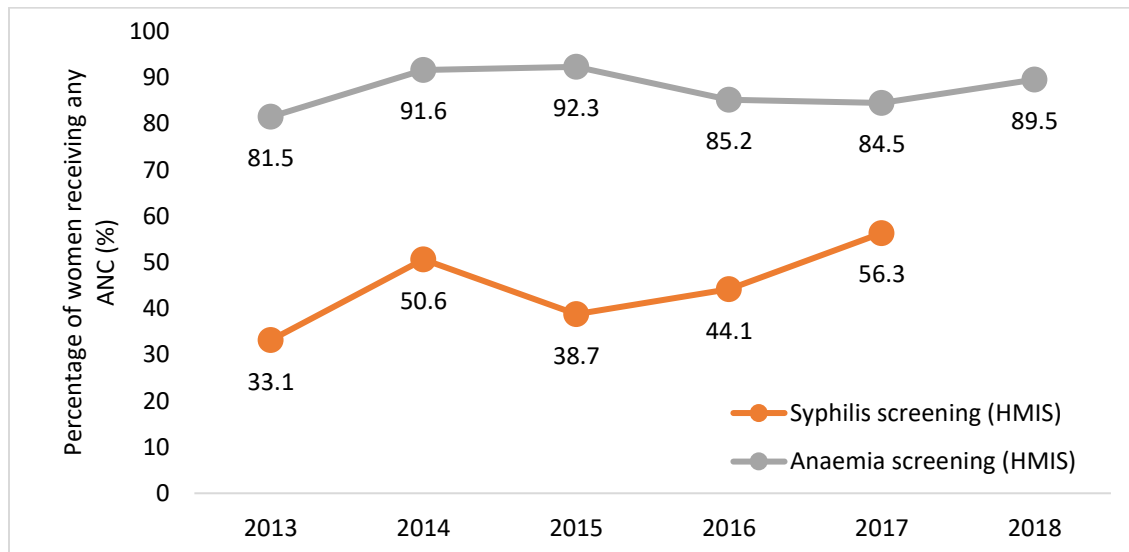
Delivery care

Facility and skilled deliveries

The proportion of institutional deliveries appeared to increase from 67% to 84% among women who gave birth in the preceding five years according to the ZDHS 2013/4 and 2018 respectively (Figure 4.18 and Figure 4.19). These figures refer to the five-year period prior to the surveys. Deliveries attended by a skilled provider (skilled birth attendance, SBA) were slightly less common according to the ZDHS, but also increased from 64% to 80% in that time period, which surpassed the 2018 target of 79%.

The HMIS data also showed an increase during 2014-2018 from 2016 when coverage was estimated at 69%, increasing to 78% by 2018. As was discussed in the data quality section, underreporting of deliveries was especially common in Lusaka where an estimated 25% of live births / deliveries were not reported. When this is taken into account, coverage is about 4 points higher in 2018 (82%).

Figure 4.18: Trends in institutional delivery coverage (% of live births), Zambia, HMIS 2015-2018 and ZDHS 2013/14 and 2018
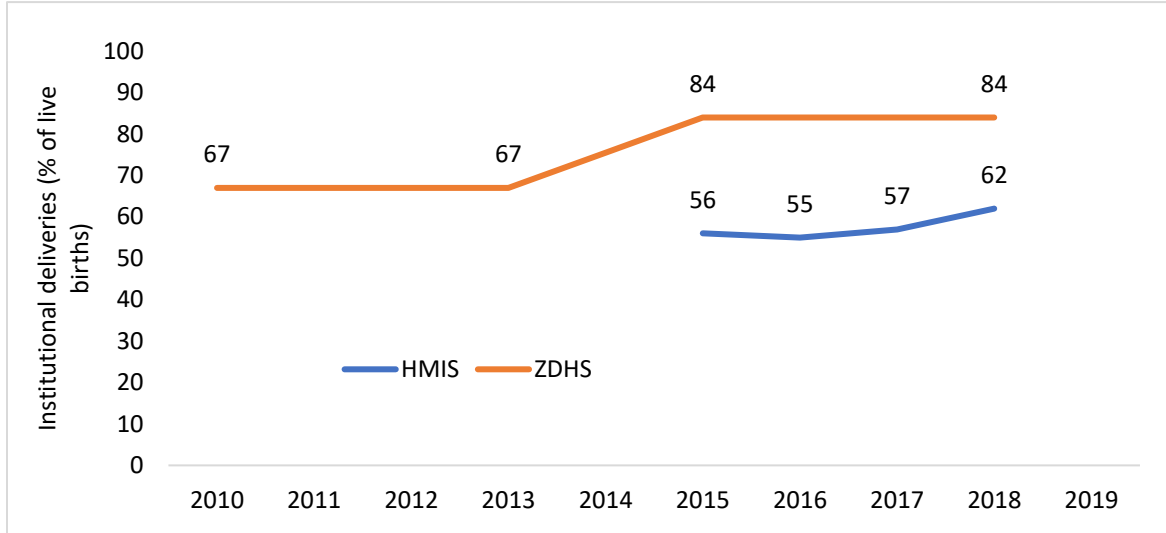
Figure 4.19: Trends in institutional delivery and skilled birth attendance (% of live births), Zambia, ZDHS 2013/14 and 2018
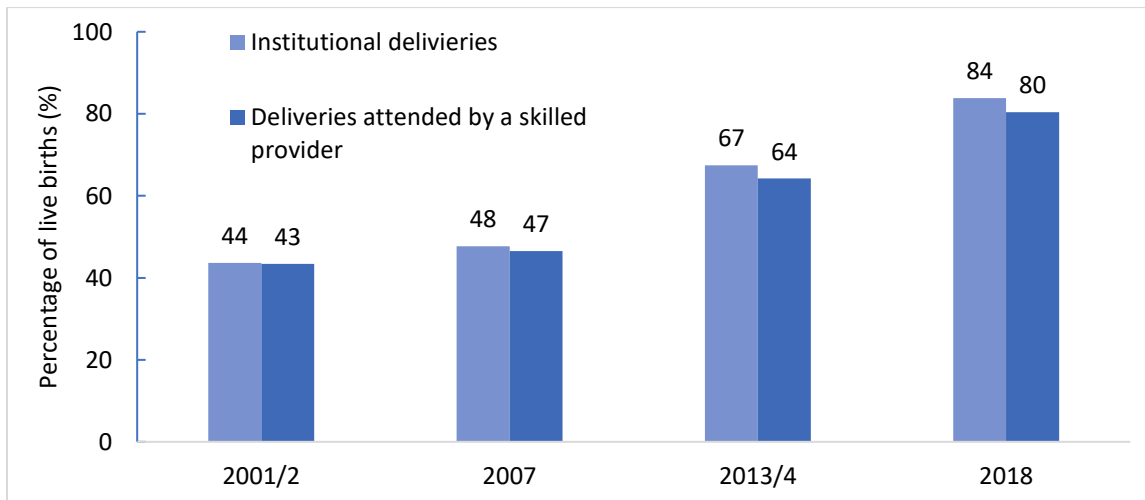
Trends in the institutional delivery rates among women who delivered in the previous five years varied by region in Zambia (Figure 4.20). Comparing the 2013/14 and 2018 ZDHS, the greatest increases occurred in Central and Northern provinces with the lowest rates initially, but also improved in Southern, Luapula and Copperbelt provinces with moderate rates in 2013/14. Provinces with initially high institutional delivery rates, and less improvement by 2018, included North Western and particularly Lusaka (HMIS estimate adjusted for underreporting by 25%).

Figure 4.20: Levels and trends in institutional delivery among women who delivered in the past five years by region, Zambia ZDHS 2013/4 and 2018
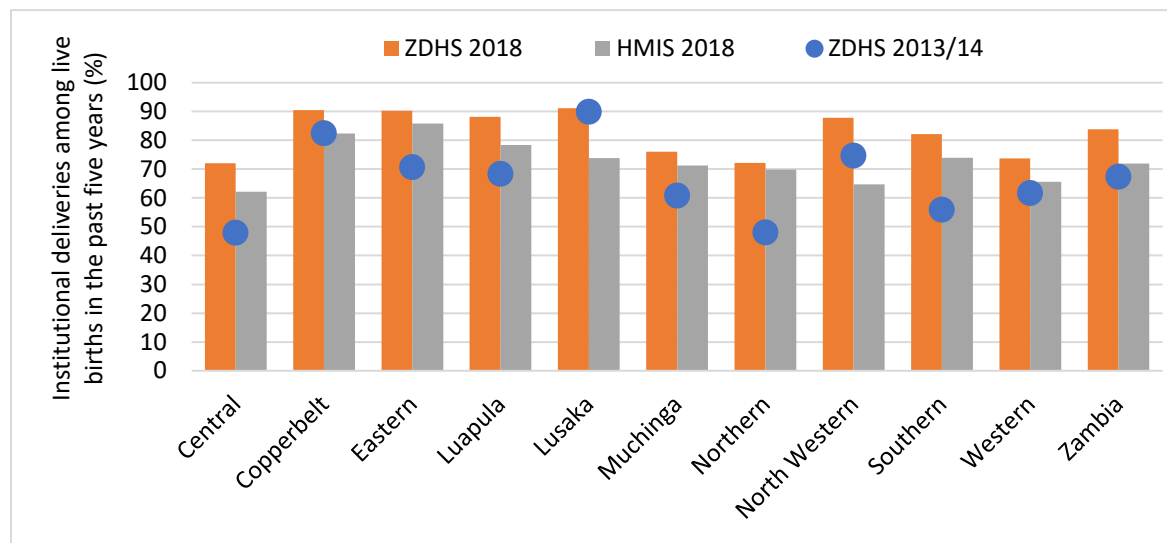
Socioeconomic inequities in skilled birth attendance appeared to reduce over time between 2007 and 2018, as shown in Figure 4.21. In 2007, SBA was highly inequitable: 64 percentage points higher among women in the richest (91%) than the poorest (27%) wealth quintile. This gap reduced greatly to 29 percentage points, though still high, due to an increasing proportion of women in the poorest (67%) compared to richest (96%) wealth quintile reporting having SBA by 2018.

Figure 4.21: Equity in skilled birth attendance among women who delivered in the past five years by wealth quintile, Zambia, ZDHS 2007, 2013/14 and 2018
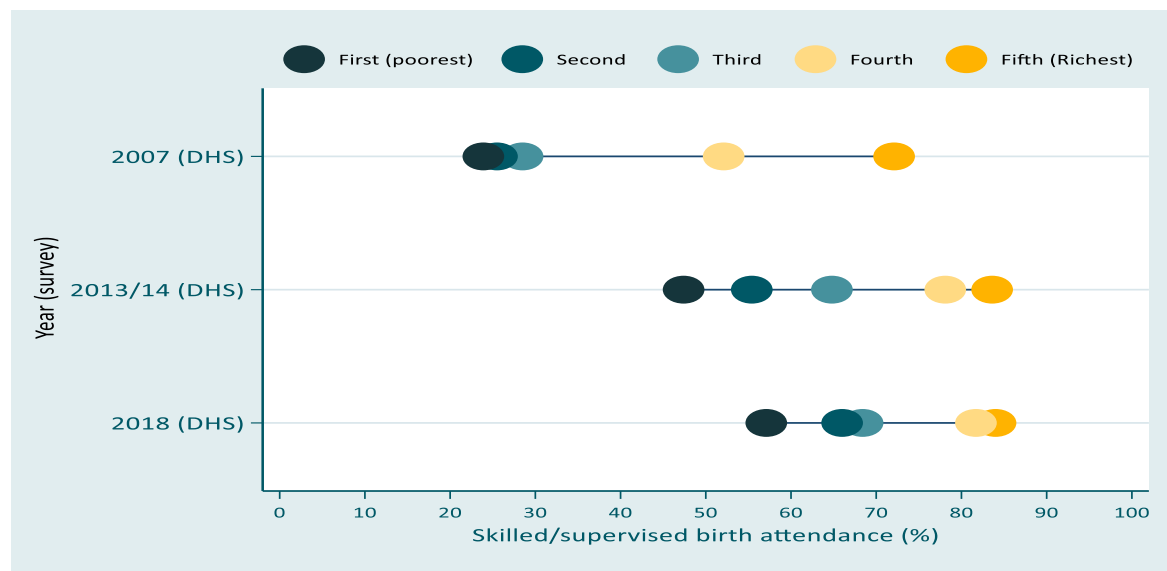
Caesarean section

While it can be a life-saving intervention, the level of need for C-sections in a population is difficult to determine and has often been given as in the range of 10–15% of all live births according to WHO. C-section rates have remained below this level in Zambia but increased by a few percentage points in the last few years (Figure 4.22). The increase likely reflects the increases in institutional deliveries as well. The rates according to the ZDHS among

those who gave birth in the previous five years doubled from 2% in ZDHS 2001/2 to 4.4% in ZDHS 2013/14, and 5% in 2018. According to the HMIS, the rate increased from 3.5% in 2014 to 5.6% by 2018.
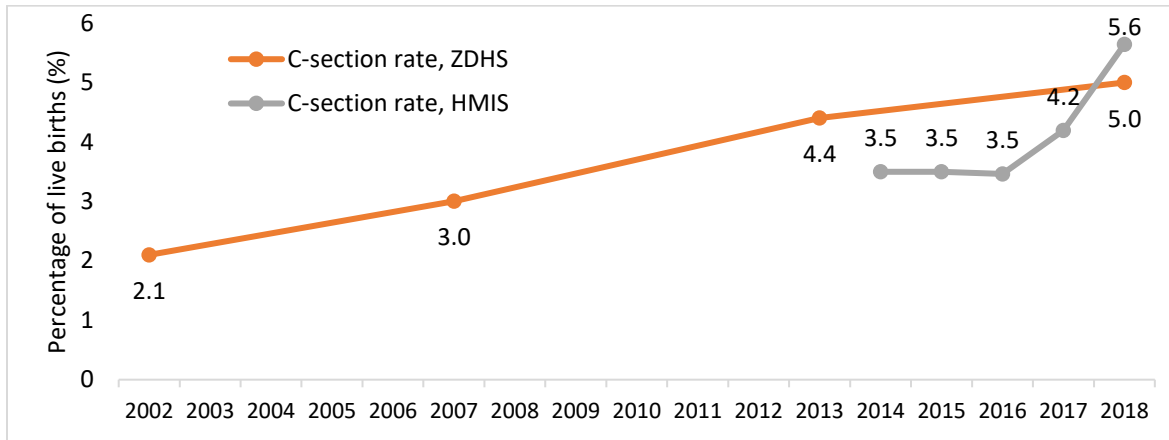
Postnatal care

Attendance at a postnatal care visit within 48 hours after delivery among women who gave birth in the past two years was collected in the ZDHS. Overall, PNC within 48 hours increased from 63 to 70% between 2013 and 2018 as shown in Figure 4.23. Four or more PNC visits was highest in Lusaka at 84% according to the 2018 ZDHS (though it was much lower in 63% in HMIS data after adjusting using a correction factor for underreporting), and lowest in Northern province (54% in ZDHS), and in Central according to HMIS (43%).

PNC attendance within 48 hours increased in this time period in most provinces according to the ZDHS. This was most notable in provinces with lower baseline 2013/14 rates, around 60%, including Western (13 percentage point increase) and Central (17 percentage points) provinces, and in Muchinga (17 percentage points) and Luapula (15 percentage points) where baseline rates were higher (around 70%). Conversely, in Eastern and North Western provinces where baselines rates were also moderate, rates of PNC reduced by 1 and 5 percentage points respectively by 2018.

Figure 4.23: Trends in postnatal care attendance (% of all live births) within 48 hours of delivery among women aged 15-49 who gave birth in the two years preceding the survey by region, Zambia, ZDHS 2013/14 & 2018 and HMIS 2018
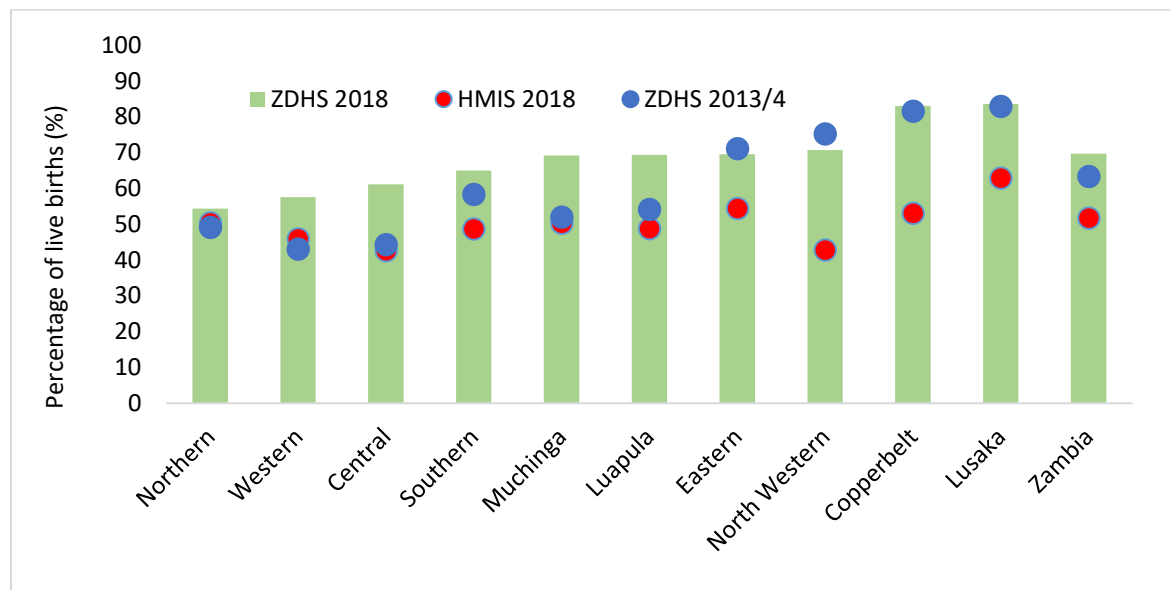
Socioeconomic differences in having a postnatal care visit within the first 48 hours after birth appeared to have reduced in the past decade, due to an increasing rate among the lower wealth quintiles (Figure 4.24). In 2007 ZDHS, PNC in the first 48 hours among women who delivered in the past two years were 48 percentage points higher among women in the richest (72%) than poorest (24%) quintiles. In 2018, there was a 27-percentage point gap, with 84% of women who delivered in the past five years in the richest and 57% of those in the poorest quintile groups reporting that they had a PNC visit in the first 48 hours after giving birth.

Figure 4.24: Equity in receipt of postnatal care within 48 hours among women who delivered in the past five years by wealth quintile, Zambia, ZDHS 2007, 2013/14 and 2018
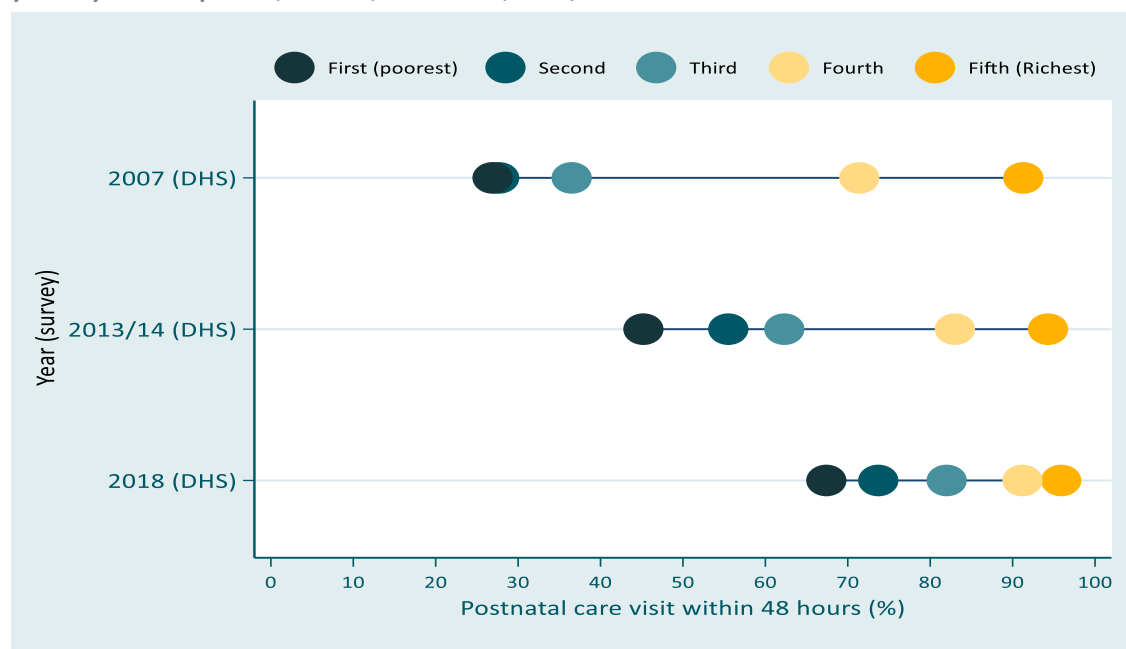
4.3 Child health and nutrition

Main points

- Nutritional status indicators improved, as stunting and overweight among children under 5 years declined and wasting reached the 2018 NHSP target. Stunting continues to decline at a rate of about 1% percentage point per year since 2001 but was still at 35%.
- Full vaccination coverage among children age 12-23 months has improved since the 2013/14 ZDHS, rising seven percentage points from 68% to 75% in 2018. Coverage of each of the recommended vaccinations and doses have also increased over the last five years.
- Early initiation of breastfeeding within one hour after birth increased, from 66% in 2013/14 76% in ZDHS 2018. Exclusive breastfeeding at ages 0-5 months remained around 70%.
- There were no changes in health-seeking behaviours for the health seeking behaviour and treatment of childhood illnesses (diarrhoea, suspected pneumonia, fever) between 2013/14 and 2018 ZDHS.

NHSP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Nutritional status and treatment of childhood illnesses				
Percentage of children underweight	15 (2013/14 ZDHS)	9.8	12 (2018 ZDHS)	Important reduction but ambitious target not reached.
Percentage of children stunted	40 (2013/14 ZDHS)	29.6	35 (2018 ZDHS)	Long term reduction since 2001 continuing.
Percentage of children wasted	6 (2013/14 ZDHS)	4	4 (2018 ZDHS)	Target achieved.
Percentage of children with minimum dietary diversity	22 (2013/14 ZDHS)	N/A	23 (2018 ZDHS)	Minimum dietary diversity did not increase in the past five years.
Exclusive breastfeeding 0-6 months	72.5 (2013/14 ZDHS)	75.8	69.9 (2018 ZDHS)	Target not met.
Breastfeeding initiated within 1 hour of birth (%)	65.8 (2013/14 ZDHS)	79	76.6 (2018 ZDHS)	Target almost reached.
Percentage of children with diarrhoea receiving Oral Rehydration Solution (ORS, and Zinc supplements) (%)	64.1 (2013/14 ZDHS)	79	66.8 (2018 ZDHS	Zinc was not offered previously, thus ratios compared were for ORS only.
Percentage of caregivers with appropriate care-seeking for symptoms of pneumonia (%)	71.9 (2013/14 ZDHS)	82	74.5 (2018 ZDHS)	No major change over time.
Immunization of children				
BCG coverage (%)	94.9 (2013/14 ZDHS)	90	97.5 (2018 ZDHS)	Target achieved.
BCG to Measles 1 dose dropout rate (new) (%)	10.5 (2013/14 ZDHS)	N/A	6.8 (2018 ZDHS)	Reduced by three points
OPV coverage, 3rd dose (%)	77.6 (2013/14 ZDHS)	90	81.2 (2018 ZDHS)	Target achieved.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
OPV1 to OPV3 doses drop-out rate (%)	19.4 (2013/14 ZDHS)	N/A	15.9 (2018 ZDHS)	Reduction by nearly 5 percentage points.
Pentavalent vaccine, 3rd dose (%)	85.8 (2013/14 ZDHS)	90	92.1 (2018 ZDHS)	Target achieved.
Penta 1 to Penta 3 drop-out rate (%)	10.5 (2013/14 ZDHS)	N/A	5.9 (2018 ZDHS)	Reduced by almost 5 points.
PCV 3 coverage rate (%)	92.9 (2016, HIA 2)	90	90.6 (2018, HIA 2) 89.8 (2018 ZDHS)	Newly introduced vaccines following ZDHS 2013/14.
Rota 2 coverage rate (%)	N/A	90	90.6 (2018 ZDHS)	Newly introduced vaccines following ZDHS 2013/14.
Measles - Rubella first dose coverage rate (%)	84.9 (2013/14 ZDHS)	90	90.9 (2018 ZDHS)	Target achieved.
Full immunization coverage (%)	68.3 (2013/14 ZDHS)	79	75 (2018 ZDHS)	Improved noticeably but not quite reached the target.

Data sources and quality: Zambia has conducted many Child Health and Nutrition indicator surveys that can provide data on long term trends. Data for several NHSP Child health and Nutrition indicators were obtained from ZDHS 2013/14 and 2018 and HMIS. The ZDHS also included Child health and Nutrition modules in 2013 and 2018. For data quality, data for a number of indicators was not available for the required reference period. For instance, immunization coverage data for PCV and Rota were only available in the 2018 ZDHS because these were newly introduced vaccines. Data on coverage of routine immunizations was also available in the HMIS 2014-2018, and WHO-Joint Reporting Form (JRF) surveys collected in 2015 and 2018.

Indicators: Zambia has a National RMNCAH&N Strategic Plan 2017-2021 which is linked to the NHSP. The strategic plan has several indicators, the majority of which are part of the NHSP matrix of indicators, and some are part of the NHSP M&E framework. For the Child health and Nutrition component, the available 2018 indicators are categorized under the following sections:

1. *Children's nutritional status* (percentage of children underweight, stunted, and wasted, children with minimum dietary diversity and exclusive breastfeeding 0-6 months)
2. *Vaccination of children* (coverage rates of BCG, PV (0,1,2,3), Penta (1,2,3), PCV 3, Rota 2, MR 1 & 2, and fully immunized coverage for children 12-23 months; and drop-out rates for BCG to Measles 1 dose (new), OPV1 to OPV3 doses, and Penta 1 to Penta 3 doses)
3. *Treatment of childhood illnesses* (percentage of children with diarrhoea receiving Oral Rehydration Solution (ORS and zinc supplements) and percentage of caregivers with appropriate care-seeking for symptoms of pneumonia)

Nutritional status of children

Anthropometric indicators for young children based on weight (kilogram, kg) and height/length (centimetres, cm) are often used to provide outcome measures of nutritional status. Long term trends in stunting, an indicator of chronic malnutrition, show a steady decline from 2001 which continued during 2013/14 -2018 (Figure 4.25). The average annual rate of decline is 2.4% per year. If this pace continues until 2030, the rate of stunting would come down from 35% to 26% in 2030. Wasting, a measure of acute malnutrition, was at its lowest level in 2018 (4%), which was the NHSP target. Underweight is a combined measure of chronic and acute malnutrition decreased from 15% to 12% between 2013/14-2018.

Figure 4.25: Nutritional status of children under five (underweight, stunting and wasting), Zambia, ZDHS 2001-2018
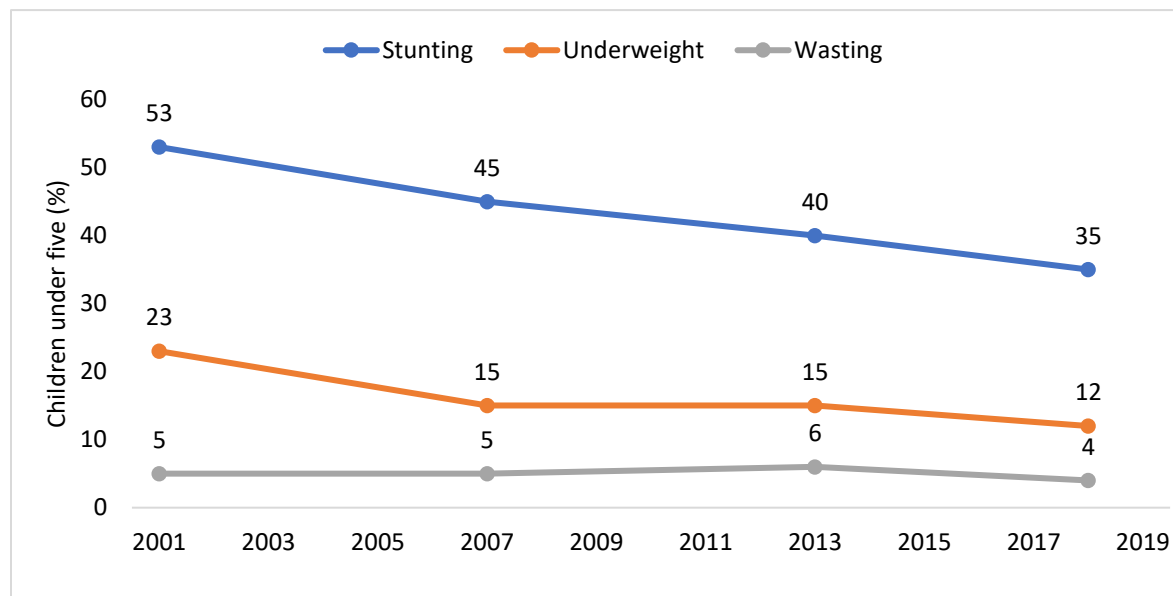
Decreases in stunting, wasting and underweight between 2013/14 and 2018 have generally occurred for children under five in all age groups, but particularly for stunting for those between 9 and 35 months, and for underweight between ages 6 to 11 months (which did not reduce greatly in older groups) (Figure 4.26).

Figure 4.26: Nutritional status among children under 5 by age in months, Zambia, ZDHS 2013/14 and 2018
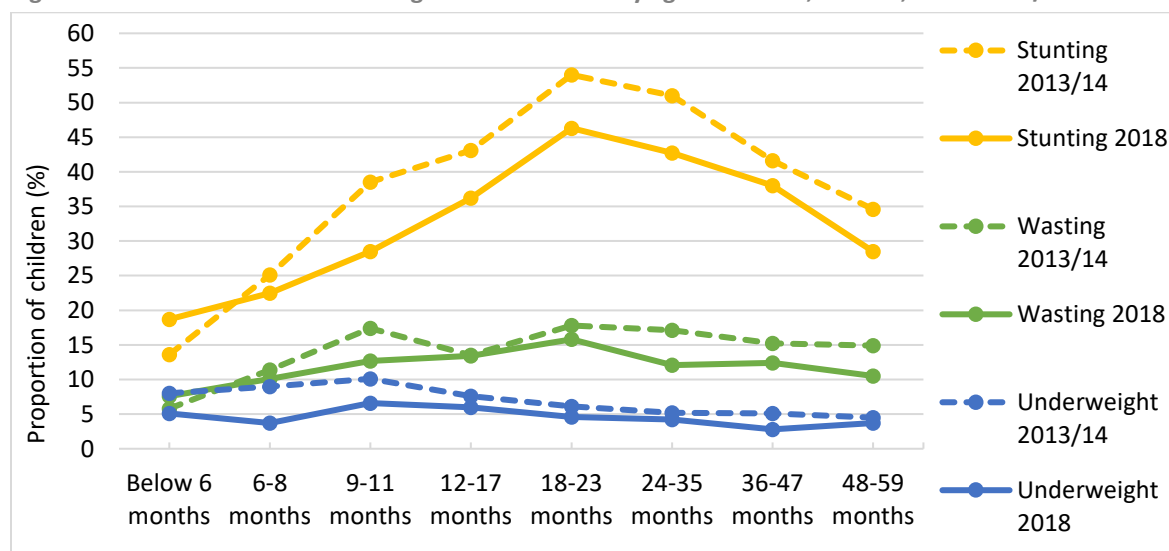
Sex differences in nutritional status were evident in both 2013/14 and 2018 ZDHS data (Figure 4.27). A greater proportion of male than female children under 5 were underweight, stunted, and wasted, and improvements in each were slightly greater among female children.

Figure 4.27: Nutritional status among children under five by sex, Zambia, ZDHS 2013/14 and 2018

Stunting among children under 5, a measure that reflects the cumulative effects of chronic malnutrition, appeared to reduce in most provinces in Zambia from 2013/14 to 2018 ZDHS. As shown in Figure 4.28, the largest improvements in stunting were in Muchinga, Central and Eastern provinces. The least improvement was in Lusaka and Luapula where the rates went up slightly by 2018.

Figure 4.28: Stunting among children under five by province, Zambia, ZDHS 2013/14 and 2018
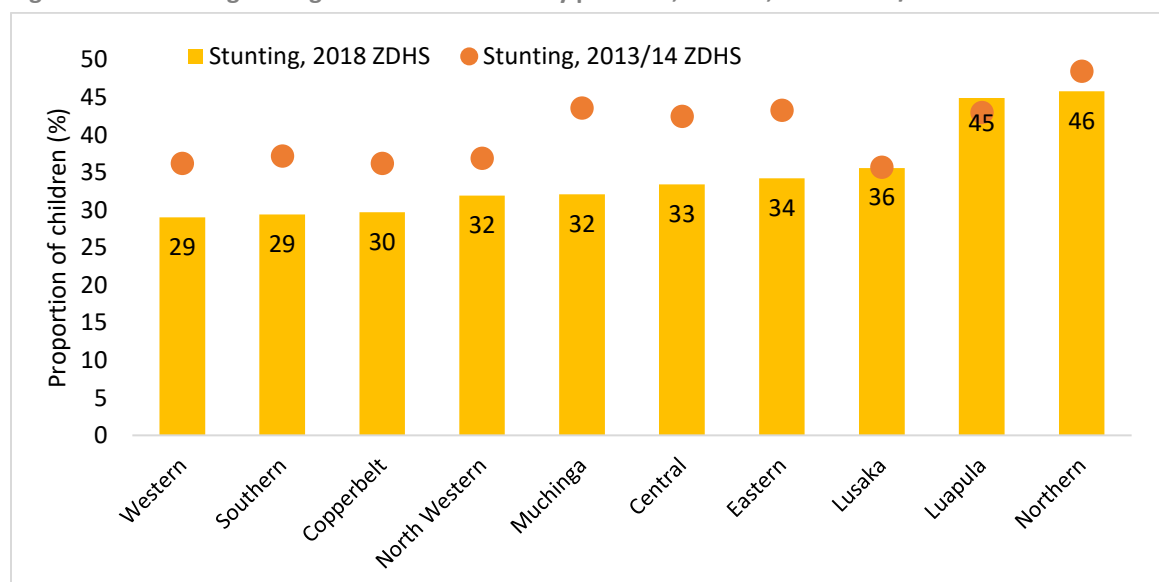
Comparing stunting rates among childer under five by wealth quintile, there were higher rates among the poorest compared to richest groups according to the 2007, 2013/14 and 2018 ZDHS data (Figure 4.29). Stunting reduced among all wealth groups in that time period, yet the absolute inequity remained nearly the same at about 15 percentage points more stunting among the poorest than richest group.

Figure 4.29: Stunting among children under five by wealth quintile, Zambia, ZDHS 2007, 2013/14 & 2018
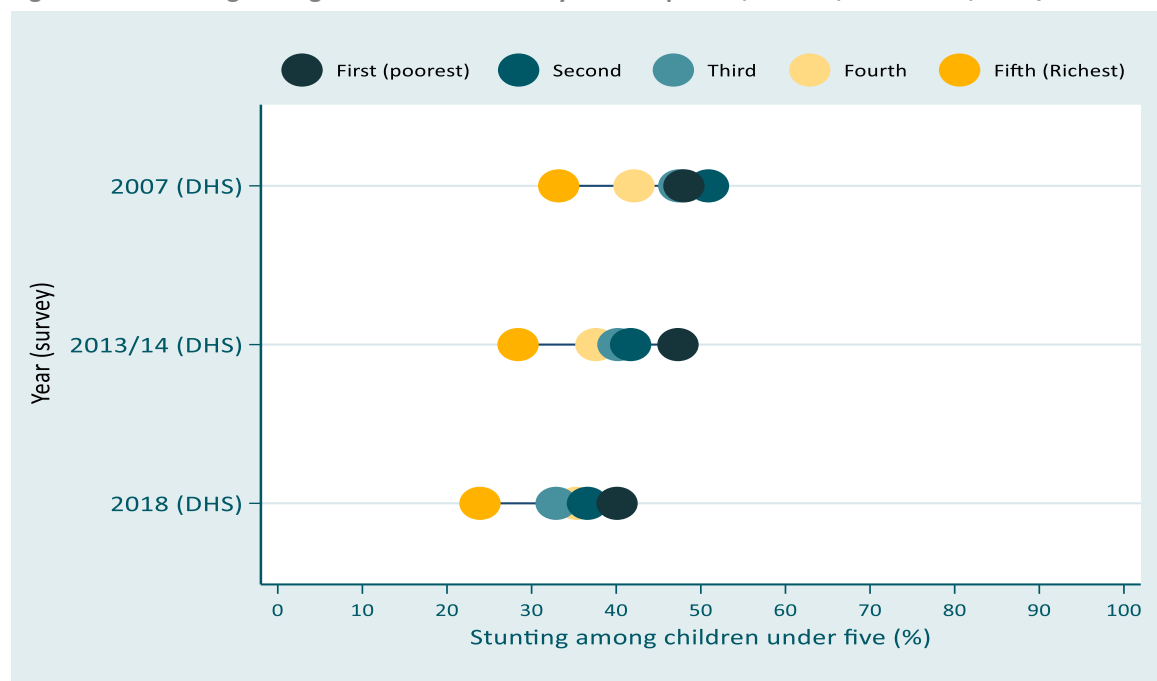
Indicators of infant and young child feeding practices showed no real improvement between 2013/14 and 2018 according to the ZDHS. The proportion of children receiving the minimum acceptable diet was 11% in 2013/14, based on meal frequency and diet diversity, which increased negligibly to 12.5% by 2018 (ZDHS), and similarly those receiving minimum dietary diversity remained similar at 23% in 2018 (Figure 4.30). The proportion who were exclusively breastfed for the first six months of life reduced slightly from 72.5 to 69.9% in that time period as well.

Figure 4.30: Infant and young child feeding practices (minimum acceptable diet and minimum dietary diversity for children 6-23 months, and exclusive breastfeeding 0-6 months), Zambia, ZDHS 2013/4 and 2018
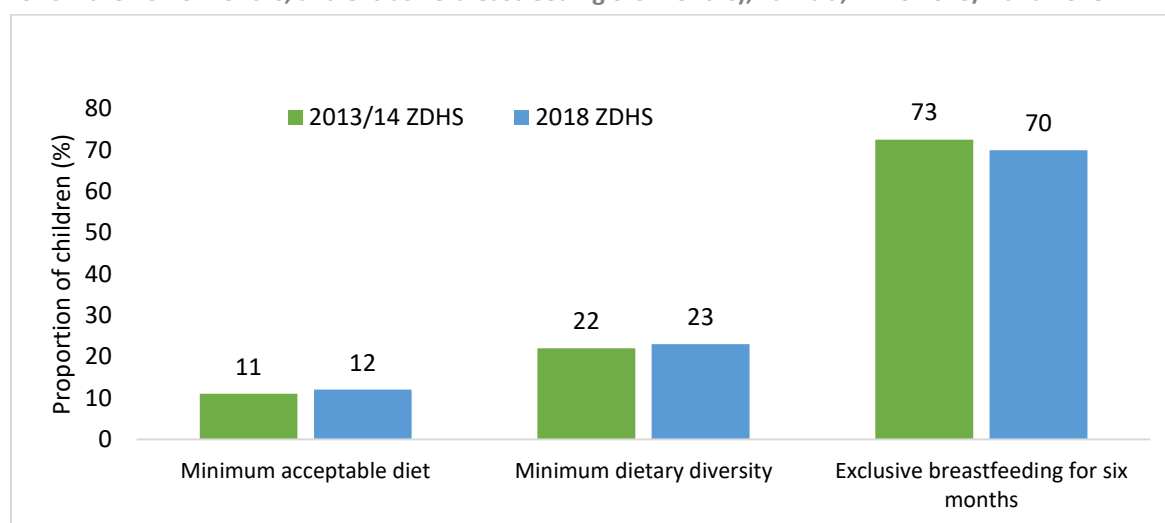
Early initiation of breastfeeding within one hour after birth and exclusive breastfeeding for the first six months of life were collected in the ZDHS (2001, 2007, 2013/4 and 2018). Figure 4.31 below shows the rates of early initiation of and exclusive breastfeeding; the former was for children born within five years preceding the survey except for 2013/14 when it was for children born within two years before the survey, and the latter was for children born within two years preceding the survey, except for 2001 when it was among children born within three years

preceding. Exclusive breastfeeding in the first six months increased between 2001 (51%) and 2013/14 (73%) but declined somewhat by 2018 (70%). Early initiation of breastfeeding also increased to nearly 76% in 2018. According to the HMIS data, it appeared that early initiation of breastfeeding was also 75% among children born within 5 year prior to the survey, but this requires further analysis.

Figure 4.31: Early initiation and exclusive breastfeeding among children born two and five years preceding the survey, Zambia, ZDHS 2001/2-2018, and HMIS 2018
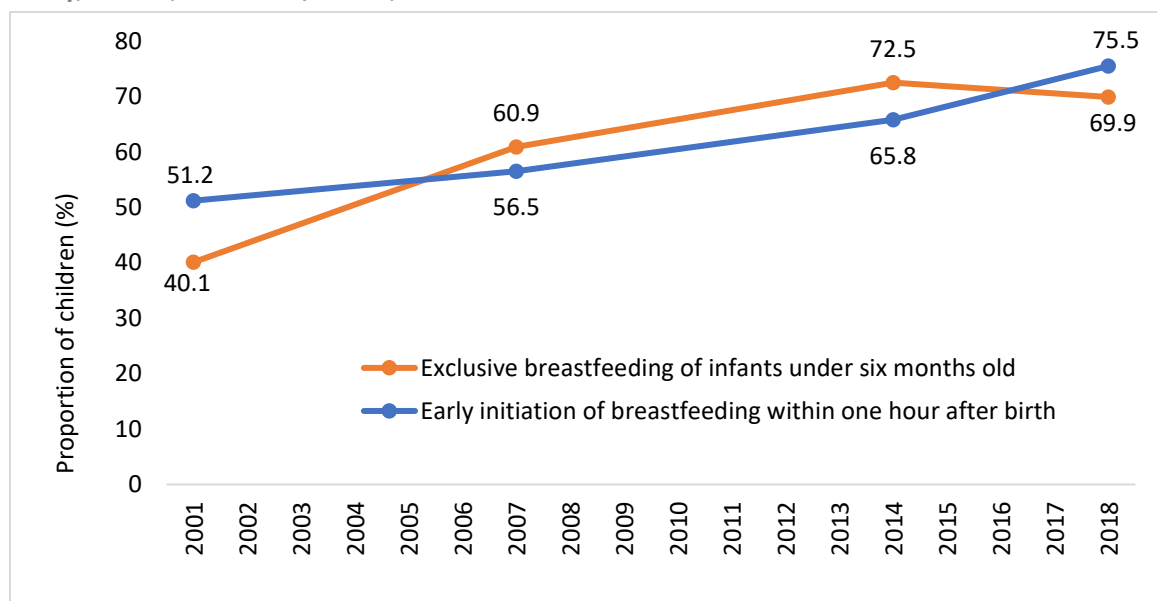
Vaccination of children

Universal immunization of children against common vaccine-preventable diseases is crucial to reducing infant and child mortality. In Zambia, routine childhood vaccines include BCG vaccine (tuberculosis), DPT-HepB-Hib or pentavalent vaccine (diphtheria, tetanus, pertussis, hepatitis B and *Haemophilus influenzae* type b), oral polio vaccine or OPV (poliomyelitis), PCV (pneumococcal conjugate vaccine), rotavirus or RV vaccine, and measles and rubella or MR vaccine. According to the guidelines developed by the WHO, children are considered to have received all basic vaccinations when they have received BCG vaccination, three doses of DPT vaccine (given as pentavalent), three doses of polio vaccine (excluding the polio vaccine given at birth), and a vaccination against measles (given as measles and rubella). The administrative data reported to WHO-UNICEF JRF indicated that coverage for all antigens was above 90% by 2018 (Figure 4.32).

Figure 4.32: Routine immunization coverage among infants, Zambia, WHO/JRF surveys 2015-2018
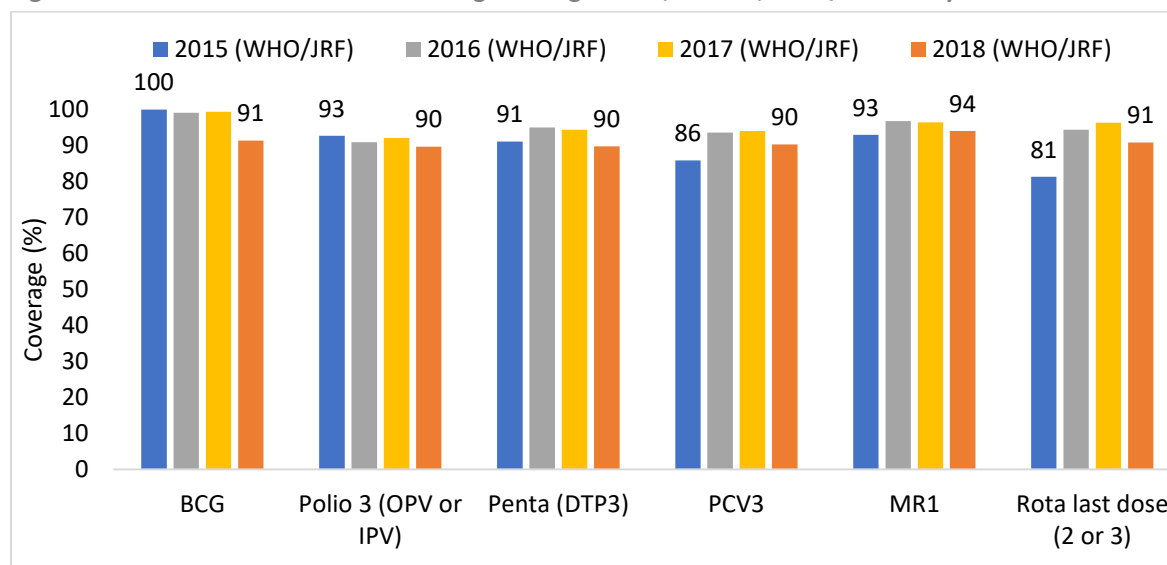
The data in ZDHS showed some differences in vaccination coverage among children between 12 and 23 months. Figure 4.33 shows that 75% of children 12-23 months were fully immunized. This represents an improvement since the 2013/14 ZDHS, where the fully immunized coverage was estimated to be at 68%. Similarly, there was a positive trend for individual antigens, and the target was reached for Penta, measles-rubella (MR1) and Rota vaccines by 2018 (and was also reached in 2013/14 for BCG).

Figure 4.33: Coverage of basic vaccinations among children aged 12-23 months, Zambia, ZDHS 2013/14 & 2018
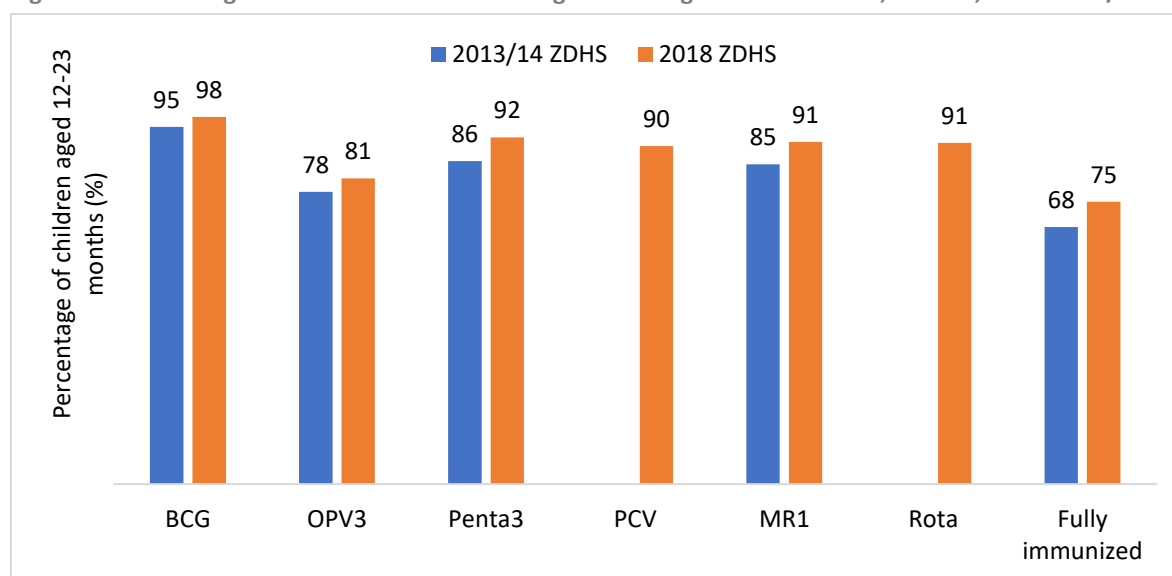
Figure 4.34 shows comparisons in coverage of Penta 3 doses and Measles 1 dose between HMIS between 2014-2018 and the latest rounds of ZDHS. Coverage of Penta3 and Measles increased in the HMIS and ZDHS between 2014 and 2017 from just under 90% to about 95%, but in HMIS these dropped slightly in 2018.

34

Figure 4.34: Coverage of Penta3 and Measles vaccination among children aged 12-23 months, Zambia, ZDHS 2013/14 & 2018 and HMIS 2014-2018
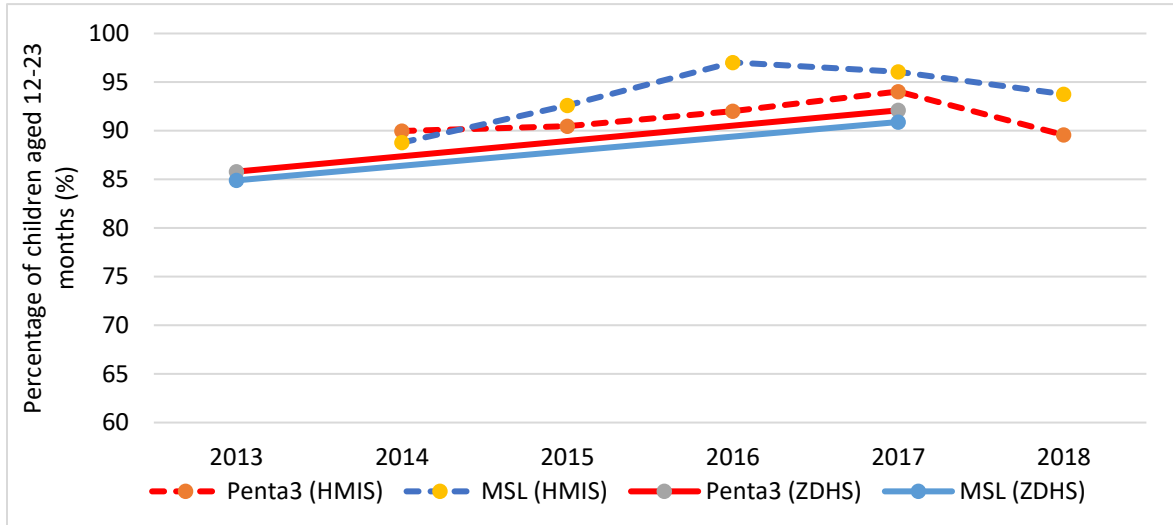
In terms of drop-out rates, there has generally been an improvement across antigens, as depicted in Figure 4.35 below. For BCG to Measles drop-out, the rate reduced from 10.5% in 2013/14 to 6.8% in 2018. Similarly, the drop-out rate for OPV 1 to 3 also decreased from 19.4 to 15.9% in that time period. The drop-out rate for Penta1 to 3 was a bit lower, and reduced less, from 10.5 to 5.9% between 2013/14 and 2018 in the ZDHS.

Figure 4.35: Drop-out rates for selected antigens, Zambia, ZDHS 2013/14 and ZDHS
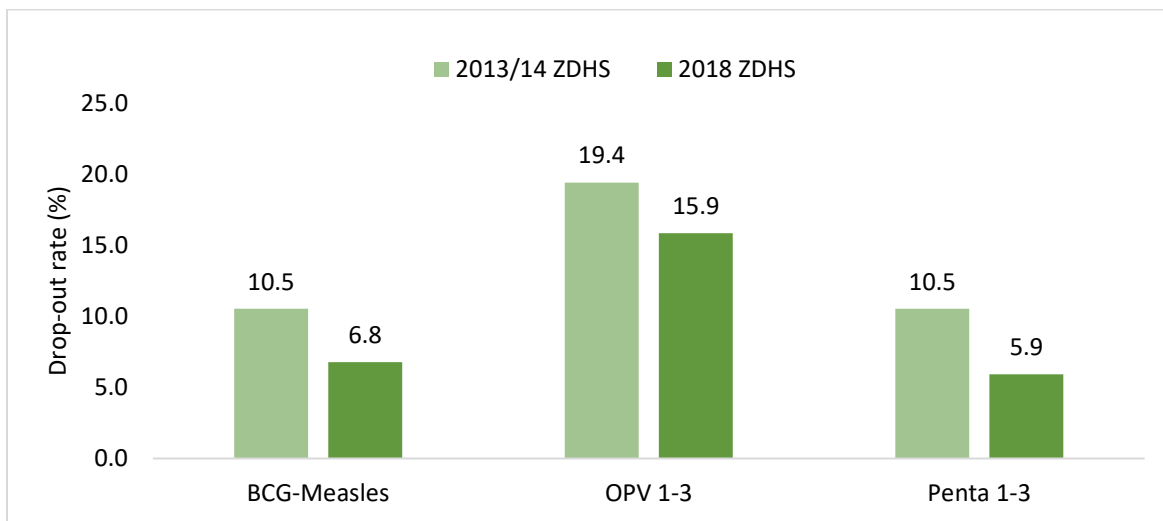
Treatment of childhood illnesses

Pneumonia and other acute respiratory infections (ARIs), fever, and dehydration from diarrhoea are important contributing causes of childhood morbidity and mortality in developing countries (WHO 2003). Prompt medical attention when a child has the symptoms of these illnesses is, therefore, crucial in reducing child deaths.

Figure 4.36 shows that 67% of children with diarrhoea received fluid from an oral rehydration salt (ORS) packet by 2018, three percentage points higher than in 2013/14. There was also an incremental increase in the proportion of care-seeking when children had symptoms of fever, from 64% to 67% between 2013/14 and 2018 ZDHS respectively.

Figure 4.36: Treatment of childhood illnesses, Zambia, ZDHS 2013/14 & 2018
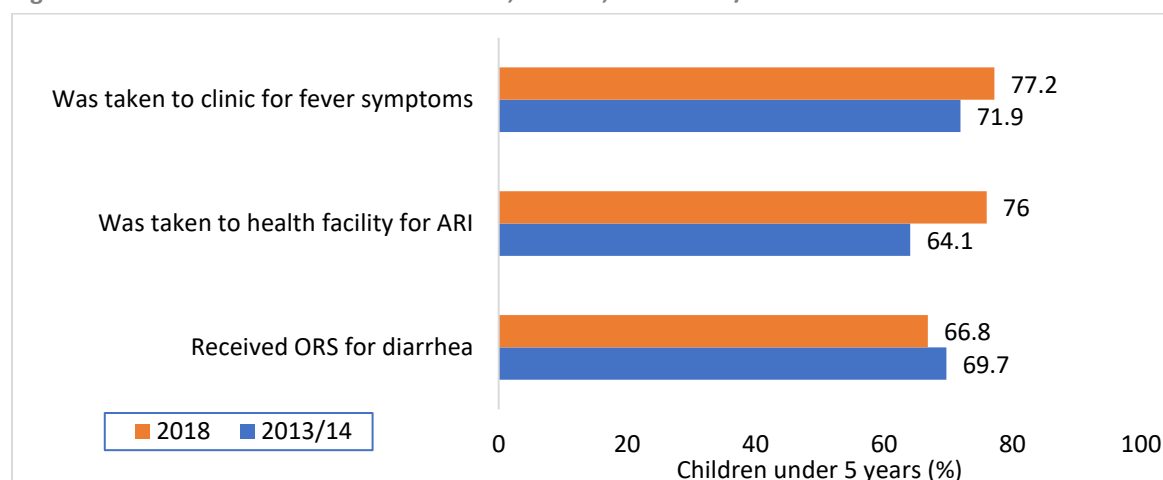
4.4 Adolescent health

Main points

- Adolescent health improved for some indicators, while others deserve further attention.
- The adolescent birth rate declined somewhat between 2013/14 and 2018, from 141 to 135 per 1000 adolescent girls aged 15-19 years, almost reaching the target of 133. The proportion of young women aged 20-24 who were married by age 18 was over 30% in 2013/14.
- HIV prevalence rates among adolescents aged 15-19 did not change greatly comparing 2016 ZAMPHIA and 2018 ZDHS data and remained twice as high among girls than boys.
- Similarly, the proportion of adolescents with comprehensive knowledge of HIV prevention did not change since 2013/14 and remained much lower than the target.
- There were six additional districts which had the minimum Adolescent Health Package.

NHSP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Adolescent birth rate per 1,000	141 (2013/14 ZDHS)	133	135 (2018 ZDHS)	Slight reduction.
HIV prevalence among adolescents (%)	0.9 (10-14 yrs, 2016 ZAMPHIA) Overall: 2.5 (15-19 yrs, 2016 ZAMPHIA) Male: 1.6; Female: 3.3 (15-19 yrs, ZAMPHIA 2016)	N/A	Overall: 1.9 (15-19 yrs, ZDHS 2018) Male: 1.2; Female: 2.6 (15-19 yrs, ZDHS 2018)	ZDHS 2018 shows slightly lower levels.
Percentage of districts with minimum adolescent health package (%)	42 (Programme report)	N/A	48 (Programme report)	
Percentage of adolescents with comprehensive right knowledge of HIV prevention (%)	Male – 39 Female – 42 Overall – 39.5 (2013/14 ZDHS)	60	Male – 41 Female – 43 Overall - 42 (2018 ZDHS)	Young people age group used (15-24 yrs). Minimal progress made.

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Percentage of women aged 20–24 who were married or in a union before age 15 and before age 18 (%)	Before 15: 5.9 Before 18: 31.4 (2013/14 ZDHS)	N/A	Before 15: 5.2 Before 18: 29 (2018 ZDHS)	Slight decline.

Data sources and quality: Data for several NHSP adolescent health indicators were obtained from ZDHS 2013/2014 and 2018 including adolescent birth rate, HIV prevalence, percentage of adolescents with comprehensive right knowledge of HIV prevention, and percentage of early marriage. Data for the latter were not available in ZDHS 2018 report.

Indicators: Zambia has a National RMNCAH&N Strategic Plan 2017-2021 which has indicators linked to the NHSP, Legacy goals and NHSP M&E Framework. The indicators with available data were adolescent birth rate, HIV prevalence among adolescents, percentage of adolescents with comprehensive right knowledge of HIV prevention, and proportion of women being married as an adolescent.

Adolescent birth rate and prevalence of early marriage

The adolescent birth rate per 1000 adolescent girls aged 15-19 years has declined a little over time, as shown in Figure 4.37. Between 2013/14 to 2018, ZDHS showed that the rates reduced from 141 to 135 overall. This was consistently higher in rural than urban areas. Yet the rates declined more between 2013/14 and 2018 than in previous years, from 184 to 174 in rural areas, and 97 to 88 in urban areas.

The percentage of adolescent girls aged 15-19 years who had begun childbearing, or were pregnant at the time of the survey, was 29.2% in ZDHS 2018 with large differences between urban and rural girls (19.3 and 37.0% respectively). These indicators were the same in the ZDHS 2-13/14 (28.5% overall, 20.0% and 36.4% in urban and rural girls),

Figure 4.37: Adolescent birth rate (per 1000 women), national, urban, and rural Zambia, ZDHS 2001/2-2018
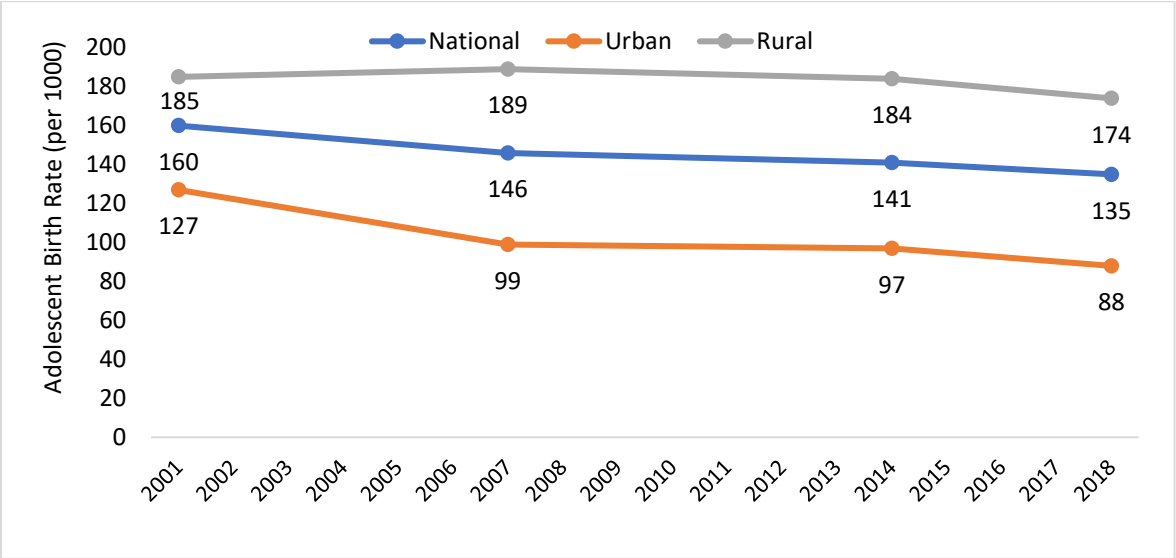
According to the ZDHS 2013/14, the proportion of women aged 20-24 who were married or in union before age 15 was 6%, while the proportion married by age 18 was much greater, at 31.4%. This reduced slightly in the ZDHS 2018, as the percentage of women aged 20-24 married by age 15 was 5%, and by 18 was 29%. The percentage of adolescent girls reporting they have ever had a live birth in the 2013/14 survey remained at around 24% by 2018

(Figure 4.38). Yet regional differences were apparent, with the greatest reductions were in Lusaka, North Western, and Northern provinces, compared to increases in Copperbelt and Southern provinces.

Figure 4.38: Proportion of adolescents who reported ever having a live birth by region, Zambia, ZDHS 2013/14 & 2018
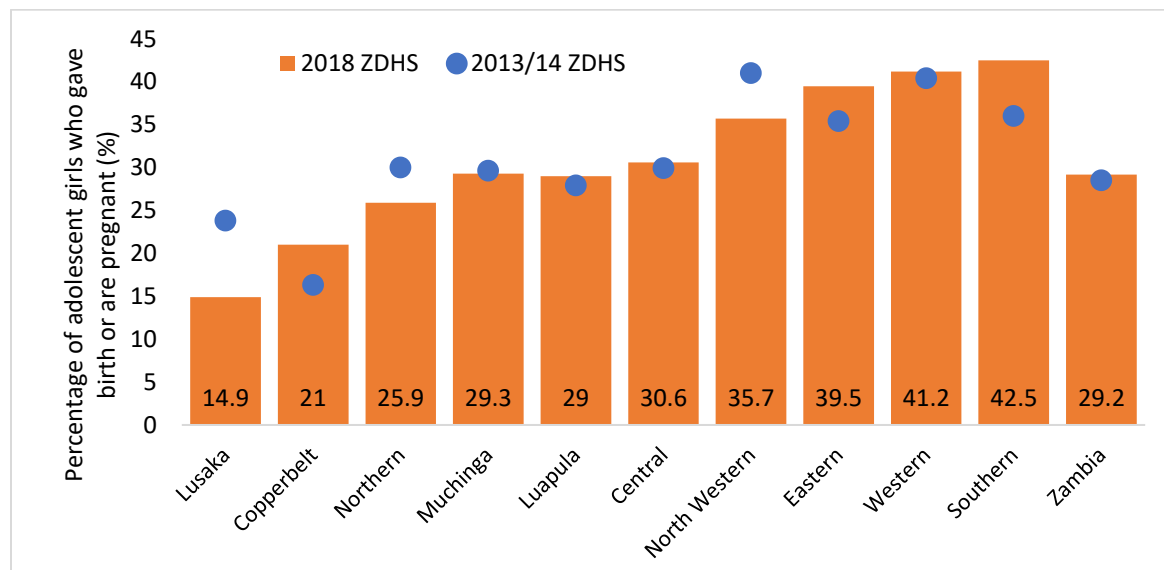
HIV prevalence and knowledge among adolescents

Testing for HIV prevalence among adolescents aged 15-19 years was conducted in the ZDHS (2013/14 and 2018) and ZAMPHIA (2016) surveys. In the ZDHS, if a respondent consented to the testing, blood obtained from a finger prick was used to prepare five blood spots on a filter paper card labelled with a bar code unique to the respondent. If the respondent did not consent to additional testing using his or her sample, the words "no further testing" were written on the filter paper card. The samples were processed at the TDRC and UTH Virology laboratories, and selected enzyme-linked immunosorbent assay (ELISA) test results were reviewed by an HIV prevalence testing expert. The ZAMPHIA household survey used a serological rapid diagnostic testing algorithm based on Zambia's national guidelines, with laboratory confirmation of seropositive samples using a supplemental assay.

The HIV prevalence remained notably higher among adolescent girls than boys, at 4.1% versus 4.8% in the ZDHS 2013/14, and 3.3% versus 1.6% in ZAMPHIA 2016 respectively. Further, in the ZDHS 2018 girls had higher HIV prevalence (2.6%) than boys (1.2%) (Figure 4.39 below), though these were both lower than the prevalence in 2016. These trends are not statistically significant. As HIV prevalence among adolescents are mostly accounted for by new infections, the reduced rates may indicate that incidence is also declining somewhat. There are however more children who acquired HIV from their mothers surviving into adolescence, which complicates the interpretation.

Figure 4.39: Trend in HIV prevalence among adolescents aged 15-19, Zambia, 2013/14 ZDHS, 2016 ZAMPHIA, & 2018 ZDHS
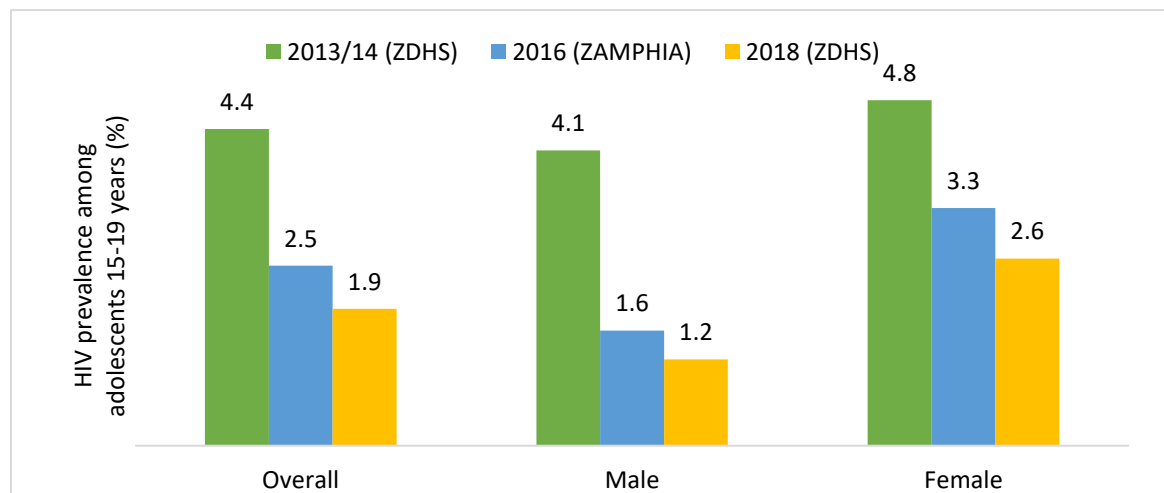
Comparing the HIV prevalence by age group and sex in the ZAMPHIA 2016 survey, there was a much higher proportion of females than males being HIV positive (Figure 4.40). This gap between females and males widened with increasing age: 3.3% versus 1.5% among adolescents 15-19 years, and 8.3% versus 2.0% among 20 to 24-year olds respectively. The prevalence was higher among increasing age groups overall (mostly due to the increasing prevalence among females), from 0.9% for those aged 10 to 14 years, to 2.5% for adolescents aged 15 to 19 years, and 5.2% for youth aged between 20 to 24 years. In ZDHS 2018, the HIV prevalence increased from 1.6, 2.4, 4.8 to 8.4% among those aged 15-17, 18-19, 20-22 and 23-24 years respectively. An unknown proportion of the adolescent infections are paediatric infections, acquired during pregnancy, childbirth or postpartum periods.

Figure 4.40: HIV prevalence among adolescent girls and boys by age group, Zambia, 2016 ZAMPHIA
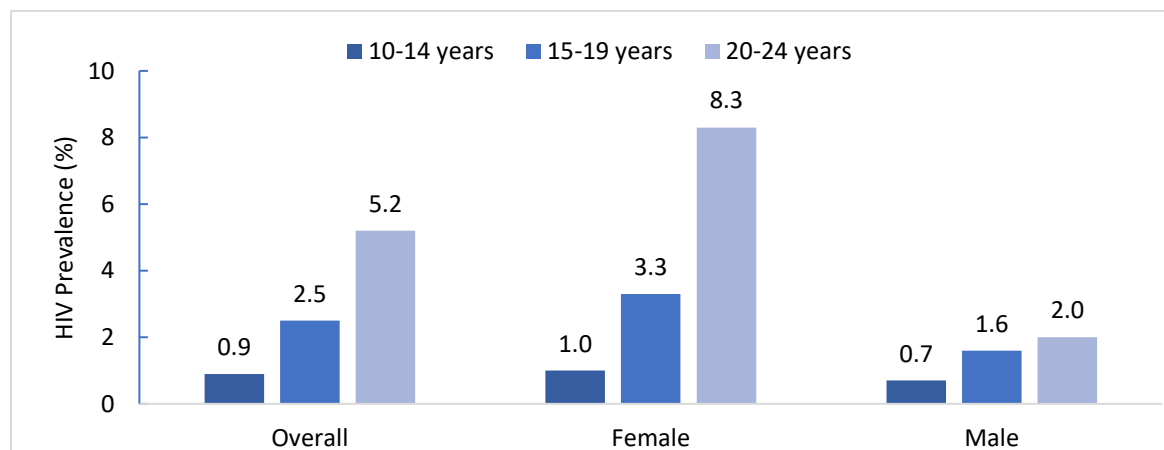
Comprehensive knowledge of HIV prevention was determined based on the proportion of youth aged 15-24 years old who correctly identified that consistent use of condoms during sexual intercourse, and having just one uninfected faithful partner, can reduce the chances of getting the AIDS virus, knowing that a healthy-looking person can have HIV, and rejecting the two most common local misconceptions about HIV transmission (that the AIDS virus can be transmitted by mosquito bites and that a person can become infected by sharing food with someone who has the AIDS virus). This information was collected in the ZDHS 2013/14 and 2018, and ZAMPHIA 2016 surveys. As shown in Figure 4.41, surveys suggested that the proportion of youth with comprehensive knowledge declined from 46.7% to 42.6% among males, but increased slightly from 41.5% to 42.6% among females, between 2013/14 and 2018.

Figure 4.41: Proportion of youth aged 15-24 years with comprehensive right knowledge of HIV Prevention, Zambia, ZDHS 2013/14 & 2018 and ZAMPHIA 2016
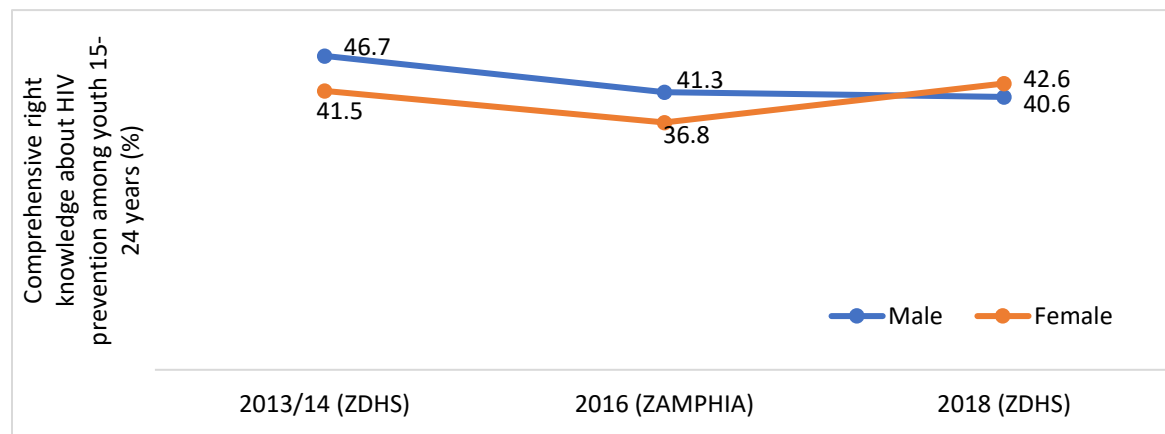
4.5   Gender-based violence and child sexual assault

Main points

- Very little data exists on GBV and CSA in Zambia, as it is likely that the number of cases reported are far less than the number of actual cases occurring.
- The number of people who were reported to have received PEP as a result of GBV in 2015 was low.
- The reported number of children who were sexually abused was higher than the numbers receiving PEP (1351 and 611 respectively in 2018).
- Knowing the characteristics of GBV and CSA in our setting would aid early identification and intervention.

NHSP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Gender-Based Violence and Child Sexual Abuse				
Proportion of individuals seeking PEP as a result of sexual assault		N/A	601 (2015, World Vision Zambia)	No baseline.
Number of children seeking health services as a result of sexual violence in a given period	3790 (HIA 2, 2016; UTH PCOE, 2016)	N/A	1565 (HIA 2, 2018; UTH PCOE, 2018)	Huge disparity in the figures from HIA 2 for 2018.

Data sources and quality: Cases of GBV and violence in Zambia are likely under-reported. Data for several GBV and violence against children NHSP indicators were obtained from World Vision Zambia (WVZ) in 2015 and by the Paediatric Centre of Excellence of the University Teaching Hospital (UTH-PCOE) 2013-2018. This approach uses data from those that report to police stations and thereafter seek medical care in health facilities. These statistics are an underestimate as many cases are not likely to be recorded in health facilities.

Indicators: Zambia has a National RMNCAH&N Strategic Plan 2017-2021 which has indicators linked to the NHSP, Legacy goals and NHSP M&E Framework. The NHSP has several GBV and violence against children indicators including the proportion of individuals seeking PEP as a result of sexual assault and number of children seeking health services as a result of sexual violence.

Background on prevalence of Gender-based Violence

Gender-based violence (GBV) is defined as any act that results in, or is likely to result in, physical, sexual, or psychological harm or suffering among women, including threats of such acts and coercion or arbitrary deprivations of liberty, whether occurring in public or in private life (United Nations, 1993; United Nations, 1995). The 2007, 2013/14 and 2018 ZDHS reported different forms of gender-based violence that were reported to be ever experienced by women aged 15-49 from a husband or partner (shown in Figure 4.42). Comparing 2013/14 to 2007 rounds of the ZDHS, rates of each type of violence had gone down slightly. In 2018, still nearly 30% of women reported ever experiencing physical violence, 15% sexual violence, and a higher rate of 31% of women reported emotional violence.

Figure 4.42: Proportion of women aged 15-49 years who ever experienced physical, sexual or emotional violence, Zambia, ZDHS 2007, 2013/14 & 2018
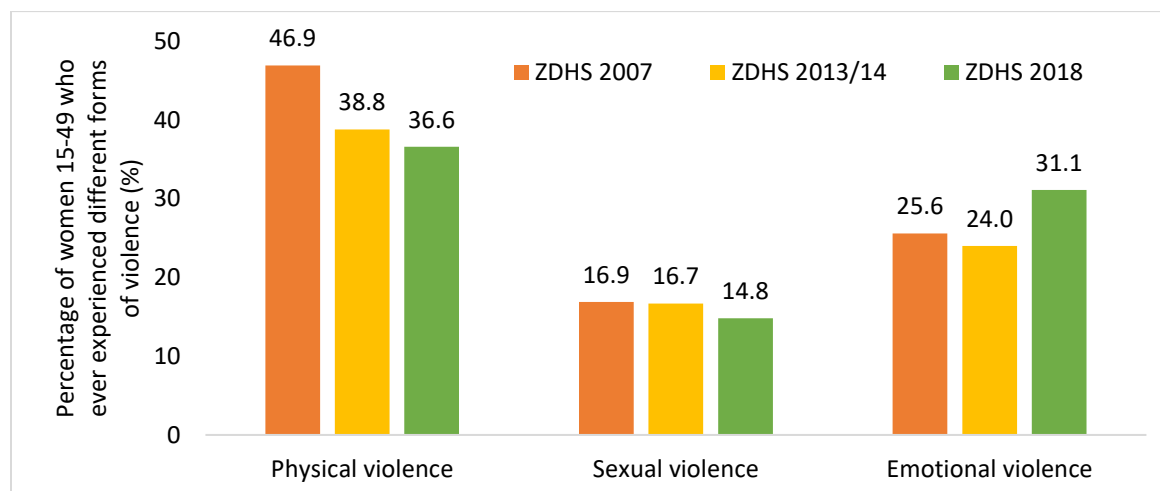
Proportion of individuals seeking Post-Exposure Prophylaxis (PEP) as a result of sexual assault

The table and graph below provide a snapshot of some of the GBV indicators currently tracked with data reported by WVZ in 2015 and by UTH PCOE 2013-2018. Table 4.1 shows the number of people receiving care after experiencing GBV, compared to the Life of Project (LOP) targets. The majority receiving care after experiencing GBV were females, at 20,046 compared to 6,422 males. The total of 26,468 who received care reached 52% of the LOP target of 51,300. Provision of Post-Exposure Prophylaxis (PEP) is quite low when compared to the number of sexual assault cases reported. The table below also indicates that the total number of people provided with PEP after sexual assault was 601 (all but one was female), which was less than a fifth of the LOP target.

Table 4.1: Number of people receiving post-GBV care and people provided with post-exposure prophylaxis (PEP); Midterm evaluation: Stamping out and preventing (STOP) gender-based violence (GBV) in Zambia, WVZ – 2015

Key Indicator	Life of Project (LOP) target	Total number (cumulative) of LOP target reached			Percent of LOP target reached
		Overall	Male	Female	
Number of people receiving post-GBV care	51,300	26,468	6,422	20,046	52%
Number of people provided with PEP	3,150	601	1	600	19%

Child sexual abuse and care-seeking as a result of sexual violence

Figure 4.43 shows the number of CSA cases reported between 2013 and 2018, as well as the number of children that were given PEP during the same period, according to data collected by UTH PCOE. The number of children reported to have been sexually abused increased between 2013 and 2015 from 1226 to 1451, then declined but remained higher in 2016 (1341) and 2018 (1351). The number of children receiving PEP was much lower and less than half of the number reporting CSA, at 611 in 2018.

Figure 4.43: Number of children seeking health services as a result of sexual abuse and number of those provided with PEP, UTH PCOE, 2013-2018
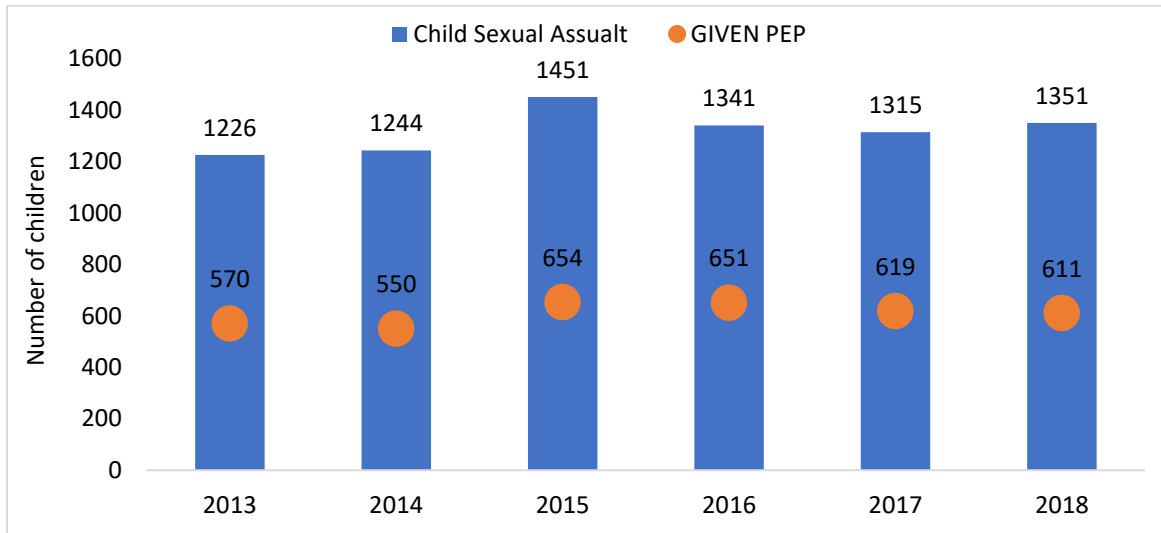
5.   Communicable diseases

5.1   Malaria

Main points

- Malaria has declined in Zambia between 2015-2018, most prominently shown by a halving of the parasite prevalence rate in children, but major provincial differences remained.
- All malaria intervention coverage indicators showed positive trends, and several reached the 2018 HSDP targets. There were increases for use of LLITN, IPT3 and IRS, as well as diagnostic testing by blood slide or rapid test in children and use of ACT for treatment of malaria.
- Intervention coverage has increased in provinces with higher prevalence between 2015-2018, and generally reached lower socio-economic groups as much or more than higher socio-economic groups. This is likely correlated with the higher prevalence among those living rurally and from lower socio-economic groups.

NHSP Targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Malaria				
Malaria mortality rate per 100,000 population	15.5 (HMIS 2016)	13.3	7 (HMIS 2018)	Baseline was adjusted with new data; decline, target achieved based on health facility data.
Malaria incidence per 1,000 population	336 (HMIS 2015)	168	312 (2018 HMIS)	No major decline, large differences by province.
Prevalence of malaria parasitaemia (6–59 months) (%)	17 (ZMIS 2015)	9.0	9.1 (ZMIS 2018)	Major decline since 2018, in all provinces.
Slept under LLITN previous night: all pregnant women (PW) 15–49, children under 5 years) (%)	All: 55 PW: 58.2 Under 5: 59.0 (ZMIS 2015)	All 73.0 PW 74.9 Under-5 75.4	All: 63.6 PW: 71.1 Under-5: 69.0 (ZMIS 2018)	Good progress during 2015-2018, but short of 2018 target.
Proportion of treated malaria cases that were lab confirmed (%)	83 (HMIS 2016)		96 (HMIS 2018)	Nearly all cases now lab confirmed.
IPT3 dose to pregnant women (%)	44.7 (ZMIS 2015)		67.3 (ZMIS 2018)	Major increase while IPT2 remained at about 80%.
IRS: percent of households reached in past 12 months (%)	28 (2015 ZMIS)	57.4	35 (ZMIS 2018)	Increase in coverage by one-fifth, but far off 2018 target.

Data sources and quality: Zambia has conducted many malaria indicator surveys that can provide data on long term trends. Data for several NHSP malaria indicators were obtained from national malaria indicator surveys (ZMIS) in 2015 and 2018. ZMIS was also conducted in 2006, 2008, 2010 and 2012 and all surveys include collection of blood for malaria parasite testing. The ZDHS also included malaria modules in 2013/14 and 2018. Malaria programme data from health facilities provide insights into mortality and incidence. This approach uses data from those that attend health facilities to compute population rates. These statistics are an underestimate because some cases are not recorded in health facilities but can also be an overestimate if malaria is over-diagnosed in health facilities. The increased use of lab test confirmed diagnoses minimizes the latter risk. The HMIS was used to

compute IPT coverage rates, using the number of first antenatal care visits as denominator (adjusted for a small proportion of pregnant women who never attend ANC).

Indicators: Zambia has a National Malaria Elimination Strategic Plan 2017-2021 which is linked to the NHSP. The malaria elimination plan has 17 indicators. The NHSP includes 7 malaria indicators, some are part of the NHSP matrix of indicators, and some are part of the NHSP M&E framework. The indicators include malaria epidemiology and coverage of key interventions long lasting insecticide treated nets (LLITN), intermittent preventive therapy (IPT) during pregnancy with SP (sulphadoxine-pyrimethamine), and indoor residual spraying (IRS).

Malaria prevalence, incidence and mortality

There are three indicators to assess trends in the malaria epidemic. The malaria incidence and malaria mortality in the population are based on the health facility data with estimated total population as denominators.[5] The parasite prevalence in children is obtained from testing in national population-based surveys.

By 2018, 96% of the malaria diagnoses in health facilities were lab confirmed. This is a major improvement compared to previous years (83% in 2016 and 91% in 2017). The proportion of malaria diagnoses that were children under 5 years declined from 38% in 2015 to 31% in 2018. The malaria incidence per 1000 population was 312 per 1000 population in 2018, down from 374 in the preceding year, but still quite similar to the baseline of HSDP in 2015 (336 per 1000 population). Malaria mortality decreased from 15.2 to 7 per 100,000 population during 2015-2018, based on the health facility deaths (Figure 5.1).

Figure 5.1: Malaria incidence and mortality per 100,000 population, based on DHIS2 reported numbers of cases and deaths, Zambia, 2014-2018
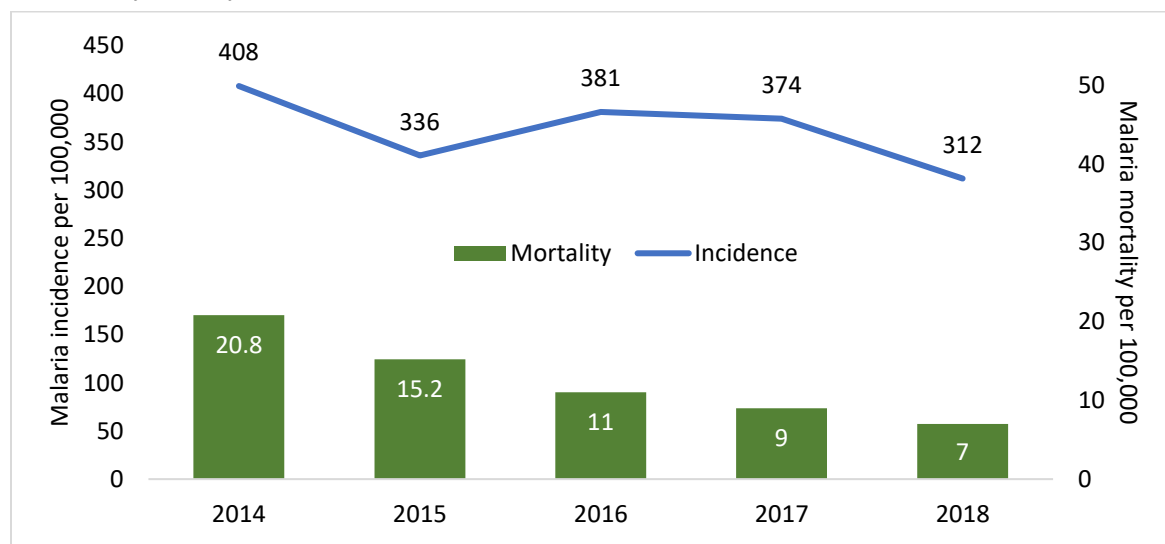
The population-based surveys show a major decline during 2015-2018 from 17% to 9% malaria parasite prevalence among children 6-59 months (diagnosed by blood slide and microscopy). The preceding surveys in 2010 and 2012 showed little decline, making the 2018 results more remarkable (Figure 5.2).

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[5] The statistics presented here were computed by the malaria programme from HMIS data.

Figure 5.2: Malaria parasite prevalence by microscopy among children 6-59 months, Zambia malaria indicator surveys, 2006-2018
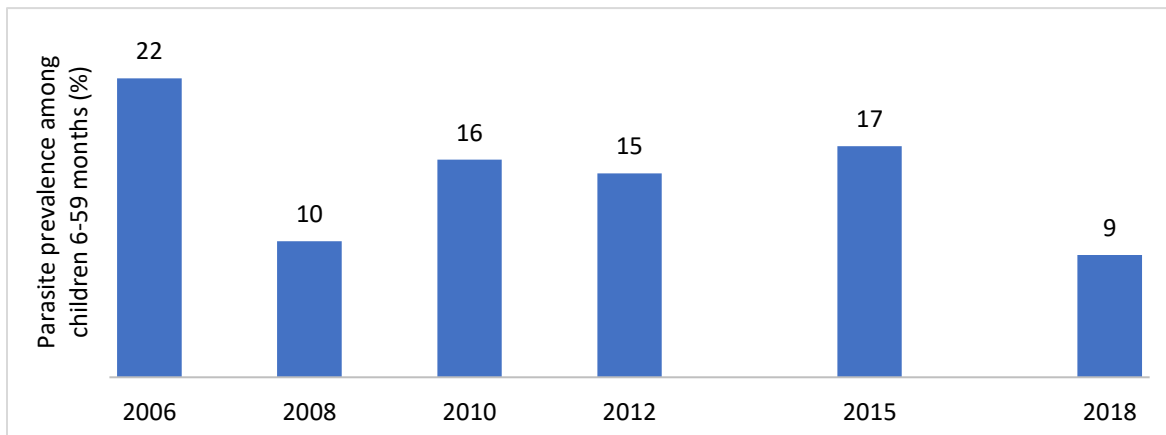
In 2018, there were nearly 5.2 million OPD visits with the diagnosis of malaria (2nd most common after respiratory diseases) which was 23% of the total new OPD visits. In 2016 and 2017, malaria was more commonly diagnosed with 30% and 28% of all OPD diagnoses respectively. The proportion of outpatient visits diagnosed as malaria is often taken as an indicator of population incidence changes, but because the major changes in reporting practices (the shift from predominance of clinical diagnosis to confirmed cases only) the trend can be deceptive and is not presented here. No reliable data on malaria mortality in health facilities or from the death registration were available. The vital registration data on cause of death collected by the Ministry of Home Affairs had surprisingly low malaria mortality rates, which may be a data quality issue.

Coverage of interventions

Insecticide-treated nets (ITNs) are a critical preventive intervention for malaria control. The trends, based on MIS and ZDHS, shows a continuing gradual increase in household ownership during HSDP to 80% in the MIS 2018 (Figure 5.3). The ZDHS 2018 reported a lower figure of 72%, but still up from the 68% in the previous ZDHS in 2013/14. The MIS 2018 was conducted in April-May and the ZDHS during July-December. The percent of children under 5 sleeping under a LLITN increased from 56% to 69% (64% in ZDHS 2018) from 2015 to 2018, a major increase. Pregnant women followed the same track as children under-5 years.

Figure 5.3: Trends in ITN use among children under five years and pregnant women, national surveys, Zambia
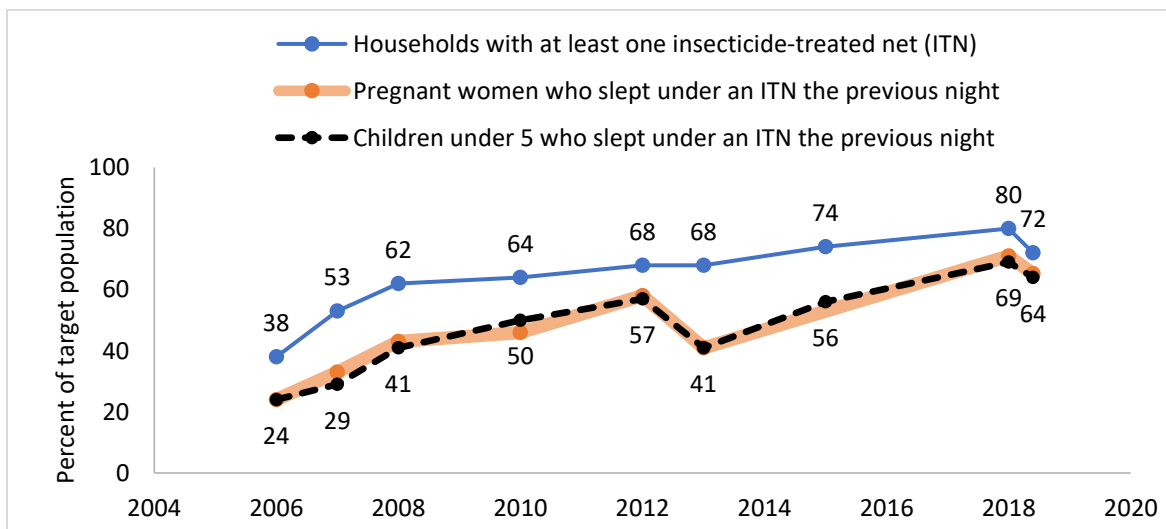
Intermittent preventive therapy (IPT) aims for three doses of sulphadoxine-pyrimethamine (SP) during pregnancy. The household surveys indicated that there was a gradual increase in IPT2 to 81% in 2018 (Figure 5.4). IPT also increased to 65% according to the ZMIS 2018 (57% in ZDHS 2018). The coverage estimates based on the HMIS (using first ANC visit as the denominator, with an adjustment for the proportion of women not attending ANC) were slightly lower than those obtained with the surveys. In addition, the trend in the HMIS data is different from 2016 showing a decline for IPT2 and a flattening for IPT3 coverage. Underreporting of IPT or overreporting of ANC in the HMIS is a likely cause.

Figure 5.4: Coverage of intermittent preventive therapy (two or three doses of SP) among pregnant women, national surveys 2006–2017 and HMIS data 20013-2018
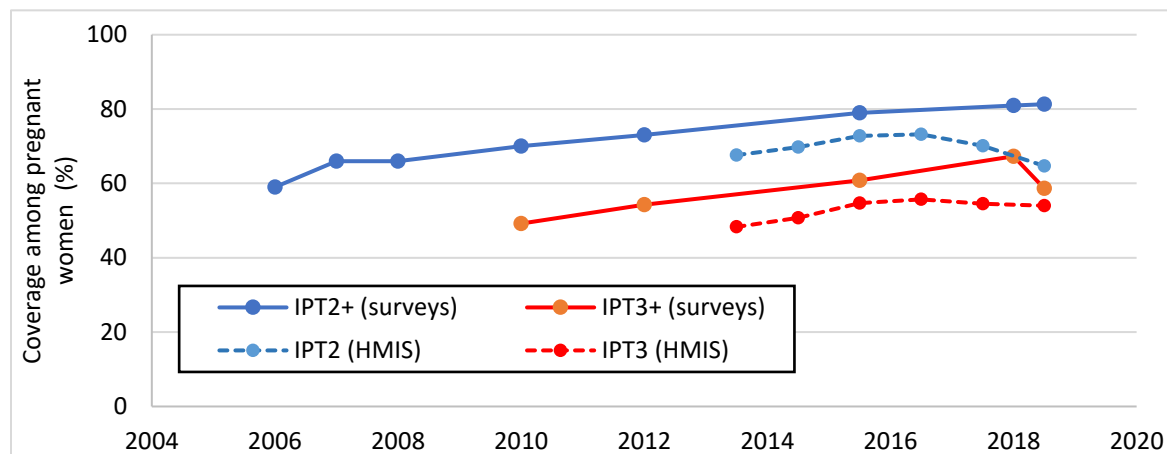
The surveys provide data on the coverage of households with IRS. The ZMIS showed a recent increase of IRS coverage to 35% in 2018, from 28% at the start of NHSP (Figure 5.5). This however is still far from the HSDP target of 57%. Nearly universal coverage has now been achieved for the use of ACT for the treatment of children under 5 with fever, according to both ZMIS and ZDHS 2018 (96% and 97% respectively), up from 92% in 2015. Also, there was a major improvement in diagnostic practices in children under 5 years. In 2018, 55% (ZMIS) and 63% (ZDHS) had blood taken from a finger or heel to test for malaria, compared to 36% in 2015.

Figure 5.5: Indoor residual spraying in the previous 12 months (households), and treatment and diagnostic practices for children with fever, national surveys
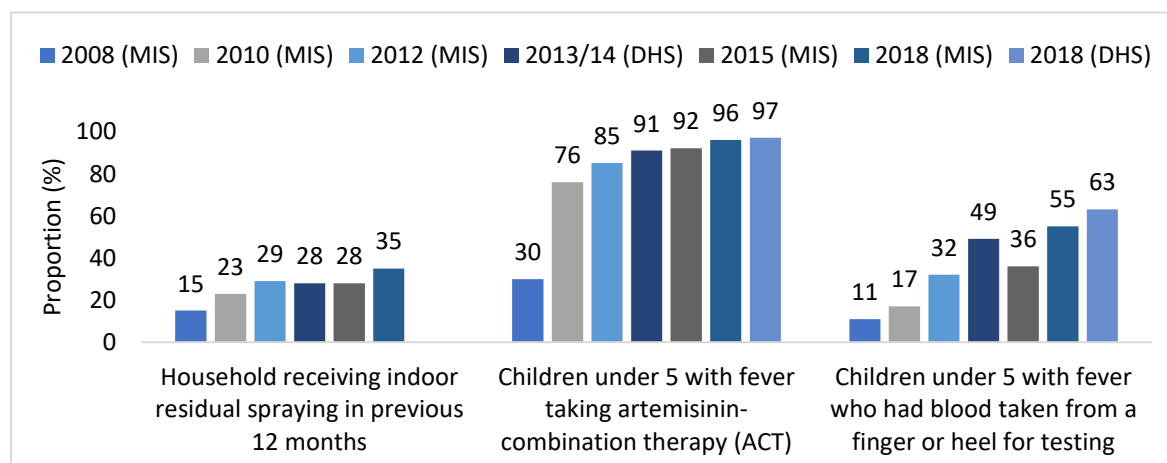
Malaria by province

There is major variation in the epidemiology of malaria within Zambia (Figure 5.6). In 2018, Luapula had by far the highest prevalence among children under 5 years (30%) followed by Muchinga (23%). After northern Zambia, the

provinces in western Zambia (North Western and Western) had the second highest prevalence. Very low prevalence was observed in Southern, Lusaka and Central provinces. All provinces experienced a decline in parasite prevalence among children between ZMIS 2015 and ZMIS 2018, most prominently in Central province from 14% to 2%. The smaller change was observed in Luapula.

Figure 5.6: Malaria parasite prevalence among children under 5 by province, Zambia MIS 2018
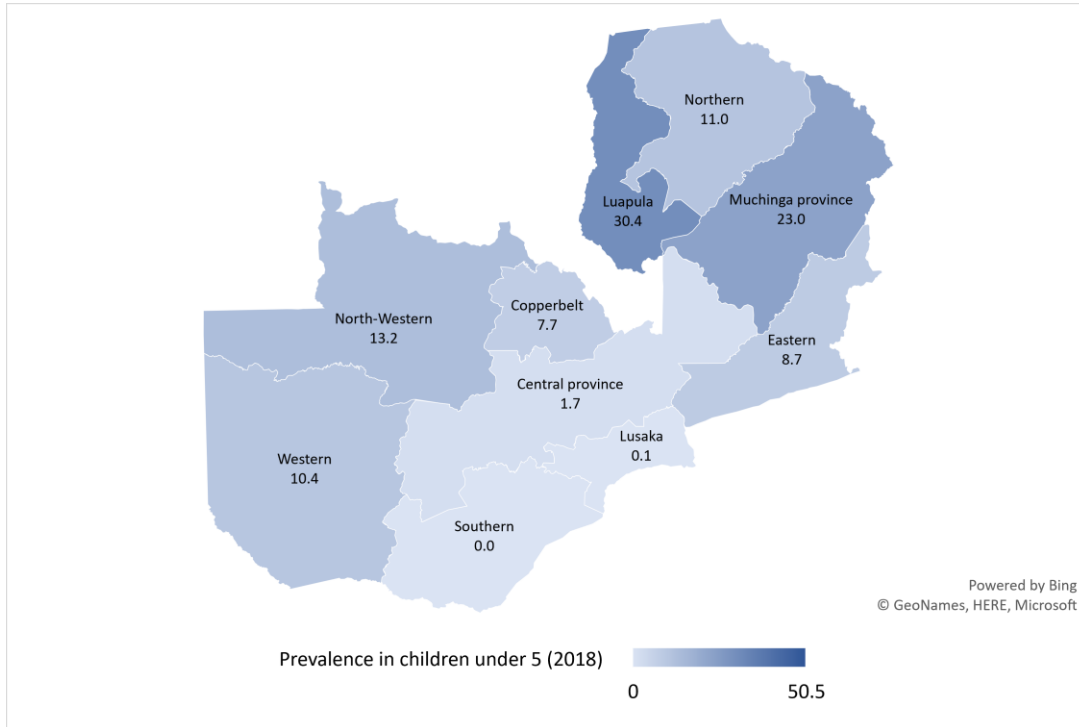
Between 2008 and 2018, the malaria parasite prevalence among children under 5 was consistently higher among those living rurally, but the prevalence decreased in 2018 compared to 2015 from 23% to 14% in rural areas and from 6% to 1% in urban areas (Figure 5.7).

Figure 5.7: Malaria parasite prevalence by urban and rural residence, Zambia MIS 2008-2018

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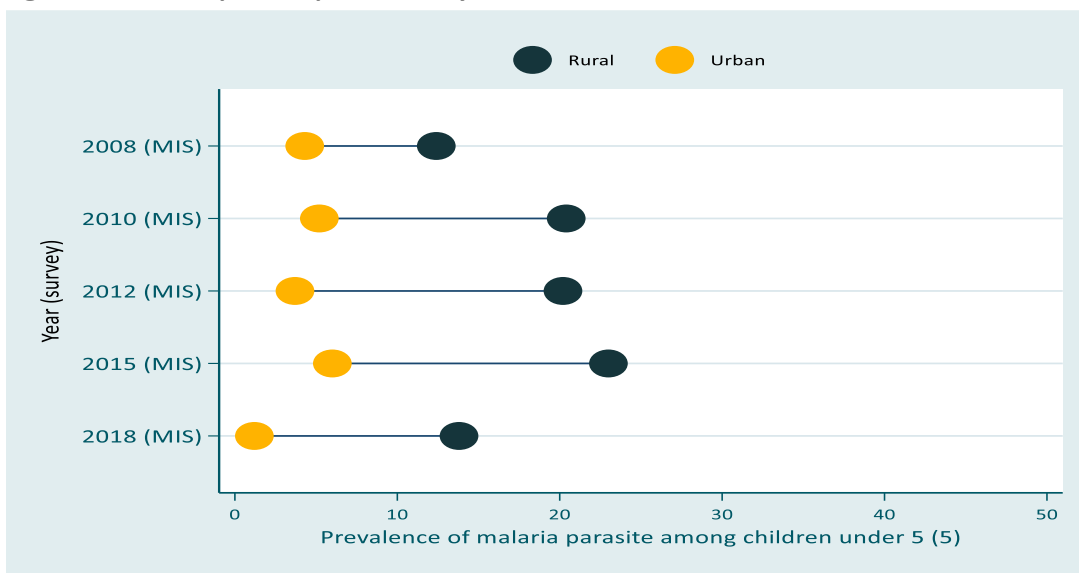
Coverage of key prevention interventions (ITN, IRS and IPT3+) increased in nearly all provinces between 2015 and 2018 according to ZMIS (Figure 5.8). The increases were greatest in provinces with a high prevalence of malaria parasite during this period, including Luapula, Muchinga, North Western, Northern, Western provinces. There was also an increase in those with low prevalence, including the Southern and Lusaka provinces. The Eastern and Central provinces did not see a noticeable increase in coverage, and in Copperbelt province there was a decline in coverage.

Figure 5.8: Coverage of ITN/IRS/IPT3+ interventions by province prevalence level, Zambia, ZMIS 2015 and 2018
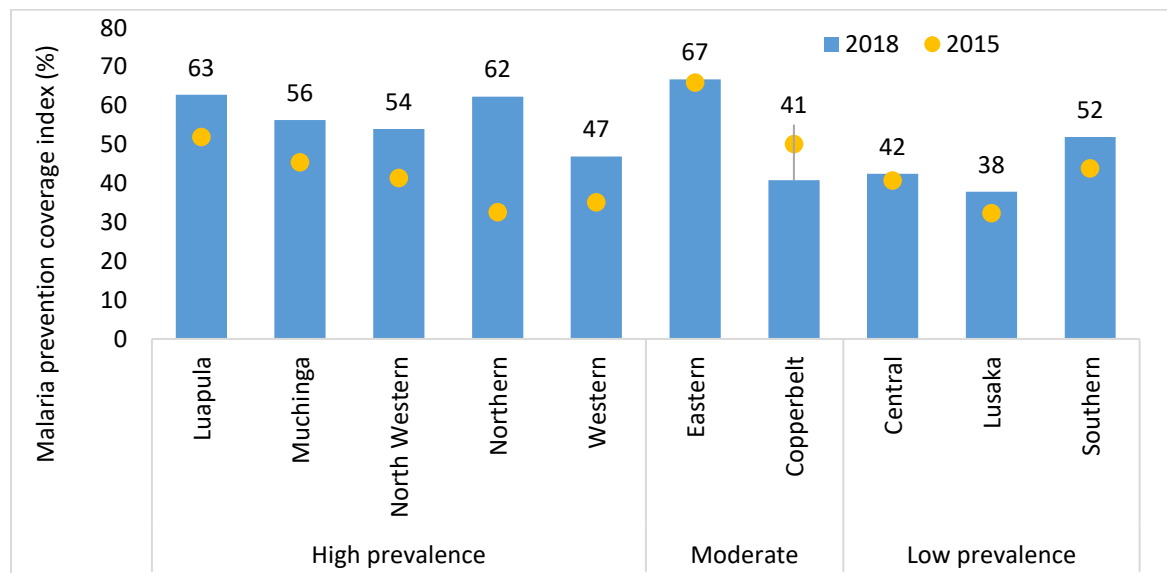
There were some socio-economic differences in coverage of malaria prevention interventions, as shown in Figure 5.9. For ITN and IRS, a higher proportion of those in poorer groups received the intervention, in line with higher prevalence among those groups. The proportion of women receiving IPT 3+ was lower but increasing for poorer compared to richer groups.

Figure 5.9: Equity in coverage of IPT3+ by wealth quintile, Zambia national surveys, 2008-2018
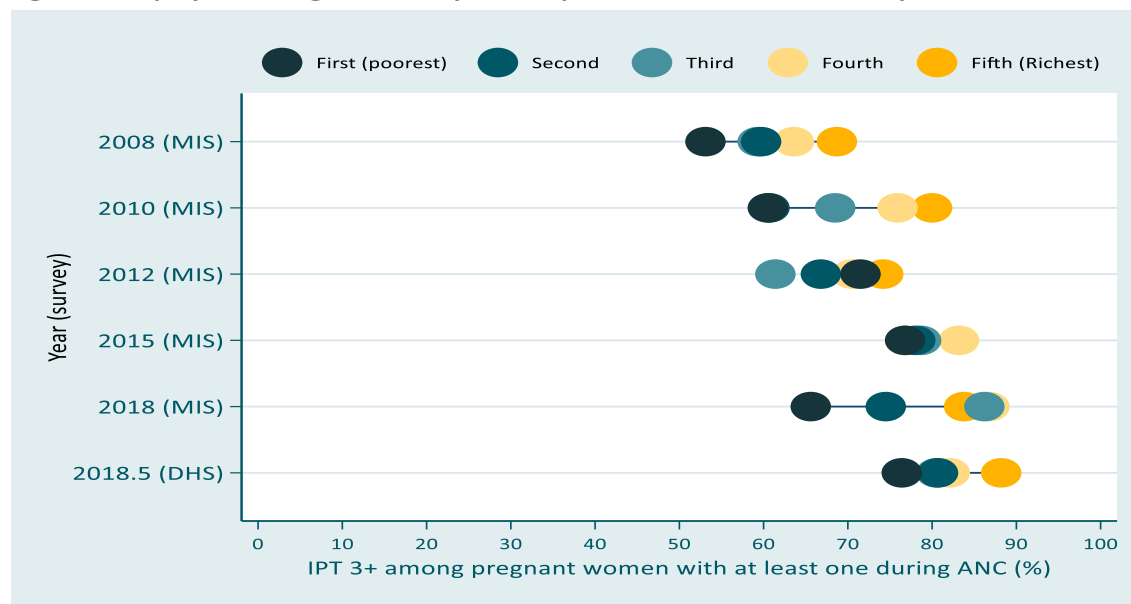
5.2   HIV/AIDS

Main points

- There has been a long-term trend towards reduction in HIV/AIDS mortality (-37% since 2010) and to a lesser extent HIV incidence (-13% since 2010) but HIV incidence is still significant with nearly 50,000 new infections every year and 1.2 million living with HIV in 2018.
- Coverage of ART has increased to 78% in 2018, due to more widespread HIV testing since 2017 and more rapid initiation of treatment. However, effective coverage, viral load suppression among all people living with HIV, was still 59% in 2018.
- PMTCT is universal and almost 9,000 new infections are averted every year.
- The indicators on sexual behavior related to the prevention of HIV and STI showed little progress (except male circumcision).

NHSP targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
HIV/AIDS				
HIV deaths per 100,000 population	126 (HMIS, 2016)	110	N/A	
HIV incidence per 1,000 population	6.1 (2016, ZAMPHIA)	0.5	N/A	Only UNAIDS/Spectrum predicted estimates available.
HIV prevalence among 15-59 years (%)	12.0 (2016, ZAMPHIA)	10.0	11.1 (ZDHS 2018, 15-49 years)	15-59 is slightly higher than 15-49; no decline.
ART coverage among eligible persons living with HIV infection (M/F) (%)	85.1 86.2 (M) 84.4 (F) (ZAMPHIA 2016)	87.1 87.7 (M) 86.6 (F)	92 (HMIS Q2 2019) 84 (COP Q3 2018)	Indicator refers to those who have been diagnosed, not coverage; progress according to HMIS.
Viral load suppression among PLHIV (%)	89.2 87.7 (M) 90.1 (F)	89.5 88.6 (M) 90.1 (F)	86.3 (HMIS Oct18-Sep19); 88 (COP Q3 2018)	Only data for both sexes, just short of target and baseline.
ART retention at 12 months (%)	75 (HMIS 2015)	78	N/A	No data.
HIV-positive women receiving ART for PMTCT (%)	65 (NACP, 2012)	90, by 2017 (NACP)	>90 (UNAIDS) 88.5 HMIS 2018	
PMTCT: children testing positive within 18 months (%)	5.0 (HMIS 2016)	3.4	3.8 (HMIS 2018)	Good progress but short of target.
Awareness of HIV positive status among 15-59 years (%)	71 69 (M) 73 (F) (ZAMPHIA 2016)	75.7 73.4 (M) 77.0 (F)	90 (HMIS, Q2 2019)	Baseline corrected with ZAMPHIA data. Target achieved by 2019.
Condom use at last sex among those with 2+ partners in last year (%)	27.4 (M, 15-59) 29.7 (F, 15-49) (ZDHS 2013/14)	50 (M) 50 (F)	26.5 (M) 38.2 (F) (ZDHS 2018)	No progress for men, not sufficient for women to reach target.
Knowledge of HIV among 15-19 years (%)	39.5 (ZDHS 2013/14)	60	42 (ZHDS 2018)	Knowledge of four prevention methods.

Data sources: The most recent AIDS impact survey was conducted in 2016 (ZAMPHIA 2016), which provides a wealth of information of the HIV epidemic and the response. The ZDHS 2018 provides more recent data on HIV prevalence and several other indicators. The PMTCT and ART data are derived from the HMIS. The comparison of the time trends based on the different sources needs to be done with caution.

Indicators: The NHSP M&E plan includes a range of HIV indicators related to the epidemiology of HIV, treatment coverage and success for ART and PMTCT. There are no prevention indicators, except knowledge among adolescents. The NHSP list of indicators includes a few additional indicators such as percent of clients newly started on ART, percent of pregnant women testing positive at first ANC visit, percent of HIV positive pregnant women started on ART, and number of medical male circumcisions conducted.

HIV mortality, prevalence and incidence

Trends in HIV mortality cannot be monitored directly as there is no comprehensive system of death registration with reliable cause of death. The estimated number of deaths due to HIV in 2018 was 17,000 (uncertainty range 13,000-22,000) compared to 18,000 in 2015 and 16,000 in 2017, based on UNAIDS modeling with Spectrum.[6] The number of people living with HIV in Zambia was estimated at 1.2 million (uncertainty range 1.1-1.4 million), including 48,000 children, for 2018.

HIV prevalence trends can be assessed with three surveys in the last 5 years: ZDHS 2013/14 and 2018 and ZAMPHIA 2016. In general, there is no or a very limited decline in HIV prevalence among adults 15-49 years (Figure 5.10). Urban prevalence for both sexes appears to have increased while rural prevalence declined, with little net effect on the overall prevalence. The urban rural ratio was 2.2 in 2018, up from 1.7 in 2016, but about the same as in 2013/4 (2.0) (Table 5.1).

The NHSP indicator refers to 15-59 years. The prevalence of this age group was available for men only in ZDHS (8.3%) 2018, compared to 7.5 for men aged 15-49. In ZAMPHIA 2016, the prevalence was 12.0% among men and women aged 15-59, compared to 11.4% at ages 15-49 years. The 2018 prevalence for those aged 15-59 is therefore expected to be slightly higher than 15-49 years (11.1%) and therefore has not achieved the target of 10% by 2018.

Figure 5.10: HIV prevalence 15-49 years, both sexes, urban rural, Zambia national surveys

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[6] "Zambia." UNAIDS. 2019: https://www.unaids.org/en/regionscountries/countries/zambia.
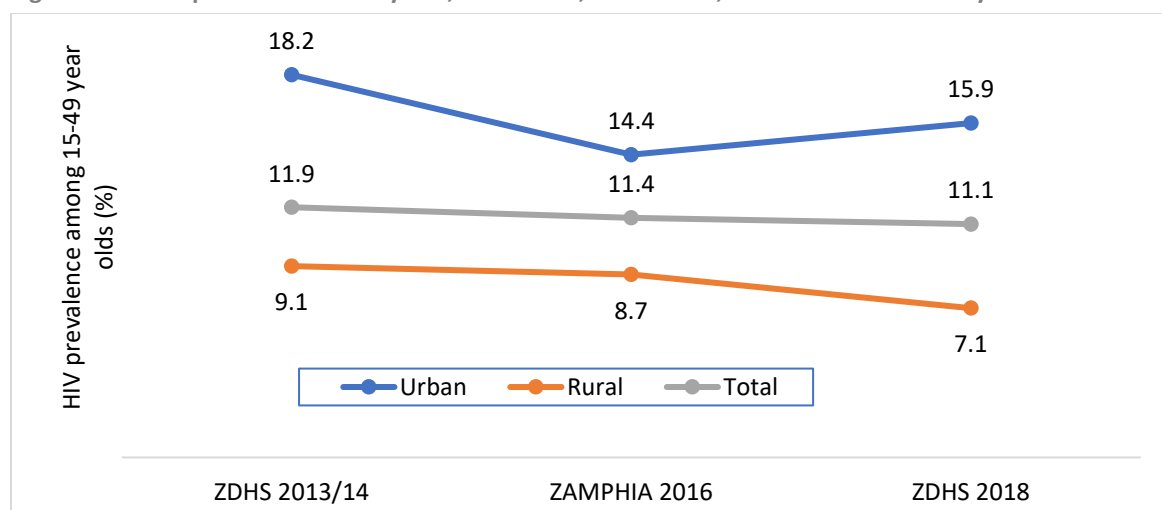
Women still have much higher HIV prevalence than men, peaking at earlier ages and showing no decline, while the male prevalence has declined since 2013/14. The female to male HIV prevalence ratio increased from 1.3 in 2013/14 to 1.7 in 2016 to 1.9 in 2018. The age patterns however are changing, with an increasing prevalence with increasing age, and no longer a peak at ages 25-34 years for women, and 35-44 years for men. ART is presumably the main cause of this change.

Table 5.1: HIV prevalence among males and females aged 15-49 years, Zambia, national surveys

	ZDHS 2013/14	ZAMPHIA 2016	ZDHS 2018
Male	11.3	8.3	7.5
Female	15.1	14.3	14.2
Female: male ratio	1.3	1.7	1.9

The provincial picture of HIV prevalence is very consistent over time with little change in the rankings (Figure 5.11). By 2018, HIV prevalence for those aged 15-49 years of both sexes was about 15% in the two most urbanized provinces – Lusaka and Copperbelt – and about 5% in the three most northern provinces of Muchinga, Northern and North-Western. Changes between 2016 and 2018 were modest in all provinces except Northern and Western provinces were major declines were observed. It has to be kept in mind that sampling errors are quite large at the provincial level.

Figure 5.11: HIV prevalence among both men and women aged 15-49 years by province, national surveys
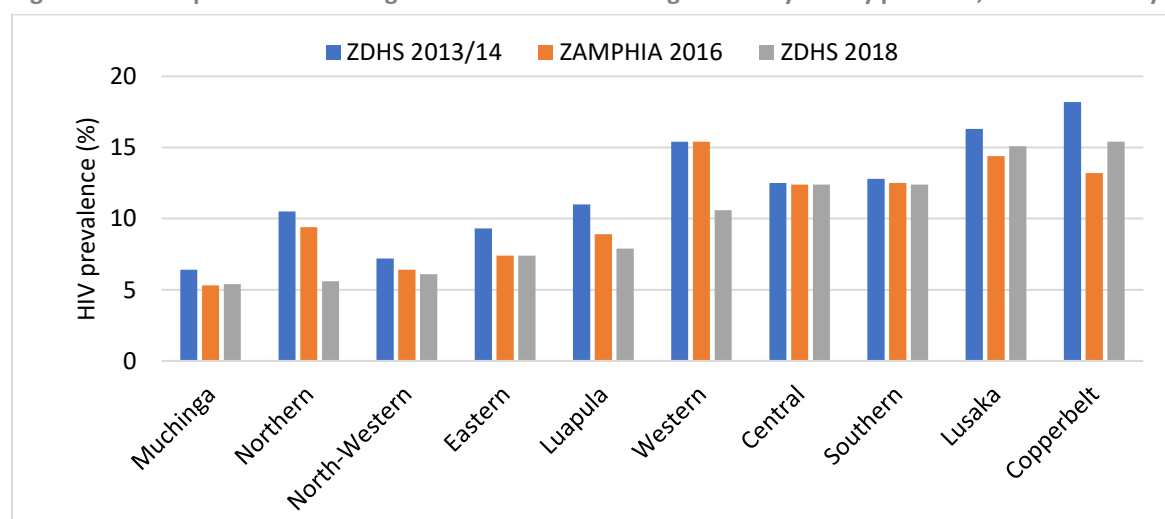
The ZAMPHIA 2016 estimated HIV incidence rates, using an algorithm based on LAg Avidity assay, viral load and ART. At ages 15-59 years HIV incidence was 0.61% (0.41-0.81%), with much higher rates among women than men (0.93% and 0.29% respectively). Under age 25 years there were hardly any new male infections (0.08%) compared to 1.08% for females. The UNAIDS/Spectrum estimates for 2018 are about 48,000 new infections, including 5,400 children. No incidence data are available from the ZDHS 2018 to ascertain the trend.

As discussed earlier, the ZDHS 2018 showed an HIV prevalence of 1.9% among those aged 15-19, which reduced from 4.4% in 2013/14 ZDHS and 2.5% in 2016 ZAMPHIA surveys. Given that reported adolescent HIV infections may be recently acquired, this suggests HIV incidence may have also reduced, especially since there are more adolescents with HIV acquired through vertical transmission surviving into adolescence because of ART.

Antiretroviral (ARV) therapy coverage

The treatment targets in Zambia are in line with the global 90-90-90 targets: 90% of people living with HIV knowing their status, 90% on ART and 90% with viral load suppression. The ZAMPHIA 2016 provided population-level data on the situation for women and men 15-59 years living with HIV: 71%, 87% and 89% for the three targets.

The National AIDS Control programme provided estimates of coverage for the second quarter of 2019, using Spectrum estimates of number of people living with HIV as a denominator. Among adults 15+ years 90% knew their status, 92% was on ART (1,028,016 persons) and 61.4% was virally suppressed. Data from COP for the third quarter of 2018, also obtained from the national programme, were 100%, 84% and 86% respectively.

The percent of adults 15-59 years who had been diagnosed as HIV positive increased dramatically from 71% in the 2016 ZAMPHIA to 90% according to the HMIS numbers. As the data sources are different, the time trend has to be interpreted with caution. There is however supporting evidence from the number of HIV tests conducted which increased from 2.1 million in 2015 and 2.4 million in 2016 to 4.6 million in 2017. This is likely due to better access from 2017, when HIV testing became part of routine care with health providers encouraged to initiate testing and also conduct campaigns. HIV testing is now offered in most if not all service points in a health facility. Other targeted approaches such as Index and Self testing may also have contributed to increased coverage of HIV Testing services.

The ZDHS 2018 also documented a major increase in HIV testing for both men and women (Figure 5.12). The proportion of men and women HIV tested and receiving results in the last 12 months increased with 17 percentage points for men and 21 percentage points for women between 2016 and 2018.

Figure 5.12: HIV tested in the last 12 months preceding the survey, men and women aged 15-49, Zambia, national surveys
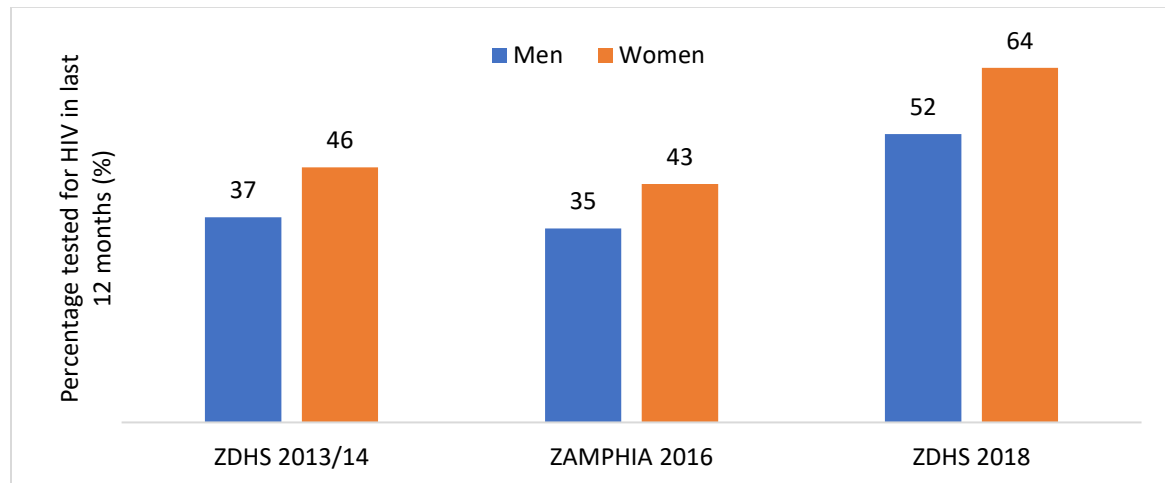
Treatment coverage (ART among people living with HIV) is high and increased from 62% to 83% among people 15-59 years according to the HMIS data for Quarter 2 2019 (Figure 5.13). The 83% coverage is derived from 90% of persons living with HIV diagnosed with HIV, and 92% ART initiation among those diagnosed. The COP data for 2018 (Q3) reported slightly lower treatment initiation rates (84%). At this level of ART coverage, Zambia is still on track to reach the 90-90-90 targets. The number of people initiating treatment increased dramatically during NHSP due to the test and start policy. In 2015 and 2016 about 100,000 persons-initiated treatment. In 2017 this increased to 173,000 and in 2018 to 226,000.

Viral load suppression was 86.3% in the period October 2018-September 2019, and just slightly lower than in the ZAMPHIA 2016 (89%) (Figure). The COP figures for Q3 2018 were similar: 88% among persons 15+ years who are on ART were virally suppressed. The HMIS data were based on testing of 709,061 persons on treatment. This means that about 300,000 persons were not tested. If the non-tested persons on treatment are less likely to have viral load suppression, then the 86.3% is an overestimate (but national viral load suppression would still be higher than 70%). Viral load suppression was high in all provinces, ranging from 81% in Western province to 90% in Eastern province.

If the HMIS results are correct, effective coverage of ART (defined as viral load suppression among people living with HIV) is only 72%, just one percent short of the 90-90-90 associated target of 73% effective coverage (Figure 5.13). The UNAIDS / Spectrum estimates for 2018 were lower: 87% awareness, 78% ART coverage and 59% effective coverage.

Figure 5.13: Proportion of people living with HIV who are aware of their status (diagnosed), on ART, and with viral load suppression, ZAMPHIA 2016, HMIS Q2 2019 and UNAIDS Global targets
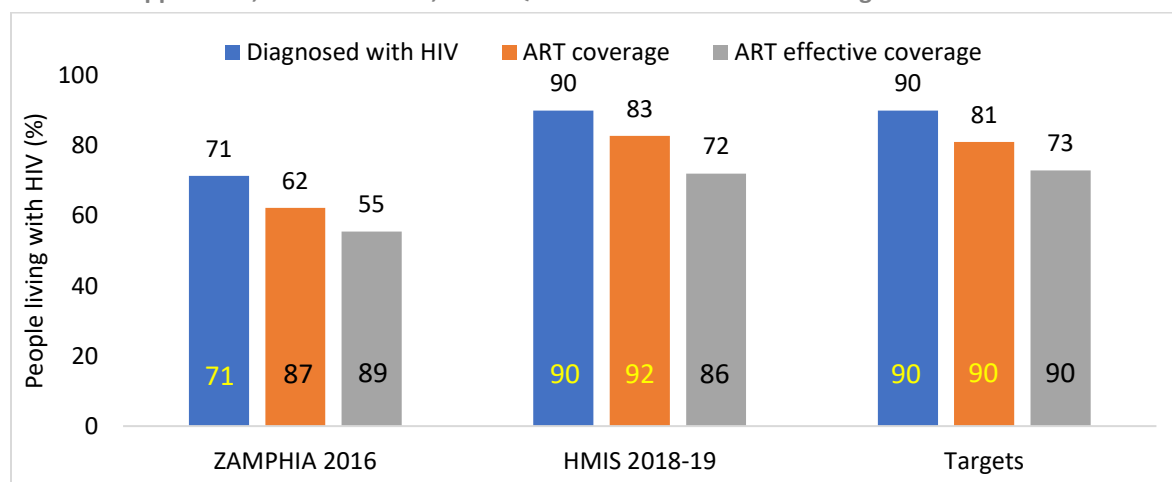
ART retention is a critical indicator of the quality of the programme. No data were available to assess the trend in ART retention and impact of treatment on health, wellbeing and survival.

Prevention of mother-to-child transmission

PMTCT is universally accessible in Zambia, and ART coverage is estimated to be over 95% in 2018 according to the 2018 UNAIDS statistical summary. According to HMIS 88.5% of pregnant women newly diagnosed with HIV received ART in 2018.

HMIS data indicate that early infant diagnosis of HIV seropositivity was done for 71% of exposed babies. The percent of newborns who were HIV positive was 3.8% at 18 months of age, which falls just short of the NHSP target. An estimated 8,800 new infections are averted by ART.

Male circumcision

The voluntary medical male circumcision programme reports increasing numbers over time and achieved it midterm NHSP target of 392,000. In 2015 and 2016, there were 225,000 and 312,000 male circumcisions, respectively. In 2017 and 2018, there were 485,000 and 431,000 respectively. Six of the nine provinces are on track to achieve their province specific 2020 targets (not on track Lusaka, Muchinga, Northern and Central).

Knowledge and condom use at higher risk sex

Knowledge of four HIV prevention methods – saying that HIV can be prevented by using condoms and limiting sexual intercourse to one uninfected partner, knowing that a healthy person can have HIV and rejecting the two most common local misconceptions about HIV - was 40.5%% among girls 15-19 and 38.6% among boys in the ZHDS 2018. For adolescents this meant no progress as the baseline of the NHSP target was 39.5%.

Condom use at last sex among women with two or more partners was higher in the ZDHS 2018 than in the preceding survey 2013/14, but the achievement of 38% fell short of the 50% target. For men 15-59, the same indicator showed no change. Another indicator used in 2018 but not in ZDHS 2013/14 is condom use with the last higher risk partner (nonmarried non-cohabiting partner): 35% for women and 53% for men, but it has to be kept in mind that the numbers are small as few women report such partners.

5.3 Tuberculosis

Main points
- Most TB indicators progressed during NHSP, including declining TB incidence and notification rates, high TB treatment success rates (90%), increasing treatment success rates among MDR-TB patients and nearly all TB/HIV patients on ART.
- Yet, effective coverage of TB treatment remained low (52%) as TB case detection / treatment initiation rates did not increase and were still below 60%.

NHSP targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Tuberculosis				
TB incidence rate / TB cases per 100,000	391 (2015 WHO)	335	346 (WHO 2018)	Incidence rates estimated by WHO.
TB death rate per 100,000 population	115 (2015 WHO)	115	102 (2018 WHO)	Death rates estimated by WHO.
TB notification rate (per 100,000 population)	231 (2015 TB prevalence survey)	N/A	202 (TB prevalence survey 2018)	Substantial decline.
TB treatment coverage / case detection per 100 incidence cases	59.3 (2015 WHO)	N/A	58.5 (2018 WHO)	No progress, major impact on effective coverage.
TB treatment cure rate (success rate) (%)	84 (HMIS, 2015)	86	90 (2018 HMIS)	Target surpassed in 2018, but effective coverage not progressing.
Multi-drug resistance: successfully treated cases (%)	30 (2015 HMIS)	65	71 (2016 cases)	Target surpassed.
TB/HIV patients on ART (%)	76 (2015 HMIS)	77	91 (2018 HMIS)	Target surpassed.

Data sources: The national programme has a standardized reporting system of cases and treatment outcomes which forms the basis for the statistics. The first national tuberculosis prevalence survey in 2014, however, showed that incidence rates were much higher than previously estimated, which led to major adjustments in the case detection rate. WHO estimates are also used to obtain incidence rates.

Indicators: The indicators in NHSP and/or in the monitoring plan are summarized in the table above. Most indicators and targets are derived from the TB national plan 2017-2021. Another indicator referred to the number of TB notified cases with a baseline of 36,700 in 2016 (HMIS) and targets of 45,600 in 2018 (and 59,000 for 2021). The analysis focused on the TB notification rate per 100,000 population rather than the absolute numbers.

TB mortality and incidence

TB mortality was estimated by WHO based on notification and treatment rates for 2018. There were an estimated about 18,000 TB deaths, including 13,000 TB deaths among HIV positive persons. This is 74% of all TB deaths. These figures correspond to a TB mortality rate of 102 per 100,000 population, and 28 per 100,000 (95% uncertainty range 16-42) among the HIV negatives. There was only a small decline of this mortality rate since 2015 when TB mortality was estimated at 115, but this met the 2018 target of 115.

TB incidence was also estimated by WHO, using TB notification rates and other data as key inputs (Figure 5.14). Zambia has experienced a major long-term decline which continued into NHSP 2017-2021. By 2018, incidence was estimated at 60,000 new TB cases (uncertainty range 39,000-86,000) or 346 per 100,000 population. This was down from 391 in 2015.

Figure 5.14: Tuberculosis incidence per 100,000 population (with uncertainty range), Zambia, WHO 2000–2018
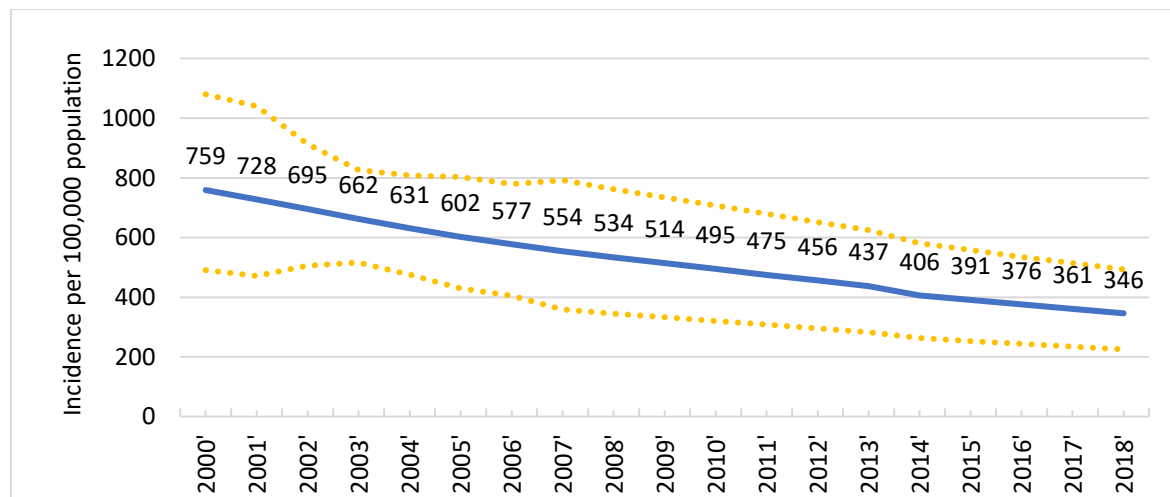
In 2018, there were 35,071 new and relapse TB case notifications (35,922 all cases), corresponding with a TB notification rate of 213 per 100,000 population. This represents a decline since 2015 when the rate was 269 per 100,000 population (Figure 5.15).

The 2013-2014 TB prevalence survey, however, showed that TB notifications fell short of all new cases which were estimated at 60,000 for 2018. Figure 5.16 is a scatter plot of the TB notification rates (all forms) and the TB prevalence rate from the 2014 survey by province (provided by the TB programme). The two are expected to be highly correlated which is the case for all provinces except Copperbelt and Northern provinces. In the latter two provinces the TB prevalence rates in the survey suggest that one would expect a much higher TB notification rate. This may be related to lower case detection rates in those provinces.

Figure 5.15: Annual TB notification (new and relapse) notifications per 100,000 population, Zambia, 2015-2018
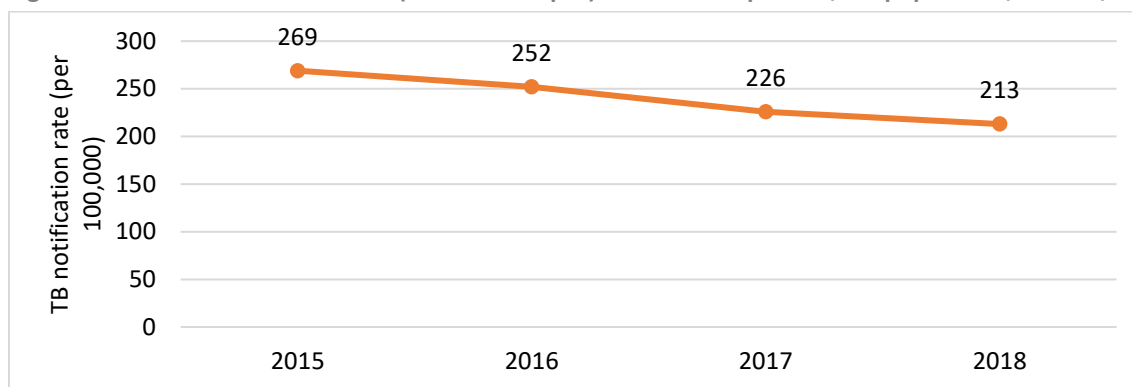
The case detection rate or treatment coverage is the notified cases divided by the estimated incident cases. There was no progress in the treatment coverage rate which remained just under 60% (Figure 5.16).

Figure 5.16: TB notification rate (from HMIS) by bacteriologically confirmed TB prevalence (from the 2014 TB prevalence survey) by province
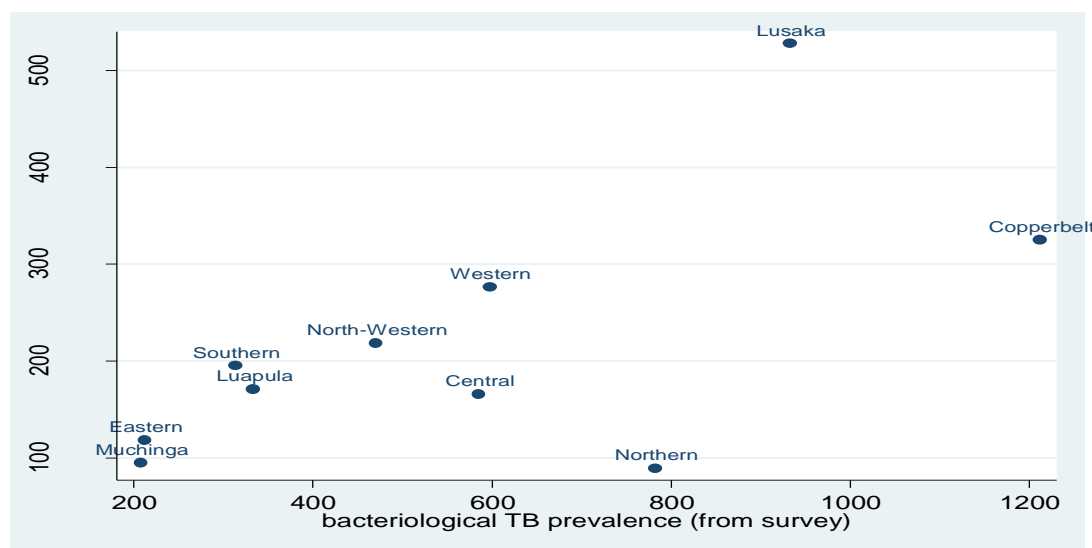
The national TB control programme monitors multiple indicators related to HIV. The majority of TB patients who were tested were found to have HIV: 58% in 2018 and 59% in 2017. Almost all HIV positive TB patients were put on ART in 2018: 91%. The NHSP target for 2018 was met.

Intervention coverage and quality

The case detection rate is computed from the notified cases divided by estimated incident cases. The national 2014 TB prevalence survey resulted in an upward adjustment of the estimated incidence cases and a lowering of the case detection rate to 37% for 2015, but with very large uncertainty (22–78%). Especially, among older people (45 years and over) case detection rates were low. The case detection rate for 2018 was estimated at 50%, well off the 2020 target of 72%.

The treatment success rate in Zambia is high. In 2018, 90% of all new and relapse cases from 2017 completed the treatment successfully, up from 88% in the preceding year and 86% at the baseline of NHSP. The 2018 target was met. The effective coverage, defined as detection and successful treatment, was however still low: 52% in 2018, with little progress over time (Figure 5.17).

Zambia is considered a low multi drug-resistant TB (MDR-TB or Rifampicin resistant) country (1.1% of new cases). The number of cases is on the rise. In 2018, 627 cases of MDR-TB were diagnosed (and 1 case of XDR-TB) of which 506 were put on second-line treatment (81%). The treatment success rate among MDR-TB cases put on treatment in 2016 was 71%.

Figure 5.17: Tuberculosis treatment coverage (case detection) per 100 incident cases, TB treatment success rate (%) and effective coverage of TB treatment (%), WHO, 2015–2018
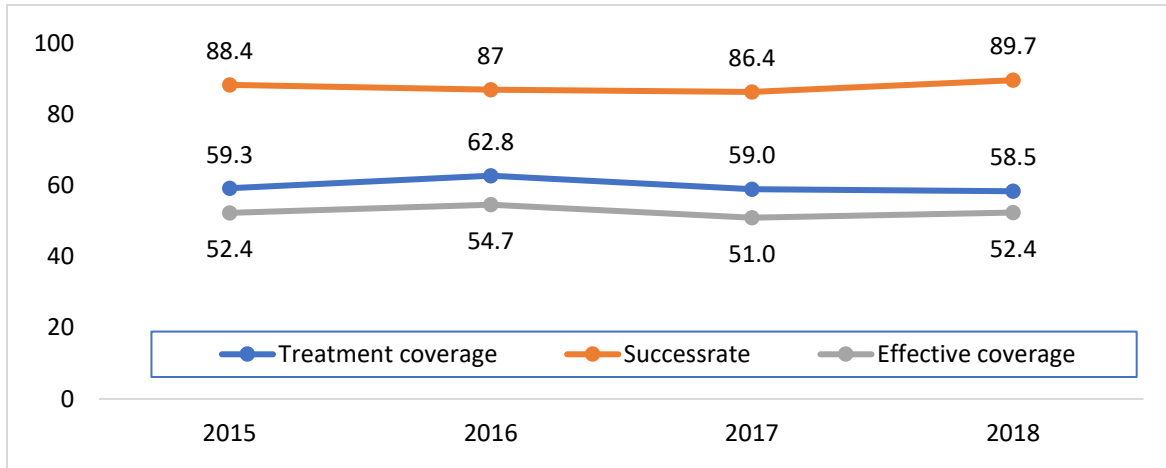
Provincial patterns in TB notification

There is marked variability in TB notification rates by province (Figure 5.18). Lusaka province has by far the highest notification rate, followed at a distance by the Copperbelt province. At the lower end, Northern, Eastern and Muchinga provinces have TB notification rates that are less than a quarter of that of Lusaka province. In almost all provinces the notification rates decline during 2015-18 with exception of Northwestern and Luapula provinces.

Figure 5.18: Tuberculosis case notification rates per 100,000 by province, 2015–2018
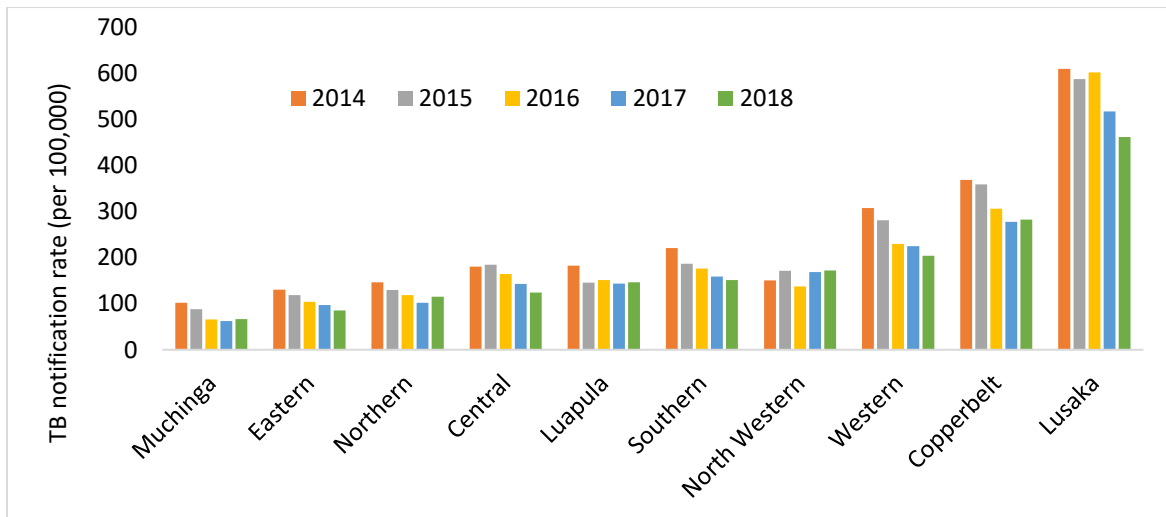
Tuberculosis treatment success rates

The TB success rates were computed by dividing the sum of the patients who completed TB treatment and patients who were cured divided by the total number of TB patients evaluated. Both annual and provincial TB success rates were computed for the years 2015-2018. There was a decline in the annual treatment success rates from 88% in 2015 to 86% in 2017 but in 2018 the rate went up to 90% (Figure 5.19).

Figure 5.19: Annual treatment success rates from 2015 to 2018
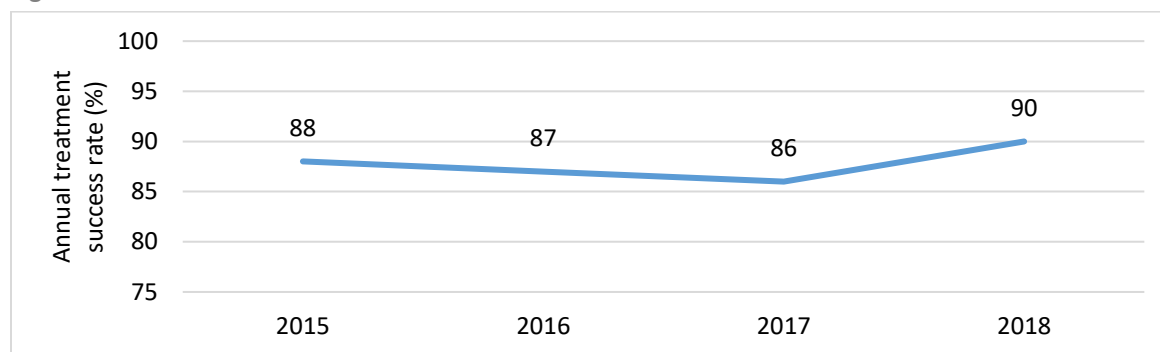
Provincial TB treatment success rates between 2015 to 2018 ranged from 74% to 95%. Luapula Province has the lowest treatment success rate average of 79.5. Lusaka Province had the highest average of 92% between 2015 and 2018 (Figure 5.20).

Figure 5.20: Treatment success rates for all ten provinces from 2015 to 2018

	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	North Western	Southern	Western
2015	87.00	88.00	86.00	74.00	91.00	90.00	91.00	84.00	91.00	88.00
2016	84.00	85.00	86.00	81.00	91.00	83.00	89.00	82.00	88.00	85.00
2017	83.00	83.00	79.00	75.00	91.00	82.00	90.00	84.00	87.00	83.00
2018	86.00	86.00	80.00	88.00	95.00	82.00	82.00	89.00	86.00	87.00
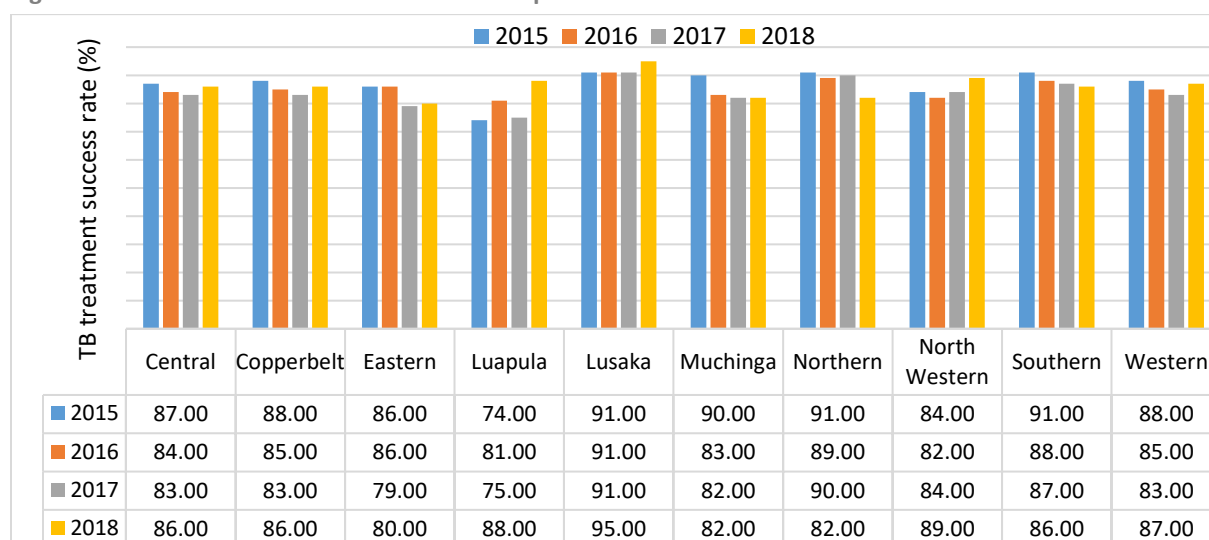
Annual notification rates have been declining from 269/100,000 in 2015 to 213/100,000 in 2018. The notification rates have been lowest in Muchinga Province with an average of 70.5/100,000 notifications. The highest average notification rate was recorded in Lusaka Province of 536.5/100,000 per year.

5.4 Neglected tropical diseases

Main points
- Neglected tropical diseases (NTDs) are endemic in many of the 117 districts in Zambia: lymphatic filariasis (LF) is in 85 districts, soil-transmitted helminths (STH) in 103, schistosomiasis in 103 districts, and trachoma in 50 districts.
- Cases of human African trypanosomiasis rhodesiense have declined from over 700 cases in 2005 to 53 cases in 2016.
- Coverage of preventive chemotherapy for applicable NTDs varied greatly, being high for lymphatic filariasis and soil-transmitted helminths, but low for schistosomiasis.

Indicator	Baseline	Target 2018	Achievement	Comments
Neglected tropical diseases				
Coverage of preventive chemotherapy for applicable NTDs (%)	92.6 (2015)	95.2	Ranging from 18 to over 90 (NTD programme, 2018)	LF and STH doing well, trachoma moderate, but schistosomiasis coverage is low.

The NTD programme aims to eliminate NTDs in Zambia by 2020. Its strategies are scale up MDA campaigns for preventive chemotherapy for amenable NTDs, enhancement of surveillance of NTDs and improve management so that all cases are promptly treated and formulation of health (sanitation and hygiene) promotion programmes that are aimed at preventing and reducing NTDs. In addition, the programme aims to sustain the elimination status of leprosy in Zambia through enhanced surveillance and integrate the NTD Control activities into primary health care services.

Lymphatic filariasis (LF), schistosomiasis and soil-transmitted helminths (STH) are common in all districts in Zambia. The majority of districts have all three NTDs (Figure 5.21). Multiple drug administration (MDA) strategies are in place for all districts and specifics depend on the NTD epidemiology in each district.

LF is endemic to 85 districts of the 117 districts in Zambia. Four rounds of the five/six MDAs in all the ten provinces have been attained by 2018. The fifth round is expected by end of 2019 in all the 10 provinces and will be followed-up by a coverage survey. Sentinel and coverage surveys so far conducted after each of the four rounds has shown a positive trend.

Figure 5.21: Presence of lymphatic filariasis, schistosomiasis and soil-transmitted helminths and treatment approaches by district, NTD program
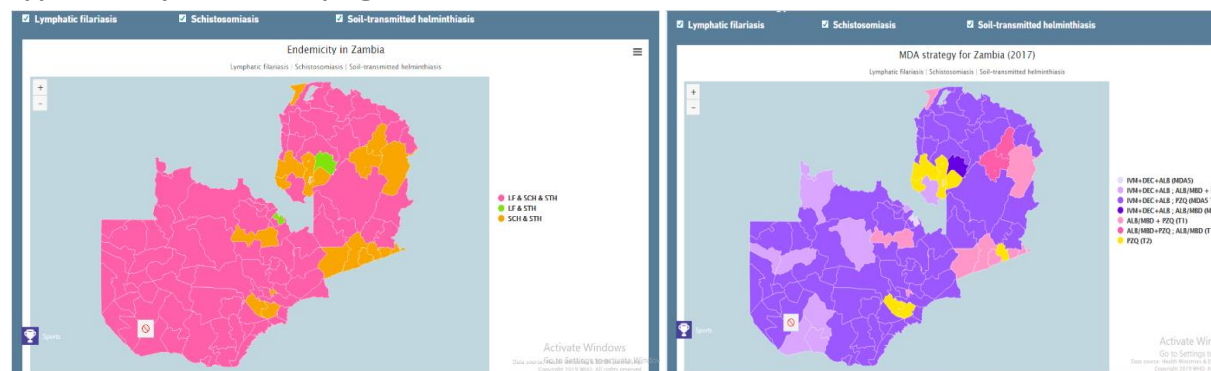
Schistosomiasis is endemic in 103 of the 117 districts in Zambia. Estimation of SCH MDA rounds so far conducted is difficult as there has been no time when SCH MDA implementation has been 100 % geographical coverage for any province. However, four provinces comprising of 43 districts may benefit from schistosomiasis MDAs by end of 2019. The impact and coverage surveys conducted in districts where schistosomiasis MDA has been implemented also show a positive trend.

Trachoma is endemic in 50 districts of 117 districts in Zambia. Trachoma campaigns have been conducted and confirmation of elimination is to be conducted in 26 districts (5 million people treated through MDA). Eleven districts were due for MDA in 2019 while 7 other districts are due in 2020. The provision of trachiaisis surgeries are yet to be done in 12 districts to reach National Trachoma elimination. Over 2000 sight saving surgeries have been conducted.

Figure 5.22 shows the coverage of preventive chemotherapy with the NTD program targeted populations as denominators. LF coverage is over 90%, soil transmitted helminth coverage increased to over 90% in 2018, trachoma was around 61% in 2018 and schistosomiasis declined from 30% to 18% from 2017 to 2018.

Figure 5.22: Preventive chemotherapy NTDs therapeutic coverage (LF, trachoma, soil transmitted helminths and schistosomiasis), 2015-2018, NTD programme
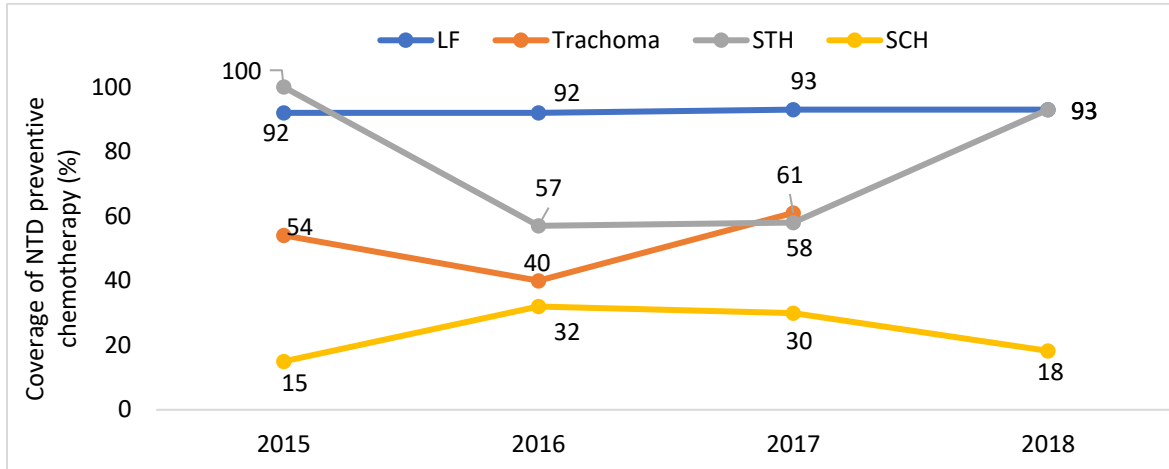
Cases of human African trypanosomiasis rhodesiense have declined in the past decade from over 700 cases in 2005 to 53 cases in 2016. The last year with more than 100 cases was 2014 (Figure 5.23).

Figure 5.23: Number of reported cases of human African trypanosomiasis rhodesiense HAT, Zambia, NTD program 2001-2016

60
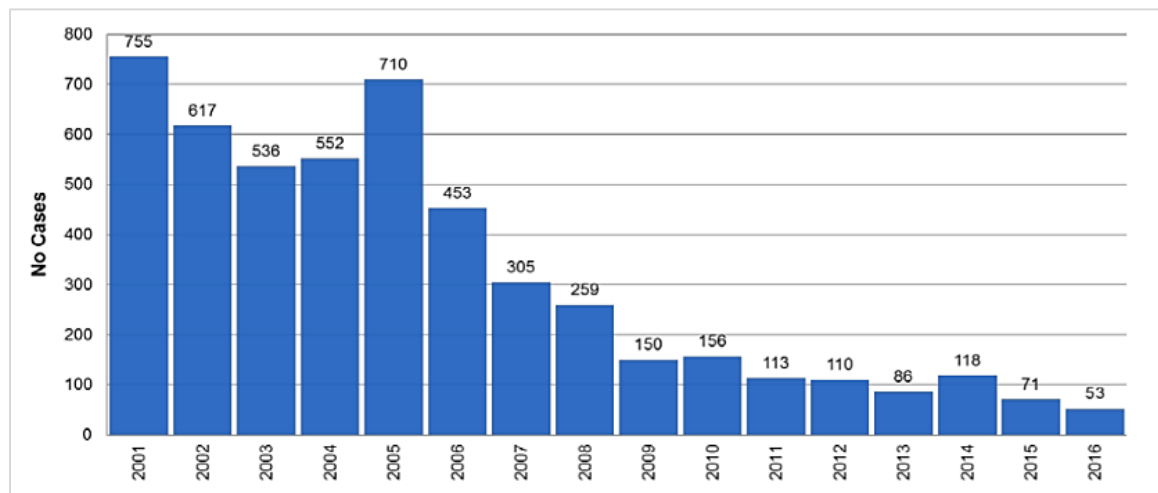
6.   Non-communicable diseases, mental health & injuries

Main points

- There are multiple risk factors for NCD that show unfavourable levels and trends in Zambia. In general, risk factors tend to be higher for urban residents.
- Obesity and overweight prevalence among women increased from 23% in 2014 (15-49 years) to 33% in 2017 (18-69 years). Long term trends accelerated rapidly. Among children under-five, there was almost no overweight and no increase over time.
- A tenth of adults did not engage in adequate physical activity in 2017, especially urban women.
- Alcohol use was high among regular users (one-third of men and one-ninth of women).
- Tobacco use was low for women (1%), and remained the same among males (20.2% to 19.6%), but lower than the targets of 3% and 21% respectively for 2018.
- About 6% of adults in 2017 reported having raised blood glucose levels or were currently on medication for diabetes.
- The prevalence of raised blood pressure among males and females in 2017 was 20.5% and 17.6%, respectively.
- Average daily salt intake of 9.5 grams in 2017 was almost two times higher than the WHO threshold of 5 grams per day.
- Only 21% of women 18-69 years had ever been screened for cervical cancer.

NSHP Targets and indicators

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Obesity and overweight prevalence among adults (M/F) (18–69 yrs) (%)	M: NA; F: 22.8 (15-49 years, 2013/14 ZDHS)	N/A	M: 16.2; F: 32.5 (18-69 yrs, STEPS 2017)	Prevalence of obesity and overweight has worsened among women.
Adults with insufficient physical activity (%)	N/A	17.8%	10.4% (STEPS 2017)	Lower than the target for which the basis is not clear
Prevalence or raised blood glucose among adults 25–64 years (%)	N/A		Male: 6; Female: 6 (2017 STEPS)	No baseline and target.
Age-standardized prevalence of current tobacco use among persons aged 15+ years (%)	Male: 20.2 (2013/14 ZDHS) Female: 1.6 (2013/14 ZDHS)	Male: 21 Female: 3	Male: 19.6 (ZDHS 2018) Female: 0.9 (ZDHS 2018)	Good progress among females. Tobacco use increasing among males.
Adults with raised BP (SBP ≥ 140 and/or DBP ≥ 90 mmHg), %	N/A	N/A	All: 19; M: 21; F: 18 (STEPS, 2017)	

Indicator	Baseline (year, source)	Target 2018	Achievement (source)	Comments
Mean salt intake among adults (in grams)	N/A	<5[7]	All: 9.5g; F: 8.5g; M: 10.5g (STEPS, 2017)	Salt intake in Zambia is almost two times higher than the recommended daily allowance.

Data sources and quality: Data on NCD risk factors were obtained from the 2001/02, 2007 and 2013/14 ZDHS, and the 2017 STEPS survey. The age groups differ in the reports of ZDHS and STEPS, 15-49 or 15-59 years, and 18-69 years respectively, which would cause small differences in the prevalence. We combined overweight and obesity in most of our analyses, where overweight refers to a BMI >=26 but less than 30 and obesity to 30 and over.

Indicators: The monitoring and evaluation (M&E) framework for the National Health Strategic Plan (NHSP) 2017-2021 includes only one adult NCD risk factor indicator – the prevalence of smoking any tobacco product among persons aged 15 years or older (by sex) and the prevalence of childhood obesity. The indicator matrix for the midterm review (MTR) of the NHSP included two additional NCD risk factor indictors: percentage of adults with raised blood pressure and mean salt intake among adults. The NHSP has an additional NCD risk factor indicator. The analysis also includes indicators for risk factors such as obesity/overweight, physical inactivity and raised blood glucose levels.

There is also has an indicator on the incidence of cancer by type which could not be assessed as the cancer registry data cannot be considered a good reflection of population incidence. According to the registry data the incidence of cervical cancer in 2018 was 103 per 100 000 population (target of 11.0 per 100 000 population). The incidence of breast cancer in 2018 was 1.74 per 100 000 population (target of 6.0 per 100 000 population) and for prostate cancer, 3.8 per 100 000 compared to a target of 3.37 per 100 000 population. However, the lack of comprehensiveness of the cancer registry implies that no conclusions can be drawn from these data. Note that only 21.1% of women 30-49 years reported to have ever had a cervical cancer screening test in the STEPS 2017.

The M&E framework of the NHSP includes indicators on mental health: the percent of districts providing services for severe mental health disorders, and the number of districts providing rehabilitation services for alcohol and drug dependence. Although these indicators had explicit targets, progress could not be assessed due to data unavailability. An additional mental indicator, the total number of admissions for mental disorders, was included in the indicator matrix for the MTR of the NHSP. Reliable data on this indicator were not available.

For injuries, the NHSP has three injuries/trauma indicators: the number of comprehensive emergency care units/trauma centres, the distribution of injuries as a result of road traffic accidents (RTA) per year, and the death rate due to RTA per 100,000 population. The first indicator on the number of trauma centres could not be assessed due to the lack of data. Data on injuries and deaths from RTA were obtained from the HMIS and the Road Transport and Safety Agency (RATSA), respectively. The level and trends of population rates obtained from these data were highly implausible, and it was decided not to include these data in this report.

Obesity and overweight
Obesity and overweight are important risk factors for hypertension, cardiovascular disease, and some cancers. The prevalence of obesity (BMI >= 30kg/m^2) and overweight (BMI >= 25kg/m^2) among women has increased significantly over time; from 12.2% in 2001, 19.2% in 2007, 22.8% in 2014 to 32.5% in 2017. In 2017 for which data were available for both males and females, the prevalence of obesity and overweight was significantly higher

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[7] WHO recommendation for daily salt intake.

among females. Figure 6.1 shows the trend in the adult obesity and overweight prevalence between 2001 and 2017.

Figure 6.1: Women's prevalence of obesity and overweight, ZDHS (15-49 years) and STEPS (18-69 years), 2001-2017
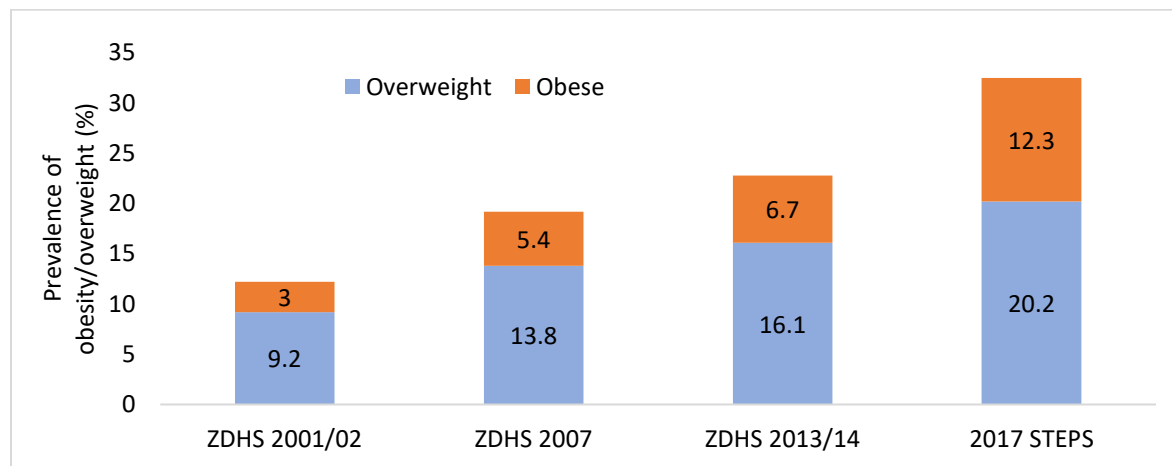
For 2017, for which obesity and overweight prevalence data were available for both males and females, the analysis was also disaggregated by age groups. This is presented in Figure 6.2 below. For the overall population, the obesity and overweight prevalence was highest in the 40-59 age group (33.9%) followed by the 60-69 age group (31.6%). These age groups also had the highest obesity an overweight prevalence among males and females. The lowest obesity/overweight prevalence was among 18 to 29 year olds for both sexes.

Figure 6.2: Adult obesity and overweight prevalence by sex and age group, STEPS 2017
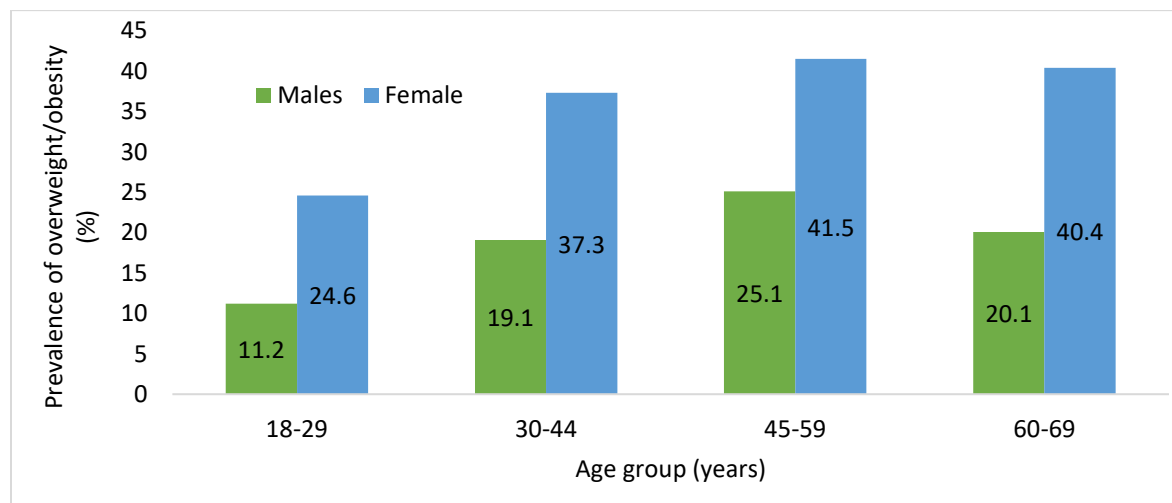
Figure 6.3 shows the trends in adult obesity and overweight prevalence among women by place of residence from the 2001/02, 2007 and 2013/14 ZDHS. Two observations can be made. First, across all data points, the obesity and overweight prevalence was two to three times higher in urban areas compared to rural areas. Second, for both places of residence, the obesity and overweight prevalence has been increasing over time.

Figure 6.3: Obesity and overweight prevalence among women 15-49 years by place of residence, Zambia, ZDHS 2001/02, 2007, 2013/14
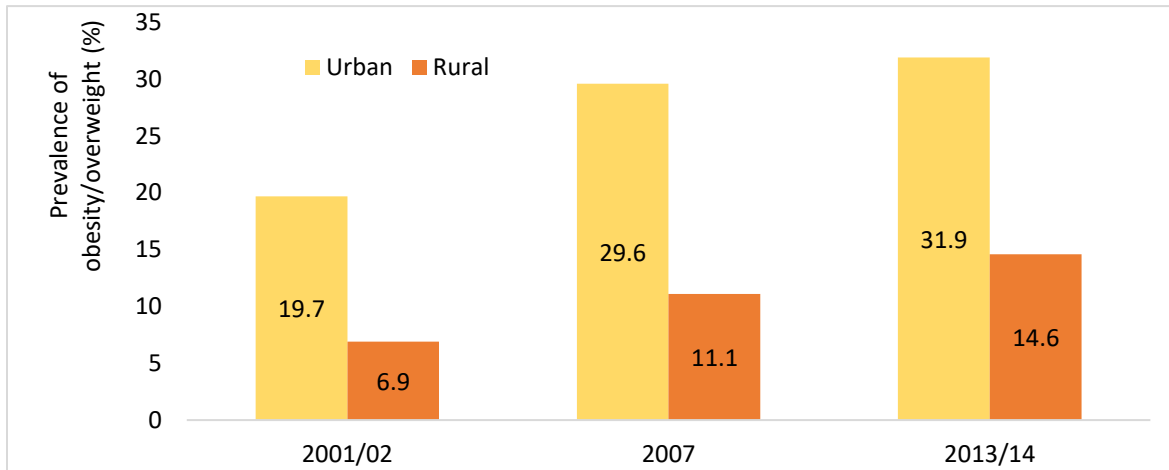
Figure 6.4 shows the adult obesity and overweight prevalence among women disaggregated by province between 2001 and 2014. From the figure it can be observed that Lusaka province had the highest prevalence across all data points, followed by Copperbelt and Southern provinces. Western province had consistently the lowest obesity and overweight prevalence. It is also important to note that the obesity and overweight prevalence has been increasing steadily across all provinces.

Figure 6.4: Obesity and overweight prevalence among women aged 15-49 years by province, Zambia, ZDHS 2001/02, 2007, 2013/14
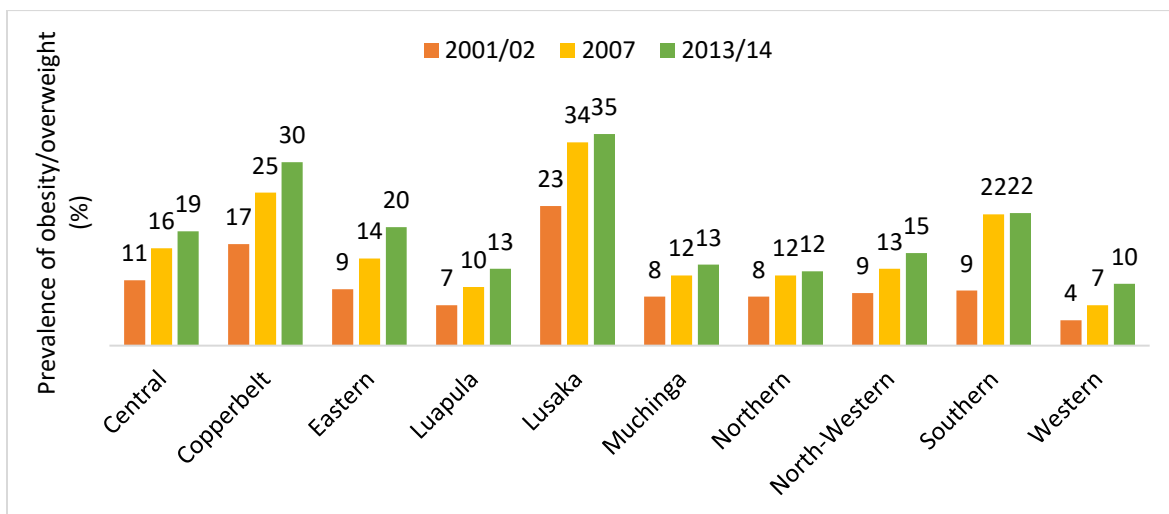
The adult obesity and overweight prevalence among women was further disaggregated by wealth quintile (Figure 6.5). Two things can be noted: first, the higher the wealth quintile, the higher the obesity and overweight prevalence. Second, the prevalence of obesity and overweight appear to be increasing over time across all five wealth quintiles.

Figure 6.5: Adult obesity and overweight prevalence among women by wealth quintile, Zambia, ZDHS 2007 & 2013/14
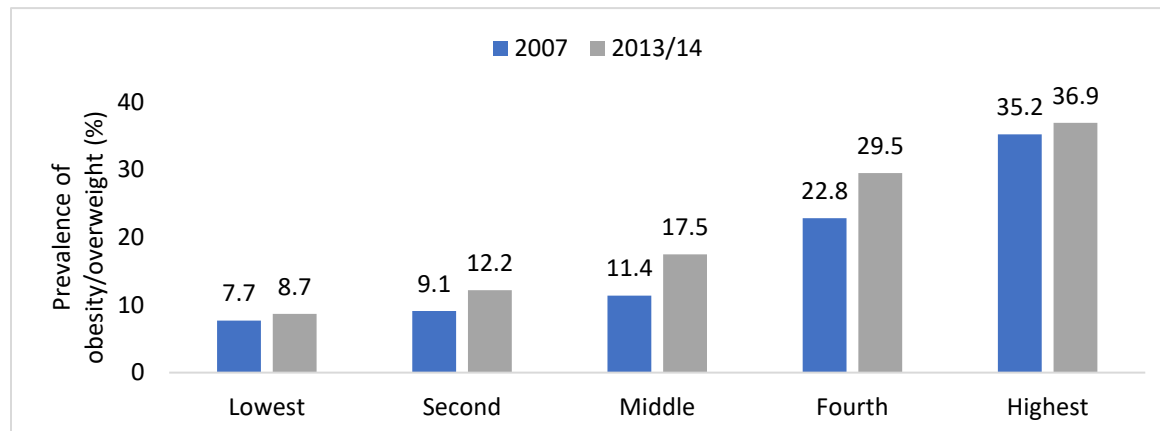
Evidence has shown the link between childhood and adulthood obesity and overweight. In particular, children who are obese have a greater likelihood of being obese as adults. Therefore, the analysis also looked at the trend in prevalence of childhood overweight. Overall, the prevalence of childhood overweight has remained relatively low. According to the 2007 and 2013/14 ZDHS, childhood overweight has declined marginally from 1% in 2007 to 0.8% in 2014. Since then the 2018 ZDHS indicates that the childhood overweight prevalence has remained unchanged at 0.8% (see Figure 6.6).

Figure 6.6: Childhood overweight prevalence, Zambia, ZDHS 2007, 2013/14, 2018
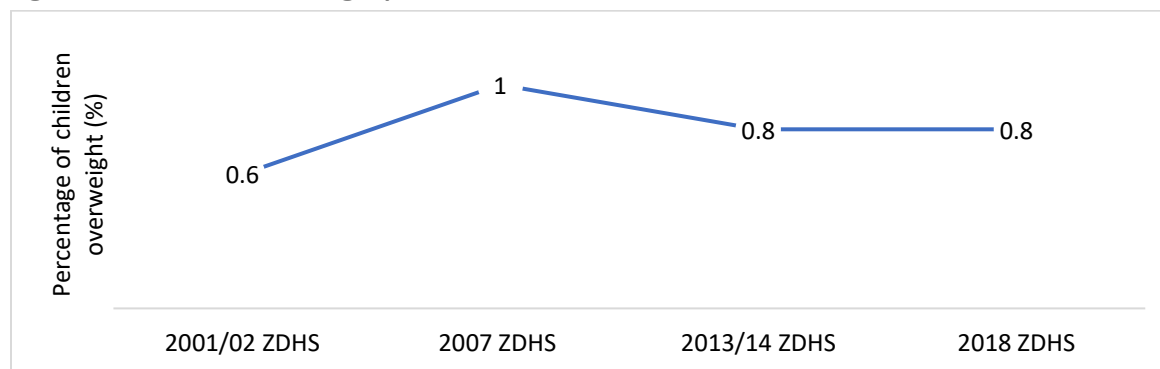
Even among urban and the wealthiest households, childhood overweight prevalence was found to be low (1.4% and 1.7% respectively).

Physical inactivity

A key driver of overweight and obesity is inadequate physical activity. According to the 2017 STEPS survey, 10.4% of adults 18-69 years did not engage in sufficient physical activity in the last week. Insufficient physical activity was defined as less than 150 minutes of moderate or intensive physical activity per week. The levels of physical inactivity were higher among females (15.1%) compared to males (5.7%).

Tobacco use

Over time, tobacco use among both males and females has been declining. Between 2001 and 2014, the prevalence of tobacco use among females declined from 2.7% to 1.6% while among males it declined from 26.4% to 20.2% (still relatively high) over the same period. In 2018, tobacco use was not notably different among males, and less than a percentage point less for females who already used tobacco much less often than men (see Figure 6.7).

Figure 6.7: Prevalence of tobacco use among adults 15-49 years by sex, Zambia, ZDHS 2001/02, 2007, 2013/14 & 2018
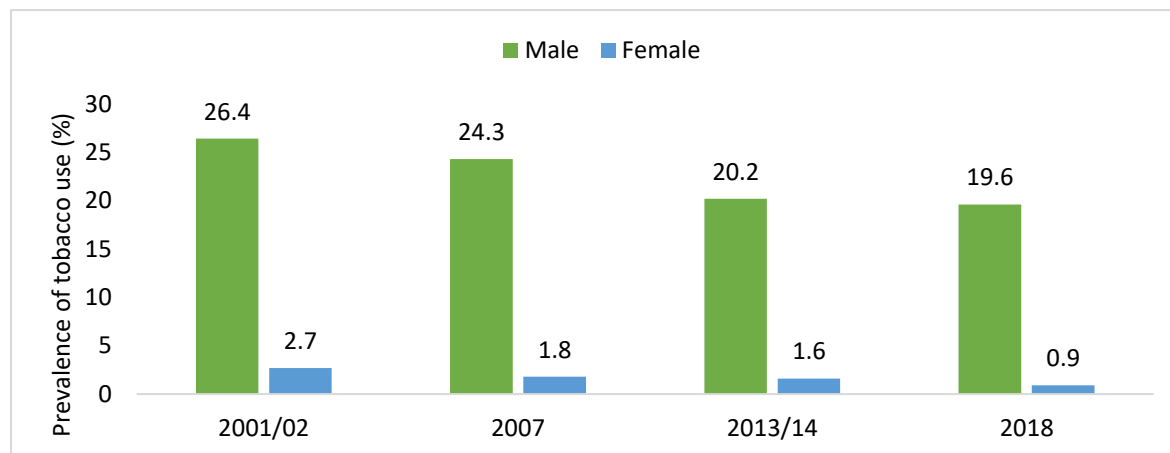
According to the STEPS survey, the prevalence of tobacco use among females 18-69 years was 2% in 2017, which was lower than the target of 3% (not shown in figures). Among males of the same age group, the prevalence of tobacco use was 23% which was higher than the target of 21%. The 2017 STEPS survey also disaggregated tobacco use by product type. Manufactured cigarettes were the most common product, with 67.9% of tobacco users reporting using them. This was followed by hand-rolled cigarettes at 48.6%, pipes at 5.1%, cigars, cheroots and cigarillos at 9.8%, shisha at 3.3% and other products at 3.5%.

The average prevalence of tobacco use among all adults in the ZDHS data was further disaggregated by place of residence. This is shown is Figure 6.8 below. Two things can be noted. Firstly, for all ZDHS survey rounds, the prevalence was consistently higher in rural areas. Secondly, the prevalence of tobacco use has was declining more quickly in the rural than urban areas. In 2013/14, the prevalence in urban areas was 9% compared to almost 12% in rural areas, but in 2018 it was 10% in urban areas and 11% in the rural areas.

Figure 6.8: Prevalence of tobacco use among adults by place of residence, Zambia, ZDHS 2001, 2007, 2013/14, 2018
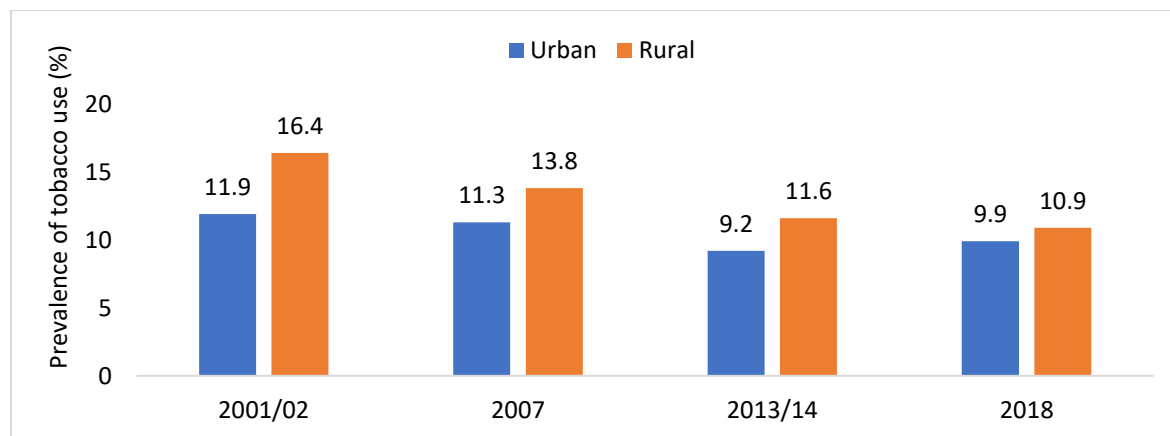
Further, the prevalence of tobacco use was disaggregated by wealth quintiles. Figure 6.9 shows the prevalence of tobacco use by wealth quintile from the ZDHS 2013/14 and 2018. The prevalence is highest in the lowest and second lowest quintiles, but the reduction between time points was also greatest for the lowest quintile (by 6 percentage points, compared to less than two points among the other wealth quintile groups).

Figure 6.9: Prevalence of tobacco use among adults by wealth quintile, Zambia, ZDHS 2013/14 & 2018
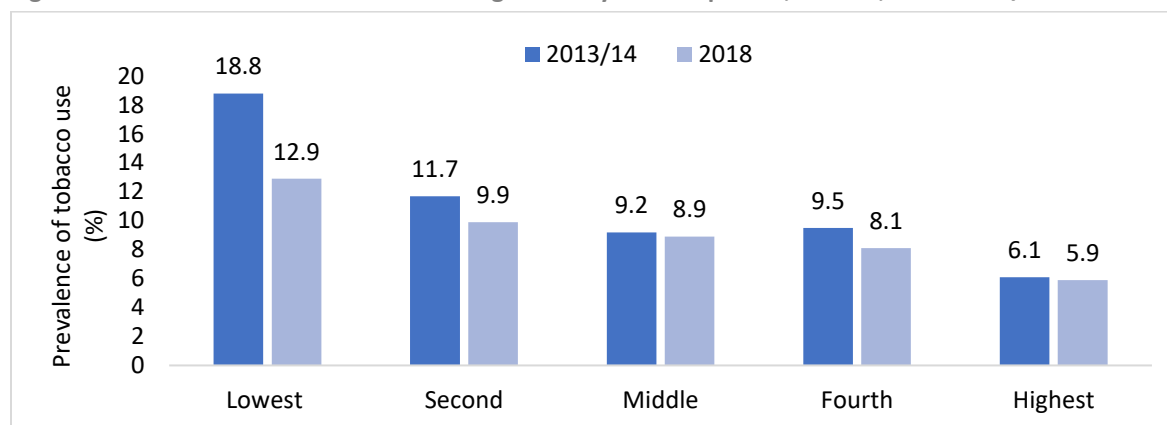
Alcohol consumption

Three-quarters of women and just of half of men 18-69 years (52%) had never used alcohol according to the STEPS 2017. Overall, 32% of men and 12% of women drank alcohol in the last 30 days. Among men alcohol use was similar among urban and rural men, but for women it was more an urban phenomenon (twice as high as rural). Among the current drinkers, the average was 7.7 occasions of alcohol in the 30 days with an average of 6.3 drinks per occasion for men. For women the average was 4.0 occasions with 4.3 drinks per occasion.

High blood pressure

The prevalence of high blood pressure derived from a 2017 STEPS survey that sampled 4302 persons (N=4302) was 19.1% for both sexes, 20.5% for males and 17.6% for females. Raised blood pressure was defined as having systolic blood pressure of at least 140 mmHg and/or a diastolic blood pressure of 90 mmHg. Figure 6.10 below shows the effective coverage of hypertension treatment among sampled adults in 2017. The survey showed that of the sampled population with raised hypertension, 9% of those with hypertension were on treatment and only 2.5% had their hypertension controlled. 84.6% of those with hypertension were not on medication. From the figure, it is important to note that the percentage of females with hypertension who were on treatment or had their hypertension controlled was greater than that of males.

Figure 6.10: Effective coverage of hypertension treatment among adults, Zambia, STEPS survey 2017
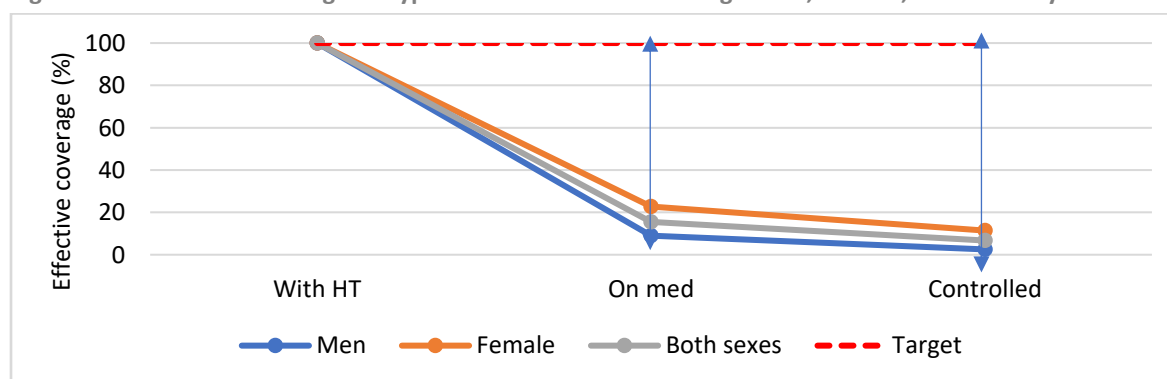
Raised blood glucose

There were no sufficient data points to assess the trends in the prevalence of raised blood glucose levels. Nevertheless, the 2017 STEPS survey found that 6.0% of adults reported having raised blood glucose levels or were currently on medication for diabetes. There was no statistically significant difference in the raised blood glucose prevalence between males and females. Of all those previously diagnosed with raised blood glucose, 20.9% reported being on insulin treatment.

Salt intake

Although the indicator on daily salt intake had no explicit target, an implicit target was the World Health Organization (WHO) recommended threshold of five grams. The overall mean daily salt intake was 9.5 grams in 2017; almost twice the recommended threshold. When disaggregated by sex, the average daily salt intake was significantly higher among males (10.5 grams) compared to females (8.5 grams).

Recommendations on NCD

The analysis has highlighted evidence of the presence and/or increase in numerous NCD risk factors such as obesity and overweight, physical inactivity, tobacco use, raised blood pressure, raised blood glucose, and salt intake. In order to combat the NCD burden, and track and achieve NCD-related indicators and targets in the NHSP, a number of measures need to be put in place or reinforced:

1. There is need to intensify community awareness campaigns on the importance of engaging in sufficient physical activity. This is likely to reduce the prevalence of overweight and obesity which are to a large extent driven by insufficient physical exercise.
2. In addition, reducing the obesity and overweight prevalence requires strengthened human resource capacity such as the training and recruitment of dieticians.
3. There is need to intensify community and facility screening for NCD risk factors such as raised blood pressure and blood glucose.
4. The enactment of the tobacco control policy needs to be accelerated.
5. Tracking relevant NCD indicators in the NHSP requires the collection of routine data on NCD risk factors such as high blood pressure and raised glucose. This analysis relied on data from surveys which are typically conducted after at least three years, making the tracking of indicators more challenging.

Mental health disorders

The HMIS does include reporting of mental health disorders from IPD and OPD by type (neurosis/psychosis). The quality of reporting is an issue as discussed above. In 2018, 12492 psychosis cases were reported, similar to the year before. Neurosis reporting was much lower, even though it is a much more common condition. I was not possible to ascertain trends.

Recommendations on mental health

Although this analysis has shown evidence of the declining number of mental health disorders, significant data quality concerns have also been highlighted. The implication of these concerns is that the trends observed cannot be taken at face value in light of significant data limitations. In order to support the achievement of mental health related targets, the following measures need to be implemented:

1. Enhanced community awareness on the 'facts' about mental illnesses. Put differently, there is need to debunk the various myths associated with mental disorders, resulting in stigma against people suffering from these disorders;
2. Training and recruitment of human resources such as psychiatrists;
3. Targeted investments in physical infrastructure for mental health services; and
4. In order to better target interventions, there is need to disaggregate routine mental health data by age group and sex.

Road traffic accident injuries

In 2018, 296,060 injuries due to road traffic accidents were reported, which was much lower than two years earlier. The data however cannot be considered to be reliable and no level of trend can be ascertained. The applied to mortality due to traffic accidents.

Recommendations on RTA

As with mental health, data on RTA injuries and deaths have serious data limitations relating to completeness of the data. For example, data on injuries are unlikely to be captured if they are not reported to the relevant hospital, police and road safety authorities. These data quality concerns are further exacerbated by a lack of a routine data sharing mechanism among these authorities. Strengthening collaboration among them is likely to increase the quality of data on RTA injuries and deaths. In addition, to better inform policy, there is need to disaggregate RTA injuries by mode of transport and time of associated RTA accidents (day/night), age group and sex.

7.   Health systems

The NHSP 2017-2021 has multiple indicators for monitoring the performance of the health system, including governance and financing, infrastructure, health workforce, medicines and commodities, and health information system, which are presented in the following sections in turn.

7.1   Governance and financing

Main points

- The coordination and implementation management structures for NHSP are in place and functioning. Program-specific plans are generally well-aligned with NHSP.
- The health sector budget has increased during NHSP but the percent of government remained the same at just under 10%.
- The most recent National Health Accounts (NHA) was conducted in 2016 and no NHA had been done in the first half period of the implementation of the NHSP 2017-2021. This makes it difficult to track expenditures in the health sector.
- The current health care financing for public health institutions is largely tax based. However, the implementation of the National Health Insurance Scheme commenced in October 2019.

NHSP Targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement	Comments
Governance				
Service (HP, HC & Hospital) and management (province, district) units with functional governance structures for implementing, coordinating and monitoring NHSP 2017-21 (%)	(Administrative Reports, 2016)	100	100	Governance structures are virtually present in the institutions.
Service units with planning and reporting tools relevant to each level of care (policies, strategy, operational plans, M&E framework) (%)	(Administrative Reports, 2016)	100	100	The target was achieved, although there is a need to better define the indicator.
Presence of functional coordination and partnership mechanism from community to national level	(Administrative Reports, 2016)	TBA	Yes	The target was achieved, although there is a need to better define the indicator.
Appropriate steward stability to implement policies				Field work results awaited.

Indicator	Baseline (year)	Target 2018	Achievement	Comments
Programmes implemented according to NHSP (annual reports, performance reports etc.) (number)				Field work results awaited.
Financing				
Out of Pocket (OOP) health expenditure as percent of current expenditure on health (%)	12.2 (2016 NHA report)	17.6	No Data	The target is higher than baseline; OOP estimates by WHO are much higher,
Total current expenditure on health (%) of gross domestic product	4.5 (2016 NHA report)	9.0	No Data	
Household Health Expenditure as percent of Total Health Expenditure (%)	11.5 (2016 NHA report)		No Data	
Government expenditure on health as percent of total current expenditure (%)	38.3 (2016 NHA report)	13.4	No Data	
External source of current spending on health as percent of current expenditure on health (%)	42.5 (2016 NHA report)	43.4	No Data	
Total capital expenditure on health as a percent of current plus capital expenditure on health (%)	5.1 (2016 NHA report)	8.8	No Data	
Population covered by health insurance (%)	4 (2016 NHA report)	50	4	The target was not met.

NHSP was operationalized through the processes and systems of the Government's Medium-Term Expenditure Frameworks and the annual budgets and plans. The signed MoU by stakeholders in the health sector aimed at collaboration in the implementation of the NHSP 2017- 2021. The general principles for the collaboration among key players in the health sector have been stated in the MoU. It was noted however that, the MoU governing the implementation of the NHSP 2017-2021 had not been signed though it had been finalized.

National level coordination structures were well established. The highest coordination structure is the Annual Consultative Meeting with ministerial representation, ambassadors/high commissioners, heads of bilateral development cooperation, UN system, multilaterals and civil society involved in the health sector, which meets once a year.

Sector Wide Approach (SWAp) principles were followed to ensure the functioning of the coordination structures in the health sector. To support the implementation of the SWAps, regular policy meetings were an effective forum for regular appraisal of national health policies and strategies. The meetings provided a platform to review current policies, propose modifications or conceive new policies. They also aimed at monitoring progress made and decide potential changes of the approved work programme. The agenda items of the policy meetings are primarily derived from Technical Working Group meetings, namely, the Troikas (Community Paramedics/CP, GRZ and civil

society, non-governmental and faith-based organizations, NFBOs, PHPs), meetings between representatives for stakeholders (Troika members) and the MOH Permanent Secretaries.

The technical working groups meet as required, but at least quarterly, to monitor and advise on the development and implementation of the annual work programmes. The working groups report to the policy meetings through the secretariat. As required and as decided in the policy meeting, different task forces and sub-committees can be formed within the framework of each technical working group.

The subnational levels conducted management meetings, technical meetings, district integrated meetings and provincial integrated meetings among others to ensure effective coordination of the health programmes. The planning and budgeting tools had undergone some reviews and adjustments to include the emerging issues and policies. The planning handbooks were available at all levels in both hard and soft copies and they were available on the Ministry of Health website. Most HMIS reporting tools were available but there had been erratic supply of under 5 cards in the period under review.

On health care financing, there has been no NHA in the past 3 years. The NHA 2016 data refer to the period 2013-2016. During that period, the health sector was heavily dependent on external assistance with an annual average of 42% (US$30 per capita) of the total per capita health expenditure coming from donors during the period 2013–2016, and 41% (US$28 per capita) from government (Figure 7.1). Hospitals were the main recipients with on average about 30% of the total health expenditure (Figure 7.2).

Figure 7.1: Current health expenditure by financing sources 2013-2016, NHA 2016
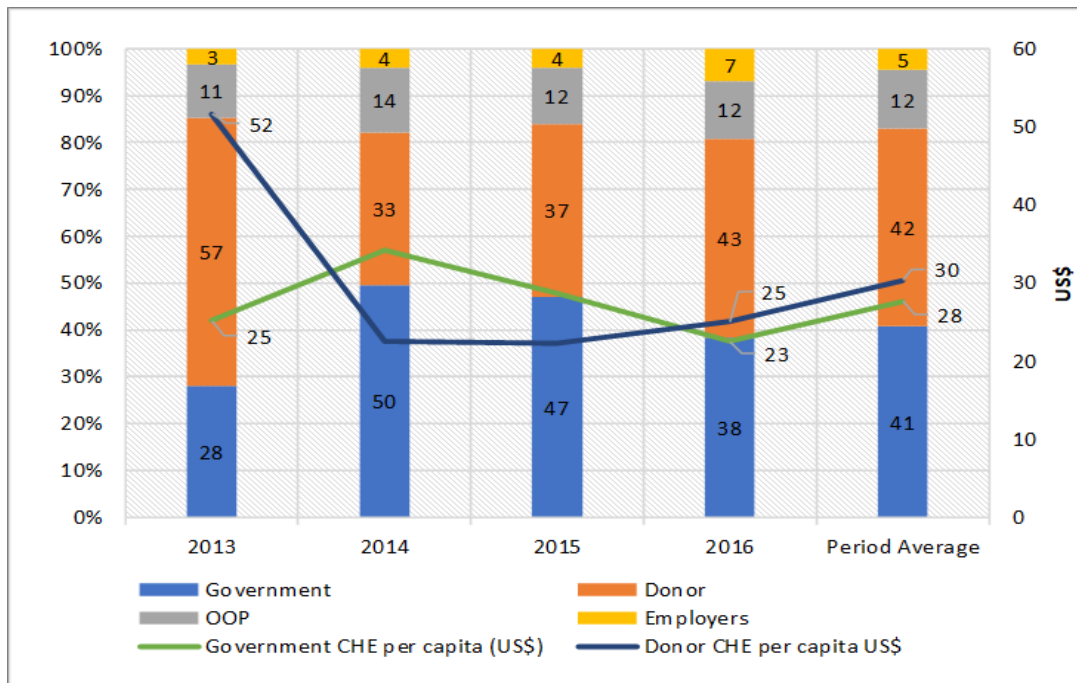
Figure 7.2: Distribution of the health spending, NHA 2016
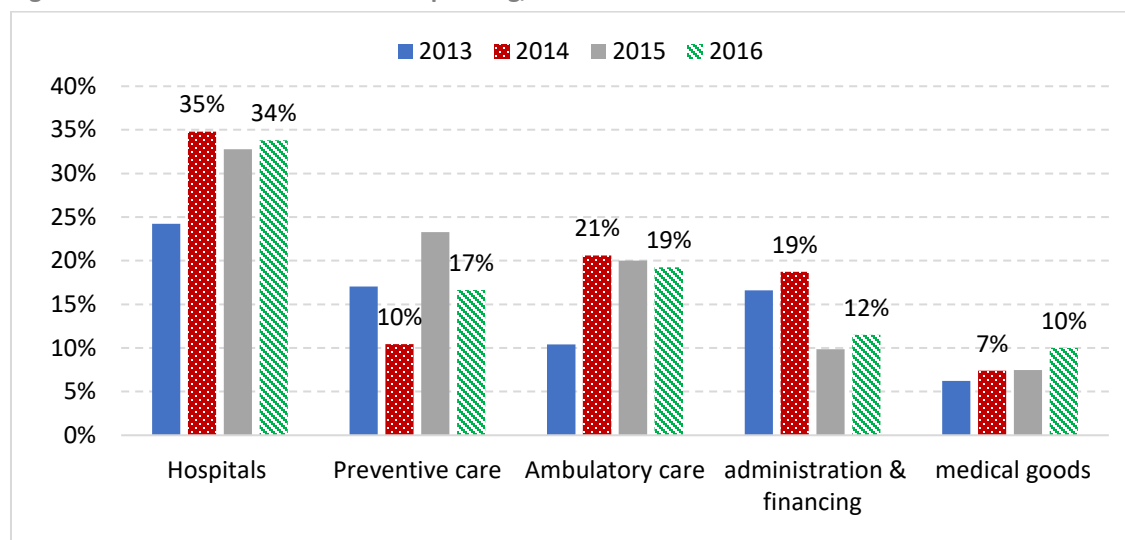
The government budget allocated to the Ministry of Health increased during 2014-18, although it remained constant as a proportion of the national budget at about 9% for most years, falling well short of the target of 15% (Figure 7.3).

Figure 7.3: Ministry of Health annual budget in total Kwacha (billions) and as a percentage of the national budget, 2012-2019
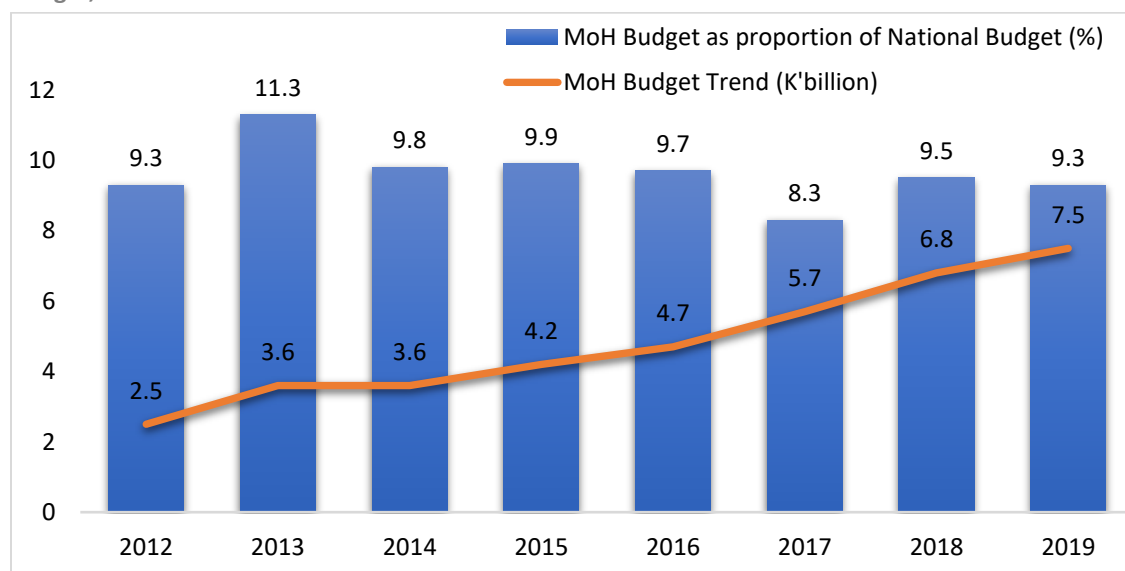
The coverage of health insurance in the country was estimated to have remained largely the same at 4%, which is from private insurance. The figures however are from the Zambia Household Health Expenditure and Utilization survey, which included insurance data that was collected last in 2014. The current health care financing for public health institutions is largely tax based. However, the implementation of the National Health Insurance Scheme commenced in October 2019.

Recommendations on governance and financing:

1. Build capacity within MoH staff to periodically conduct NHA surveys.
2. NHSP indicators should be revised to at least a maximum of 100 and also measure quality of services.

3. NHSP targets should be revised to be in line with the current performance and also account for equity analysis (e.g.: human resources, infrastructure).
4. The analysis of the performance of NHSP should include the district level where disaggregated data is available.
5. MoU between CPs and MoH should be signed and implemented to ensure harmonized approach in the implementation of the NHSP.
6. Targets should be set and mid-term achievement to serve as baseline for indicators that have no baseline.

7.2 Health workforce

Main points

- The total health workforce requirement in the country as per the established positions at the end of 2019 was 126,389, however the filled positions were 60,332 (a gap of 52%).
- The core health workforce density (medical officers, nurses, midwives, clinical officers) increased to 16.5/10,000 in 2019 but still well-short of the target.
- There is variation across the provinces with Eastern and Muchinga provinces reporting low health workforce density per 10,000 population, while Lusaka and Copper belt provinces reported the highest health workforce density.
- The number of facilities with 80% of professional staff at all levels of health care was 100%, representing a significant capacity for service provision at the different levels of health care.

NHSP Targets and indicators

Indicator	Baseline	Target 2018	Achievement	Comments
Health workforce				
Health worker density (Medical officer/MO, Clinical officer/CO, nurses, and midwives)	12 per 10,000 population	35	16.5 (2019)	Major increase but the 2018 target is still far off.
Percent of approved posts filled by skilled personnel (doctors, medical licentiates, clinical officers, nurses, other) by the six levels of care (%)	69.2 (WHO AFRO)	73.5	47	This indicator was well below the target and baseline.
Health facilities with at least 80% of professional staff on establishment filled (by the six levels of care) (%)	73 (HRIS year)	85	100	Every facility in Zambia has qualified personnel.
Health facilities with at least one qualified health worker (%)	88	90	>95	Performance above target.
Health Workers trained annually as percent of total professional workforce gap (%)	N/A	N/A		No data.
Proportion of health workers recruited annually as percent of the workforce gap (%)	N/A	N/A	16	Significant achievements were made during 2018-19 with deficits of 16% in 2018 and 11% 2019.

Data sources and quality: a major effort is being made to increase health workforce numbers and distribution, which is accompanied by close monitoring of the numbers in the establishment. Even though Zambia has no full health workforce registry, the health workforce data appear of good quality and are up-to-date. The main drawback is the lack of data on the private sector.

The main objectives concerning health workforce in NHSP are to coordinate human resources management and administrative support functions for effective running of the Ministry. The key focus strategies are to:

- Improve the availability and distribution of qualified health workers in the country.
- Strengthen human resource management and planning in order to improve efficient and effective utilization of existing staff.
- Promote a healthy and safe work environment.
- Strengthen administrative support services to the Ministry.

Recruitment of health workers has been the priority during NHSP. Table 7.1 shows that 8,437 and 5,045 health workers were recruited in 2017 and 2018 according to MoH figures. Among those, there were 5,103 and 3,314 core health professionals – doctors, clinical officers, nurses and midwives - in 2017 and 2018, respectively. The last column of the table shows the relative size of the increase defined as a ratio of the total new recruitment in 2017 and 2018, divided by the workforce in May 2019. This could be considered as an approximation of the percent of the workforce in establishments by May 2019 that was recruited in 2017 or 2018.

The 2017-18 new recruits among the core health professionals constituted 22% of the total workforce in 2019. Clinical officers had the greatest recruitment (56%), followed by nurses (29%). Among doctors in 2018, 11% were new recruits. Even though no data are available on numbers exiting the workforce (retirement, resignation, mortality), these figures on new recruitment are very high and have an impact on health workforce densities in Zambia.

Yet Zambia is still considered to have a significant workforce gap. Every health facility has skilled staff, but the full establishment target of skilled staff for all six score cards is still well off: 52% of facilities have complete filled establishment. In 2018, the health workers recruited presented 16% of the health workforce gap. This figure for 2019 is 11%.

Table 7.1: Number of health workers recruited in 2017 and 2018, total workforce in May 2019 and ratio of those recruited in 2017 or 2018 to those working in 2019

	2017	2018	Total	Working May 2019	Recruited 2017/18 / total 2019 (%)
Doctors	40	240	280	2,463	11.4
Clinical officers	1,158	516	1,674	2,990	56.0
Midwives	317	459	776	3,973	19.5
Nurses	3,588	2,099	5,687	19,856	28.6
Total core health professionals	5,103	3,314	8,417	29,282	28.7
Other core cadres	3,334	1,731	5,065	31,050	16.3
Total	8,437	5,045	13,482	60,332	22.3

The number of health workers in establishments by cadre is shown in Table 7.2. In 2018, there were 14.9 core health professionals per 10,000 population and in 2019 this increased to 16.5 per 10,000. If all health professionals are included, these densiities increase to 20.5 and 22.0 per 10,000 for 2018 and 2019, respectively. These numbers fall well short of the very ambitious NHSP target of 35 per 10,000 by 2021 but present major progress

from the baseline (12 per 10,000 population). Even though this is far from the target, it is considerably higher than in many other countries in the region and close the the World Health report 2006 threshold of 23 per 10,000 population.

The skills mix – here taken as the ratio of nurses and midwives to physicians – is relatively high and increased from 10.4 in 2018 to 10.6 in 2019. The ratio of nurses and midwives to doctors and clinical officers was 4.5.

Table 7.2: Density of health workers per 10,000 population by cadre, total core health professionals and all health professionals, 2018 and 2019, Ministry of Health

	2018	**2019**
Doctor	1.1	1.3
Clinical officer	1.8	1.8
Midwife	2.2	2.2
Nurse	9.8	11.3
Core health professionals	14.9	16.5
All health professionals	20.5	22.0

Figure 7.4 and Figure 7.5 show the distribution of core health professionals - by province, based on data from Human Resources for Health Information System (HRHIS) of the MoH in 2019. Lusaka, Copperbelt, Southern, Western and Northern Provinces had higher densities of core health workers and met the target compared to the rest of the provinces. North Western and Central provinces had a good progress towards achieivng the targets while Eastern and Muchinga had a decline in the density.

The urban provinces of Lusaka and Copperbelt were the most populated in terms of clinical officers (1.8 of the 3,058/10,000 population), doctors (1.3 of the 2,198/10,000 population), midwives (2.2 of 3,833/10,000) and nurses (9.8 of 19,561/10,000). This simply showed that for every 10,000 population, there was only one doctor while there were 10 nurses.

Figure 7.4: Core health worker density per 10,000 population by province, Ministry of Health, midterm review, 2019 HRHIS
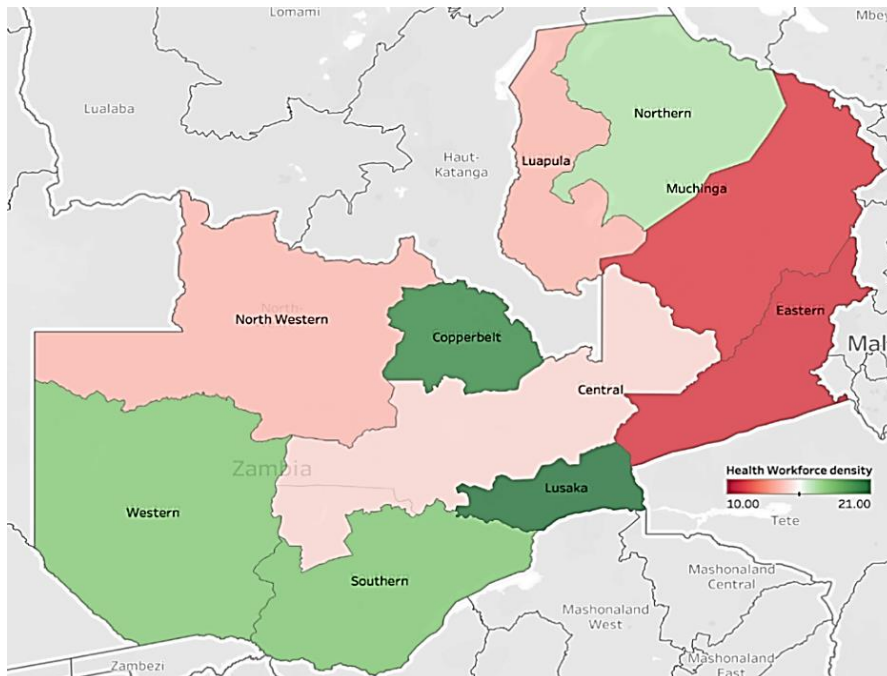
Figure 7.5: Summary of core health worker density per 10,000 population, Ministry of Health, 2019
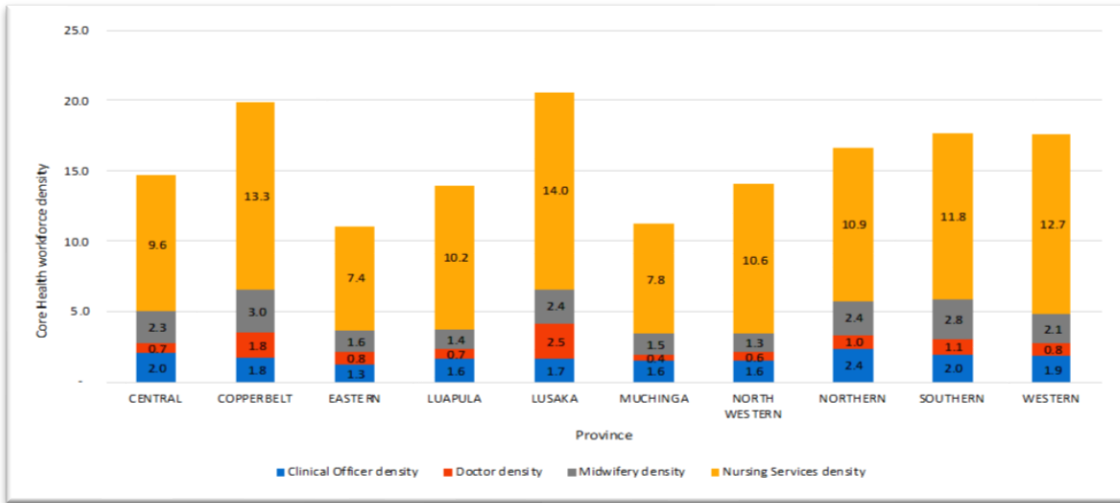
Figure 7.6 shows the recent trend in core health worker approved post filled for 2018 and 2019. The findings indicated an increase of 10 percentage points in approved posts for nurses, while there was a slight increase of 5 points in the posts filled by doctors across the country. However, the average in Zambia was 47% in 2018 and 51% in 2019, well below the target.

Figure 7.6: Core health worker approved posts filled (%), HRHIS 2018 2019
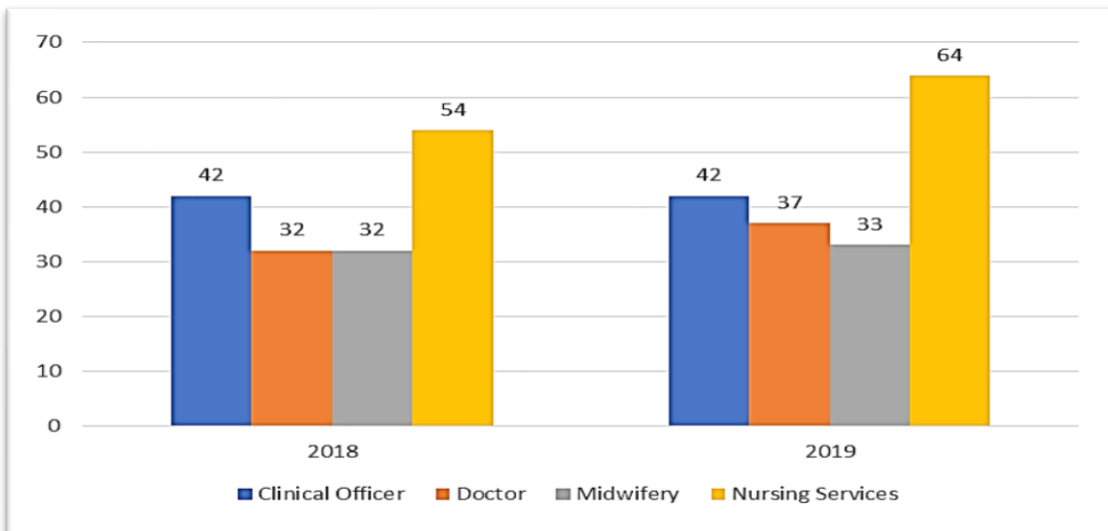
More females had been recruited in 2017 than males in Lusaka and Copperbelt, giving a ratio of 1:2 (Figure 7.7). In other words, for every male recruited there were two females that were recruited.
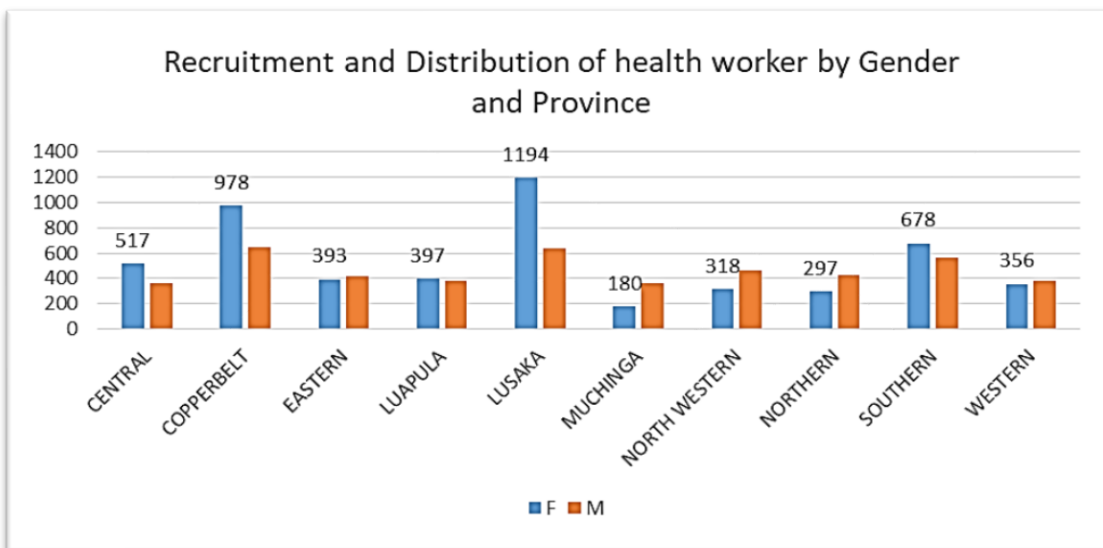
Zambia has made significant efforts in availing health workforce for service delivery with increase in filling the gap in the approved positions. Significant efforts should be made to continue with the efforts to fill the approved positions. There is however inequitable distribution across the different provinces and efforts should be made to equitably distribute the health care workers across the country.

Recommendations on health workforce:

1. Implement and institutionalize National Health Accounts and carry out labour market analysis to ensure proper planning between production, recruitment and retention.
2. Implement a research on reasons into internal and external brain drain (with a view of developing mechanisms to increase retention rate of HRH).

7.3   Health infrastructure, medicines, utilization

Main points
- The target in Zambia is to have about 12 health facilities per 100,000 population. This target has been surpassed with 15 public health facilities per 100,000 population. This represents one health facility for about 7,000 people in Zambia.
- Bed density per 10,000 population in Zambia declined from 20 in 2015 to 17 in 2018, but beds in the private sector are heavily underrepresented. However, the bed density in 2019 is higher than the 2018 NHSP target. Bed density ranges from 13 in Northern Province to 32 in North-Western province.
- The average number of outpatient visits was 1.3 visits per year with little change between 2015-2018. NHSP uses another indicator of OPD attendance referring to catchment populations, which is much higher (3.8 visits in 2018).
- The blood donation rate per 1000 persons declined from 7.8 at baseline to 7.4 per 1000 persons in 2018, well below the target of 10 per 1000 persons.

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Health infrastructure, medicines, utilization				
Health Facility Density (by type and distribution) per 100,000 population	4.3 (2016, NHFC)	11.8	15.1 (NHFC, 2019)	Target achieved and exceeded. Significant variations across provinces.
Bed Density and Distribution (Inpatient, Maternity, Infant, Isolation) per 10,000 population	20 (2015, WHO AFRO)	16	17.3 (NHFC, 2019)	Decline from the baseline value but density remains higher than the NHSP target.
Blood donation Rate per 1,000 persons	7.8 (2015, WHO AFRO)	10.7	7.4 (2018 ZNBTS)	Indicator regressing.
OPD attendance by the catchment population in a period of time (outpatient)	4.2 (2016, HMIS)	3.5 (2018)	3.8 (2018 HMIS)	Given the uncertainty of catchment populations the indicator is difficult to interpret.

Data sources and quality: Data on the health facility and inpatient bed densities are from the 2018 HMIS which used the National Health Facility Census 2017 (NHFC). The number of hospital beds should not include maternity beds and isolation beds but should include paediatric beds (cots). Data on blood donations are from the Zambia National Blood Transfusion Service (ZNBTS), but data are limited. The data are available only at national level. Data on outpatient service utilization are from the HMIS. However, this data does not capture outpatient health service utilization in most private health facilities. The data are consistent over time at the provincial level with no extreme outliers.

Indicators: To improve service delivery and reduce morbidity and mortality, Zambia aims to ensure the availability of essential infrastructure, medical supplies, equipment, and technologies. Fifteen indicators have been proposed in the NHSP for this strategic objective, namely:

1. Health facility density (by type and distribution) per 100,000 population
2. Bed density and distribution (Inpatient, Maternity, Infant, Isolation) per 10,000 population
3. Blood donation Rate per 1,000 persons
4. Number of attendances by the catchment population in a period of time (outpatient)
5. Proportion of facilities with basic amenities (water, electricity etc.)
6. Percent of health centres with sufficient standards of physical infrastructure
7. Availability of basic equipment for general health provision by level
8. Proportion of laboratory facilities conducting quality control testing
9. Percentage of health facilities with appropriate equipment to conduct nursing and midwifery procedures
10. Proportion of HFs offering comprehensive EmONC Services
11. Proportion of HFs offering basic EmONC Services
12. Proxy: Average availability of 14 selected essential medicines in public and private health facilities
13. Proportion of health products meeting national quality standards
14. Percent of health facilities reporting no stock out of tracer health products
15. Percentage of essential medicines prescribed in outpatient public health facilities

Data were available for only four indicators: health facility density, bed density, blood donation rate, and outpatient utilization rate. Zambia should put in place mechanisms for collecting data for assessing the progress and performance of all indicators included in the NHSP.

Health facility density

Health facility density is primarily an indicator of access to outpatient services. It assesses the number of health facilities for a defined number of the population. The target in Zambia is to have about 12 facilities per 100,000 population by 2018. As shown by Figure 7.8, the facility density in Zambia is higher than proposed in the NHSP. There are currently 15 facilities per 100,000 population in Zambia. This represents one facility for about 7,000 people. The health facility density in Zambia would be higher if all private facilities are counted.

However, provincial differences were large, with the absolute difference between the top and bottom province up to 22 points. Facilities densities in Lusaka and Copperbelt province are below the national average and this is in large part due to undercounting of private facilities. A major limitation of computation of facility density is that it assumes equal access to a health facility for everyone, but provinces like Lusaka and Copperbelt with better roads and public transport infrastructure may have better access to health facilities than Western and North-Western province.

Figure 7.8: Facility density per 100,000 Population (By Level of Care), NHFC data, 2017

	Central	Copperbelt	Eastern	Luapula	Lusaka	Muchinga	Northern	North Western	Southern	Western	National
Lev 3	0.0	0.1	0.1	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.1
Lev 2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.3	0.3	0.2
Lev 1	0.5	0.4	0.5	0.8	0.6	0.5	0.6	1.5	0.7	1.3	0.6
UHC	1.9	3.7	0.7	0.3	1.3	0.8	0.7	1.4	1.9	1.3	1.6
RHC	6.2	2.3	7.7	11.2	2.0	6.9	6.7	16.4	7.8	12.5	6.6
HP	7.5	3.6	7.0	6.3	3.2	6.0	5.8	6.8	7.5	13.6	6.1
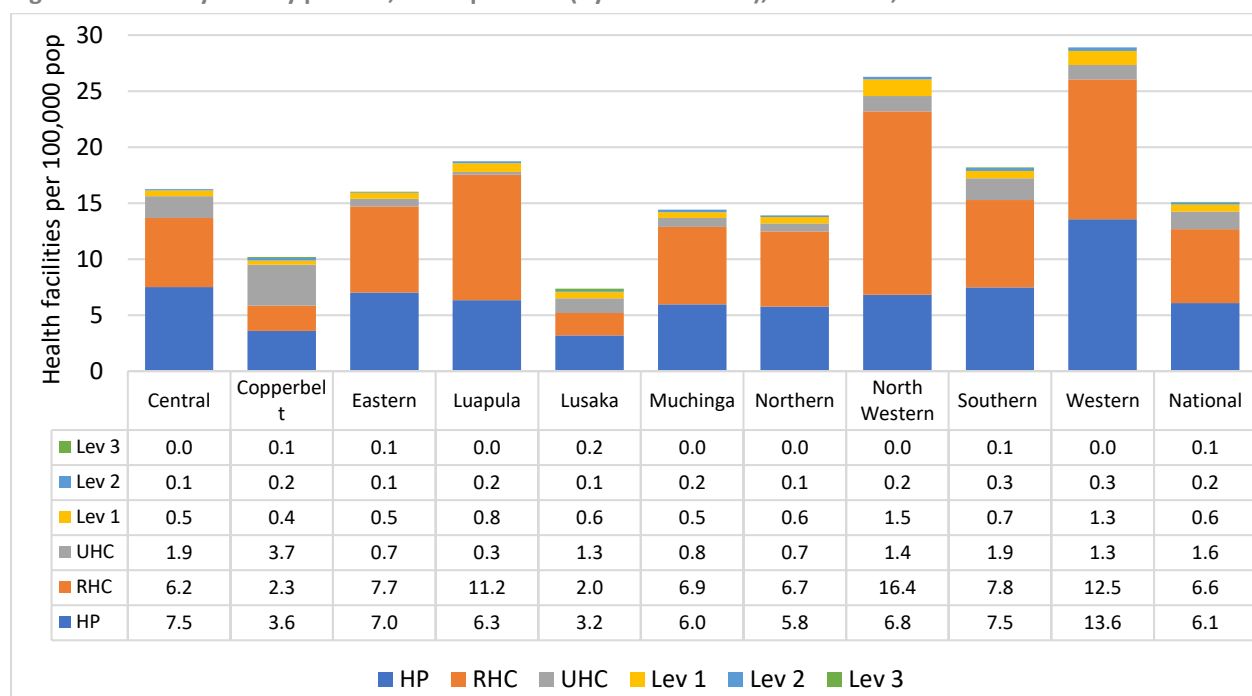
Inpatient bed density

Inpatient bed density is an indicator of access to inpatient services. It's computation usually includes paediatric beds (cots) but excludes maternity beds. The target in Zambia is to have 16 beds per 10,000 population by 2018. Data on inpatient beds are available for the year 2017 and this shows that the health facility density in Zambia was 17.3 per 10,000 population which is higher than the NHSP target (Figure 7.9). Health facility density is considered one of the stable indicators, i.e. its value tends to remain similar over time unless there has been massive investment in inpatient beds. It is therefore likely that the health facility density in Zambia during the review period is not any different from the 2017 value. As was the case with health facility density, provincial differences in bed density were quite large, with about threefold relative difference between the top and bottom province. North-Western province had the highest bed density per 10,000 population (32.1), followed by Western (23.7) and Luapula (19.8). Northern Province had the lowest bed density per 10,000 population (12.6), followed by Muchinga (12.9) and Lusaka (13.8).

Figure 7.9: Inpatient bed density per 1000 Persons, National Health Facility Census, 2017
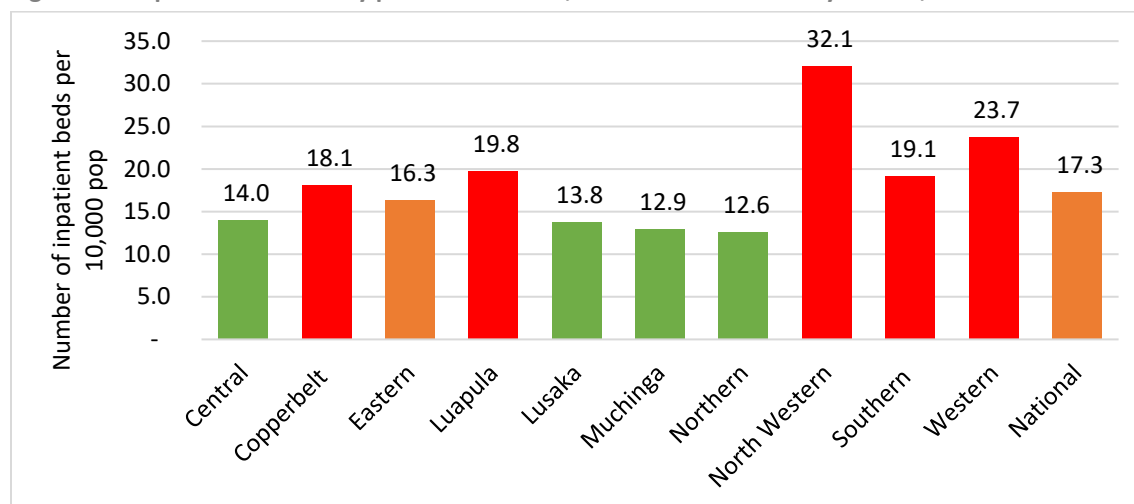
Blood donations

Zambia planned to increase the blood donation rate per 1,000 population by 15%, from 9.2 in 2017 to 10.7 in 2018. As shown by Figure 7.10, this target was not met. The blood donation rate in Zambia has largely remained stagnant at around 7 per 1,000 population.

Figure 7.10: Blood donation rate per 1000 persons, ZNBTS data, 2013-2018
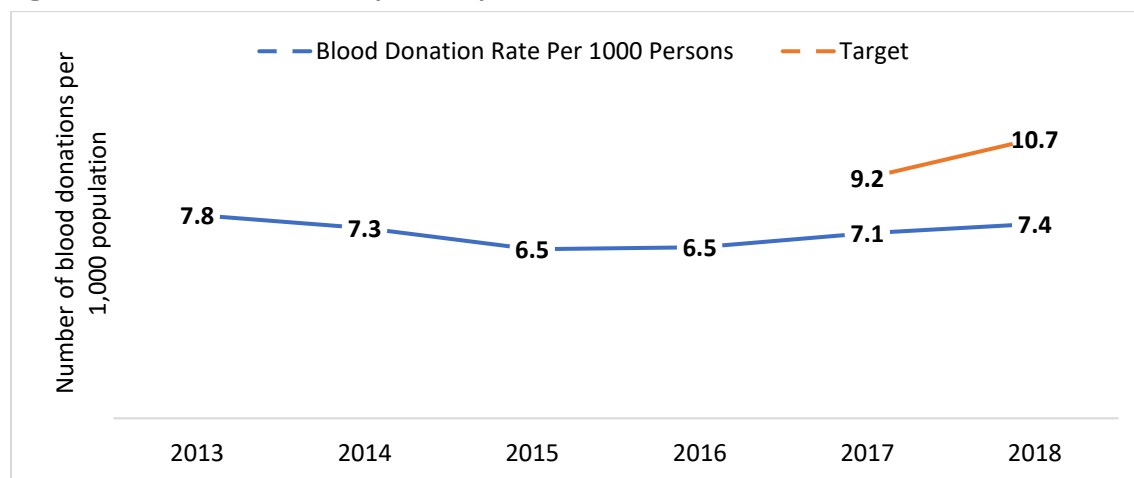
Outpatient utilization

Outpatient utilization rate or number of outpatient visits per capita per year refers to the number of visits for ambulant care, not including immunization, over the total population. In countries of the Organisation for Economic Co-operation and Development (OECD), the average number of physician consultations per person per year is about six. WHO's service availability and readiness assessment (SARA) proposes a benchmark of five visits per person per year.

The number of visits to OPD increased from about 20 million in 2016 to over 22 million in 2018. This translates into 1.3 visit person per year with little change over time (Figure 7.11). The highest OPD utilization rate were reported in Western province (2.2), followed by North Western (1.9) and Eastern (1.8). The figures for Copperbelt and especially Lusaka are low, which is due to the lack of data on private sector service utilization.

Figure 7.11: Number of outpatient department (OPD) visits per person per year, HMIS, 2016-2018
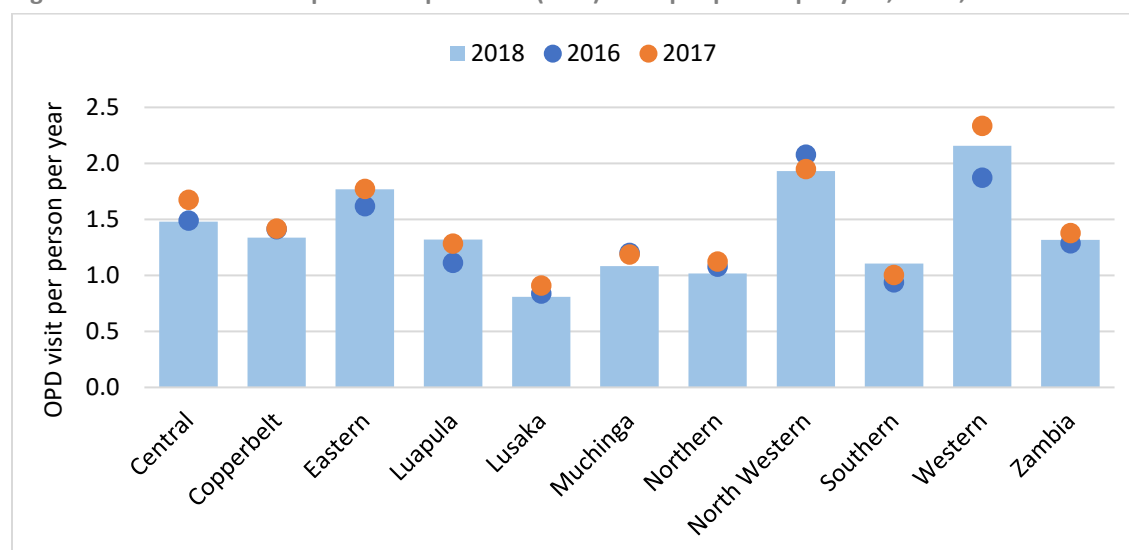
NHSP has a different indicator which is more subject to bias. The indicator refers to OPD utilization among the catchment populations. The target in Zambia is 3.5 outpatient visits per person per year. There were 3.8 outpatient visits per person per year in 2018. This however represents a 10% decline from 4.2 in 2016. The quality of these data is not clear, as the rates differ greatly from the overall OPD utilization rates.

7.4   Health information system

Main points

- Regular surveys are conducted including: DHS every five years, malaria and HIV surveys and a recent NCD survey, as well as a national health facility census in 2017 (public sector).
- Completeness of reporting in HMIS, using a single form for each facility, is high (> 90%), but data element completeness could not be assessed. Private sector reporting is very poor and also larger health facilities tend to underreport.
- Data quality in HMIS as assessed by extreme outliers, consistency over time and consistency between reported events was generally good, but 2018 showed less consistency than preceding years.
- Coverage of birth registration remains low at only 14.8%, well below the target of 20.4%. Death registration system was only operational from 2016, and coverage of deaths by the civil registration system remains a test for a good coverage.
- The Ministry of Health has a data warehouse and integrating other reporting systems is in progress.
- The proportion of health facilities using EHR was 879/2698 or 31%, a slight increase from the target set. It is important to note that the proportion of facilities with E-first, implying all service points uses electronic data, is at 228/879 or 13%.

NHSP Targets and indicators

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Health information system				
Coverage of birth registration (%)	14	20.4	14.8	Computed with estimated births in 2018; must strengthen Civil registration system.

Indicator	Baseline (year)	Target 2018	Achievement (source)	Comments
Coverage of death registration (%)	N/A	N/A	13	
Existence of a functional integrated data repository	N/A	N/A	Available	The data warehouse is not fully operational; Other service areas not stored in the data warehouse must be included.
Proportion of hospitals using correct ICD coding (%)	N/A	20	13	Inadequate ICT equipment has contributed to the low use of the ICD10 coding.
Coverage of IDSR surveillance systems (%)	25	55	100	All the districts are using IDSR for reporting weekly and monthly.
Presence of comprehensive country health database for the past 5 years	N/A	N/A	Available	The Ministry has implemented the DHIS2 for routine health information system. other data bases also exist such as Human Resource Information System (HRIS), Logistimo, EMLIS, and planning and budgeting tool and NAVISION for expenditure reporting.
Completeness levels of facility reporting (%)	80	84	90.3	The report completeness has shown improvement due to enhancement systems that monitor data entry; timeliness still remains a challenge.
Data accuracy levels of facility reporting (%)	50	54		Accuracy is partly established by verification of data in site visits to selected health facilities; indicator difficult to capture but estimates can be obtained from programmes such as HIV, TB and Maternal Health.
Proportion of health facilities with functional EHR (by level of care) (%)	20	32	31	879/2698 are using EHR while 228/879 facilities are E-first facilities.

Data sources and quality. The national surveys are of good quality and generally give consistent results. The HMIS was evaluated extensively and the results are shown in the Appendix of this report. In general, the quality of data is good, but 2018 was not as good as the previous years. Birth registration coverage survey of 2017 and administrative reports from the Department of registration and passports. The vital registration from the civil registration system was of high quality, and the data contained in the birth and death registers under the registrar's General office.

Birth and death registration

The Ministry of Home Affairs is mandated by law to record events such as births, marriages, and deaths through a civil registration system. The Ministry of Health works in collaboration with the Ministry of Home Affairs to develop comprehensive capturing of births through the civil registration system. Prior to 2015, most births were recorded through a paper-based system. Table 7.3 depicts trends in the number of births recorded from 2013 to 2018. It is evident that from the table there as an increasing trend from 2013 to 2018. The biggest increase was recorded by Lusaka from 313 in 2013 to 37292 births. Eastern province recorded a lowest increase in births record from 2361 in 2013 to 3107 in 2018.

Table 7.3: Number of births registered by province 2013-2018, Ministry of Home Affairs administrative reports

Province	Annual Births Registered					
	2013	**2014**	**2015**	**2016**	**2017**	**2018**
Central	2030	1562	3808	18280	13748	6426
Copperbelt	363	4499	12846	14775	16438	10205
Eastern	2361	10593	5290	7459	22597	3107
Luapula	582	7364	4754	9043	3807	1572
Lusaka	313	5883	22195	37726	28462	37292
Muchinga	63	6737	3179	2109	1385	2913
Northern	107	823	875	2078	2864	3068
North Western	140	1255	1423	1550	430 8	4413
Southern	973	4801	2851	7025	8964	6493
Western	1179	2144	3752	3403	2243	3060
Zambia	8111	45661	6973	98448	104816	78549

Source: 2018 administrative reports (Ministry of Home Affairs)

Births Coverage 2018
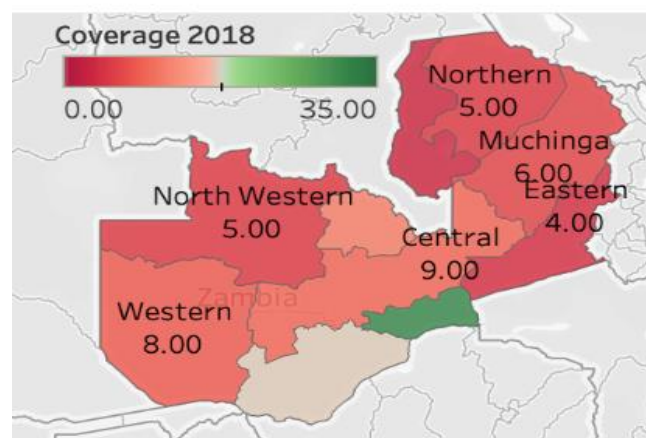
The coverage of deaths registered by a vital registration system was estimated at 14% in 2018. The coverage was computed out of the estimated number of deaths with regard to the deaths registered. There was however a falling proportion of deaths registered, from 19% in 2016 to 15% in 2018 and 14% in 2018.

Hospitals using correct ICD coding

The *Event Capture* application in DHIS2 enables registering of events that occurred at a particular time and place. An event can happen at any given point in time and is linked to a particular programme. This is in contrast to routine data, which can be captured for predefined, regular intervals. Events are sometimes called cases or records. By June 2019 only 25 hospitals out of 135 hospitals reported using ICD10 in events. Plans are under way to enhance the use of either, SmartCare or use of the Events application through capacity building and deployment of ICT equipment.

Coverage of integrated disease surveillance and response (IDSR) systems

A system of disease surveillance is implemented by the Zambia National Public Health Institute (ZNPHI) that has been established to improve disease surveillance and intelligence in disease response to outbreaks and other occurrences of public health importance. This is accomplished through establishing and running a network of public laboratories. These functions feed into the Ministry of Health to allow the Ministry to translate public health security data into effective action. ZNHPHI has set up systems at district level in all the provinces. The districts report weekly through dhis2 and are being monitored by a team of M&E officers and Public Health works. By the end of 2018, all districts had an IDSR system set up and reporting effectively. The country recorded 80% coverage in IDRS for report completeness with central province recording the highest at 95%.

Completeness levels of facility reporting

Report completeness is one of the key components of data quality, as validity and reliability are not guaranteed if the reports are not complete. Report completeness was defined as the number of reports received from health institutions (i.e. health centres and hospitals) during a given period of time per the number of reports that are expected during the same period. The main purpose of this indicator is to increase the quality and completeness of routine health information systems. The target for report completeness in line with the NHSP was set at 84%. Figure 7.12 and Figure 7.13 show the report completeness for 2018. Only Western province was below the target of 84% completeness in the HMIS- HIA 2. For details on the data quality, see Appendix.

Figure 7.12: Report completeness (percent of facility reports received) of the IDSR System, 2018 Annual IDSR report

85
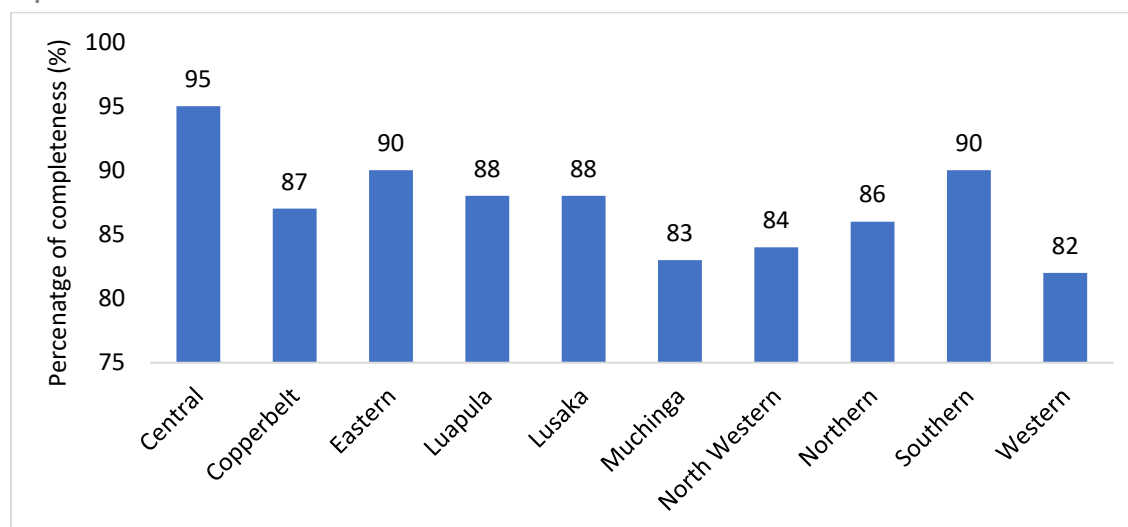
Figure 7.13: Report completeness by province Zambia, HMIS HIA 1 and HIA 2, 2018
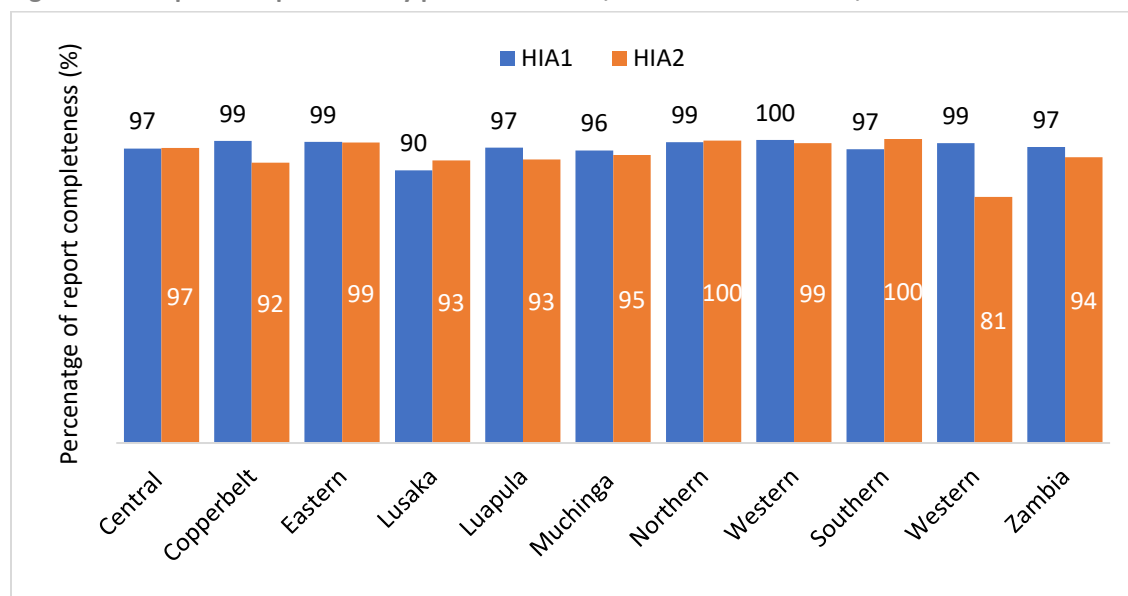
Presence of comprehensive country health database for the past five years

The Ministry has implemented the DHIS2 for a routine health management information system (HMIS). Almost all programmes use DHIS2. The system still has to mature, as the extraction of data appears complicated and is taking considerable time, at least as part of this review. There is limited sharing of access outside the MoH, which is a major limitation to enhance use of this rich source of data. Other databases also exist such as Human resource information system (HRIS) and Logistimal EMLIS but still need to be integrated with DHIS2.

Figure 7.14 presents an increase in the number of health facilities with electronic health records (EHR). The indicators were defined in line with looking at the facilities with a functional SmartCare. The facilities under private were not included in the computation. There was a sharp increase in the facilities with EHR from 18% in 2015 to 28.5% in 2017, and to 31% by 2018.

Figure 7.14: Proportion of health facilities with functional EHR (by level of care), 2015-2018
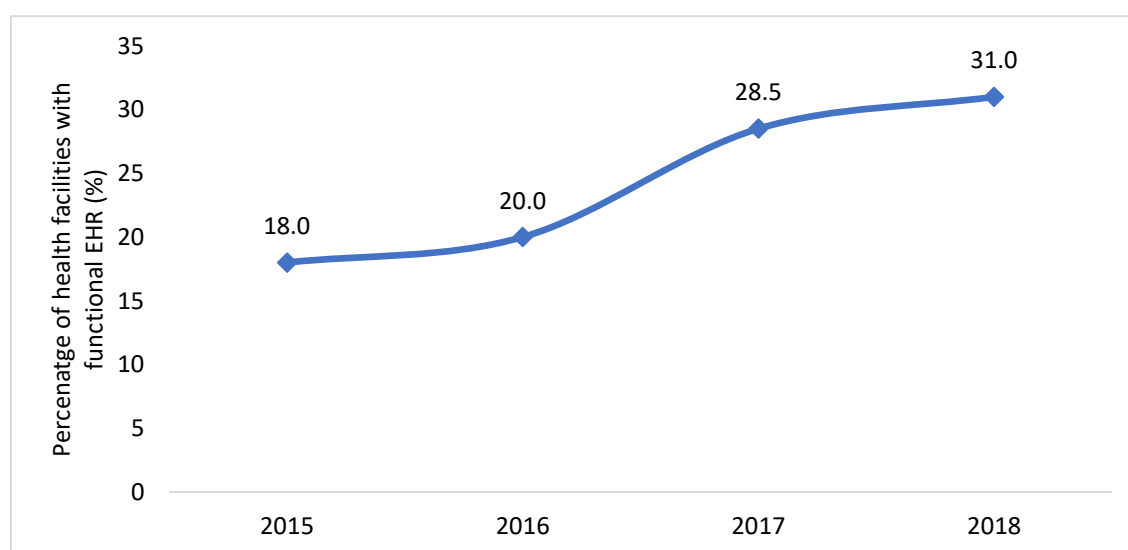
Recommendations on health information system:

1. Develop and implement framework to capture health information provided from the private sector for all indicators.
2. Operationalize the data warehouse and define levels of access to data.
3. Analysis of the performance of NHSP should include the district level where disaggregated data is available.
4. Targets should be set and mid-term achievement to serve as baseline for indicators that have no baseline.
5. Strengthen civil registration systems to collect good quality data on causes of death.
6. Streamline DHIS 2 to collect relevant to data for both programmatic and NHSP indicators and extend the reporting into DHIS2 to hospital levels.

8.   Equity and comparative analyses

8.1   Socioeconomic and rural-urban equity analysis

Main points

- Rural women and children are generally at a disadvantage compared to their urban counterparts, though inequalities appear to have lessened between 2013/14 and 2018 (among births within the previous five years). The urban rural gap in Zambia is fairly large for stunting in childhood and coverage of RMNCH interventions but there is some evidence of a reduction of the gap between the ZDHS 2013/14 and 2018. For malaria interventions the urban rural gap increased.
- Prevalence of HIV and obesity/overweight among adult women was higher in urban women compared to rural women and the gap did not greatly change for HIV, while for obesity the gap increased slightly.
- Comparing women and children in the poorest and richest households (according to wealth quintiles), there is reducing inequality in neonatal and under-five mortality rates in the past five years. Still, it was estimated that there was a higher rate of under-five mortality for those of lower compared to higher education and wealth groups among births in the five years previous to 2018.
- There was a much higher stunting rate among the poorest compared to the richest groups, which was widening over time. The malaria parasite prevalence also remained persistently higher among the poorest children.
- An inverse pattern of inequality persisted for HIV prevalence by wealth quintile, with the richest having higher prevalence than the poorest.
- The RMNCAH programme has been successful in reducing the intervention coverage gap as improvements were greatest among the poorest wealth groups.

Equity in health has been defined as the absence of systematic disparities in health or its social determinants between groups with differing positions in a social hierarchy[8]. This report describes the differences in key health indicators in the NHSP 2017-2021 between groups of people, based on socio-economic characteristics considered generally more or less disadvantaged, including rural versus urban residence to consider geographic inequities, and wealth quintiles or education level to examine socioeconomic inequities. The degree of equity will be described here in terms of the absolute difference in the rates among the urban versus rural, or highest compared to the lowest wealth or education groups, as shown in the equiplots.

Urban versus rural inequities

Between ZDHS 2007 and 2013/14, Zambia's neonatal and under five mortality rates (among births in the previous five years) reduced slightly more in urban than rural areas, as the inequity grew by 2 and 6 percentage points for NMR and U5MR respectively (Figure 8.1). Conversely, the neonatal and under-five mortality rates in ZDHS 2018 were estimated to be 4 and 6 units higher respectively among births in urban than in rural areas, although neonatal mortality rates in both regions were also higher.

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[8] Braveman, P. and S. Gruskin (2003). "Defining equity in health." *J Epidemiol Commun Health* 57: 254-258.

Figure 8.1: Rural-urban differences in neonatal and under-five mortality rates, ZDHS 2007, 2013/14 & 2018
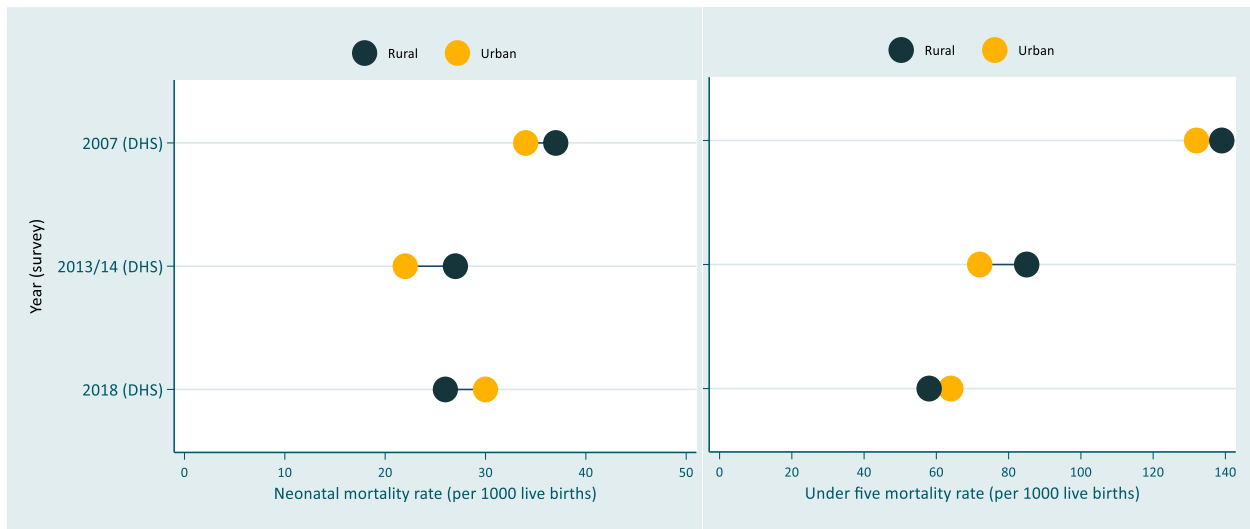
Stunting rates in rural areas decreased more than in urban areas, such that inequities reduced by 5 percentage points between 2007 to 2018, as shown in Figure 8.2. Family planning coverage increased more in rural than urban areas between 2013/4 and 2018, thus closing the gap by 5 percentage points. Full immunization coverage decreased more in rural and urban areas, but with small gaps that reduced by 7 points since 2013/14.

Figure 8.2: Rural-urban differences in stunting rates among children under five, ZDHS 2007, 2013/14 & 2018
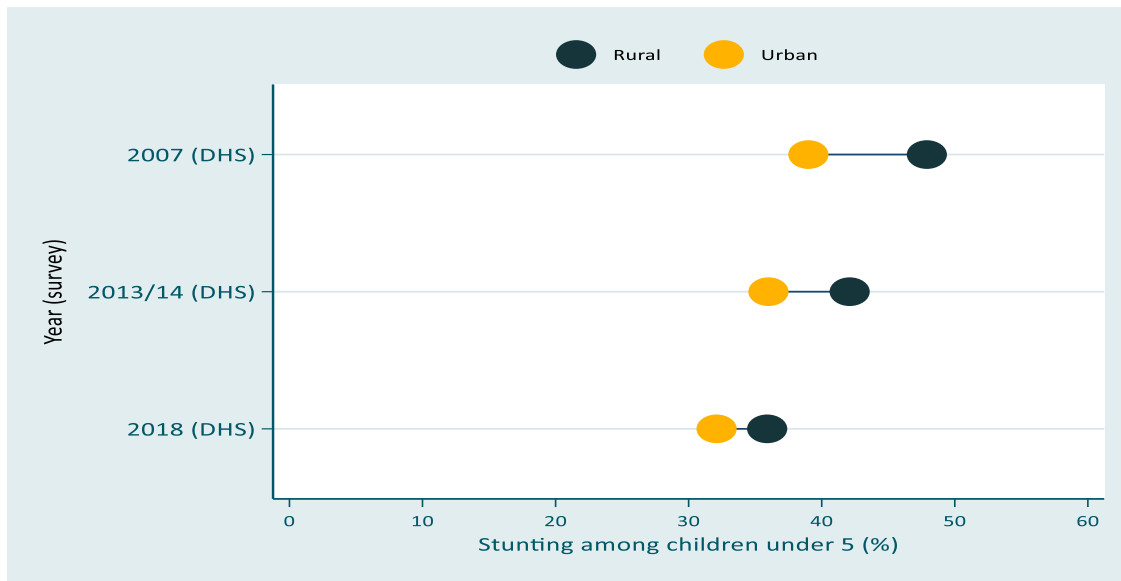
ANC intervention coverage was higher in urban areas in 2001 (ZDHS). By 2018, this had risen four percentage points higher in rural than in urban areas compared to 2013/14. Skilled birth attendance and postnatal care within the first 48 hours remained higher in urban than rural areas between 2007 and 2018 ZDHS. However, the rates increased more in rural areas so that the equity gap reduced by 30 percentage points and 18 percentages points respectively from 2007 to 2018 (shown in Figure 8.3).

Figure 8.3: Rural-urban differences in skilled birth attendance and postnatal care within 48 hours, ZDHS 2007, 2013/14 & 2018
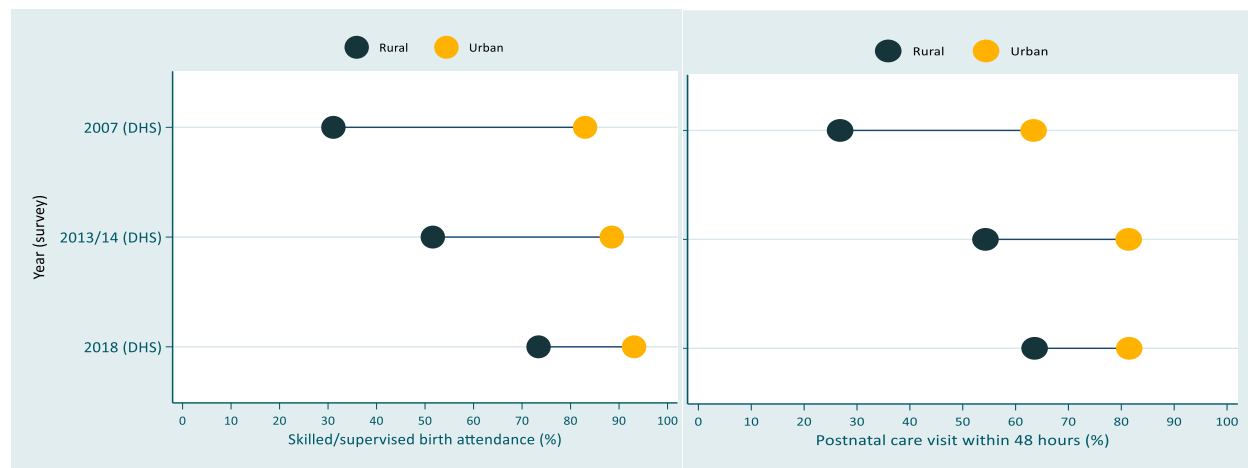
Overall, the RMNCAH composite coverage index (CCI) among people living in rural areas was low but increased more than in urban areas, such that the gap reduced from 13 percentage points in 2007 to 11 in 2013/14 and 5 in 2018 ZDHS, as shown in Figure 8.4.

Figure 8.4: Rural-urban differences in RMNCAH Composite Coverage Index, ZDHS 2007, 2013/14 & 2018
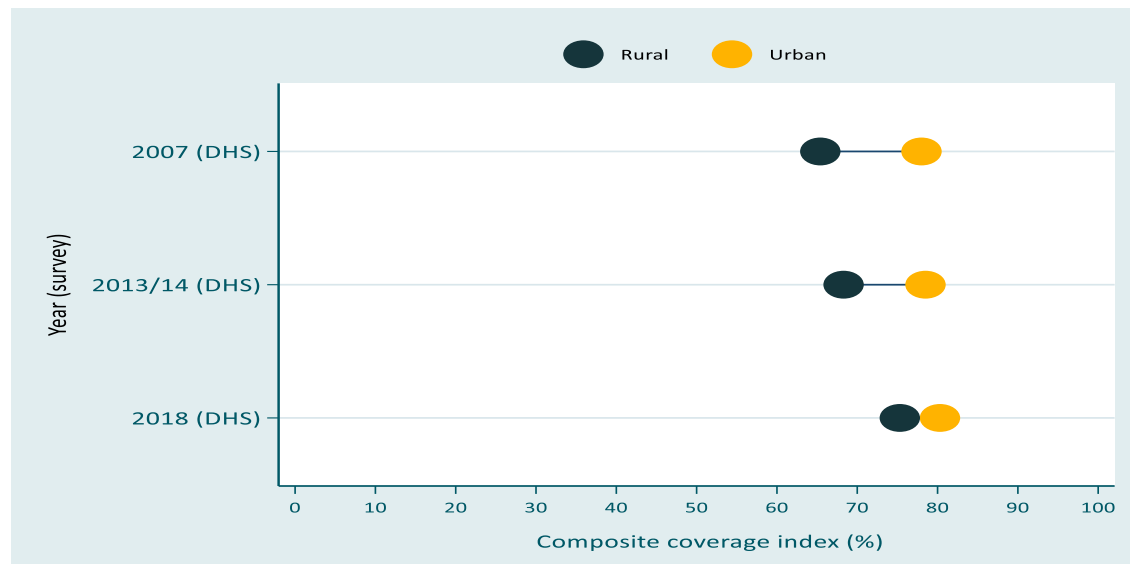
Regarding communicable diseases, HIV prevalence was higher in urban areas, showing a trend of reverse inequity for both men and women. This hardly changed between 2007 and 2018. In contrast, the prevalence of malaria was consistently much higher in rural than urban areas and the gaps increased from 8 to 18 percentage points higher between 2007 and 2018 ZDHS. Meanwhile obesity and overweight, being a risk factor for non-communicable diseases, were more prevalent in urban areas than rural; this pattern of reverse inequity increased in magnitude from 13 to 19 percentage points in the same time period.

Table 8.1 summarizes how rural-urban inequities in Zambia have changed over time, according to the last three rounds of the ZDHS (green means the gap between rural and urban groups reduced by five or more units; orange means it increased or decreased less than 5 units; and red means the gap increased five or more units). NMR and U5MR was found to be lower in rural than urban areas by 2018, reducing the equity gap since 2013/14. Stunting rates also reduced more in rural than urban areas. RMNCAH Intervention coverage improved noticeably more

among rural than urban areas. The prevalence of malaria remained higher in rural than urban areas and this gap increased, while the prevalence of HIV and obesity/underweight was higher in urban than rural areas. For HIV the gap did not greatly change, while for obesity the gap increased.

Table 8.1: Trends in inequities (percentage points) in selected health indicators between rural and urban areas, Zambia, ZDHS 2007, 2013/14 and 2018

Rate difference between rural and urban areas	ZDHS 2007	ZDHS 2013/14	ZDHS 2018	Change in inequities (2007-2018)	Change in inequities (2013/14-2018)
NMR	3	5	4	1	-1
U5MR	7	13	6	-1	-7
Stunting	9	6	4	-5	-2
TFR	10	12	7	-3	-5
Family planning coverage	10	12	7	-3	-5
Full immunization	5	10	3	-2	-7
ANC 4+	-3	0	-4	1	-4
SBA	52	36	20	-28	-16
PNC within 48 hours	36	27	18	-18	-9
RMNCAH CCI	13	11	5	-8	-6
Malaria prevalence	8	16	18	10	2
HIV prevalence, women	-12	-11	-11	1	0
HIV prevalence, men	-7	-7	-6	1	1
Obesity/overweight	-13	-16	-19	6	3

Socioeconomic status inequities

Inequities were also examined by socioeconomic status using wealth quintiles, and education levels where more reliable, to disaggregate the rates of selected indicators of health outcomes and intervention coverage. Inequalities in neonatal and under-five mortality between education and wealth groups appeared to be lower in 2018 ZDHS compared to previous rounds, and reversed for NMR since 2013/14 so that it was higher among women in higher than lower education and wealth groups (shown in Figure 8.5). NMR was lower for the two least educated groups but higher for the higher two educated groups.

Figure 8.5: Education level differences in neonatal and under-five mortality rates, ZDHS 2007, 2013/14 & 2018
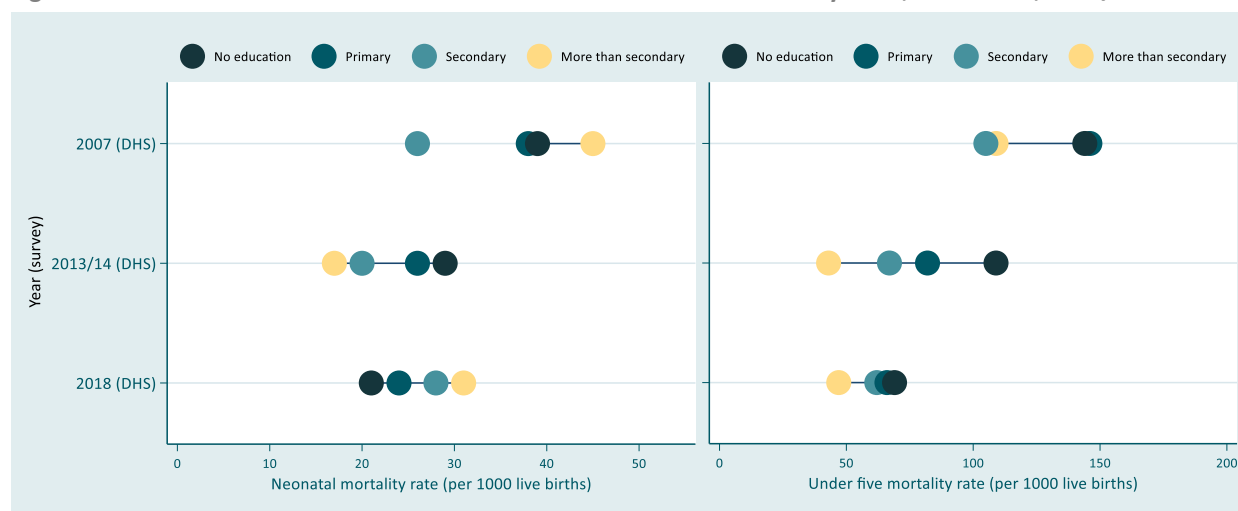
Stunting among children under five remained much higher among the four poorest than the richest group, as the absolute rate difference stayed between 15 to 20 percentage points between 2007 and 2018 ZDHS, as shown in

the Child health and nutrition section. This revealed a top pattern of inequality that suggests a cumulative degree of deprivation for a large proportion of the population.

In terms of coverage of RMNCAH interventions, having four or more ANC visits was 10 to 14 percentage points lower among the four poorer wealth quintiles than the highest wealth quintile. However in 2018, there were minimal differences among wealth groups, as shown in Figure 8.6. Skilled birth attendance and receipt of a postnatal care visit within 48 hours were increasingly common among the wealthier than less wealthy quintiles, however these gaps reduced significantly (by 35 and 21 percentage points respectively), between 2007 and 2018 according to the ZDHS.

Figure 8.6: Wealth quintile differences in coverage of four or more ANC visits, ZDHS 2013/14 & 2018
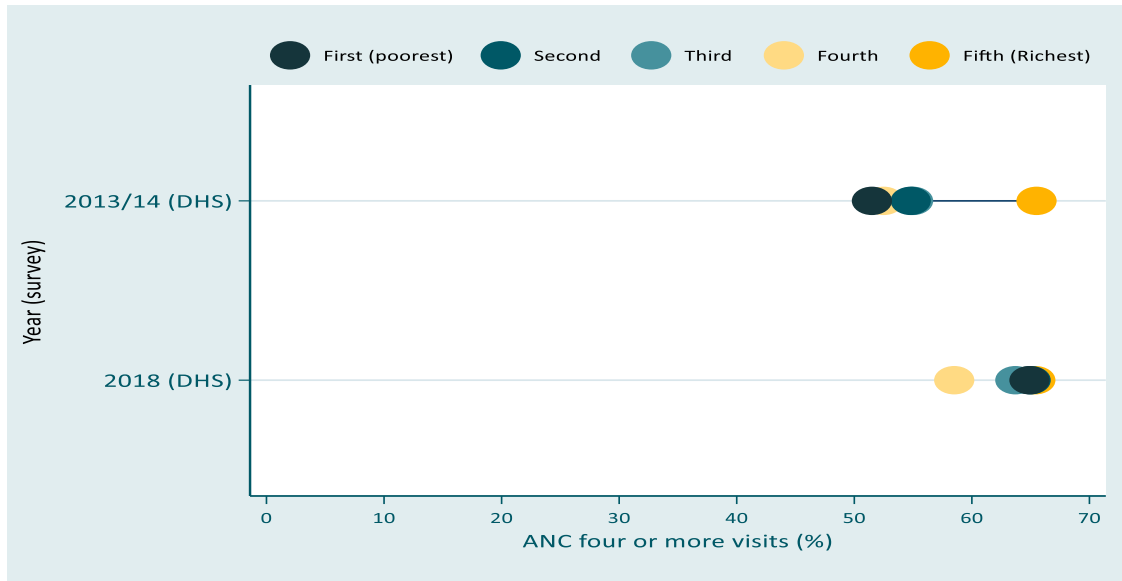
Overall, the RMNCAH CCI was also higher among the poorer wealth quintiles but the inequities reduced somewhat between 2007 and 2018 ZDHS rounds by around 4 percentage points, as shown by Figure 8.7.

Figure 8.7: Wealth quintile differences in RMNCAH Composite Coverage Index, ZDHS 2007, 2013/14 & 2018
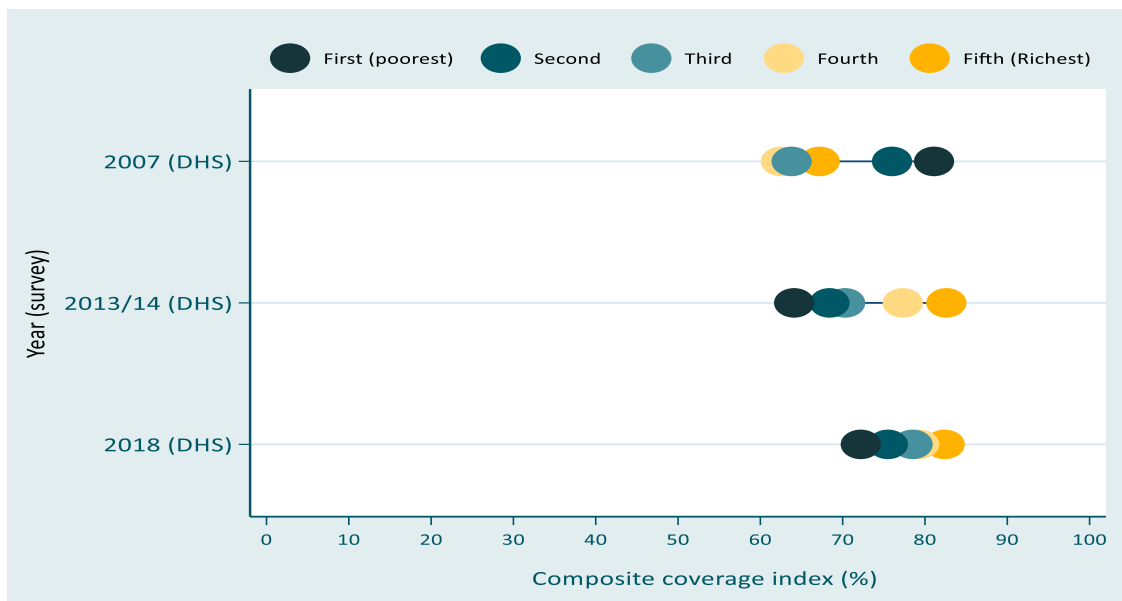
In terms of communicable diseases, malaria remained much more prevalent among the poorest than richest wealth quintile and the inequities appeared to increase between the 2008 and 2018 ZMIS. However, some measures of coverage of malaria prevention interventions appeared to become somewhat more equitable, as in 2008 the coverage was higher among the richer groups, and by 2012 and 2018, they were higher among the poorer groups, suggesting greater targeting to those with greater malaria risk (Figure 8.8 below).

Figure 8.8: Wealth quintile differences in the prevalence of malaria and coverage of ITN last night among children, MIS 2008-2018
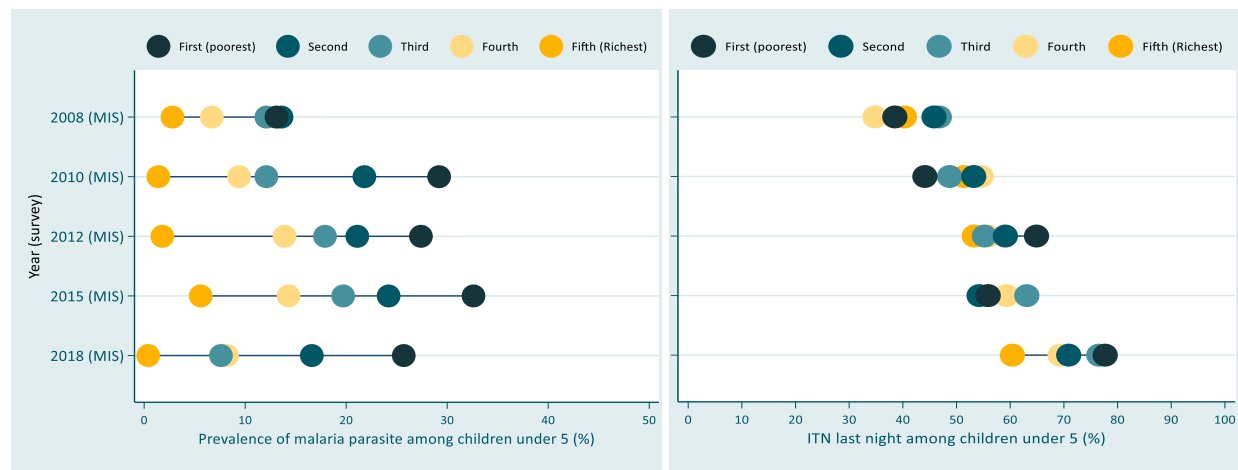
Unlike for malaria, HIV prevalence was higher among the wealthier quintiles for both women and men. Yet the trends appeared divergent, as for men the prevalence reduced for all but especially the richer quintiles, while for women the gaps and prevalence remained fairly constant between ZDHS 2007 and 2018 (Figure 8.9).

Figure 8.9: Wealth quintile differences in HIV prevalence among women and men aged 15-49, ZDHS 2007, 2013/14 & 2018
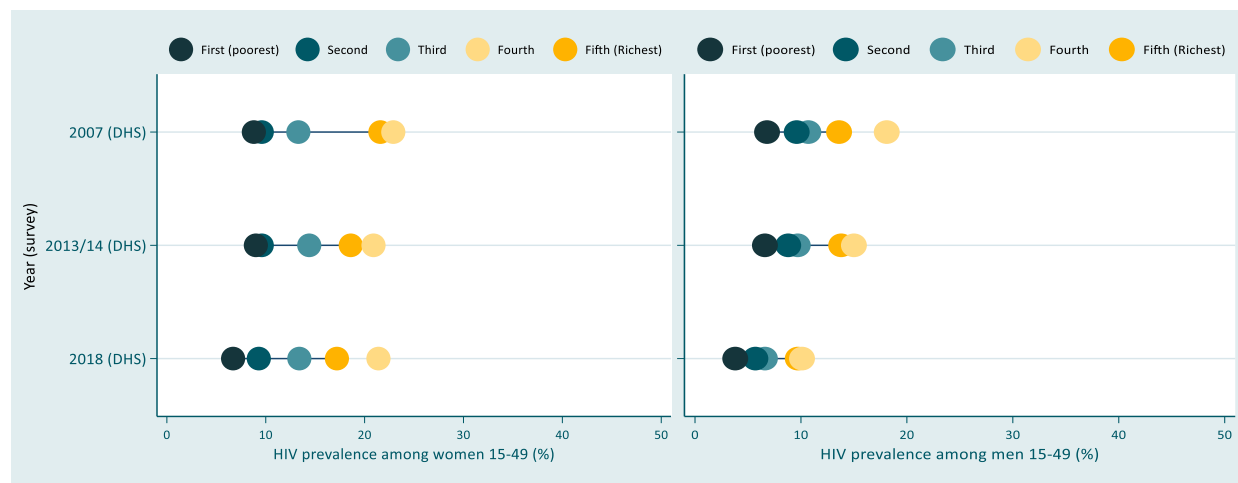
Obesity and overweight also showed a pattern of reverse inequity, in which the wealthiest quintiles had a much higher prevalence that remained almost constant between the last two ZDHS rounds.

To summarize the trends in socioeconomic inequities, Table 8.2 shows that inequities in NMR and U5MR reduced between 2007 and 2018, such that the NMR became somewhat higher among more than less educated groups, and U5MR was more similar though still higher among women in lower compared to higher education groups. Stunting was higher for poorer than richer groups and the gap widened (unlike for rural and urban). However, the CCI for RMNCAH interventions improved more for lower wealth groups and thereby reduced the gap, as for rural-

urban disparities. However, the malaria prevalence remained higher for lower wealth groups and the gap did not greatly reduce over time. Conversely, the prevalence of HIV and obesity/overweight remained higher for richer groups over time.

Table 8.2: Trends in inequities (percentage points) in selected health indicators between socioeconomic groups, Zambia, ZDHS 2007, 2013/14 and 2018

Rate difference between highest and lowest socioeconomic groups	ZDHS 2007	ZDHS 2013/14	ZDHS 2018	Change in inequities (2007-2018)	Changes in inequities (2013/14-2018)
NMR[a.]	6	12	10	4	-2
U5MR[a.]	33	66	22	-11	-44
Stunting	15	20	17	2	-3
TFR	NA	19	10		-9
Family planning coverage	14	23	12	-2	-11
Full immunization	7	17	6	-1	-11
ANC 4+	NA	14	0		-14
SBA	64	49	29	-35	-20
PNC within 48 hours	48	37	27	-21	-10
RMNCAH CCI	14	19	10	-4	-9
HIV prevalence, women	13	10	10	-3	0
HIV prevalence, men	7	7	6	-1	-1
Malaria prevalence	10	26	24	14	-2
ITN last night among children under 5 (malaria prevention intervention)	3	12	-18	-21	-30
Obesity/overweight	NA	27	28		1

[a.] The NMR and U5MR comparisons used education groups. NA=Data not disaggregated in that survey round.

Comparing people living in rural or urban areas and of lower to higher socioeconomic status, it appeared that inequities in RMNCAH intervention coverage indicators have reduced. Gaps in U5MR remained, though lower, and NMR appeared to increase among those living in urban areas, and in higher compared to lower education and wealth groups. This requires further investigation at a regional level to understand whether the benefits of improving equitable coverage may be countered by other health system, social, financial or geographic issues such as uneven access to quality care. Malaria prevalence was increasingly higher among poorer groups, while HIV and obesity/overweight prevalence were consistently higher among urban and more wealthy groups (reverse inequity). It appeared that malaria prevention intervention coverage (e.g. ITN among children) was increasing more among poorer groups, and thus it may be important to increasingly target prevention interventions for among rural and poorer areas where the prevalence of illness is highest.

8.2 Regional analysis

Main points
- Provinces varied greatly in their socioeconomic development in terms of the levels of poverty and education. Lusaka and Copperbelt had a greater proportion of the population with higher socioeconomic status, followed by Southern and Central. Eastern, Western, North Western and Northern provinces had more people with less education and higher levels of poverty.
- Provinces' rates of HIV, obesity/overweight and TB notification rates were highly correlated with its socioeconomic status, as those with wealthier populations had higher prevalence, while stunting rates were not correlated with socioeconomic status at the provincial level, and were highest in Northern and Luapula.
- The RMNCAH intervention coverage was highest in provinces that were more socioeconomically developed including Lusaka and Copperbelt, as well as Eastern despite having a lower socioeconomic status.

- Regarding measures of health system strength, OPD utilization rates generally improved in provinces with lower socioeconomic status (Western and Eastern, but also Southern with a higher socioeconomic status). Conversely, health workforce density was higher in provinces with higher socioeconomic status (Lusaka and Copperbelt), except in Western province where it was higher despite a lower socioeconomic status.
- Infrastructure strength (the density of beds and facilities) was higher in provinces with greater population density, which tended to be the more urban and socioeconomically developed provinces of Lusaka and Copperbelt.
- Provinces with higher workforce density and OPD attendance did not consistently have higher coverage of RMNCH services.

Regional analysis by socioeconomic level of development

In this section, health outcomes and intervention coverage are compared by provinces in Zambia and their relative level of socioeconomic development. To examine this, levels of poverty and education were compared in each province: poverty levels were based on the proportion of the population within the two lowest wealth quintiles (ZDHS 2013/14), and the education level was the mean number of years of education among all men and women in the sample population (ZDHS 2018).

The provinces' education and wealth levels were highly correlated (R^2=0.85), as shown in Figure 8.10 below. Lusaka and Copperbelt had the least poor (>5% in two poorest quintiles) and most educated populations (between 6-7 years), followed by Southern and then Central provinces. Eastern and Western had the poorest (70-85% in poorest two quintiles) and least educated (around 3 years), followed by North Western, Northern and Muchinga provinces. Luapula had lower education compared to poverty levels, but fell in the middle among the provinces.

Figure 8.10: Regional comparison of poverty and education levels by province, Zambia, ZDHS 2013/14 & 2018
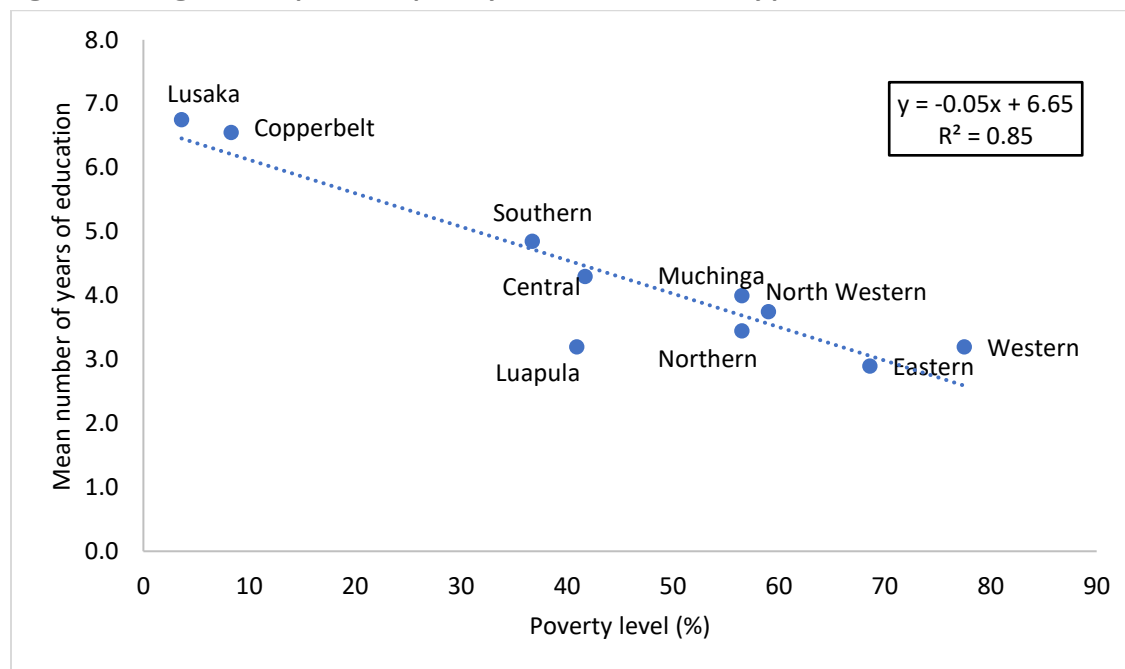
A summary measure of provinces' socioeconomic status was computed by taking the unweighted average based on the proportion of the population in the lowest two wealth quintiles and the mean number of years of education among men and women (multiplied by 10). This measure of provinces' socioeconomic status level is now compared by the regional prevalence of health status indicators, including communicable and non-communicable diseases, as well as stunting as a measure of child health and nutrition. Then it is examined in relation to indices of RMNCAH intervention coverage by province, followed by health system strength in the next section.

Health status indicators

Figure 8.11 below shows that provinces' HIV prevalence was highly correlated with its socioeconomic status (R^2=0.81). In this way, there was a higher HIV prevalence among provinces with wealthier populations (Copperbelt and Lusaka), and lower prevalence among the poorer provinces (eastern, North Western and Northern).

Figure 8.11: Regional comparison of socioeconomic development level and HIV prevalence among 15-49 year olds by province, Zambia, ZDHS 2018
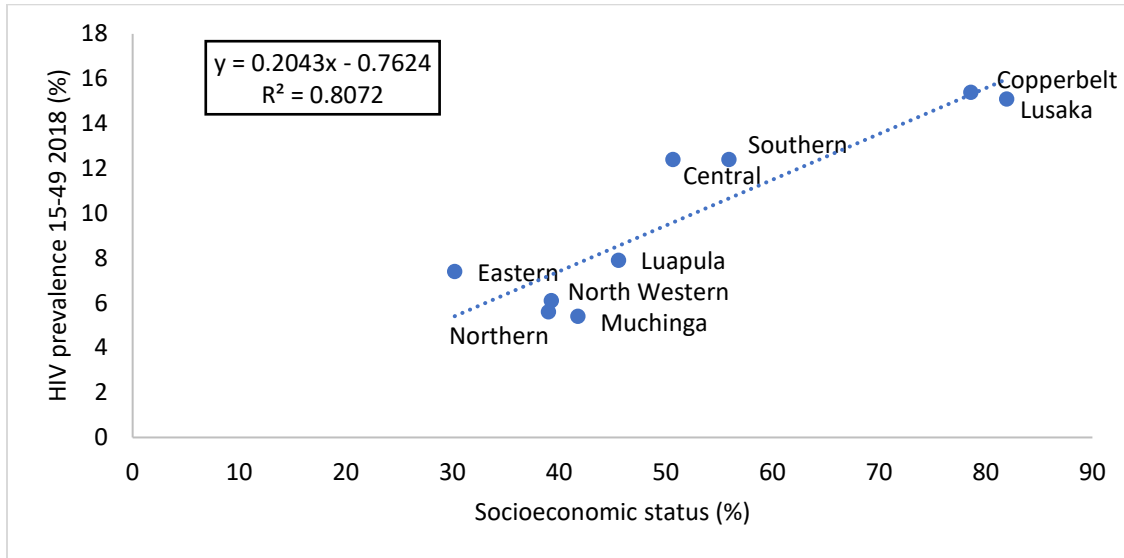
TB notification rates were also higher in more socioeconomically developed provinces (Figure 8.12). Higher HIV prevalence was also associated with higher TB notification rates in all provinces, though Lusaka was an outlier with a much higher TB notification rates compared to its to HIV prevalence level.

Figure 8.12: Regional comparison of HIV prevalence and TB notification rates by province, Zambia, ZDHS 2018
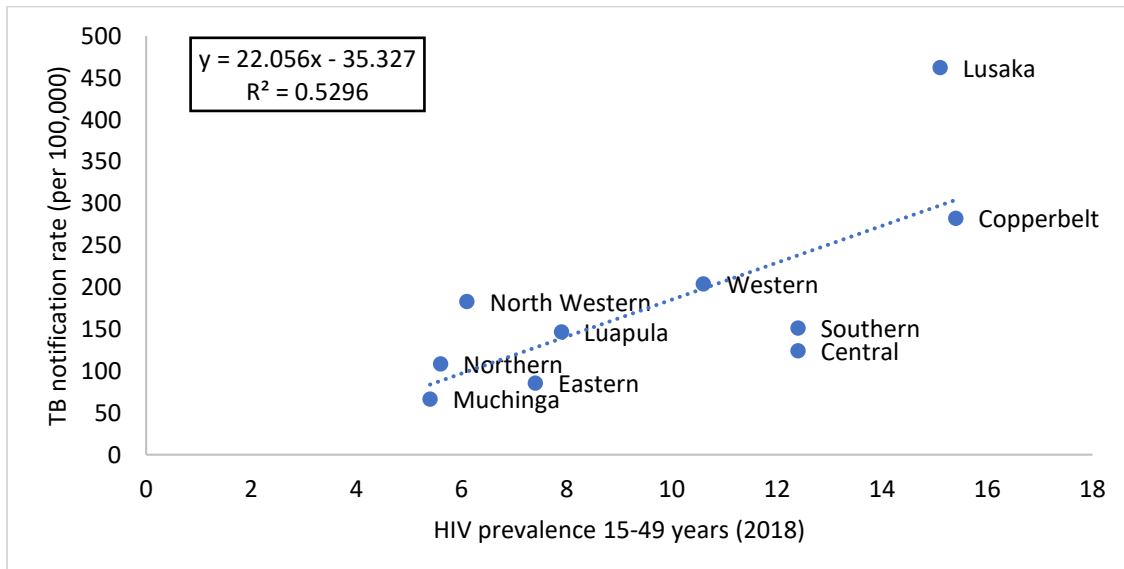
There was a strong correlation between higher socioeconomic status and higher prevalence of obesity/overweight by province (R^2=0.81), which is a known risk factor for a range of non-communicable diseases (Figure 8.13). Specifically, the wealthier provinces of Lusaka and Copperbelt had the highest prevelance of obesity and overweight while Western, Northern and North Western had the lowest prevalence.

Figure 8.13: Regional comparison of socioeconomic development level and overweight/obesity among women by province, Zambia, ZDHS 2018
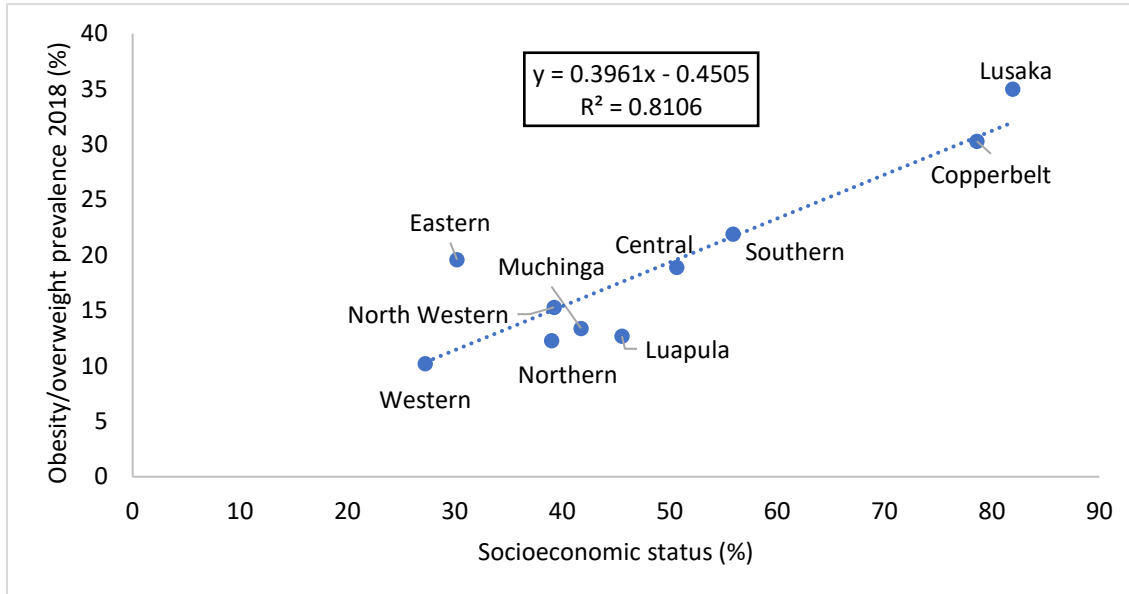
Regarding the prevalence of stunting among children under five by province, there was no clear correlation between a province's socioeconomic status and stunting, as shown in Figure 8.14 below. This is surprising as one would expect the urban provinces of Lusaka and Copperbelt to have lower levels of stunting. This requires further investigation.

Figure 8.14: Regional comparison of socioeconomic development level and stunting among children under five by province, Zambia, ZDHS 2018
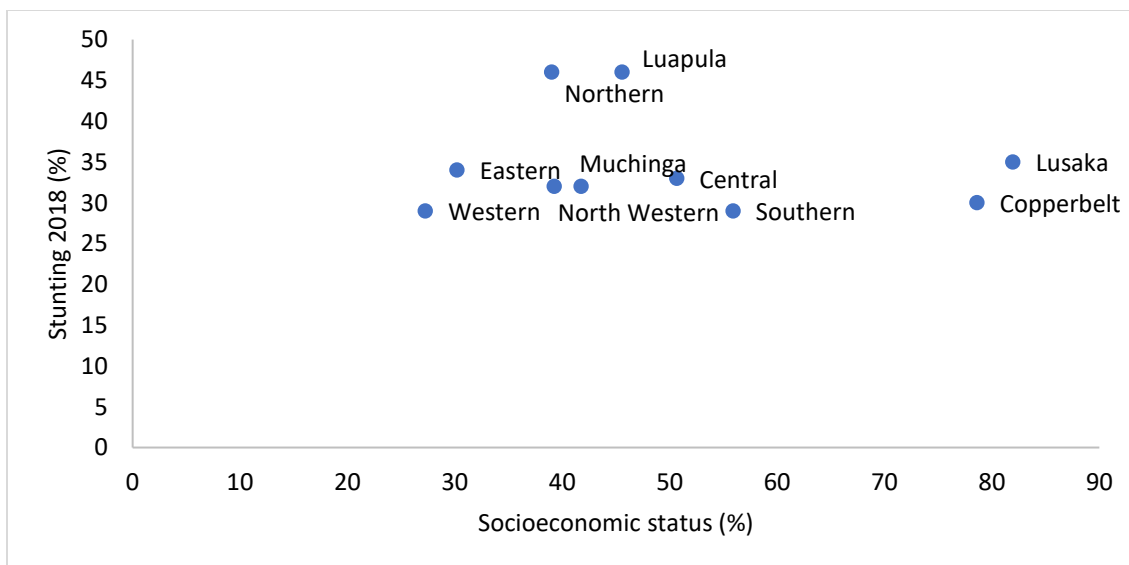
Figure 8.15 shows that in terms of absolute numbers of children who were stunted in each province, 60% of all stunting cases were found to be in Lusaka, Copperbelt, Eastern and Northern provinces (ZDHS 2018), suggesting that targeting interventions to reduce stunting in those regions could significantly reduce the proportion of children stunted in the country as a whole.

Figure 8.15: Number of children under five who were stunted and the cumulative proportion of children that were stunted by province, Zambia, ZDHS 2018
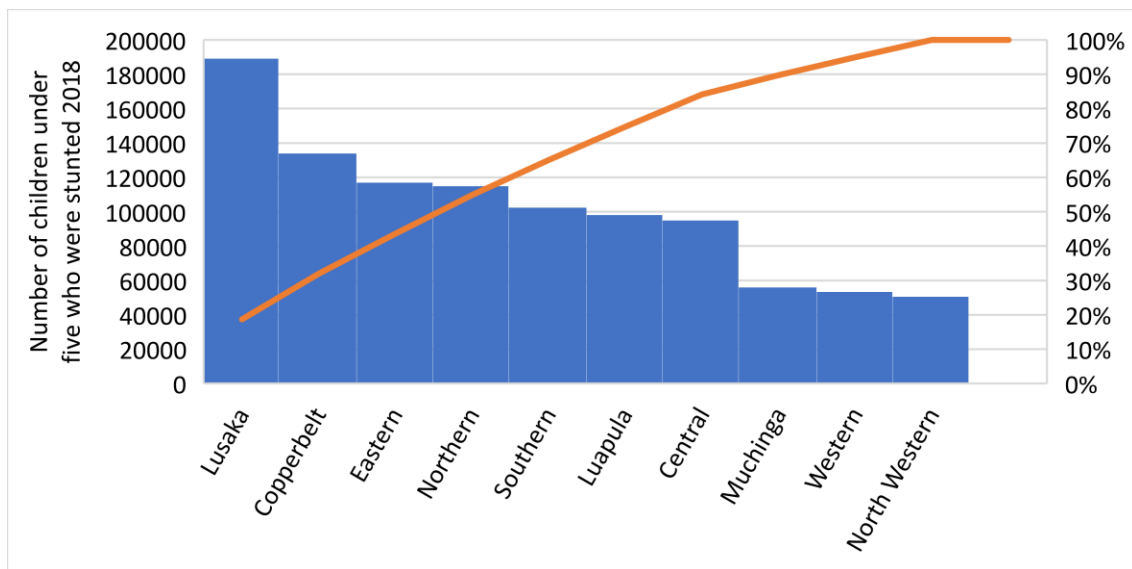
Coverage of health interventions

Looking at RMNCAH intervention coverage by province (Figure 8.16), the composite coverage index or CCI (taking the weighted average of eight indicators across the continuum of care; here using one ANC visit rather than four ANC visits based on available disaggregated ZDHS 2018 data) was higher among the richest but also some poorer provinces. Lusaka and Copperbelt had the first and third highest levels of coverage (85% and 83% respectively). Eastern province had the second highest coverage at 83%, though it had among the lowest levels of socioeconomic development. However, Western and Northern provinces with the lowest socio-economic development levels also had the lowest coverage indices, at 73% and 75% respectively.

Figure 8.16: Regional comparison of RMNCAH composite coverage index by province, Zambia, ZDHS 2018
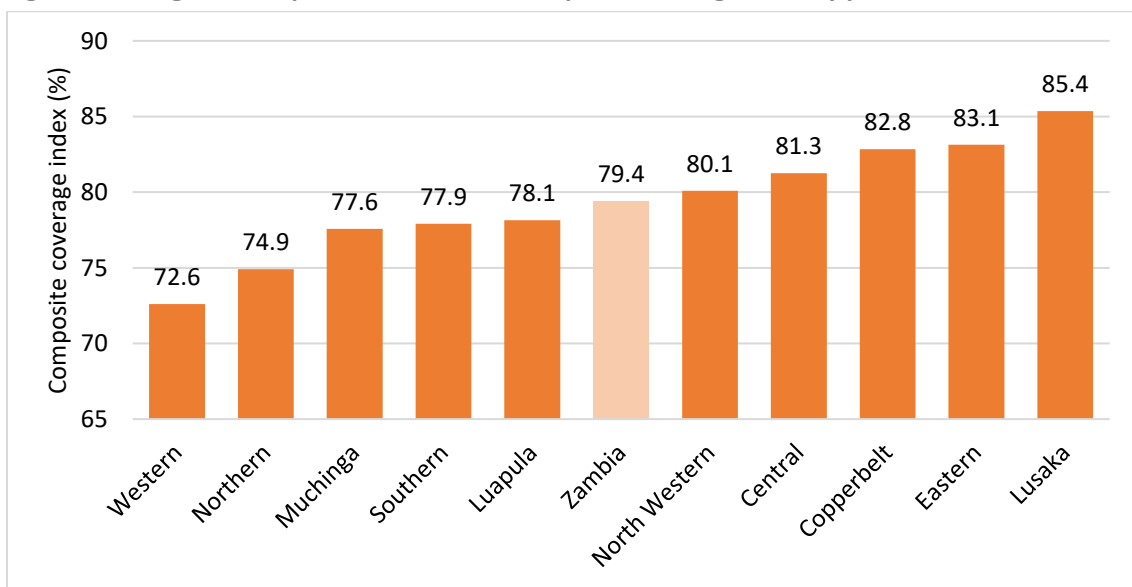
Comparing the trends in RMNCAH CCI between 2013/14 and 2018 by province, the improvements appeared to be greatest in Central, Muchinga and Northern provinces, while the smallest improvements were in Lusaka,

Copperbelt and Southern provinces where the levels were initially higher (Figure 8.17). This suggests it may be more difficult to continue improving the CCI where levels have reached a certain level.

Figure 8.17: Trends in RMNCAH composite coverage index by province, Zambia, ZDHS 2013/14 and 2018
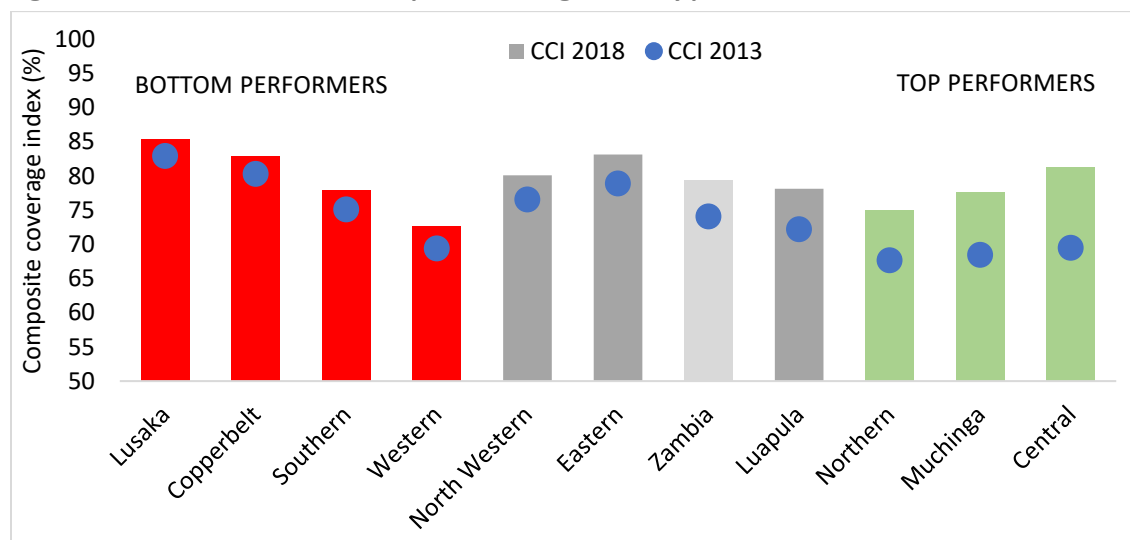
To further examine RMNCAH coverage by region in Zambia, a combined index was computed using 11 indicators of maternal and child health in the DHIS2 (HMIS) data for 2014-2018. This DHIS2-based RMNCAH coverage index combines the following indicators using an unweighted average: ANC first visit before 12 weeks, ANC 4 or more visits, IPT3, skilled birth attendance, C-section (with 15% as the maximum, equaling 100% coverage), fresh stillbirth rate as a proxy for the quality of intrapartum care (with 10 or higher per 1000 births as 0% coverage and 0 per 1000 as 100%), early initiation of breastfeeding (within the first 24 hours of life), postnatal care within 48 hours, penta3 vaccination, measles and PCV3 vaccination (unweighted).

The RMNCAH coverage index by province based on DHIS2 2018 data shows somewhat similar rankings as the CCI based on the ZDHS above, with Lusaka, Copperbelt and Eastern having the highest coverage (Figure 8.18). Western province is among the provinces with the lowest coverage, but was also accompanied by North Western and Central (which had higher CCI levels according to ZDHS data). The coverage index was 66% in Zambia overall.

Figure 8.18: RMNCAH 11-indicator coverage index by province, Zambia, HMIS 2018
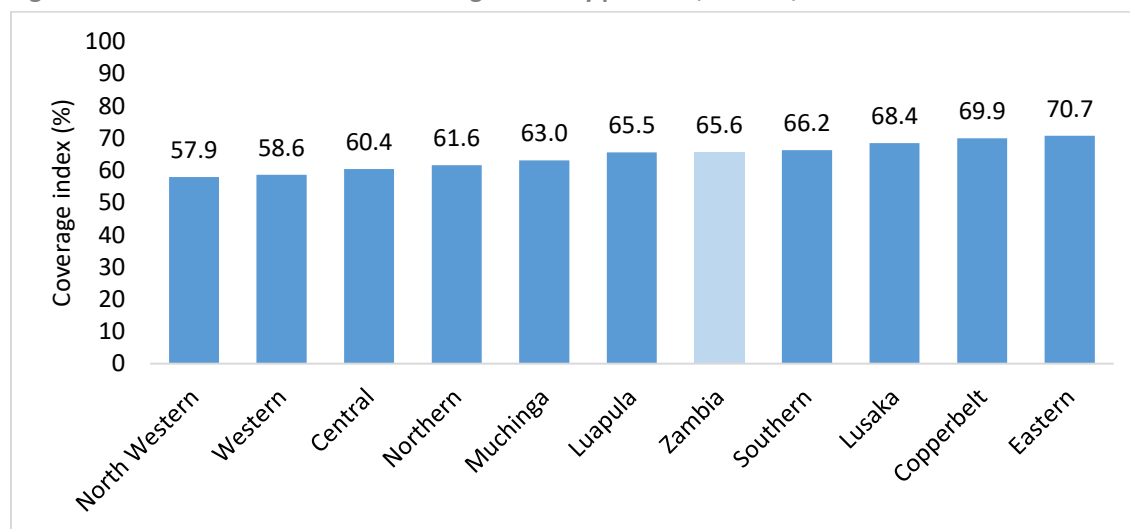
The abolute levels of improvement in this 11-indicator RMNCAH coverage index between the DHIS 2015/16 and 2018 rounds were ranked by province (Figure 8.19). The greatest increases in coverage occurred in Northern province (by over 10 percentage points), followed by Lusaka (7 points), then Luapula, Muchinga and Southern (each at 6-7). One caveat is that there is considerable uncertainty of HMIS data on Lusaka (private sector not reporting), so trends have to be interpreted with care. Zambia overall had a five percentage point improvement in coverage in that time period.

Figure 8.19: Trends in RMNCAH 11-indicator coverage index by province, Zambia, HMIS 2015/16-2018
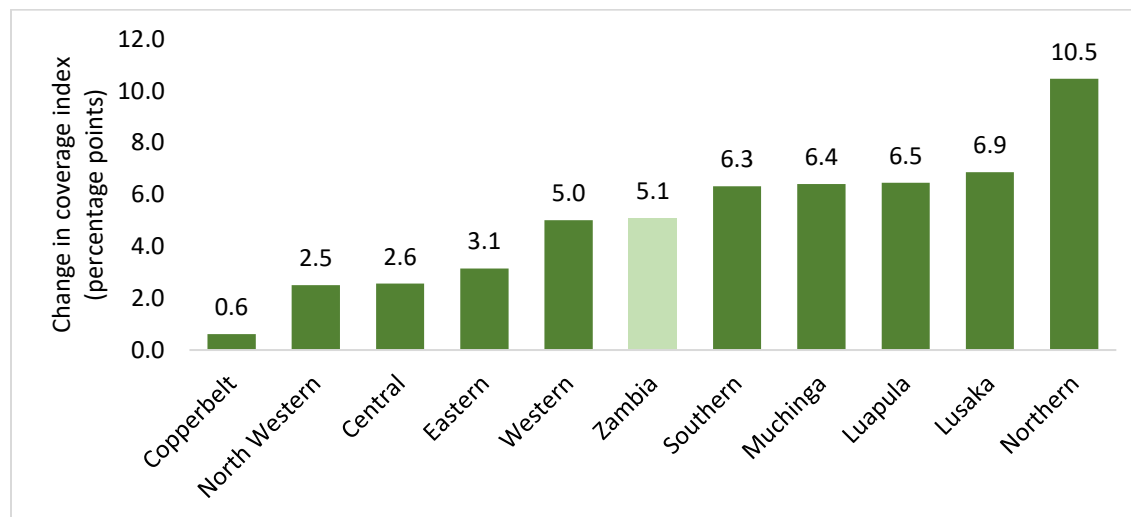
Regional analysis by health system strength

Finally, measures of health system strength within the public sector were assessed and compared with socioeconomic development levels in each province of Zambia. The first measure is the outpatient department (OPD) utilization rate per person per year. Overall, there was 1.3 visit per person per year in Zambia in 2018, with little change compared to the two preceding years. The OPD utilization rate was higher in Western, North Western and Eastern provinces, which also had lower levels of socioeconomic development. The OPD utilization rates increased slightly between 2016-18 in Western and Eastern provinces, as well as Luapula and Southern, but declined in North Western, Lusaka, Muchinga and Northern (Figure 8.20).

The density of health workforce per 10,000 population also appeared to be strongly correlated with the socioeconomic status by province (R^2=0.47). In particular, provinces with a higher degree of socioeconomic development had higher densities of the health workforce (Lusaka and Copperbelt, also being more urban), while those with lower development had lower densities of health workforce. This was not uniform, as Western province had a relatively higher health workforce density while having a greater proportion of people having a lower socioeconomic status.
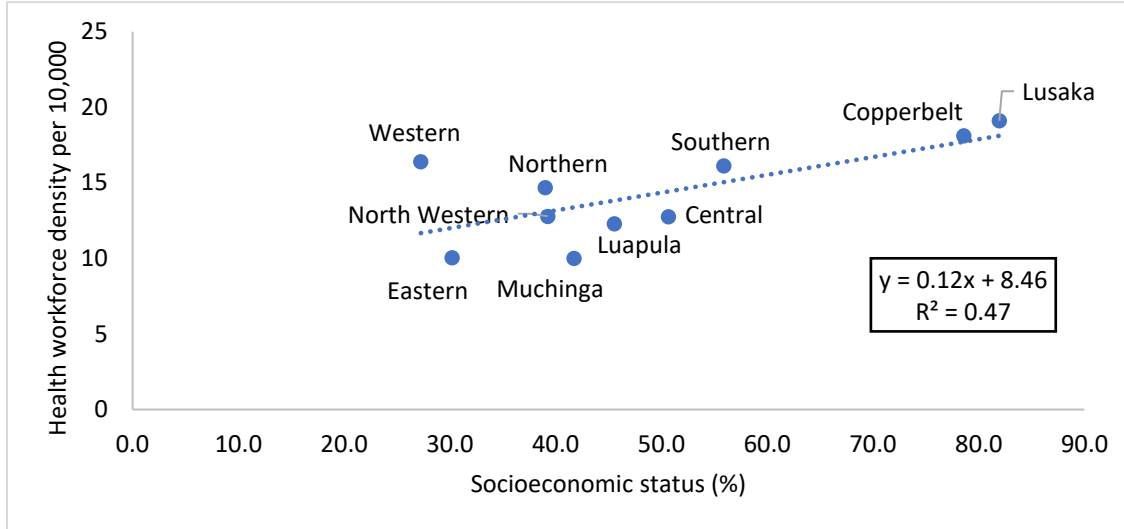
Comparing provinces' relative health workforce density with a measure of their infrastructure strength (sum of the density of beds and facilities), there appeared to be little correlation and no great differences across provinces (Figure 8.21). Lusaka and Copperbelt, with high health workforce density, had relatively lower density of beds and facilities. Comparatively, Northern and Western provinces had high bed and facility densities as well as moderately high ranking on health workforce density. Eastern and Muchinga provinces had relatively lower health workforce density as well as infrastructure strength.

Figure 8.21: Comparison of infrastructure strength and health workforce density by province, HMIS 2018 and national health facility census 2019
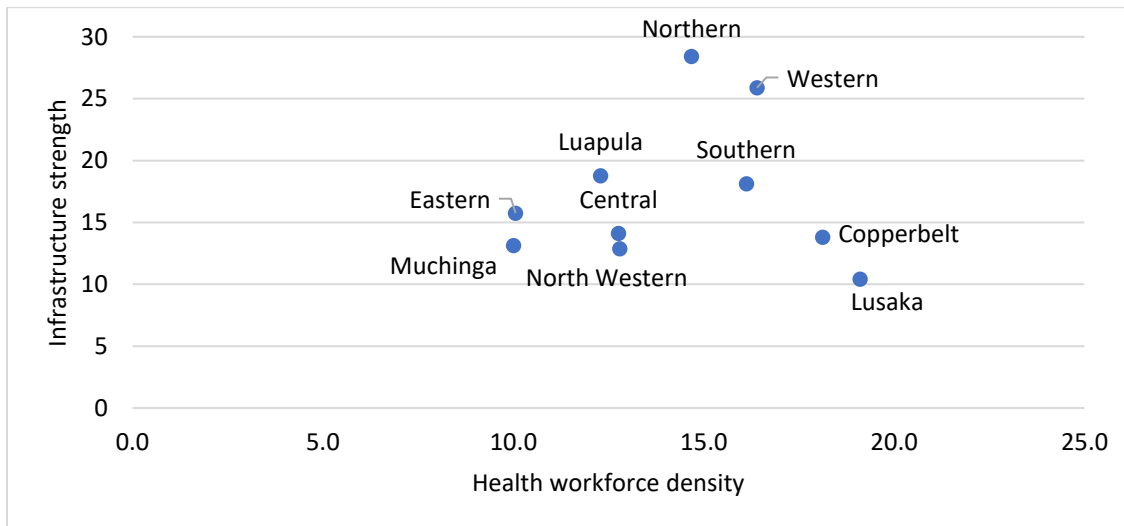
Health facility density was also compared by population density in each province within the NHF Census 2017 (Figure 8.22). There were higher facility densities in provinces that had higher population density and were more socioeconomically developed (Lusaka and Copperbelt), while the opposite appeared to be true for North Western and Western provinces. Many were in the middle, as Eastern province had relatively higher population density than facility density for that population, while Muchinga and Northern had higher facility densities and lower population densities.

Figure 8.22: Comparison of health facility and population density by province, Zambia, 2010 Census of Population and Housing (Central Statistical Office) and 2017 national health facility census
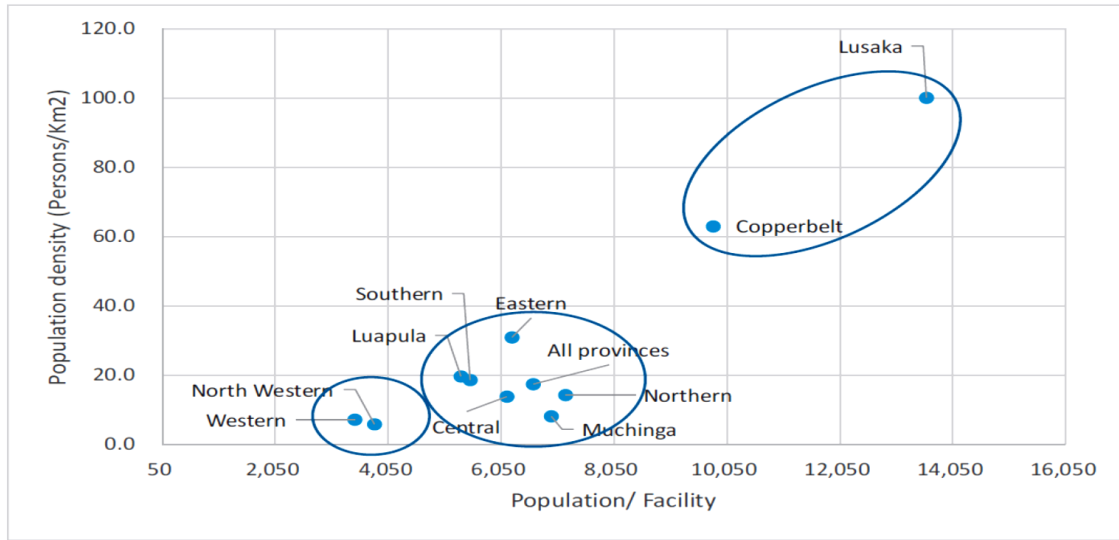
Because of this association and the likely poor reporting by private facilities in some provinces, it was not possible to construct a meaningful health system strength index based on multiple health system characteristics. We focused on the health workforce density and assessed the association with coverage (CCI from ZDHS 2018 or HMIS 2018). There was no association: provinces with higher workforce density did not have higher coverage of RMNCH services. There was also no association with OPD attendance. A higher level of socioeconomic development of a province was associated with a higher coverage index in the ZDHS 2018 (Figure 8.23).

Figure 8.23: CCI from ZDHS 2018 by level of socioeconomic development, by province, Zambia

y = 0.1367x + 72.685
R² = 0.417
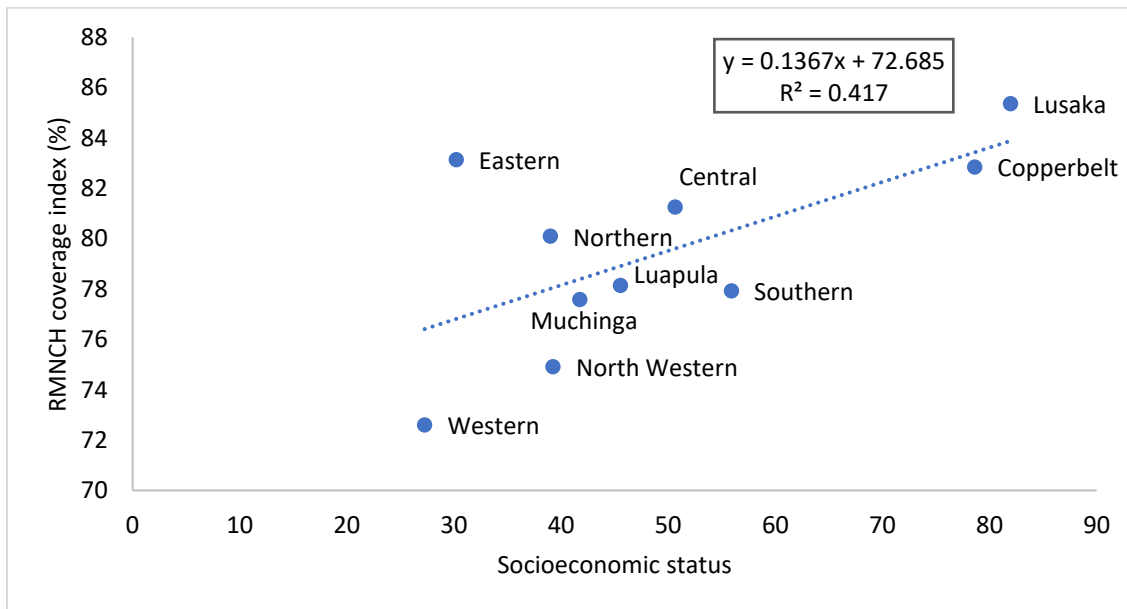
8.3 Country comparative analysis

Main points

- We compared Zambia's health status and RMNCAH coverage indicators with 10 countries in the Eastern and Southern Africa sub-region.
- In general, Zambia had an intermediate position on child mortality, child stunting and fertility levels and is in the top three for lowest maternal mortality ratio and highest coverage of RMNCAH interventions.

Country selection

Zambia's performance on a small set of RMNCH core indicators (child mortality, stunting, fertility, and coverage of interventions) was compared to 10 countries in the eastern and southern Africa sub-region which had national DHS surveys with comparable indicators in the same time period. The countries were agreed upon in the first analysis workshop. Zambia is the only country with a survey in 2018 – all others are 2016 or earlier. Therefore, we included the results from both ZDHS 2013/14 and ZDHS 2018.

Country comparisons of reproductive, maternal, newborn, child and adolescent health (RMNCAH)

We compared the MMR between countries. It is noted that this is actually the pregnancy-related mortality ratio, which also includes accidental or incidental deaths during or within 42 days after pregnancy. The most recent surveys exclude the accidental or incidental deaths to produce MMR (which was 252 per 100,000 live births in ZDHS 2018 as described earlier), but because earlier surveys did not have such information we used the 2018 value that included those deaths (278 per 100,000).

MMR was lower in Zambia than in many neighbouring countries according to ZDHS 2013/14 (398), as shown in Figure 8.24 below. It was the lowest MMR in the ZDHS 2018 at 278 per 100,000 live births (with a midpoint of 2015 as the statistic refers to the 7-year period preceding the survey), reflecting an average annual rate of decline of 7.2% between the two surveys.

Figure 8.24: Maternal and pregnancy-related mortality ratio according to the most recent surveys, selected countries in Eastern and Southern Africa
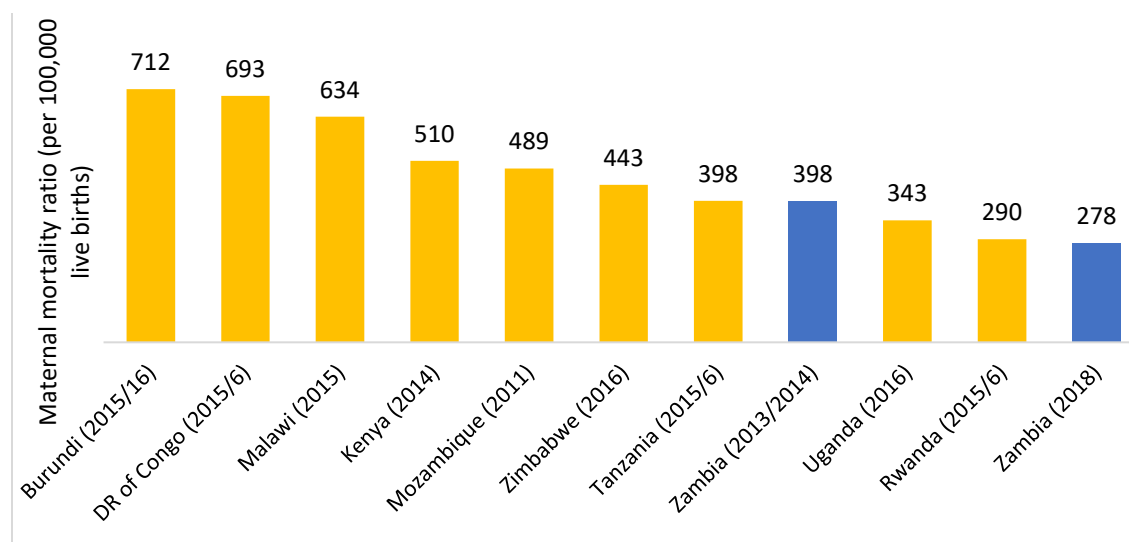
Zambia ranked second highest in U5MR among neighbouring countries, at 75 per 1000 live births according to the ZDHS 2013/14 (Figure 8.25). The U5MR reduced noticeably by ZDHS 2018 at 61, taking an intermediate position in the region compared to the most recent surveys. However, the neonatal mortality increased from 24 per 1000 live births to 27 per 1000 live births, which was the second highest in the region.

Figure 8.25: Under five (U5MR) and neonatal mortality rates (NMR) according to the most recent surveys, selected countries in Eastern and Southern Africa
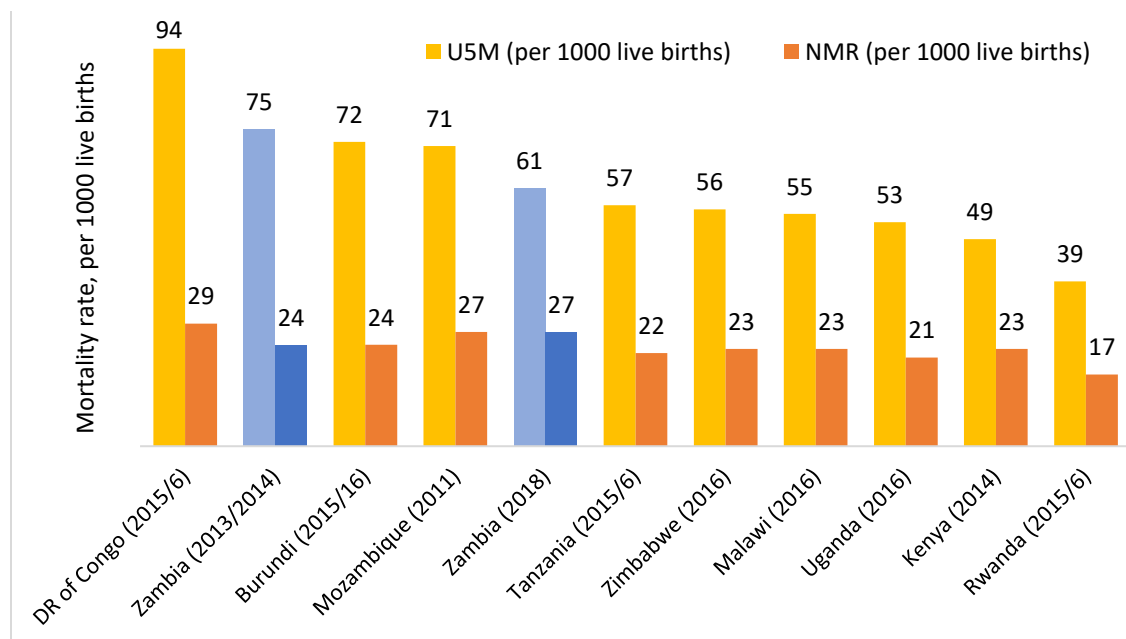
Zambia had the third highest total fertility rate in 2013/14 in the region at 5.3 per woman, but this reduced by 2018 to 4.7, leaving the country in an intermediate position in the subregion (Figure 8.26).

Figure 8.26: Total fertility rate according to the most recent DHS surveys, selected countries in Eastern and Southern Africa
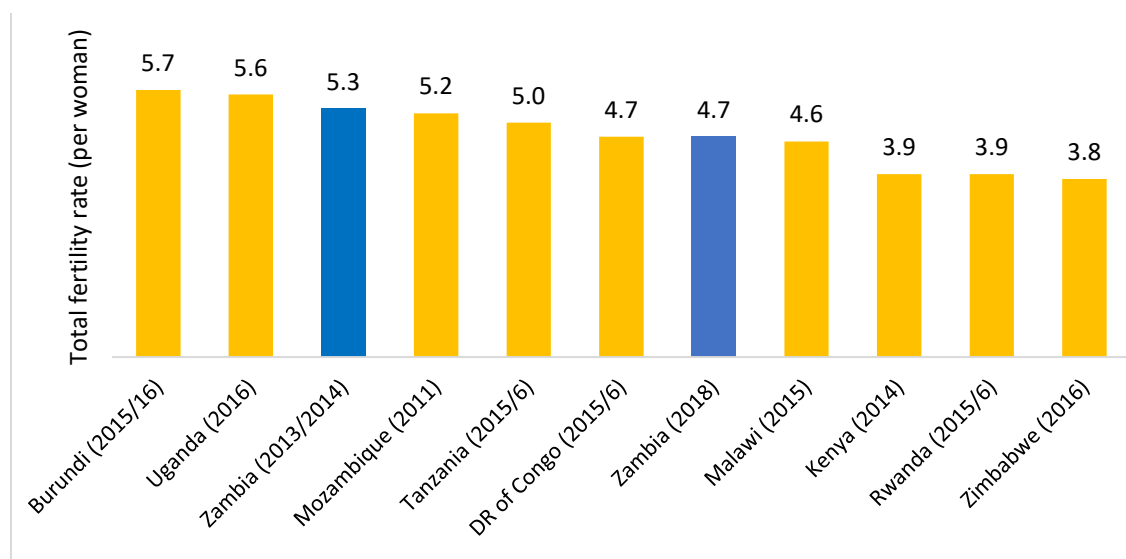
Stunting in Zambia was also third highest in the region according to ZDHS 2013/14 (Figure 8.27), but this reduced somewhat by 2018 to 35%, reflecting an average annual rate of decline of 2.7%.
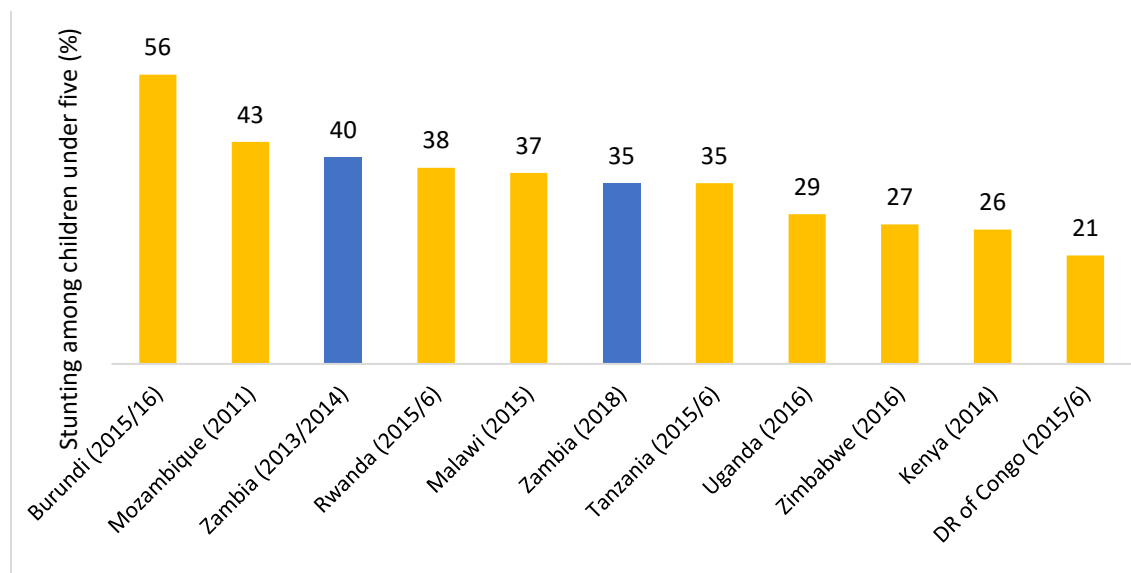
To compare the coverage of RMNCAH interventions, the composite coverage index (CCI) was used. It is a well-tested indicator that is computed as the weighted average of the coverage of eight interventions along four stages of the continuum of care: reproductive health (demand for family planning satisfied with modern methods), maternal health (at least four antenatal care visits and skilled birth attendant), immunization [BCG], DTP3 and measles and management of child illness (ORS for diarrhoea, and care-seeking for children with symptoms of pneumonia). The CCI were calculated by Countdown to 2030, from the DHS surveys in Zambia and nearby countries in the region[9]. In addition, we have calculated the CCI from the 2018 ZDHS to compare countries.

As shown in Figure 8.28, Zambia had the third highest CCI in 2013/14 (ZDHS), tied with Kenya and behind Zimbabwe and Malawi. By 2018, Zambia's CCI increased to 73% in 2018, to tie with Zimbabwe in 2016 and now second behind Malawi. In 2007, Zambia's CCI was 69% (data not shown), nearly the same as in 2013/14, suggesting increased progress in the last five years.

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[9] Countdown to 2030: Maternal Newborn and Child Survival (2017). Tracking Progress towards Universal Coverage for Reproductive, Newborn and Child Health: The 2017 Report. Washington, D.C., United Nations Children's Fund (UNICEF) and the World Health Organization (WHO): 1-268.

Figure 8.28: RMNCAH Composite Coverage Index according to the most recent DHS surveys, selected countries in Eastern and Southern Africa
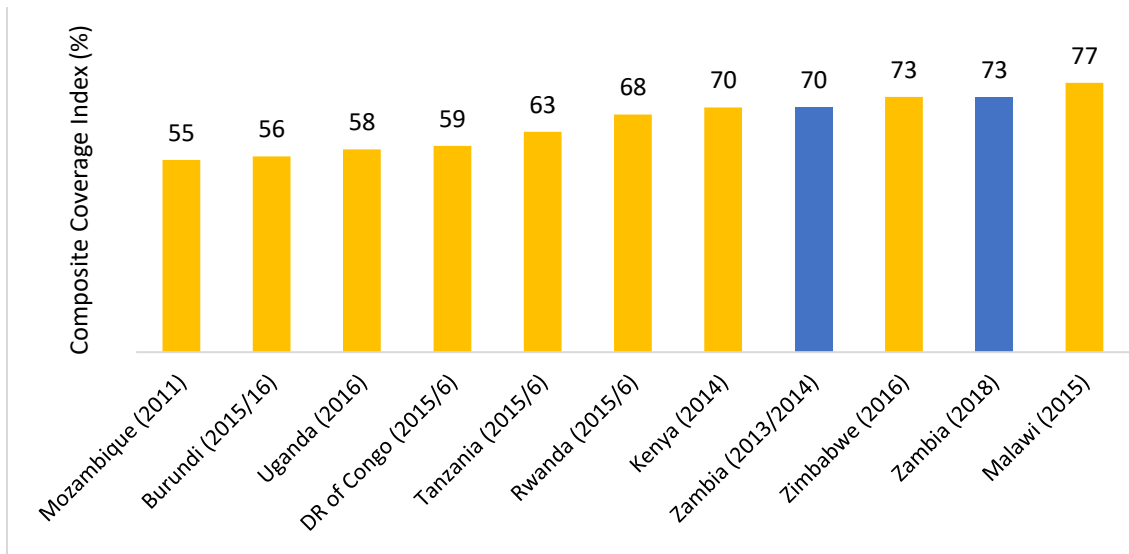
To summarize, Zambia had among the lowest MMR in the region, particularly by 2018. There was a reduction in U5MR, but increase in NMR, between 2013/14 and 2018 ZDHS rounds, leaving Zambia in a middle position among of its neighbours. The fertility and stunting rates were initially among the highest, after Burundi and then Mozambique and Uganda respectively, but improved by 2018. The composite coverage index for RMNCAH interventions was third highest in 2013/14 within the region, and increased by 3 percentage points by 2018.

Appendix: Data quality assessment and denominator estimation using health facility data

In the first part we ascertained the quality of the DHIS2 reporting for selected indicators, considering completeness and consistency. In the second part we focus on the denominators and explore alternative methods to the census-based projections.

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PART 1   Data quality assessment

</div>

The analysis focuses primarily on indicators such as ANC1, penta1 and BCG that have nearly universal coverage in Zambia and have had high coverage for quite a long time, in all provinces. If there is no drop off in immunization coverage, then the numbers of infants immunized or pregnant women coming for ANC first visit, should gradually increase by about 3% (roughly population growth). The ZDHS 2013/14 and ZDHS 2018 provide insights into the coverage of key interventions by province.

There are several preventive interventions with near universal coverage in Zambia: first antenatal visit (ANC1), BCG vaccination, first dose of pentavalent vaccination (penta1). In the ZDHS 2018, 97% of pregnant women made at least one ANC visit, 98% of infants received BCG and 98% received penta1. These coverage rates were also high in the ZDHS 2013/14 (96%, 95% and 96% respectively).

Coverage rates were high in all provinces in ZDHS 2018 (Figure A.1). There is a little more variation in ANC1 rates (range: 91-99%) than in BCG and especially compared to penta1 (range 95-99%). If the coverage is near 100%, this implies that the number of reported events in DHIS2 should be very close to the target population, provided completeness of reporting is complete. For instance, if ANC1 coverage is 96.9% and there are 100,000 ANC1 visits reported by the services, then the target population would be the 100,000 pregnant women plus the 3.1% who did not attend: 100,000 / 0.96 = 103,969 pregnant women in the target population.

Figure A.1: ANC1, BCG and penta1 coverage rates, by province, ZDHS 2013/14 and ZDHS 2018
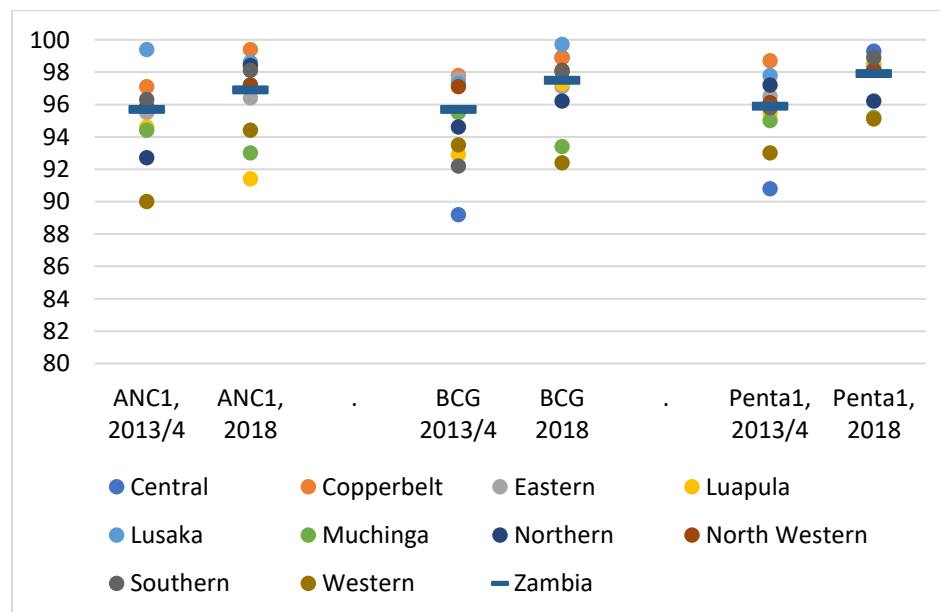
Completeness of reporting

The first step in the data quality assessment is to review the completeness of reporting by health facilities during 2014–2018. This should be done by service if specific forms are used. The assessment of coverage trends can be influenced by increasing reporting rates over time. The main issue is the extent to which the nonreporting health facilities are still providing services. If the reporting completeness is ignored this implies that all non-reporting facilities are assumed to provide no services at all. If, however, nonreporting facilities provided some ANC, the 2014 ANC number is a greater underestimate of the true number than in 2018. It is possible to adjust for this bias by assuming an adjustment factor for the nonreporting facilities:

- Zero if no service was provided at all at the non-reporting facilities
- 0.25: some services
- 0.5: half as much as the reporting facilities
- 0.75: nearly the same as the reporting facilities
- the same as the reporting facilities.[10]

For mainland we assumed an adjustment factor of 0.25 – only some services were provided in the non-reporting facilities. Because reporting rates are high, the impact on the overall trends is small.

Extreme outliers and consistency over time

The extreme outliers should be picked up in DHIS2 reporting system and corrected. It is however important to check if there are no more major outliers that can affect the results. This is done by considering the time series, as we expect some consistency over time within the subnational unit. The expected number of events (vaccinations, antenatal and delivery care, OPD, IPD etc.) can be derived by computing the median or mean for the 5-year period 2014–2018: this refers to the year 2016. The expected numbers for the subsequent/preceding years will be computed using an annual growth rate for the number of births/eligible children/pregnancy. If fertility is kept constant, this growth rate is determined by the population growth in the past: the increase in the number of women in childbearing ages. Here we used a growth rate of 3%: every year the target population increases by 3%.

We assessed the outliers for councils at the 33% level – i.e. the annual value differed more than 33% from the expected value based on the time trend derived from all values 2014–2018. There were no extreme outliers at the 33% level in all years. No corrections were made.

Internal consistency

ANC first visit and first pentavalent vaccination (or BCG) should be close. The expected difference is that there are more pregnancies than children eligible for vaccination: Abortions (default value at 5%), stillbirths (3%) and neonatal deaths (3%) should be subtracted from pregnancies to get to eligible children, but multiple births (2%) should be added. Therefore, we expect the ANC1/penta1 numbers ratio to be equal to 1 + (.05 + .03 + .03 − .02) = 1.09, if the ANC1 and Penta1 coverage rates are the same. The ZDHS 2018 shows that the coverage of ANC1 and penta1 was similar in all regions and nationally. The ratio ANC1/penta1 numbers was generally good for 2014-2017 (1.07, 1.04. 1.05 and 1.06 for 2014, 2015, 2016 and 2017 respectively). But in 2018, the ratio changed to 1.20 (provincial range 1.06-1.29) indicating either overreporting of ANC1 or underreporting of penta1 if we assume that coverage remained the same. Our main concern is whether there is underreporting of penta1 vaccinations in 2018 (and 2017).

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[10] Maina I, Wanjala P, Soti D, Kipruto H, Droti B, Boerma T. Using health-facility data to assess subnational coverage of maternal and child health indicators, Kenya. *Bull World Health Organ*. 2017, 95(10):683–694.

Penta1 can also be compared to penta3 vaccination. The expected ratio is derived from the most recent household survey which was 1.12 in the ZDHS 2013/14 and 1.06 in ZDHS 2018. Since vaccinations are obtained for children 12-23 months, and penta1 is given in the second month of life, the survey data refer on average to 16 months before the survey – roughly 2012 and 2017. Thus, the surveys indicate a reduction in the ratio between 2012 and 2017. If there was underreporting of penta1 in 2018, but not for penta3, the ratio would decline as seen here.

In the DHIS2 data the ratio was 1.12, 1.11, 1.09, 1.06 and 1.05 in 2014-2018 respectively, following a similar pattern as the survey. This is indicative of good reporting of penta1.The scatter plots also show that with a few exceptions there is good consistency between ANC1, penta1 and penta3 reported for provincial numbers in 2018 (Figure A.2).

Figure A.2: Scatterplots of reported numbers of penta1 by ANC1 (left) and penta3 by penta1 (right) by province, Zambia, 2018
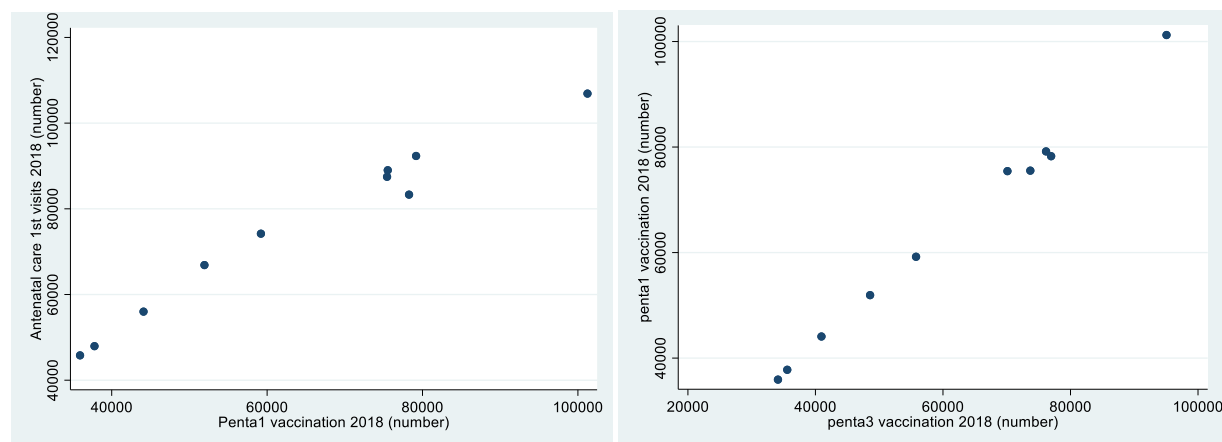
We also compared the immunization numbers between the WHO/UNICEF JRF and the DHIS2. The consistency was good and improved over time. By 2018, there are no difference (indicating that the systems are fully harmonized).

Another comparison with the survey data will provide some insights into the quality of the DHIS2 data. The ratio of deliveries to ANC1, deliveries to penta1 and deliveries to BCG in the ZDHS 2018 should be similar to the ratios based on the reported numbers of events in the HMIS data. The following needs to be considered:

- Survey data: the coverage rates reported in the ZDHS 2018 refer to the five years preceding the survey 2014-2018. Confidence intervals are not taken into account. The ANC1 rate is reported for pregnant women (self - reported), deliveries coverage is given for live births, and immunization coverage rates are given for children 12-23 months of age. To be able to compare the ratios with the HMIS data, we should use a small correction for the difference in denominators. Since this is a crude comparison we have not made this correction in the ratios below.
- HMIS data: the average number of events for the period 2014-2018 is taken to match the survey period.

Table A.1 below shows the ratio of ANC1, penta1 and BCG for the DHS survey and for the HMIS data 2014-2018. The DHS ratios are always higher, suggesting some underreporting of deliveries in the DHIS data. The differences in the ratios are larger for ANC1, which may imply that ANC1 is overreported. The best correspondence is obtained with Penta 1 and BCG: for Zambia as a whole the difference in the deliveries to penta1 ratios from the survey and HMIS respectively is 0.11; for BCG 0.13 and for ANC1 0.17.

In addition, the table shows that there is major underreporting of deliveries in Lusaka. The absolute difference between the ratios is 0.33 for ANC1 and equally high for penta1 and BCG. This implies that there are an estimated 100,000 live births in Lusaka are not reported each year (one-quarter of all births in Lusaka each year). This is

about 4% of all live births in Zambia. Also, in the other provinces, there is likely to be some underreporting of deliveries / live births but this proportion is much smaller than in Lusaka.

Table A.1: Ratio of institutional deliveries to ANC1, institutional deliveries to penta1, and institutional deliveries to BCG in ZDHS 2018 (coverage ratio), and in HMIS 2014-2018 (average annual reported number)

province	ANC1 ratio			Penta1 ratio			BCG ratio		
	DHS	HMIS	abs dif	DHS	HMIS	abs dif	DHS	HMIS	abs dif
Central	0.74	0.61	0.13	0.73	0.64	0.08	0.73	0.61	0.12
Copperbelt	0.91	0.79	0.12	0.92	0.85	0.07	0.92	0.84	0.08
Eastern	0.94	0.81	0.13	0.92	0.91	0.01	0.93	0.89	0.04
Luapula	0.96	0.76	0.20	0.89	0.84	0.06	0.91	0.81	0.10
Lusaka	0.92	0.60	**0.33**	0.93	0.61	**0.32**	0.91	0.59	**0.32**
Muchinga	0.82	0.69	0.13	0.80	0.76	0.04	0.81	0.75	0.07
Northern	0.73	0.63	0.10	0.75	0.69	0.06	0.75	0.70	0.05
North Western	0.90	0.66	**0.24**	0.90	0.74	0.15	0.90	0.71	0.18
Southern	0.84	0.75	0.09	0.83	0.76	0.07	0.84	0.71	0.13
Western	0.78	0.62	0.16	0.77	0.71	0.06	0.80	0.70	0.10
Zambia	0.86	0.70	**0.17**	0.86	0.75	**0.11**	0.86	0.72	**0.13**

In conclusion, the quality of the reported data on BCG, penta1, penta3 and ANC1 is good at the provincial and national level. The main concern is a drop-off in the numbers of infants receiving penta1 in 2017 and especially 2018, which may be true (or due to more accurate reporting). The explanation at this point is not clear and this will require further examination of the district level reports.

The deliveries reporting is consistent with ANC1, penta1 and BCG in most provinces. The main exception is Lusaka for which about one-quarter of deliveries / live births are not reporting in DHIS2.

PART 2 Denominator assessment and possible adjustment

This aim is to establish the most probable denominators / target populations for the health system and coverage indicators generated from the DHIS2 data. The analyses will be done at the national and provincial level and consider the period 2013-2018 but focus on the HDSP period of 2015-2018. It will include the following steps:

1. Assess the current denominators in DHIS2, based on census projections and CSO data (referred to as **CSO projection method**):
   - What population growth rates are used by CSO in the projections?
   - What crude birth rate and related metrics are used to estimate the number of live births, births, pregnancies and infants eligible for immunization?
2. External comparison of the crude birth rates (CBR) used in the projections with those derived from DHS and censuses, and associated target populations (referred to as **CBR method**):
   - Comparison of the CBR between the different sources
   - Computation of the number in each target population based on different CBR and other assumptions
3. Comparison of the projected target populations (live births etc.) obtained from high coverage interventions, specifically the numbers of women receiving one antenatal visit, infants receiving BCG and pentavalent vaccination (referred to **Health facility data derived method or HF derived method**):
   - Assessment of the coverage rate of near 100% interventions in ZDHS and the institutional delivery rate, national and by province
   - Comparison of the projected denominators with the expected target populations based on the ZDHS
   - Comparison of coverage rates based on DHIS2 using different denominators and the ZDHS
4. Selection of the best estimates of target populations to compute the coverage statistics.

1.   Current DHIS denominators: CSO projection method

The population projections for 2013-2019 are provided by the Central Statistical Office (CSO). The population growth rate used by CSO was 3.03% in 2013, declining gradually to 2.88% in 2019. The target populations for 2018 and 2019 have been provided by CSO to the Ministry of Health with the following national parameters:

- Pregnancies: 5.4% of total population
- Deliveries: 5.2% of total population
- Live births: 5.0% of total population
- Under 1 year: 4.0% of total population

The CBR (defined as number of live births per 1000 population per year) is an important statistic to estimate target populations. In the DHIS2 data obtained from CSO, it is 5% or 50 per 1,000 population.

In the CSO projections all provinces have the same proportions to compute the target populations except a slightly lower proportion for Muchinga and Northern Provinces.

The civil registration system has low levels of completeness for birth (14.7%) and death registration (20%) in 2016, which means these data cannot be used to estimate target population sizes.[11]

It was noted that the population changes due to the move of the district of Shibunyunyi from Lusaka to Central Province administration in 2017 appears not been taken into account in the projections in DHIS2. Therefore, this (small) adjustment was made to the population of the two provinces for the purpose of this analytical report.

2.   Assessment of crude birth rate and computation of target populations (CBR method)

The ZDHS[12] and the censuses show a decline in CBR (35 by 2018) and a consistent 7 to 10-point (per 1,000) difference between urban and rural Zambia. The provincial data from the census 2010 and DHS 2013/14 (extracted from Stat Compiler) show consistent results for the two sources, with Lusaka and Copperbelt provinces having CBR around 30 per 1,000 population and all other provinces between 38 and 41 per 1,000 population (Table A.2).

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[11] Central Statistical Office. 2016 Vital Statistics Report. Ministry of Home Affairs, Lusaka, January 2019.
[12] DHS crude birth rates refer to the three-year period before the survey.

Table A.2: Crude birth rates per 1,000 population: comparison of different sources (left panel) and by province in the 2010 census and DHS 2013/14, with estimated CBR for 2016-2018

CBR per 1000 population, Zambia.			
	Urban	Rural	Total
Census 2000	29.0	40.0	36.0
DHS 2001	36.7	47.0	43.3
DHS 2007	36.3	47.5	43.6
Census 2010	30.0	39.0	35.0
DHS 2013	32.2	40.3	37.2
DHS 2018	30.9	38.4	35.3

Change 2013-2018

urban = 30.9 / 32.2 = 0.960

rural = 37.2 / 35.3 = 0.953

CBR per 1,000 population by province.			
Province	Census 2010	DHS 2013/14	Est. CBR 2016-18
Central	36	38.3	36.5
Copperbelt	29	31.0	29.7
Eastern	38	38.6	36.8
Luapula	39	40.4	38.5
Lusaka	31	32.6	31.3
Muchinga	40	40.8	38.9
Northern	41	40.5	38.6
N-Western	38	40.4	38.5
Southern	37	41.0	39.1
Western	36	38.4	36.6

The ZDHS 2018 results show a national CBR of 35.3 per 1,000 population for Zambia, which is a small decline from 37.2 in the ZDHS 2013/14. The survey based CBRs refer to the three years before the survey. The current projections in HMIS are using a CBR for 50 per 1,000 live births, which appears much too high, and result in a target population estimate that is too high.

The provincial patterns in fertility are also consistent between the ZDHS 2013/14 and census 2010. The ZDHS 2018 does not have a provincial distribution of CBR available yet. Therefore, we estimate the provincial CBR for the main years of the study period 2016-2018 by reducing the CBR in 2013/14 with the overall ratio ZDHS 2018/ZDHS 2013/14 which was 0.96 for urban and 0.953 for rural, indicative of a small decline (Table 1). We used 0.960 for Copperbelt and Lusaka provinces, which are most urbanized, and 0.953 for all other provinces. We smoothed the pattern of growth in CBR by linear interpolation.

We computed the number of live births in each year using the CSO projections currently in DHIS2 (with a 5% CBR and little variation between provinces) and those based on the CBR derived from the ZDHS and census as described above.

The other target populations can be derived from the live births. The DHIS2 currently uses a slightly higher number of deliveries than live births (adding 0.2%) and again a slightly higher number of pregnancies (adding another 0.2%). Eligible infants are one fifth lower than the live births which assumes a very high mortality rate of infants, especially in the neonatal period (5% and 4% of total population are live births and infants respectively).

In the alternative estimation of target populations, the number of deliveries is very close to the number of live births. Deliveries include stillbirths which is likely to be about 20-30 per 1,000 births, but this is offset by multiple births: twinning rates may be estimated to be of the order of 20 per 1,000 deliveries. We assumed the difference between deliveries minus live births was 10 per 1,000.

Pregnancies are higher than deliveries because of the loss through abortions, defined as pregnancy terminations before 7 completed months of pregnancy. Losses are usually highest to be very early in pregnancy, often before any antenatal contact has been established, and we do not include those in our computations. In the initial computation, we use an abortion rate of 5%.

Table A.3 shows the target populations based on the two methods for the national level: the current DHIS denominators and those based on the CBR derived from the surveys, with different assumptions about the associated target populations for 2018. Table A.4 shows the provincial estimates of the number of live births in 2018, based on the two methods.

Table A.3: Comparison of current DHIS2 target populations based on CBS projections and alternative method based on ZDHS crude birth rates and other assumptions, Zambia, 2018

	Census projection method	CBR method	Absolute difference	Percent difference
Live births	835,942	604,158	-231,784	-27.7
Deliveries	878,161	610,261	-267,901	-30.5
Pregnancies	911,937	642,380	-269,557	-29.6
Infants	675,509	587,846	- 87,663	-13.0

Table A.4: Comparison of current DHIS2 live birth projections for 2018 with those based on alternative method using the ZDHS crude birth rate, by province

Province	DHIS2	Alternative method	Absolute difference	Percent difference
Central	81,542	63,396	-18,146	-22.3
Copperbelt	126,119	76,420	-49,699	**-39.4**
Eastern	97,333	73,028	-24,305	-25.0
Luapula	60,271	47,362	-12,909	-21.4
Lusaka	154,733	96,327	- 58,406	**-37.7**
Muchinga	49,306	39,816	- 9,490	-19.2
Northern	70,025	55,888	-14,137	-20.2
North Western	44,763	35,177	- 9,586	-21.4
Southern	100,181	79,879	- 20,301	-20.3
Western	51,669	38,579	- 13,089	-25.3
Zambia	**835,942**	**604,158**	**- 231,784**	**-27.7**

3.   Using health facility data (HF derived method)

There are several preventive interventions with near universal coverage in Zambia: first antenatal visit (ANC1), BCG vaccination, first dose of pentavalent vaccination (penta1). In the ZDHS 2018, 97% of pregnant women made at least one ANC visit, 98% of infants received BCG and 98% received penta1. These coverage rates were also high in the ZDHS 2013/14 (96%, 95% and 96% respectively).

Coverage rates were high in all provinces in ZDHS 2018 (Figure A.1). There is a little more variation in ANC1 rates (range: 91-99%) than in BCG and especially compared to penta1 (range 95-99%). If the coverage is near 100%, this implies that the number of reported events in DHIS2 should be very close to the target population, provided completeness of reporting is high and the accuracy of reporting is good. For instance, if ANC1 coverage is 96.9% and there are 100,000 ANC1 visits reported by the services, then the target population would be the 100,000 pregnant women plus the 3.1% who did not attend: 100,000 / 0.96 = 103,969 pregnant women in the target population.

If the reporting of ANC1, BCG and penta1 is complete and accurate we can compute the number of live births, derived from the reported events in DHIS2. The estimated number of the target population live births can then be derived from the sum of the number of ANC1, BCG and penta1 reported events plus those who did not receive immunization or antenatal care. In addition, to compute live births from the pregnancies derived from ANC1 visits we added a proportion that is associated with abortions (after the first visit which is on average 4 months of gestation in Zambia – default value used here is 5%). And for BCG and penta1 we add the neonatal deaths which was 2.7% according to the ZDHS 2018.

Box 1 Estimating specific target populations: pregnancies, births, live births, infants eligible for immunization

To obtain specific target populations from the overall population projections a set of assumed parameters were applied:

Live births are computed from the total population and the crude birth rate. If the live births are obtained from pregnancies (ANC1) or infants (Penta1) the proportions below were used.

Births: we assumed the stillbirth rate to be 3%, based on global estimates, and added this number to the live births to obtain all births. [Births = Live Births / (1-0.03)]

Deliveries: we assumed that 2% of births were multiple births, published elsewhere. We subtracted 2% from the births to obtain deliveries [Deliveries = Births * (1-0.02) = Live Births].

Pregnancies: to compute the number of pregnancies as denominator for the antenatal care and other indicators we excluded very early abortions and focused on abortions that would occur after the average timing of the first antenatal visit (about 4 months). We assumed an abortion rate of 5%. This number was added to the births to obtained pregnancies. [Pregnancies = Deliveries / (1-0.05)]

Infants: to compute the number of infants eligible for immunization at 6 weeks of age (the recommended time for the first pentavalent vaccination) we subtracted 3% from the number of live births. This is based on the neonatal mortality rate observed in the ZDHS 2018. [Infants = Live Births * (1-0.03)]

4.   Comparison

This section compares the results from the different methods: CSO projection, CBR method, and HF derived method. Figure A.3 shows the number of live births for 2013-2018 from the DHIS/CSO projections for DHIS2 and the estimated live births based on the DHS in the surveys, as well as for 2015-2018. The HF derived method

provides intermediate results but does not show a regular increase which would be expected from interventions with near-universal coverage.

The differences between the results of the various methods are very large with the DHIS/CSO projections at one extreme, and the ZDHS CBR based live births at the other extreme. The penta1 and BCG results are close, as expected, with penta1 slightly more plausible (in 2015). There is however an unexpected drop-off in 2018, as noted above, which may be due to overreporting in preceding years or underreporting in 2018.

ANC1 and penta1 data give fairly consistent results for 2015-2017 but not 2018 when there is a sudden surge in first ANC visits, as well as a drop in penta1. It is not clear why there is such an increase in DHIS when nearly all women used ANC for many years before 2018. This is likely to be a data quality problem.

Figure A.3: Estimated number of live births in Zambia, 2013-2018, based on different methods
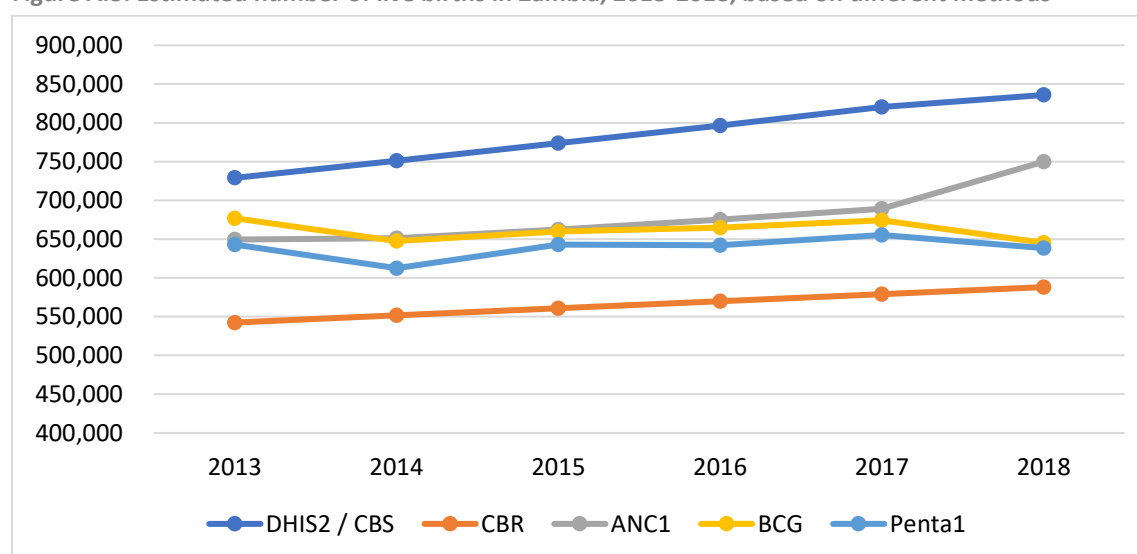
5.   Deriving the best target population from reported health facility data

The years 2016-2017 appear to be to most robust and are used to approximate the live births and other denominators from the health facility data. We computed the average of the numbers of live births derived from the reported numbers of ANC1, BCG and penta1: for Zambia this is 660,000 in 2016 and 678,000 in 2017. We derived 2015 and 2018 from these data.

	Step	Example Zambia
(a)	Compute CBR from ZDHS 2018 and ZDHS 2013 for all single years 2013-2018	E.g. 36.3 in 2015 and 34.8/1000 population in 2018
(b)	Compute mean live births derived from DHIS2 data on BCG, penta1 and ANC1 for 2016-2017	Mean for 2016-17 is 672,000 live births
(c)	Compute mean population 2016-2017 from CSO projection	16,169,556 population
(d)	Compute mean CBR for 2016-2017 by dividing (b) by (c)	672,000/16,169,556 = 41.8 per 1,000 live births
(e)	Compute ratio imputed CBR and ZDHS 2013/4 CBR 2016-17 to obtain multiplier rates	41.8 / 35.5 = 1.19
(f)	Compute adjusted CBR for all years (a) * (e)	E.g. 2018: 34.8 * 1.19 = 41.5 per 1000 population
(g)	Compute live births as (f) * (c) / 10000	E.g. 2018: 701,148 live births

The next step is to apply the health facility data derived denominators and compute coverage rates. First, we examine the results with the same indicators that were used to derive the denominators: ANC1, BCG and penta1. The results should be close in all provinces (Figure A.4 and A.5).

Figure A.4: Coverage rates for ANC1, BCG, penta1, Zambia national, based on different methods to estimate the target population (pregnancies for ANC1, infants for BCG and penta1 vaccination), compared to ZDHS 2018
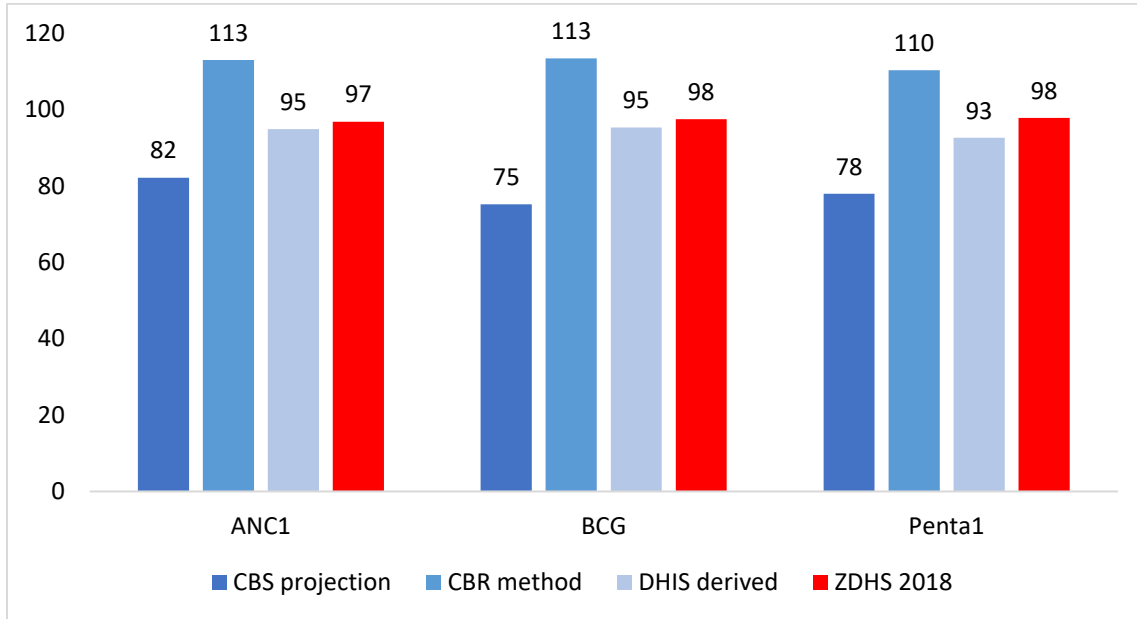
Figure A.5: ANC1 coverage among pregnant women in 2018, by province, based on different methods to estimate the target population, compared to ZDHS 2018
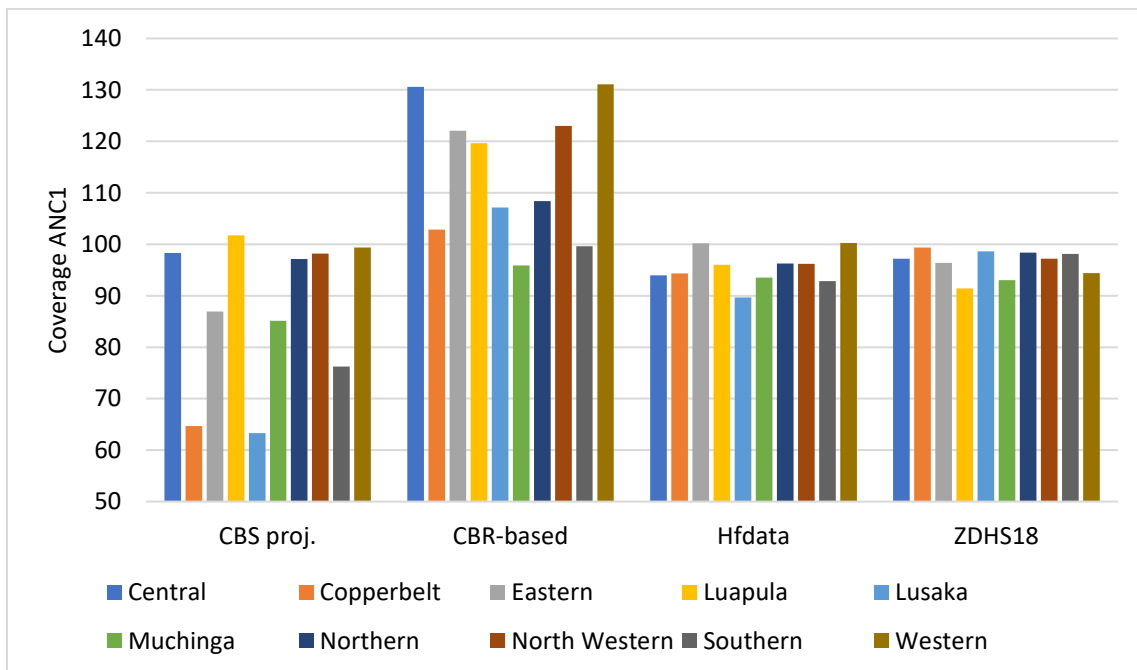
Next, we examine the denominators for the coverage of institutional deliveries. This is expected to be a robust indicator with little reporting bias. The ZDHS 2018 provides data for the five years before the survey. There is an increase between ZDHS 2013/14 and ZDHS 2018 from 67% to 84% (Figure A.6).

116

The private medical sector may play a role, as reporting is often inadequate. Also, the DHIS2 may suffer from greater underreporting by larger hospitals where typically large numbers of deliveries take place. In the ZDHS 2013/14 only 4.8% of all live births and 7.1% of all live births in health facilities took place in private medical facilities. It will be important to add ZDHS 2018 when available.

Figure A.6: Coverage of deliveries by health facilities, comparing three methods of estimation with the ZDHS 2018 results
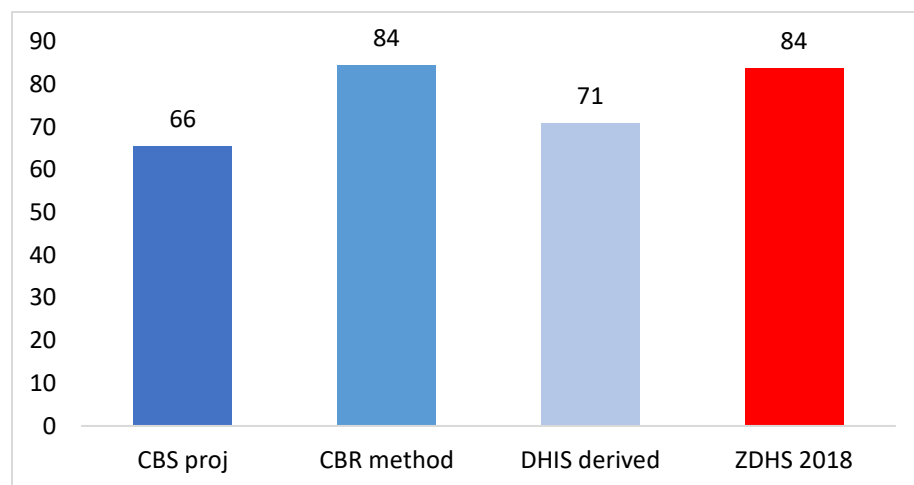
Table A.5: Coverage of deliveries by health facilities (% of live births), HMIS-derived denominators

Province	2015	2016	2017	2018
Central	58.7	60.2	62.0	61.7
Copperbelt	82.5	80.4	80.4	82.1
Eastern	81.1	81.7	84.1	86.0
Luapula	74.8	71.2	77.5	88.5
Lusaka	49.7	49.8	56.6	74.1
Muchinga	68.0	65.4	68.6	81.2
Northern	57.7	56.0	65.4	82.2
North Western	67.3	65.6	67.3	67.4
Western	69.1	71.5	72.1	73.3
Southern	60.2	58.2	64.0	71.8
Zambia	68.7	68.2	72.1	79.5

Figure A.7: Scatter plot to compare estimated coverage of deliveries by health facilities using the health facility data derived method and the ZDHS 2018 results
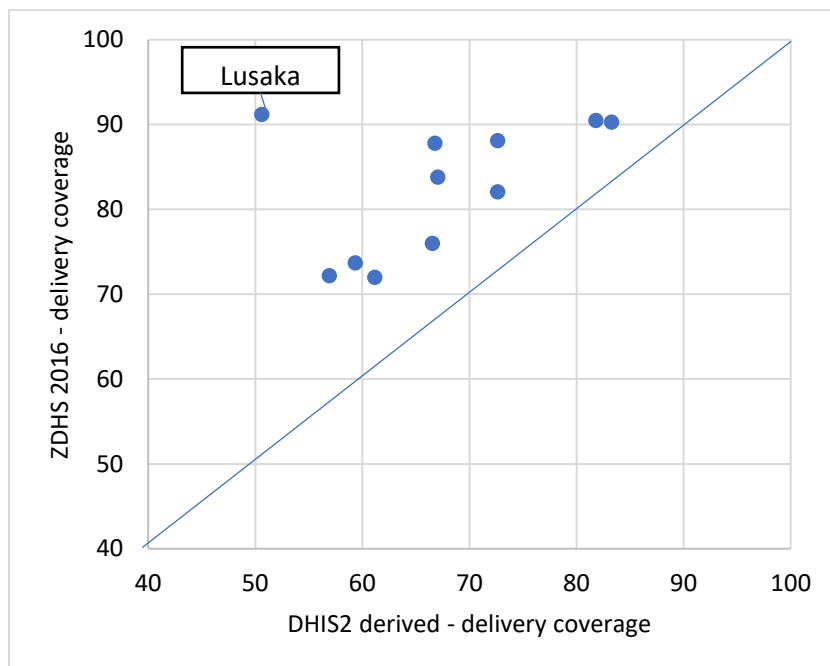
If we consider the ZDHS the gold standard (coverage was already high in the ZDHS 2013/14 with 90%), then:

Lusaka province is a major outlier. The coverage based on the reported data in HMIS is only 51% while the ZDHS 2018 reported a coverage of 91%. This is likely due to severe underreporting of deliveries by health facilities in the DHIS2 in Lusaka, and possibly also due to an overestimation of the expected number of deliveries in Lusaka.

All other provinces have 9-20% lower coverage in the health facility data then in the DHIS2 which means that:

- The reported number is too low, especially relative to immunization and ANC1. This cannot be just due to poor private sector reporting. Perhaps hospital reporting has low completeness. The fact that this seems to occur in all provinces is unusual.
- The expected number of deliveries is too high. This can be due to several factors: the CSO population projections are too high, or the estimated crude birth rate is too high. Both are possible.

The same occurs for ANC4 visits from the DHIS2 data. Coverage increased from 37% to 54% during 2015-2018, according to the DHIS2 data, but fell short of the ZDHS 2018 results of 63.5% for the five years preceding the survey. This discrepancy has been observed in other countries and may be due to overreporting of ANC4 in surveys (desirability bias possible) or underreporting in the DHIS2.

Final figures for target populations, derived from health facility data are shown below in Table A.6.

Table A.6: Target populations from health facility data (DHIS2)

province	2014	2015	2016	2017	2018
Live births					
Central	74,558	76,659	78,882	81,170	83,458
Copperbelt	75,815	77,951	80,212	82,538	84,864
Eastern	77,276	79,453	81,758	84,129	86,500
Luapula	51,979	53,444	54,994	56,588	58,183
Lusaka	97,395	100,140	103,044	106,032	109,020
Muchinga	34,501	35,474	36,502	37,561	38,620
North Western	39,078	40,179	41,344	42,543	43,742
Northern	55,247	56,804	58,452	60,147	61,842
Southern	74,680	76,785	79,011	81,303	83,594
Western	43,640	44,870	46,171	47,510	48,849
Zambia	**624,169**	**641,759**	**660,370**	**679,521**	**698,672**
Infants (immunization)					
Central	72,321	74,359	76,516	78,735	80,954
Copperbelt	73,540	75,613	77,806	80,062	82,318
Eastern	74,957	77,070	79,305	81,605	83,905
Luapula	50,419	51,840	53,344	54,891	56,438
Lusaka	94,473	97,135	99,952	102,851	105,750
Muchinga	33,466	34,409	35,407	36,434	37,461
North Western	37,905	38,974	40,104	41,267	42,430
Northern	53,590	55,100	56,698	58,342	59,987
Southern	72,440	74,481	76,641	78,864	81,086
Western	42,331	43,524	44,786	46,085	47,384
Zambia	605,444	622,507	640,559	659,135	677,712
Pregnancies					
Central	79,317	81,552	83,917	86,351	88,785
Copperbelt	80,654	82,927	85,332	87,807	90,281
Eastern	82,208	84,525	86,976	89,499	92,021
Luapula	55,297	56,855	58,504	60,200	61,897
Lusaka	103,612	106,532	109,621	112,800	115,979
Muchinga	36,704	37,738	38,832	39,959	41,085
North Western	41,572	42,744	43,983	45,259	46,534
Northern	58,774	60,430	62,183	63,986	65,789
Southern	79,447	81,686	84,055	86,492	88,930
Western	46,426	47,734	49,119	50,543	51,967
Zambia	664,009	682,723	702,522	722,895	743,268