

Exemplars in Under-5 Mortality: Nepal Case Study

Dr. Lisa R Hirschhorn^{1,2}, Raj Kumar Subedi³, Caroline Beyer^{1,4},
Dr Kriti Adhikari³, Dr Sasmrita Bastola³, Kateri Donahoe¹, Dr.
Mahesh Maskey³, Udit Persaud², Dr. Agnes Binagwaho¹

¹ *University of Global Health Equity*

² *Feinberg School of Medicine, Northwestern University*

³ *Nepal Public Health Foundation*



18 April 2018

Table of Contents

LIST OF TABLES	4
LIST OF FIGURES	5
ACKNOWLEDGEMENTS	7
ABBREVIATIONS	8
1 EXECUTIVE SUMMARY	11
1.1 Background.....	11
1.1.1 Exemplars in Global Health Under-5 Mortality Project	11
1.1.2 Nepal.....	11
1.1.3 Methods.....	12
1.2 Key Findings.....	13
1.2.1 Coverage and Equity of Selected Under-5 Mortality Interventions	13
1.2.2 Common Implementation Strategies.....	15
1.2.3 Examples of Implementation of Evidence-Based Interventions to Address Major Causes of Death.....	15
1.3 Cross-Cutting Contextual Factors	17
1.4 Challenges	19
1.5 Transferrable Knowledge for Other Countries	19
1.6 Conclusions.....	23
2 INTRODUCTION.....	1
2.1 Exemplars in Global Health	1
2.2 Exemplars in Under-5 Mortality.....	1
2.3 Nepal.....	2
3 METHODS FOR CASE STUDY	13
3.1 Project Framework.....	13
3.2 Desk Review	13
3.3 Primary Research	13
3.4 Analysis and Synthesis.....	14
3.5 Human Subjects Review	15
4 SPECIFIC CAUSES OF DEATH AND EVIDENCE-BASED INTERVENTIONS	16
4.1 Pneumonia, Diarrhea, and Malaria	17
4.1.1 Facility-Based Integrated Management of Childhood Illness (FB-IMCI)	18
4.1.2 Community-Based Integrated Management of Childhood Illness (CB-IMCI)	21
4.1.3 Other Diarrhea Interventions.....	24
4.1.4 Other Pneumonia Interventions	31
4.1.5 Other Malaria Interventions.....	32
4.2 Other Vaccine-Preventable Diseases.....	37
4.2.1 Measles Vaccination.....	38
4.2.2 Pneumococcal Vaccination	40
4.2.3 Haemophilus Influenzae Type B (Hib) Vaccination	41



4.2.4	Rotavirus Vaccination	42
4.3	HIV	42
4.3.1	Prevention of Mother to Child Transmission (PMTCT)	38
4.4	Malnutrition	46
4.5	Vitamin A	51
4.6	Neonatal Interventions	54
4.6.1	Maternal Nutrition.....	57
4.6.2	Improving Childbirth Delivery Services, Access, and Uptake	58
4.6.3	Community-Based Newborn Care Package	64
4.6.4	Improving Post-Partum Care	66
4.7	Common Implementation Strategies	68
5	Cross-Cutting Contextual Factors Facilitating U5m Reduction	70
5.1	Female Community Health Volunteers (FCHVs).....	70
5.2	Focus on Universal Health Care and Equity: National Leadership and Commitment	76
5.3	Health System Strengthening (HSS).....	79
5.4	Geography	82
5.5	Health Financing.....	83
5.6	Prioritization of Local Research	83
5.7	Data Use and Availability.....	85
5.8	Quality Assessment/Improvement	86
5.9	Donor and International Partner Resources and Coordination	87
5.10	Infrastructure and Communications.....	88
5.11	Addressing social determinants and other contributors to U5M	88
5.12	Women’s Education/Empowerment	89
5.13	Improved Access to Family Planning, Increased Birth Spacing & Decreased Fertility Rates	90
5.14	WASH.....	91
5.15	Economic Growth.....	92
5.16	Conflict.....	92
6	CROSS CUTTING AND REMAINING CHALLENGES.....	93
7	TRANSFERRABLE KNOWLEDGE FOR OTHER COUNTRIES.....	94
8	CONCLUSIONS.....	100
	SOURCES	112
	APPENDIX A.....	112



List of Tables

Table 1: Major Causes of U5 Mortality and Evidence Based Interventions (Source: Nepal DHS 2001, 2006, 2011, 2016; DHS STATcompiler).....	13
Table 2: Under-5 mortality rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016).....	4
Table 3: Neonatal mortality rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016)	4
Table 4: Evidence Based Interventions and prevalence of selected causes of death available from the DHS (Source: Nepal DHS 2001, 2006, 2011, 2016; DHS STATcompiler).....	16
Table 5: Facility-Based IMCI Key Implementation Strategies	18
Table 6: Facility-Based IMCI Implementation Strategy and Outcomes	19
Table 7: Community-Based IMCI Key Implementation Strategies.....	21
Table 8: Community-Based IMCI Implementation Strategies and Outcomes.....	23
Table 9: Other Diarrhea Interventions' Key Implementation Strategies	24
Table 10: Oral Rehydration Therapy Implementation Strategies and Outcomes	26
Table 11: Zinc Supplementation Key Implementation Strategies.....	26
Table 12: Zinc Supplementation Implementation Strategies and Outcomes	29
Table 13: Other Malaria Interventions Key Implementation Strategies.....	32
Table 14: IRS Implementation Strategies and Outcomes	34
Table 15: ITN Implementation Strategies and Outcomes.....	35
Table 16: Other Vaccine-Preventable Diseases Key Implementation Strategies	37
Table 17: Overall Vaccine Preventable Diseases Implementation Strategies and Outcomes	42
Table 18: HIV Program Key Implementation Strategies.....	42
Table 19: PMTCT Implementation Strategies and Outcomes.....	45
Table 20: Malnutrition Program Key Implementation Strategies.....	46
Table 21: Severe Acute Malnutrition Program Implementation Strategies and Outcomes	49
Table 22: Vitamin A Key Implementation Strategies.....	51
Table 23: Vitamin A Supplementation Program Implementation Strategies and Outcomes	53
Table 24: Neonatal Interventions Key Implementation Strategies.....	54
Table 25: Selected Main Policy Goals of the National Neonatal Health Strategy 2004	55
Table 26: Original roles of FCHVs in CB-NCP (Source: Healthy Newborn Network) ¹⁴⁹	64
Table 27: FBD, SBA, and EmONC/CEmONC, Community-Based Neonatal Care, and Post-Partum Care Implementation Strategies and Outcomes	65
Table 28: Selected FCHV Activities ^{43,169}	72
Table 29: Key Contextual Factors for HSS, Successes and Challenges, adapted in part from Samuels et al. ¹⁷⁹	81
Table 30: Fertility rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016).....	90
Table 31: Nepal's achievement of MDG targets related to water and sanitation (Source: Nepal MDGs Final Status Report, 2016) ²⁰⁴	91
Table 32: Infant and Child Under-5 Mortality Evidence Based Interventions.....	113
Table 33: Neonatal Mortality Evidence-Based Interventions	114



List of Figures

Figure 1: Principal investigators and participants at the research findings presentation in Kathmandu, Nepal - November 2018.....	12
Figure 2: Nepal Equity Profile, Health Indicators by Wealth Quintile from MICS 2014 (Source: Victora et al)	14
Figure 3: Steps to Scale-Up Health Innovations in Nepal (Source: Khanal et al, 2012).....	18
Figure 4: Children under-five from the community (Image credit: Anustha Mainali, Nepal Public Health Foundation)	25
Figure 5: GDP per capita (Source: World Bank)	2
Figure 6: Under-5 Mortality Rate (Source: IGME).....	3
Figure 7: Neonatal mortality rate (Source: IGME)	4
Figure 8: Maternal mortality ratio (Source: World Bank)	4
Figure 9: Causes of death for children under-5 estimates from IGME and IHME (Sources: IGME and IHME)	5
Figure 10: MOH organizational structure (Source: Nepal Health Facility, 2015)	5
Figure 11: Health system structure in Nepal (Source: Nepal Health Facility Survey, 2015)	6
Figure 12: Trend in MOH expenditure by source of financing (Source: USAID, 2016)	10
Figure 13: Share of government and EDPs in total MOH expenditure (Source: USAID, 2016).....	11
Figure 14: Composite Coverage Index in Nepal by Wealth Quintile and Year (Source: Victora et al, Countdown 2030 Equity Profile)	11
Figure 15: Maps of change in U5M rates in from 2000 to 2016 showing overall reduction but persistence in geographic differences (Source: Local Burden of Disease collaborators, IHME)	12
Figure 16: Maps of U5M rates in 2016 showing variability of rates of U5M at different administrative levels of the country (Source: Local Burden of Disease collaborators, IHME)	35
Figure 17: Timeline of IMCI Program and Precursors	40
Figure 18: Care seeking for Diarrhea, Pneumonia, and Fever in U5 (Source: DHS 1996, 2001, 2006, 2011 and MICS 2014).....	20
Figure 19: Incidence of Diarrhea in Children Under-5 (Source: DHS 1996, 2001, 2006, 2011, and 2016) ..	24
Figure 20: Treatment of U5 with Diarrhea (Source: DHS 1996, 2001, 2006, 2011, and 2016)	25
Figure 21: Percentage of Children Under-5 with Diarrhea Treated with Zinc Supplementation (Source: DHS 2006, 2011, and 2016).....	28
Figure 22: Timeline of Zinc Program Scale-Up (Mosites et al).....	28
Figure 23: Implementation Districts for POUZN Project in 2008 (Source: Wang, et al 2011)	29
Figure 24: Classification of Malaria Risk by Administrative District in Nepal 2010 (Source: Dhimal et al) ...	33
Figure 25: Percentage of Households with ITNs by Ecological Zone (Source: DHS 2006, 2011, 2016)	36
Figure 26: Rates of vaccination coverage between 1996-2016 (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)	60
Figure 27: Percentage of Children Fully Immunized at 12 Months of Age by Wealth Quintile (Source: KC et al, 2017).....	38
Figure 28: Percentage of Children Vaccinated for Measles by 12 Months of Age (Source: DHS 1996, 2001, 2006, 2011, and 2016).....	38
Figure 29: Progress in Measles Elimination in Nepal, 2000-2006 (Source: CDC).....	39



Figure 30: Hib Vaccination Coverage for Infants in Nepal (Source: Nepal: WHO and UNICEF estimates of immunization coverage)	41
Figure 31: Coverage of PMTCT program in Nepal (2006-2016) (Source: PMTCT Factsheet 2017)	46
Figure 32: Display of healthy food items in the health post corner (Image credit: Anustha Mainali, Nepal Public Health Foundation)	72
Figure 33: Structure of SAM Program (Source: IMAM Guidelines Draft 7)	50
Figure 34: Coverage of Vitamin A Supplementation (Source: HMIS/MD/DoHS)	52
Figure 35: Maps of NMR from 2000-2016 showing persistently high rates in sections of the country (Source: Local Burden of Disease Collaborators)	56
Figure 36: Neonatal disorders mortality and related policy introductions (Source: IHME).....	56
Figure 37: Percentage of Deliveries Attended by SBA (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)	60
Figure 38: Percent Distribution of Live Births by Type of Assistance during Delivery (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)	60
Figure 39: Percentage of deliveries at a health facility (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)	62
Figure 40: Rates of FBD by wealth quintile (Source: Nepal DHS 2016)	62
Figure 41: Rates of FBD by geographic area (Source: Nepal DHS 2016)	62
Figure 42: Percentage of deliveries by C-section (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)	63
Figure 43: Modeled burden of U5M causes and timing of interventions (Source: IHME).....	70
Figure 44: Exemplars project team with FCHVs and health workers (Image credit: Anustha Mainali, Nepal Public Health Foundation)	70
Figure 45: Child health metrics by geography, 2014 (Source: Victora et al, Countdown 2030 Equity Profile)	101
Figure 46: Child health metrics by wealth quintile, 2014 (Source: Victora et al, Countdown 2030 Equity Profile)	101
Figure 47: Coverage of ORS, SBA, and DPT3 immunization, by region (Source: MICS 2014)	78
Figure 48: U5M Rates by Place of Residence, 2001 (Source: Nepal DHS 2001).....	82
Figure 49: Steps to Scale-Up Health Innovations in Nepal (Source: Khanal et al, 2012).....	83
Figure 50: Development assistance for health from donors for Nepal from 2000 to 2009 (Source: Yang et al).....	87
Figure 51: EPIS model of implementation (Source: Aarons, et al).....	115
Figure 52: Types of outcomes in implementation research (Source: Proctor, et al)	116
Figure 53: Framework for understanding interventions to reduce under-5 mortality (copyright UGHE)...	117



Acknowledgements

The research team would like to acknowledge the following individuals and groups for their critical role in this research, their feedback on our findings, and their overall support and guidance on this case study:

- **The Nepal Public Health Foundation** for their partnership and inputs into this case study and facilitation and participation of the in-country data collection
- **Gates Ventures** colleagues for their initial literature review, decomposition analysis, and feedback on this case study and our findings
- **The Institute for Health Metrics and Evaluation** and Simon Hay's team for creating the under-5 and neonatal mortality rate maps based on Local Burden of Disease data
- **Cesar Victora and his team at the International Center for Equity in Health, Federal University of Pelotas, Brazil** for their equity analyses and data visualizations
- **The Exemplars in Under-5 Mortality Technical Advisory Panel** for offering their invaluable perspectives on our findings and suggesting inputs and adjustments that bolstered our analyses and strengthened our report
- **Key informants and national and community stakeholders** for providing essential qualitative information, historical perspectives and narratives, and feedback on our findings, ensuring we captured the most accurate reflection possible on Nepal's journey to reducing under-5 mortality

We would also like to thank Gates Ventures and the Bill and Melinda Gates Foundation for their funding support of this project.



Abbreviations

ACF	Action Contre La Faim
ACT	Artemisinin combination therapy
AED	Academy for Education and Development
AHW	Auxiliary health worker
AIDS	Acquired Immune Deficiency Syndrome
AMDD	Averting Maternal Death and Disability
ANM	Auxiliary nurse midwife
ANC	Antenatal care
ARI	Acute respiratory infection
ART	Antiretroviral therapy
ARV	Antiretroviral
AusAID	Australian international aid agency
BCG	Bacillus Calmette–Guérin
BEmONC	Basic Emergency Obstetric and Neonatal Care
BMGF	Bill and Melinda Gates Foundation
BMI	Body mass index
BPKIHS	B.P. Koirala Institute of Health Sciences
BPP	Birth Preparedness Package
CB-IMCI	Community-Based Integrated Management of Childhood Illness
CB-IMNCI	Community-Based Integrated Management of Neonatal and Childhood Illness
CB-NCP	Community-Based Newborn Care Package
CB-PMTCT	Community-Based Prevention of Mother-to-Child Transmission of HIV
CBAC	Community-Based Management of ARI/CDD
CCI	Composite Coverage Index
CDD	Control of Diarrheal Disease
CEmONC	Comprehensive Emergency Obstetric and Neonatal Care
CHFP	Community and Health Facility as Partners
CHW	Community health worker
CIDA	Canadian International Development Agency
cIMCI	Community Integrated Management of Childhood Illness
CLTS	Community Led Total Sanitation
CMAM	Community-based management of acute malnutrition
DDT	Dichloro-diphenyl-trichloroethane
DFID	Department for International Development (UK)
DHS	Demographic and Health Survey
DoHS	Department of Health Services
DPT	Diphtheria-pertussis-tetanus
EBI	Evidence-based intervention
EDCD	Epidemiology and Disease Control Division
EDP	External development partner
EID	Early infant diagnosis (in context of PMTCT)
EmONC	Emergency Obstetric and Neonatal Care
EPI	Expanded Program on Immunization
EPIS	Exploration, Preparation, Implementation, Sustainment
eVT	Elimination of vertical transmission
FB-IMCI	Facility-Based Integrated Management of Childhood Illness
FBD	Facility based delivery
FCHV	Female Community Health Volunteer
FHD	Family Health Division (MOH)
FHI	Family Health International
GAM	Global acute malnutrition
GDP	Gross domestic product
HCT	HIV counseling and testing



HepB	Hepatitis B
HFMSp	Health Facility Management Strengthening Program
HFOMC	Health Facility Operation and Management Committee
HiB	Haemophilus influenza B
HIC	High income country
HIV	Human Immunodeficiency Virus
HKI	Hellen Keller International
HMIS	Health Management Information Systems
HF	Health facility
HR	Human resources
HSS	Health systems strengthening
ICCM	Integrated Community Case Management
IEC	Information, education, and communication
IGME	Inter-agency Group for Child Mortality Estimation (United Nations)
IHME	Institute for Health Metrics and Evaluation
IMAM	Integrated Management of Acute Malnutrition
IMAMI	Integrated Management of Acute Malnutrition including infants under six months of age
IMCI	Integrated Management of Childhood Illness
INGO	International non-governmental organization
IRS	Indoor residual spraying
ITN	Insecticide treated net
JAKPAS	Janatako Khanepani ra sarsafai karyaram (People's drinking water and sanitation program)
JSI	John Snow, Inc.
KI	Key informant
KMC	Kangaroo mother care
LBW	Low birth weight
LLIN	Long-lasting insecticide-treated net
LMIC	Low- and middle-income country
LSGA	Local Self Governance Act
M&E	Monitoring and evaluation
MAM	Moderate acute malnutrition
MCHC	Maternal and child health care
MCHW	Maternal and child health worker
MDG	Millennium Development Goal
MGH	Mothers' Group for Health
MICS	Multiple Indicator Cluster Survey
MINI	Morang Innovative Neonatal Intervention
MIYC	Maternal Infant and Young Child
MMR	Maternal mortality rate
MNCH	Maternal, neonatal, and child health
MO	Medical officer
MOH	Ministry of Health
MSNP	Multi-sectorial nutrition plan
MTCT	Mother-to-child transmission
NAGA	Nutrition Assessment and Gap Analysis
NCASC	National Center for AIDS and STD Control
NEPAS	Nepal Paediatric Society
NEWAH	Nepal Water for Health
NFHP	Nepal Family Health Program
NGO	Non-governmental organization
NHRC	Nepal Health Research Council
NHSPII	National Health Sector Program II
NICU	Neonatal intensive care unit
NMR	Neonatal mortality rate
NMSP	National Malaria Strategic Plan



NNIPS	Nepal Nutrition Intervention Project, Sarlahi
NPA	National Plan of Action
NPHF	Nepal Public Health Foundation
NPR	Nepalese Rupee
NTAG	Nepal Technical Assistance Group
NVAP	National Vitamin A Program
OMNI	Opportunities for Micronutrient Interventions Project
OOP	Out-of-pocket (expenditure)
ORS	Oral rehydration solution
ORT	Oral rehydration therapy
PCV	Pneumococcal Conjugate Vaccine
PHC/ORC	Primary health care outreach clinics
PHCC	Primary health care center
PI	Principal Investigator
PLHA	People living with HIV/AIDS
PMTCT	Prevention of Mother-to-Child Transmission of HIV
PNC	Post-natal care
POUZN	Social Marketing Plus for Diarrhoeal Disease Control: Point of Use Water Disinfection and Zinc Treatment
PPH	Postpartum hemorrhage
PPP	Public-private partnership
PSBI	Possible serious bacterial infection
PSI	Population Services International
QA	Quality assurance
RDT	Rapid diagnostic testing
RHD	Regional Health Directorate
RWSSP	Rural Water Supply and Sanitation Project
SAM	Severe acute malnutrition
SAPNA	South Asian Pneumococcal Alliance
SBA	Skilled birth attendant/attendance
SDG	Sustainable Development Goal
SDIP	Safe Delivery Incentives Program
SI	Strategic information
SMNHLTP	Safe Motherhood and Neonatal Health Long Term Plan
SMS	Short message service
STD	Sexually transmitted disease
SWAp	Sector wide approach
ToT	Training of trainers
TWG	Technical working group
U5M	Under-5 mortality
UGHE	University of Global Health Equity
UHC	Urban health center
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States Dollar
VCT	Voluntary counseling and testing
VDC	Village Development Committee
VHW	Village health worker
WASH	Water, sanitation, and hygiene
WFP	World Food Programme
WHO	World Health Organization
WHO SEARO	World Health Organization South-East Asia Regional Office



1 Executive Summary

1.1 Background

1.1.1 Exemplars in Global Health Under-5 Mortality Project

The Exemplars in Under-5 Mortality project aims to identify lessons from countries' successes in reducing under-5 mortality to inform the decision-making of leaders, policymakers, and funders. The University of Global Health Equity is collaborating with bgC3 and the Bill & Melinda Gates Foundation to understand exemplar countries successful reduction of under-5 mortality (U5M) – a high priority issue within global health. The project is designed to identify and disseminate cross-cutting implementation strategies and policy lessons that can be adapted and adopted in other countries working to achieve similar progress. The scope is limited to deaths amenable to improvement in healthcare delivery and quality, and focuses on the uptake of recommended evidence-based interventions (EBIs) to reduce U5M between 2000 and 2015. We applied an implementation science lens and mixed methods to understand not just what was selected and quantitative outcomes, but how and why the EBIs were implemented.

1.1.2 Nepal

Nepal is a diverse country in its geography; sociopolitical and economic spectrum; and ethnic, cultural, and religious identities. The country is divided into three distinct geographic zones: mountain, hill, and terai (low-lying flatlands), which represent significant geographic access challenges. With the vast majority (81%) of the country's population living in rural areas and across terrain that is often difficult to navigate, geographic access to healthcare has proven to be a consistent challenge to improving health equitably nationwide, although recent work to strengthen roads has occurred. The country has had economic growth, with GDP per capita growing from USD\$231 in 2000 to USD\$747 in 2015. While this was a large increase, Nepal's GDP per capita was still well below the South Asia average of USD\$1,545, and its neighbors India (USD\$1,606), Pakistan (USD\$1,429), and Bangladesh (USD\$1,210), in 2015.¹ The Human Development Index also increased from .410 in 1995 to .446 in 2000 to .566 in 2015.² While there has been a large drop in the proportion living below the poverty line – from 43% in 2003 to 25% in 2010 – that percent did not change between 2010 and 2015. Although a majority of the workforce is employed in the agricultural sector, the majority of the significant poverty reduction in the recent past has stemmed from non-agricultural production and remittances (which account for nearly 30% of the country's GDP, alone).^{1,3} While Nepal has steadily increased investments in the health sector, the total and relative amount (5% of national budget) has been lower than many regional neighbors and has relied on donor funding and out of pocket expenditures, which challenge sustainability and equity.

During a significant portion of the study period (1996 – 2006), the country experienced a Maoist insurgency, which took a significant toll on economic and social development and caused direct loss of lives and internal displacement. During this time period and afterwards, Nepal continued to experience political upheaval, with 10 different prime ministers serving from 2000 to 2015. Although these challenges may have slowed the uptake and scaling of some policies and interventions, the country experienced a sharp decrease in U5M across wealth quintiles and geographic regions during this period, though inequity persists. From 2001 to 2016, U5M decreased from **91 deaths per 1,000 live births to 39 deaths per 1,000 live births**, a decline

of 57%. During this same period, neonatal mortality (NMR) declined from **39 deaths per 1,000 live births to 21 deaths per 1,000 live births**, a decline of 46%. This drop in NMR was faster than the South Asia region, which had a decline in neonatal mortality of 38% (from 47 in 2000 to 29 in 2015), and among low-income countries, which had an average decline of 35% (from 42 in 2000 to 26 in 2015).¹

1.1.3 Methods

For the U5M exemplar project, we synthesized selected existing implementation science frameworks and implementation outcomes to create an U5M Exemplar implementation science framework. This framework guided the research and analysis to understand EBI implementation strategies and outcomes and identify key contextual factors and policies that facilitated or hampered this success.⁴⁻⁶ The research team performed a review of published and gray literature related to U5M in Nepal focused on which, how, and why EBIs were implemented to reduce U5M and key contextual factors associated with success or challenges. Using the U5M Exemplar framework, the research team then conducted and analyzed 21 key informant interviews with policy-makers, implementers at the national and subnational level, academics, donors, and implementing partners in Nepal to understand the implementation strategies, policies, and contextual factors most relevant to the success in reducing U5M in Nepal and extract potential lessons learned and approaches which could be implemented in other countries. Results for each EBI were analyzed using the framework. Additional analyses from the International Center for Equity in Health (Victora and team) and geospatial mapping from the Institute for Health Metrics and Evaluation (Hay and team) were used to further explore changes in equity indices for mortality and EBI coverage. Finally, the findings were presented to a group of stakeholders including key informants, current and former MOH leaders involved in EBI implementation, and selected academics and implementers in November 2018. The feedback was incorporated into the case study.



Figure 1: Principal investigators and participants at the research findings presentation in Kathmandu, Nepal - November 2018

1.2 Key Findings

1.2.1 Coverage and Equity of Selected Under-5 Mortality Interventions

Nepal was found to have implemented many of the EBIs identified as effective in reducing U5M in low and middle-income countries. Many of the EBIs were implemented and sustained using the strategies described below, successfully achieving national scale-up and associated with sustained health improvements in the causes of death and diseases targeted. However, others were implemented with some inconsistency of coverage and variability of integration into a sustainable national scale strategy. For example, some EBIs were piloted and scaled to selected districts and regions but did not reach national scale. Other EBIs were identified as a priority and proposed for implementation, but stalled in the testing and resourcing of the intervention stages. Table 1 shows that the coverage of selected EBIs increased during the study period, such as care seeking for pneumonia, diarrhea, and fever; selected vaccinations; and facility-based delivery. Other areas, such as treatment with oral rehydration solution, increased but remained at just over 40% coverage. The incidence of a number of underlying conditions decreased, including diarrhea, fever, and stunting. Other health indicators showed improvement, such as an increase in birth spacing and a decrease in teen pregnancy.

Inequity of coverage was seen based on measures such as women's education and urban versus rural residence (with larger gaps for maternal care, immunization, and care-seeking for pneumonia). Despite significant efforts, geographic inequity in coverage of a number of EBIs persisted, with a range of the composite coverage index from 54% to 75% (and postnatal care from 17% to 76%), with the lowest rates typically in the mid-Western and Eastern areas.⁷

Table 1: Major Causes of U5 Mortality and Evidence Based Interventions (Source: Nepal DHS 2001, 2006, 2011, 2016; DHS STATcompiler)

U5 Cause of Death	Intervention	2001	2006	2011	2016
Lower Respiratory Infections	Care-seeking for pneumonia	26.8%	40.1%	53.9%	89.5%
	Vaccination: 3 doses of PCV	Not implemented			45.5%
	Vaccination: Hib	Not implemented			Not found*
	U5 with symptoms of ARI – 2 weeks preceding survey	22.8%	5.3%	4.6%	2.4%
Diarrheal Diseases	Oral rehydration therapy	30.7%	28.2%	43.4%	57.7%**
	Vaccination: 3 doses of rotavirus	Not implemented			
	Care-seeking for diarrhea	21.9%	26.8%	39.3%	70.1%
	U5 with diarrhea – 2 weeks preceding survey	20.4%	11.9%	13.8%	7.6%
Malaria	Households with mosquito nets		61.3%	67.8%	75.1%
	Care-seeking for fever	25%	32.9%	42.6%	78.7%
	Treatment of children with fever by ACT	Not found	Not found	Not found	Not found
	Prompt treatment of children with fever by ACT	Not found	Not found	Not found	Not found
	U5 with fever – 2 weeks preceding survey	32%	16.9%	18.7%	21.2%
Measles	Vaccination: Measles	70.6%	85.0%	88.0%	90.4%



Malnutrition	Exclusive breastfeeding from 0-5 months	68.3%	53.0%	69.6%	66.1%
	U5 receiving vitamin A supplements in the six months preceding survey		87.5%	86.8%	82.5%
	U5 stunted	57.2%	49.3%	40.5%	35.8%
	U5 wasted	11.2%	12.6%	10.9%	9.6%
HIV	HIV counseling during antenatal care				13.2%
	HIV testing during antenatal care				21%
Other Vaccine Preventable Diseases	Full vaccination coverage with 3 doses DPT, 3 doses polio, measles and BCG	65.6%	82.8%	87%	77.8%
Neonatal Causes of Death	Antenatal care: 1+ visits by a skilled provider	27.9%	43.7%	58.3%	83.6%
	Antenatal care: 4+ visits by a skilled provider	14.5%	30.3%	51.6%	70.4%
	Antenatal care: 1 st antenatal visit in the 1 st trimester	16.4%	27.7%	49.7%	65.1%
	Vaccination: Tetanus protection at birth		77.8%	82.1%	88.7%
	Delivery in a health facility	9.8%	19.1%	40.6%	62.3%
	Delivery attended by skilled provider	11.9%	20.2%	40.5%	62.7%
	Delivery by C-section	1%	3%	5.3%	9.6%
	Postnatal care: Postnatal visit for baby within 2 days of birth			30.1%	56.6%
	Postnatal care: Postnatal visit for mother within 2 days of birth			44.5%	56.7%
	Median birth interval (months)	31.8	33.6	36.2	36.7
	Teenagers who have begun childbearing	21.4%	18.5%	16.7%	16.7%
	* DPT vaccinations included DPT/HepB as well as DPT/HepB/Hib, cannot distinguish Hib vaccine coverage in 2011 DHS ** through 2011, ORT includes ORS and/or increased fluids; in 2016, ORS, recommended home fluids, and/or increased fluids				

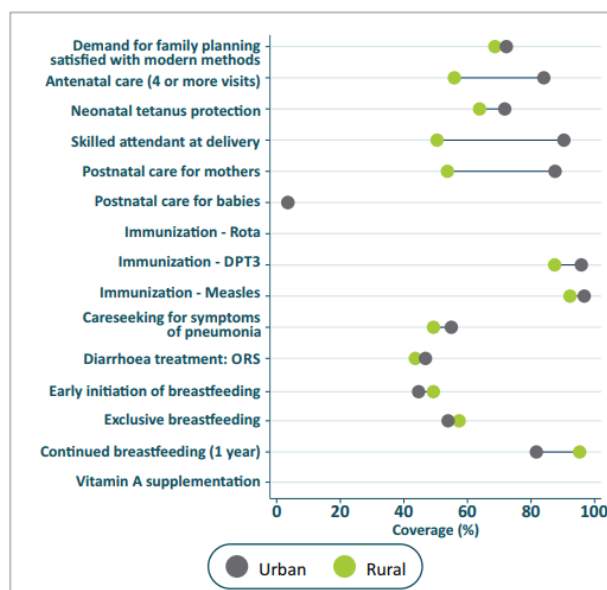
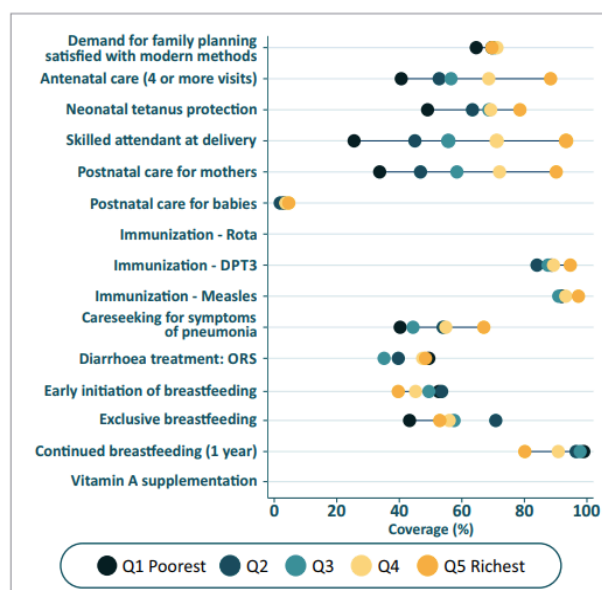


Figure 2: Nepal Equity Profile, Health Indicators by Wealth Quintile and Place of Residence from MICS 2014 (Source: Victora et al)

1.2.2 Common Implementation Strategies

We identified common strategies that were applied to different evidence-based interventions, although some were implemented with variable success. Commonly identified strategies included:

- Engagement for health interventions across sectors (intersectoral strategy)
- Local data collection and pilot testing and studies in a limited region prior to national scale-up
- Leveraging a strong community-based care delivery system
- Investment in human resources for health and ongoing health workforce strengthening
- Integration of new initiatives into existing programs and systems
- Decentralization of responsibilities, authority, and resources to local bodies
- Engagement and coordination of implementing partners and donors
- Adaptation of interventions to local setting
- Community engagement and sensitization
- Integrating equity focus into policy and implementation

1.2.3 Examples of Implementation of Evidence-Based Interventions to Address Major Causes of Death

Nepal implemented many of the existing EBIs before or during the study period, while a number of others were only implemented towards the end or after the study period. The work started with interventions that addressed causes of death across age groups, including vaccination, improving maternal care, and addressing major causes of death through expansion of treatment of diarrhea and respiratory illness. Responding to a slower decline in neonatal mortality, with this age group representing a growing proportion of under-5 deaths, Nepal also targeted expansion of a number of neonatal-focused EBIs. The work in Nepal also included initiatives addressing underlying causes and social determinants, including WASH programs, women's empowerment, and expansion of reproductive rights. While the data on causes of death in Nepal are limited, modeling from IHME found that throughout the period of interest (2000-2015), major amenable causes of death included newborn causes, pneumonia and lower respiratory infections, diarrhea, measles, and meningitis. Injury was a significant cause of death during the study period but falls outside of the scope of this research. Mortality rates for each of these causes of death decreased over this time period. Similar to many other countries and reflecting the increased proportion of under-5 deaths in neonates, the relative proportion of neonatal causes of death has increased. We describe three illustrative EBI implementations and the implementation strategies employed below. Complete descriptions of the range of initiatives can be found in the full report.

1.2.3.1 Community Based Integrated Management of Childhood Illness (CB-IMCI)

Because of low access to treatment in remote districts due to geographic inaccessibility of health centers, and high rates of respiratory disease, Nepal explored community-based treatment of respiratory infection to expand access to care from facilities to communities. Like many EBI implementations in Nepal, this started with a three-year Ministry of Health (MOH) pilot study in one district using community-based volunteers identified and trained for management of acute respiratory infection (ARI). The pilot was successful, with ARI cases detected and treated with a 28% reduction in the risk of death from all causes



for children under-5.⁸ Because of uncertainty of the capacity of the existing community health workforce to deliver community-based care, the adoption of the approach was discussed over six years. Reflecting the overlap in strategies and care delivery cadre, in 1997-1998, the community-based ARI intervention was combined with the existing community-based diarrheal disease program and implemented in six districts. In 1998-1999, nutrition and immunization were also integrated into the community-based care program (CBAC) and expanded to five additional districts. The CBAC program was then merged into the broader CB-IMCI program. Training materials and guidelines were adapted to include CB-IMCI for community based delivery and the facility-based (FB) IMCI training was reduced to nine days to increase feasibility and allow addition of community and program management components to reflect the expanded role of facility staff to oversee the CB-IMCI.^{9,10} Along with the FB-IMCI, the CB-IMCI program in Nepal expanded over 10 years (from 1999 to 2009) to cover all 75 districts in the country. Further adaptation of the CB-IMCI program occurred in 2011, with the addition of community-based neonatal care to the program, creating the Community-Based Integrated Management of Neonatal and Childhood Illness (CB-IMNCI) Program. Coverage of a number of interventions has varied (Table 1) and data for quality (effective coverage) were not identified during the case study.

1.2.3.2 Pneumococcal Vaccination

WHO recommended the use of PCV-7 in vaccination of children in LMICs in 2006, updated to the PCV-10 or PCV-13 vaccine in 2012. Based on this recommendation and evidence of high child mortality due to pneumonia, Nepal chose to adopt PCV.^{11,12} As with other vaccines in the country, Nepal performed multiple local studies to assess for national need for this intervention, delaying national adoption of PCV. The Government of Nepal applied for financial support from Gavi for implementation of the PCV vaccine in September 2012, with plans to introduce the vaccine in August 2014 and with actual rollout in 2015.¹³ Although initially the MOH wanted to introduce PCV-13 to cover more serotypes, they chose to introduce PCV-10 due to limitations in cold chain space.¹⁴ Other steps in preparation for the introduction of PCV included developing guidelines and training manuals; creating advocacy and sensitization materials for involved stakeholders and organizing advocacy meetings with national and local leadership; and training of vaccinators.¹³ Because PCV was introduced nationally in Nepal in 2015, the implementation and sustainment of the vaccine lie primarily outside this case study's time period of interest. Reflecting the year of initial implementation, vaccination with all three doses of PCV at age 2 years (versus full recommended vaccine coverage at 1 year which was high) was low at 5% in 2015 and increased to 46% in 2016.¹⁵

1.2.3.3 Rotavirus

In 2000, a study in Nepal found that rotavirus was the most common diagnosed cause of diarrhea in children, causing up to 39% of cases.¹⁶ Although the rotavirus vaccine was first recommended by the WHO in 2009, it had not been implemented in Nepal by the end of the study period. The Nepali National Immunization Program added introduction of the rotavirus vaccine in their 2011-2016 Comprehensive Multi-Year Plan, with the initial aim of rolling out the vaccine in 2016.¹⁷ Preparations for rotavirus vaccination rollout included several studies to understand incidence of rotavirus in different age groups, seasonal disease patterns, and most common serotypes. Within the health sector structure, preparations have involved a complete cold chain assessment, approval for vaccine adoption from the Logistic



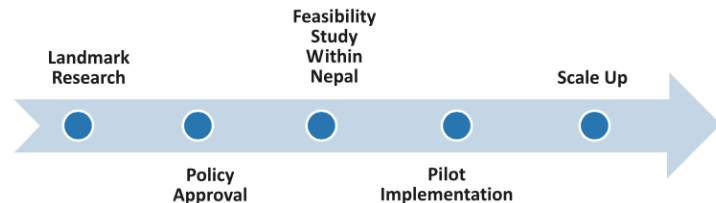
Management Division and the Ministry of Finance, and preparation of training manuals for providers and educational materials for communities specific to rotavirus vaccine.¹⁷ Roll-out of the rotavirus vaccine was planned to start in 2018 in Nepal, but some gaps in final preparation and the needed system remained. According to one key informant, the government has recently put the rollout on hold with plans to implement it once all preparations are set.

1.3 Cross-Cutting Contextual Factors

Through the desk review and key informant interviews, we identified a number of cross-cutting contextual factors at the global, national, and community levels that both facilitated and hindered the successful implementation of EBIs and subsequent reduction in U5M. Some of these were specific national level policies and programs that affected the effective implementation of the EBIs as well as overall U5M, while others were broader national level cultural factors, such as a culture of local evidence generation and data collection and use. These policies and other contextual factors contributed in meaningful ways to the success of U5M reduction in Nepal, as well as some notable delays and inconsistent implementation strategies from the national level down through the health system. These cross-cutting contextual factors broadly include:

- **Strong community health work force (Female Community Health Volunteers (FCHVs).** This cadre's responsibilities evolved from reproductive health services to focus on U5M reduction through maternal, neonatal, and child health related initiatives including: health promotion and education, dispensing of selected preventative commodities, and treatment and referral services. Several KIs credited FCHVs as key contributors to U5M reduction in Nepal.
- **Focus on universal health care and equity through national leadership and commitment,** as enshrined in Nepal's interim constitution in 2007 (and the 2015 constitution). The country has committed to access to health care as a fundamental right of the people and, more recently, "reaching the unreached" and ensuring equity in health policy and delivery. While this has not been uniformly achieved, it remains an area where ongoing adaptation and work were identified.
- **Health Systems,** and the work to strengthen health systems, including infrastructure and human resources for health, was essential for U5M reduction. However, some gaps presented barriers, including ongoing inequitable coverage for more remote areas, limited monitoring capacity, low capacity for planning, and challenges with decentralization.
- **Geography** has remained a major challenge to equitable access to health facilities and care with persistent gaps in coverage, particularly in the western and northern regions.
- **Prioritization of local research** was emphasized by KIs in many sectors as essential in Nepal prior to the adoption of interventions to increase acceptability and appropriateness. KIs and published literature outlined the steps in Figure 3.¹⁸ However, challenges were also observed, including long periods between decisions to explore new EBIs and initiation of national scale-up. In addition, a number of EBIs found to be effective were not able to be scaled.

- **Data Use and Availability** was identified as important in setting priorities and monitoring progress in Nepal via the HMIS and national DHS. However, information on data quality from HMIS and differences between DHS and data from routine sources were noted.



*Figure 3: Steps to Scale-Up Health Innovations in Nepal
(Source: Khanal et al, 2012)*

- **Quality of Care:** Prioritization of quality was noted during the study period. However, although the MOH drafted a Quality Assurance Policy in 2009 to “ensure the quality of services provided by governmental, non-governmental, and private sector according to set standard,” with no resource backup, the implementation of the policy remains poor.¹⁹ There has been recent work to establish more formal approaches to quality assessment and improvement from a national level, but this falls largely outside of the study period.
- **Donor and International Partner Resources and Coordination** was repeatedly identified as a facilitator both for early pilot work as well as expansion of EBIs, with coordination helped by a pooled fund and Sector Wide Approaches (SWAp). In most of the EBIs, donors were directly engaged or engaged through their funded implementing partners as members of technical working groups to provide input into guidelines or as direct implementers of pilots. However, challenges with coordination and donor-led projects that were not sustained or did not achieve national scale were also identified as challenges.
- **Improved access to family planning and decreased fertility rates** and the general “opening of reproductive rights” were cited by many KIs as contributing to improvement in U5M. One KI noted that frequent unwanted pregnancies and challenges with birth spacing led to increased childhood mortality, adding that higher maternal mortality also ultimately left surviving children worse off.
- **Broader initiatives:** A number of initiatives not directly related to implementing the EBIs but which addressed barriers or social determinants of health, as well as incidence of underlying diseases, were identified as critical to the drop in U5M. These included:
 - **Infrastructure, Transportation, and Communications:** An increase in paved roads, electricity coverage, and telecommunications connectivity facilitated access and has the potential to increase movement to health facilities and greater communication between health centers.
 - **Women’s Education/Empowerment:** Addressing gender inequity and women’s rights were strong themes during the study period. These ranged from efforts to increase education to increasing property and inheritance rights and other protections (see also reproductive rights).
 - **WASH:** The work to improve WASH has likely been a contributing contextual factor to reducing the incidence of diarrhea and so reducing the contribution of diarrhea as a cause of U5M.

- **Economic growth**, including large funds from remittances, were also identified as empowering families and giving women in particular the resources needed and increased expectations for care to demand more and better services.
- **Leadership** was noted to have a strong role in implementation of several programs/policies related to maternal and child health in Nepal, contributing to the decline in under-five mortality. This was evidenced in Nepal's commitment to several initiatives and incorporation of maternal and child health into national policies such as the National Health Policy of 1991, the second long-term health plan of 1997, and the free health care policy of 2006, as well as being a signatory to several international commitments, such as the MDGs. This has occurred despite the instability of the government over the past few decades, which was noted to have hindered effective implementation of policies.
- **Conflict**: The civil war in Nepal overlapped with the study period. However, while the conflict took lives and caused other harm, the prioritization by both sides to ensure access to care was associated with expansion, rather than disruption, of services.

1.4 Challenges

Despite the progress made, Nepal has been challenged by a number of factors that have prevented them from achieving their goal of equity in coverage and outcomes and that pose potential threats to sustaining and continuing progress. These include:

- **An increase in natural disasters and climate-change related events**
- **An FCHV system under stress** due to the broadening scope of activities and aging of the cadres, among other issues
 - This involves questions of program sustainability with increasing demands and available alternatives to FCHVs
- **Rising proportional causes of death** for children under 5 that **require higher levels of care** (prematurity, for example) **and continued geographic access**
 - The rise in proportional morbidity among newborns related to low birthweight and prematurity indicates a need for greater investment in high cost, facility-based interventions, such as neonatal intensive care units
- Continuing **concerns about quality and equity of coverage** in a number of areas, particularly in especially mountainous or remote locations
- **Donors' contribution to Nepal's health budget decreasing** further in light of Nepal's plan to graduate to the status of a lower-middle income country by 2022
- **Ongoing inequity** based on wealth, socioeconomic status, geography, and gender
 - Notably, patients have experienced high out of pocket expenses

1.5 Transferrable Knowledge for Other Countries

There were a number of replicable strategies from Nepal that would be relevant for other countries looking to accelerate decline in U5M, learning from Nepal's successes and challenges. These included investing in the health system (infrastructure and health workers) to reflect local constraints and needs; a commitment



to equity in access (geographic, financial), which was also reflected in intersectoral initiatives and policies; building a strong community health program, which was used to integrate multiple initiatives and expand access and community engagement; a strong commitment to other initiatives, which impacted environmental and social determinants, including women's empowerment, infrastructure, and WASH; generating local evidence to inform implementation of new EBIs; and integrated accountability at the local level. Other areas, which were important but introduced later or towards the end of the study period, included quality of care and strengthening human resources. Details on selected transferrable strategies are outlined below, with details in the full report.

Areas of strength and recognized challenges:

1. Plan for equity from the beginning

Nepal had mixed results initially to address equity both for wealth as well as geography. In the last few years, explicit goals, including “reaching the unreached” and using data to identify where care is not being received, have supported work to address persistent gaps. Nepal has also led in policies which are designed specifically with equity in mind, although challenges in implementation were described, due in part to available resources and the need to further customize implementation strategies to different populations. Some transferable lessons include:

- Using a rights-based approach and integration of this approach into policies and legal frameworks at the national level
- Integrating an equity agenda into health system strengthening for national challenges (for Nepal: wealth, gender, caste, and geography)
- Utilizing an equity agenda in geographic access
- Ensuring financial accessibility through systems designed to ensure equity
- Including a focus on reproductive rights and access, reflecting national priorities above donor priorities

2. Build on existing health system capacity through integrating new initiatives while strengthening the underlying health system

Integration of new programs into existing structures and previous programs was important to reduce risk for vertical projects and duplication of work while providing resources to increase overall capacity. This was at the local and sub-national care delivery level and central level in protocols, policies, and management. Notable examples of this include:

- The multi-sectoral nutrition plan (MSNP), implemented in 2012: This focused on a number of implementation strategies, including integration of services across sectors and prevention as well as treatment; decentralized care, including outpatient when possible and inpatient when indicated; and monitoring and evaluation, including integration into current HMIS system
- Integrating zinc treatment into an existing program for CB-IMCI
- Broader health systems strengthening efforts and continued building on existing health system capacity, with the program of FCHVs as central for MNCH interventions



- Expanding the existing surveillance system to include measles in order to increase data for target areas where increased access was needed to address outbreaks
- Integrating multiple interventions into the community based program, including community- and facility-based ARI and diarrheal programs and nutrition and vaccination programs to create the comprehensive CB-IMCI program, eventually expanding neonatal interventions as well.^{10,20}

3. Develop a community health worker program with a standardized education, management, and accountability system that involves the community and health professionals

The FCHVs were repeatedly noted as core to the success in dropping U5M. Multiple EBIs were incorporated into their scope of work, rather than creating new cadres. The success was also related to strong governance from mothers' groups (who select the FCHVs), minimum criteria, and the authority and respect related to the position. However, as noted above, expansion and new generations who have broader employment opportunities highlight the need to reflect on the potential need to adapt even established programs as contextual factors change.

4. Use evidence-based decision making and create policies and strategies based on global and local scientific evidence and feasibility and value the local generation of research and evidence

Nepal had a strong practice of exploring new global developments but then requiring local pilot testing to determine need or impact of potential EBIs before adoption, often by local researchers but also through implementing partners. While this often increased ownership, it also posed some challenges involving time to implement (ex. Rotavirus) or capacity to scale. Specific lessons included:

- Development and use of local routine data to drive change
- Prioritization of local research

5. Consultations and participation: Engage and consult stakeholders and leverage expertise across sectors and levels, including MOH, donors, academics, implementing partners, and community members

This approach ensured both better acceptability and potential for scale through broad engagement at the start and leveraging of available technical knowledge. This was typically done through technical working groups as well as identifying technical experts to lead the pilot testing, which was characteristic of the implementation initiation of EBIs. Scope included reviewing published evidence, exploring feasibility before implementing new EBIs, designing pilot testing, and adapting existing EBIs. There were some practical successes such as the Newborn Working Group, which included local experts in maternal health, child health, neonatologists, public health leaders, and researchers and has had input into ongoing work to reduce NMR, and the National PMTCT Working Group, including WHO, United Nations Population Fund (UNFPA), United Nations Children's Fund (UNICEF), the Joint United Nations Programme on HIV/AIDS, and USAID/Family Health International (FHI). Specific lessons include:



- Leveraging and coordinating donor and NGO activities
- Ensuring participation of communities in program implementation
- Making a wider range of expertise available through technical working groups

6. Ensure accountability through local empowerment and capacity building

Nepal fostered accountability through decentralization and community engagement. The country has been gradually decentralizing health governance at a district level with mixed results and may offer lessons in success and where change is potentially needed. Nepal has also engaged and empowered community leadership and authority through programs such as the mothers' groups for health (MGHs), which are important for accountability and oversight and ensuring community participation, and the Village Development Committee (VDC), which is accountable to the local health institution.

7. Pursue quality service delivery

One lesson extracted was ensuring that quality is embedded in the initiation and throughout implementation of an intervention and is scalable to national coverage with measurement to ensure impact. Although some work was integrated into EBI implementation, the overall strategies represented the priority to measure and improve quality, an identified gap. However, this focus has increased over time and new work offers practical approaches, including a recommitment at the national level. Strategies included:

- Ensuring training to the local level through cascades of training
- Integrating quality assurance into the national policy
- Establishment of a national commission for quality with political leadership

8. Multisectoral collaboration to address health and health-related determinants

Through engagement of multisectoral work, a number of interventions were critical to reducing U5M and supported addressing other determinants of health. These included WASH, improvements in roads, and women's empowerment, among others.

9. Develop locally responsive demand side interventions

Nepal identified where barriers existed that could be addressed through locally adapted, demand-side interventions, including transport support and community sensitization to increase acceptability and demand using opinion leaders (ex. Mothers' groups and FCHVs). For example, transportation vouchers and conditional cash transfers were given to women pursuing facility-based deliveries.

10. Plan for sustainability

Nepal used a range of strategies to ensure sustainability, including local data production to drive adaptation and acceptability (see above and in full case), ensuring programs were reflected in national policy, engaging the private sector (ex. zinc production), and basing interventions in leveraging community engagement. There were notable successes with sustainability efforts, as well as challenges reflecting, in part, the reliance on donor funding.



11. Address other factors related to U5M

Nepal made significant improvements in structures and social determinants not related directly to health that likely contributed to their success in U5M reduction. These included:

- Broader infrastructural investment, including improvements to roads, schools, electricity, and communication, combined with Nepal's steady economic growth, which have contributed to the successes seen in the health sector
- Addressing underlying causes of ill health, such as safe water and sanitation
- Women's empowerment
- An equity agenda, including financial wellbeing, education, reproductive rights, and legal protections

12. Strengthen health systems to support EBI implementation and build ability to address emerging issues

Nepal built and upgraded the quality of infrastructure, including facilities, and increased human resources, which provided the staff and space needed to deliver the EBIs. They have recently identified existing gaps and are further investing to "reach the unreached". As noted previously, the comparatively low proportion of the national budget devoted to health, decreasing donor funding, and a reliance on out of pocket expenditures pose a challenge to equitable EBI coverage. Equitable coverage is further challenged by the relative contribution from the country commitments. However, leadership had a strong role in implementing several programs/policies related to maternal and child health in Nepal and supporting the work to decrease in under-five mortality. Much of this was accomplished through integration into national initiatives and policies, which ensured continuity of some of the work, despite the challenges due to multiple transitions in the government that may have impacted effectiveness of implementation of the policies.

1.6 Conclusions

Nepal has achieved remarkable drops in U5M and neonatal mortality despite challenges in political instability and geographic access. The increase in coverage of EBIs has been more variable overall for some groups based on geographic area, wealth, and caste. Improvements outside the health system and other interventions to address social and other determinants of health, including women's empowerment and reproductive rights, roads, and economic development, were identified as key factors influencing U5M. The strong community health workforce, through the FCHV program, were credited with many of the successes, whether directly or through community sensitization and engagement. Challenges remain in areas including quality, sustaining the community workforce as the country continues in its pursuit of reaching the unreached, and addressing causes of death requiring higher levels of care.

2 Introduction

2.1 Exemplars in Global Health

The Exemplars in Global Health project was started by bgC3 to inform high impact global health decisions by making it easier to replicate large-scale national and global health successes through evidence-based narratives. The core of the project is to identify the knowledge and evidence detailing the successes, as well as drivers of and barriers to those successes, among “exemplars” – positive outlier countries or regions that have demonstrated outperformance relative to peers or beyond what might be expected given context and/or financing. The content goes beyond traditional research and peer-reviewed literature to better understand how these exemplars were able to achieve success beyond their regional neighbors and other comparable countries. The analysis and conclusions are designed to be data-driven and rigorous, but also to create knowledge that is transferable and accessible and has the potential to be used across a range of key stakeholders. Therefore, the content developed by the Exemplars project is intended primarily for an audience of national policymakers, implementers, and funders – people with the potential to significantly impact global health policy and implementation at scale.

2.2 Exemplars in Under-5 Mortality

As a part of the broader Exemplars project, the University of Global Health Equity (UGHE) is working with the teams at bgC3 and the Bill and Melinda Gates Foundation to better understand countries’ successes in reducing under-5 mortality (U5M) between 2000 and 2015. This work was designed with two aims: 1) developing and testing an implementation framework and mixed methods approach to understand the successes of these countries, and 2) extracting actionable and transferable knowledge focused on implementation strategies and key contextual factors to inform other countries working towards the same goal. The scope of mortality was limited to amenable causes of death - those which are potentially preventable with a stronger and higher quality health care system. The work was divided into a number of activities. These included: 1) identifying evidence based interventions (EBIs) in use in low- and middle-income countries (LMICs); 2) developing and applying an implementation science-based approach to understanding how the EBIs put into place by these exemplar countries were prioritized, adapted, implemented, and sustained; 3) understanding how the evidence based interventions implemented by a country were prioritized, adapted, implemented, and sustained through research into both existing publicly available sources and primary key informant interviews; and 4) identifying the key contextual factors and policy interventions critical to each country’s success. The work was guided by the developed framework, which was informed by a number of frameworks in use for U5M (e.g. Countdown 2015, WHO) and implementation science. The framework and identified EBIs can be found in Appendix A.

Seven countries meeting “exemplar” criteria for U5M were chosen based on the rates of decline in U5M compared with countries in their region or with similar economic resources, with input from a technical advisory panel. These countries were chosen to represent a range of locations and sizes, with the goal of identifying varied implementation success factors common to countries that have over-performed in U5M.



2.3 Nepal

Background

Located in Southeast Asia, Nepal is a landlocked country with a population of approximately 30 million people. The country is divided into three ecological zones based on altitude: mountain, hill, and terai (low-lying flatlands). The mountain zone makes up 35% of the country's land area with 6.7% of the total population. The hill zone is 42% of the land area with 43.0% of the population. With the lowest altitude and highest population density, the terai zone is 23% of the land area and 50.3% of the population. The country's population has increased from 19 million in 1990 to 29 million in 2016, with most (81%) living in rural areas.^{21,22}



Figure 4: Children under-five from the community (Image credit: Anustha Mainali, Nepal Public Health Foundation)

Nepal has significant diversity in language and culture, with the 2001 census recording 125 languages and 103 different ethnic groups. Although the formal caste system was abolished in 1963, the sociopolitical ordering has continuing effects on marginalization of some communities and “untouchable” groups (Chamars, Musahars, and Tatma) remain some of the poorest in the country.²³ Hinduism is the country's primary religion (81.3%), followed by Buddhism (9%), and Islam (4%).²⁴

Economic Status and Development

Nepal has had economic growth, with GDP per capita growing from USD\$231 in 2000 to USD\$744 in 2015. While this was a large increase, Nepal's GDP per capita was still well below the South Asia average of USD\$1,545, and its neighbors India (USD\$1,606), Pakistan (USD\$1,429), and Bangladesh (USD\$1,210), in 2015.¹ The Human Development Index also increased from .410 in 1995 to .446 in 2000 to .558 in 2015.² While there has been a large drop in the proportion living below the poverty line – from 43% in 2003 to 25% in 2010 – that percent has not changed in the following 7 years.¹

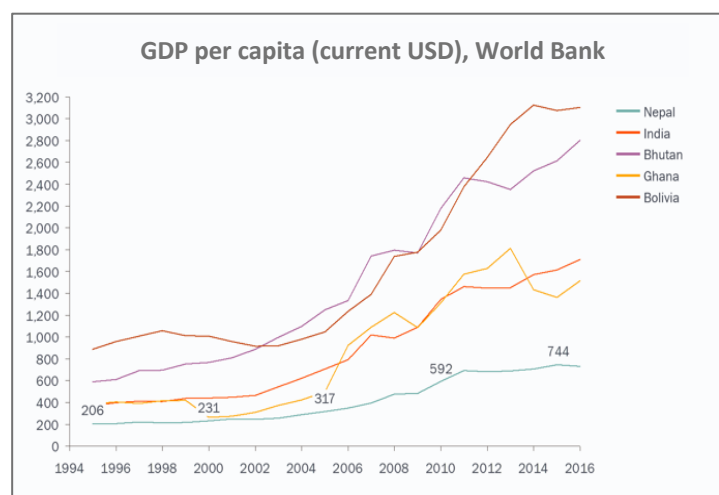


Figure 5: GDP per capita (Source: World Bank)

Nepal's labor force is mostly agricultural, (although agriculture only makes up 27% of the country's GDP) with challenges in further growth due to a lack of skilled labor.²⁵ The country's industry also includes processing and manufacturing of agricultural commodities. Services, including the tourism sector, and manufacturing, including the textiles sector, represented 52% of Nepal's GDP in 2016.¹ Labor, however, is a large export. The World Bank estimates that 28.3% of Nepal's GDP comes from remittances, placing it within the top 5 countries with personal remittances received as a percentage of GDP.¹ These remittances, as well as non-agricultural production, accounted for the majority of the reduction in poverty between 2003 and 2010 noted above.³ Of interest, key informants noted that this labor migration has also resulted in greater expectation for quality of care as well as greater financial resources to purchase health care in traditionally poorer communities.

Additional infrastructural challenges to Nepal's growth during the study period include its landlocked geographic location, persistent power shortages, and underdeveloped transportation infrastructure.

Political Landscape (see also Contextual Factors: Conflict)

Nepal had a period of conflict between 1996 and 2006 with the Maoist insurgency, which took a significant toll on economic and social development, as well as direct loss of lives and internal displacement. Despite this conflict, a 2010 analysis of health outcomes during and after the civil war found that Nepal made progress on most health indicators during the conflict.²⁶ Key informants noted that health care delivery was considered a priority by the insurgency and that continuation of services rather than disruption was a goal for both sides.

Since the end of the conflict through 2015, Nepal has continued to have challenges with political stability, with 10 different prime ministers serving during the study period. These leadership transitions were felt to delay the translation of some policies and pilots into national scale-up, as detailed below.

Mortality Rates

The rates of U5M in Nepal dropped between 2000 and 2015 to become one of the lowest in the South Asia region. Rates of U5M decreased in both urban and rural areas, as well as across wealth quintiles, although some inequity still exists more prominent based on wealth than geographic location. According to the 2016 DHS, the lowest wealth quintile had a U5M rate of 62 deaths per 1,000 live births, and the highest wealth quintile had a U5M rate of 24 per 1,000 live births (IHME estimates 79 per 1,000 live births in 2000 reduced to 37 in 2015).

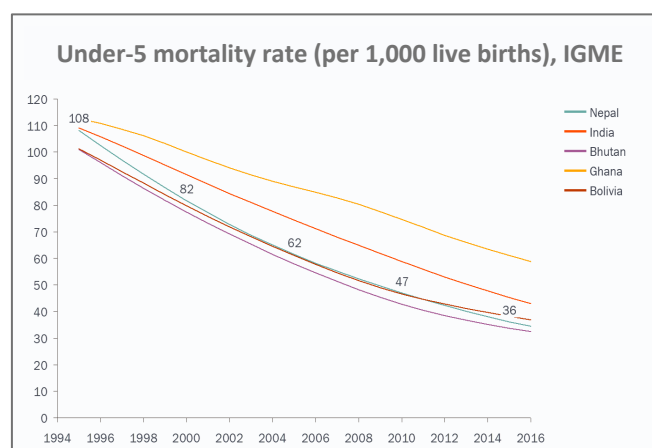


Figure 6: Under-5 Mortality Rate (Source: IGME)



Table 2: Under-5 mortality rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016)

Under-5 mortality rate calculated as deaths per 1,000 live births					
	1996	2001	2006	2011	2016
Total	118	91	61	54	39
Urban	82	66	47	45	34
Rural	143	112	84	64	44
Lowest wealth quintile	156	130	98	75	62
Highest wealth quintile	83	68	47	36	24

The neonatal mortality rate has also declined from 39 deaths per 1,000 live births in 2001 to 21 deaths per 1,000 live births in 2016 according to the DHS (IGME estimates of 40.6 per 1,000 live births in 2000 to 21.6 deaths per 1,000 live births in 2016).²⁷⁻²⁹ However, geographic inequity exists (26 deaths per 1,000 live births in rural areas versus 16 deaths per 1,000 live births in urban areas) with differences also between the poorest and wealthiest Nepalese (36 deaths per 1,000 live births versus 12 deaths per 1,000 live births).

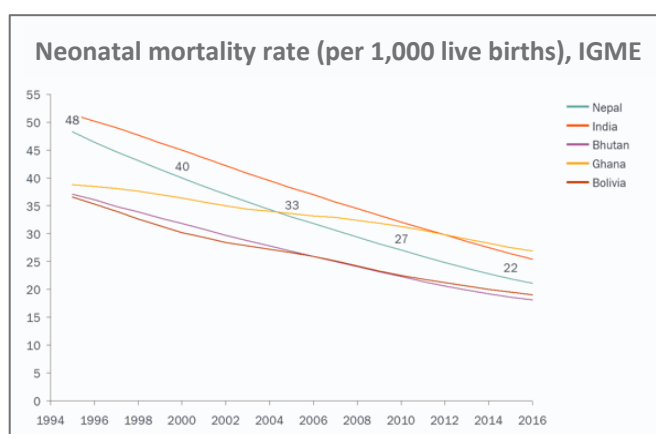


Figure 7: Neonatal mortality rate (Source: IGME)

Table 3: Neonatal mortality rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016)

Neonatal mortality rate calculated as deaths per 1,000 live births					
	1996	2001	2006	2011	2016
Total	50	39	33	33	21
Urban	43	37	25	25	16
Rural	59	49	40	36	26
Lowest wealth quintile	57	49	43	37	36
Highest wealth quintile	48	32	26	19	12

The maternal mortality ratio (MMR) has also dropped during the study period, with estimates from the World Bank showing a decrease from 660 to 258 per 100,000 live births from 1995 to 2015.¹ Despite this decrease, the MMR in Nepal is still higher than many of its neighbors, with the DHS in 2016 estimating the MMR at 239 deaths per 100,000 live births (compared to India, Bangladesh, and Pakistan, which were 174, 176, and 178 deaths per 100,000 live births in 2015, respectively).^{1,28}

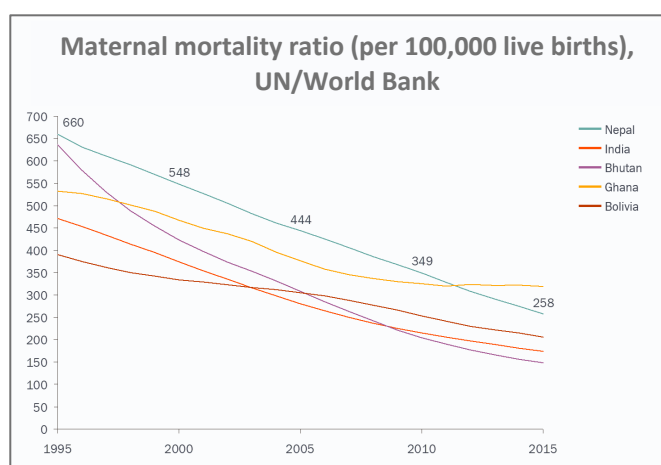


Figure 8: Maternal mortality ratio (Source: World Bank)



Based on models from IGME and IHME, the patterns and causes of death for all children under-5 have also changed over time, with a growing proportion occurring in newborns and decreases in some communicable diseases, including measles and meningitis.^{30,31}

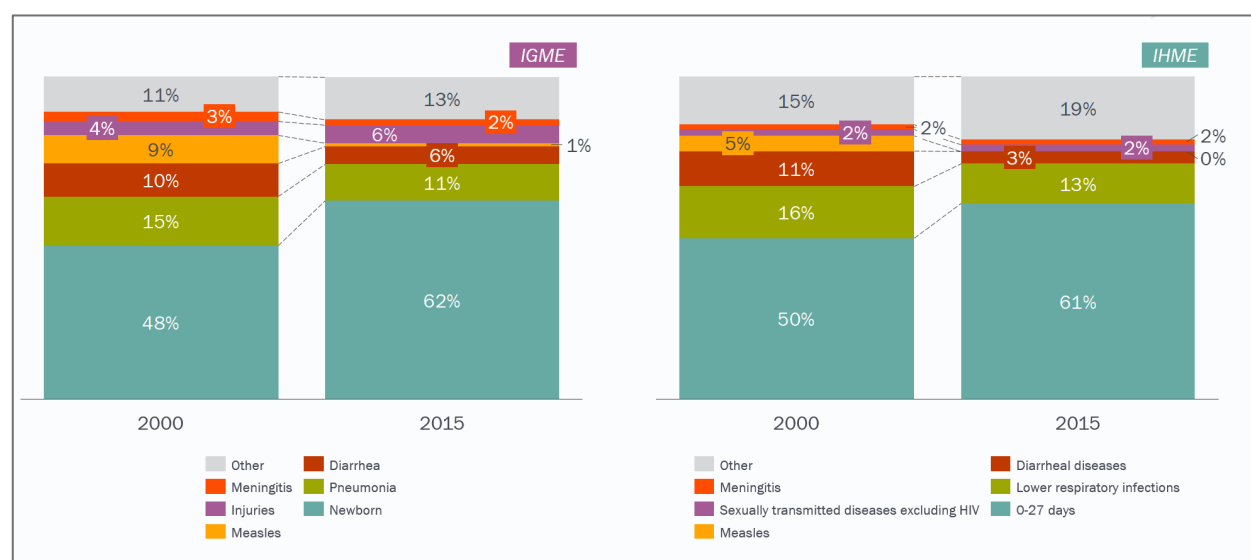


Figure 9: Causes of death for children under-5 estimates from IGME and IHME (Sources: IGME and IHME)

Health System Organization and Governance

Health System Structure (see also Contextual Factors: Universal Health Coverage and Equity)

The system has both public and private providers, with a rapid increase in private sector service provision during the period of the study. The private sector increased from comprising 23% of hospitals in 2003 to 78% in 2008, with a disproportionate number in the central region (76%). The private sector accounted for 70% of health expenditure in 2015 (81% of which is out of pocket).³² As of 2014, 75 district health offices managed basic health care service delivery through a network of 76 district-level hospitals, 204 primary health care centers (PHCCs), 329 urban health centers (UHCs), 3,805 health posts, 250 community health units, 12,908 primary health care outreach clinics (PHC/ORCs), and 16,355 Expanded Program on Immunization (EPI) outreach clinics across the country.³³ These were designed to be equitable in distribution: District level health facilities are in every district and primary health care centers (n=205) are in every electoral constituency (catchment

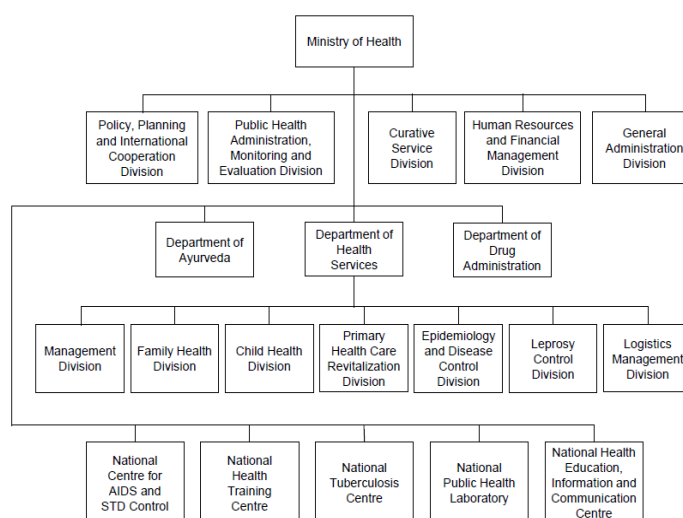


Figure 10: MOH organizational structure (Source: Nepal Health Facility Survey, 2015)

area represented by a member of parliament). Similarly, health posts/community health units are in every Village Development Committee (VDC), as well as EPI clinics (number varies from 1-5 depending on the size of VDC). This represents a significant increase in geographic access since 2000, when many districts did not have hospitals. Over the period of the study, health facilities were also substantially improved regarding quality and services available, including upgrading the category of health facilities (i.e. sub-health post to health post, health posts to PHCCs, etc.) and increasing the number of birthing and comprehensive emergency obstetric care centers. While there has been a significant investment in the health system, it faces a number of challenges, including unequal distribution of facilities, poor infrastructure, poor retention of providers in rural settings, and supply chain gaps.

Ministry of Health

In 2015, the Ministry of Health had three departments, five regional health offices, five autonomous bodies, six professional councils, 27 zonal and regional hospitals, 19 medical college teaching hospitals, 76 district-level teaching hospitals, and 364 private hospitals.³³

Among the ministry's three departments, the Department of Health Services is primarily responsible for preventive, promotive, and curative health services throughout the country. The other two departments – the Department of Ayurveda and the Department of Drug Administration – deal with the traditional medicine system and national pharmaceutical regulation, respectively.

Decentralization

While Nepal has experienced significant political upheaval since the early 1990s, the 1991 National Health Policy has continued to drive much of the Ministry's mission.³³ The policy mandated decentralization, with a prominent role for district health bodies in the planning and management of curative and promotive health services from the district level down to the village level.³⁴ The levels include national, regional/zonal, district, Village Development Committee (VDC), and community (although these are changing with recent political changes). The system includes the public sector, private providers, and institutions run by faith-based NGO partners. There is also significant investment in the community-based providers, notably the Female Community Health Volunteers (See Contextual Factors for more details).

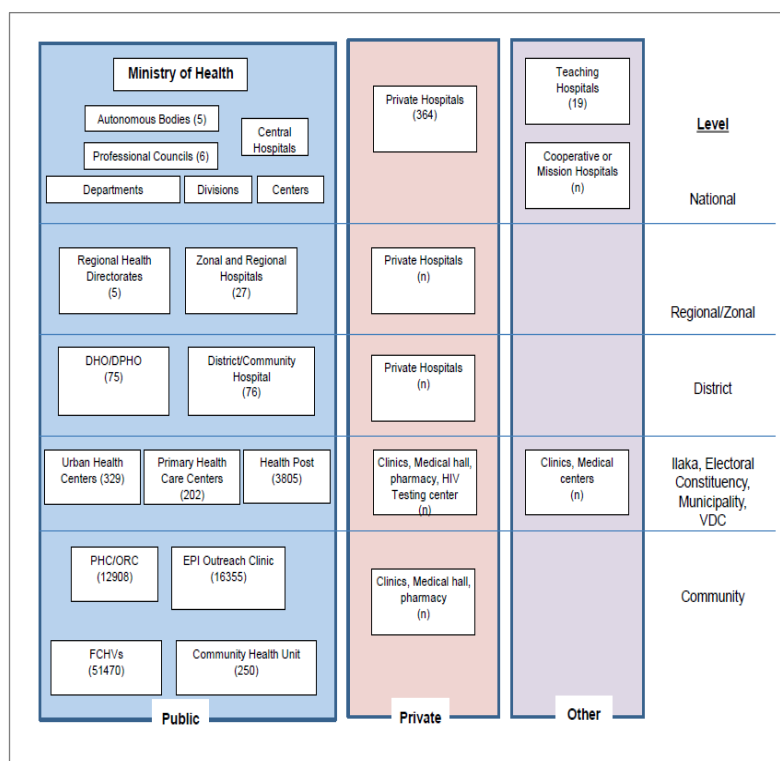


Figure 11: Health system structure in Nepal (Source: Nepal Health Facility Survey, 2015) **The total number of non-hospital private facilities is unknown.**

Since 1991, Nepal has been gradually decentralizing health governance at a district level. The Local Self Governance Act (LSGA), in 1999, aimed to decentralize governance in the health sector through devolution of responsibilities, authority, and resources to local bodies. This act facilitated the transfer of power and authority over public sector health care to local bodies called Health Facility Operation and Management Committees (HFOMCs). These committees were created to serve as a bridge between the government and local communities, conveying the concerns of community members to health facilities and VDCs. The goal was to represent all community members and the committees were mandated to work with local governments to identify health service gaps, oversee health planning, and mobilize funds and resources. The HFOMC members include the elected Village Development Committee chair, a locally elected woman representative, a representative from the dalit and marginalized population, a female community health volunteer, a local school teacher, and the person in charge of the health facility. However, while decentralization led to health care at the more local level, the impact of the efforts and of the committees was not clear and KIs noted that the members of the HFOMC are not compensated, with the frequency of meetings and local involvement and impact varied across Nepal.^{35,36}

In 2003, the Nepal Family Health Program (NFHP) – funded by USAID and implemented by partners^a – helped the Nepali government more fully implement the transfer of health facility management to communities in 17 core program districts, including strengthening the local committees.³⁷ By 2006, this process was completed in 28 districts and involved 1,433 health facilities, with approximately half being supported by NFHP (USAID funded) and the other half directly by the Government of Nepal. Following this formal process, three-day capacity assessments and strengthening trainings were given to 502 members of the new HFOMCs.

An assessment in 2006, however, found that simply doing a one-step handover of health facilities to the communities was not effective; there were a number of challenges, including confusion about roles and responsibilities of different stakeholders, too much emphasis placed by HFOMCs on improving physical infrastructure with limited focus on quality of care issues, and dalit and women members requiring more support than other HFOMC members to participate effectively. The conclusion was that the handover should be a series of steps and not a single transition. Based on these experiences, NFHP, in close cooperation with the National Health Training Centre and other stakeholders, engaged in capacity building of local health facilities and developed a modified approach called Community and Health Facility as Partners (CHFP), which was implemented in eight core program districts covering 100 Village Development Committees. After further refinement and modification of the CHFP approach, it was implemented as part of the NFHP II in 4 more core program districts, covering 55 VDCs.

^a Nepal Family Health Program (NFHP), John Snow Inc., NFHP ran from December 2001 to December 2007 and was implemented by JSI, EngenderHealth, Johns Hopkins University/Center for Communication Program (JHU/CCP), Johns Hopkins University Program in International Education on Reproductive Health (JHPIEGO), CARE, Save the Children/US (SC/US), Nepal Fertility Care Center (NFCC), Nepali Technical Assistance Group (NTAG), Management Support Services (MASS), and ADRA. http://nfhp.jsi.com/Res/Docs/TechBrief17-HFMSP_000.pdf, accessed Sept 20, 2018

In 2009, NFHP II again changed the name of the program to the Health Facility Management Strengthening Program (HFMSPP) to more accurately reflect program goals. After two years of implementation in the 55 VDCs covered by, and the favorable results collected through Technical Support Visits, the approach was scaled up in 2010 in 557 VDCs of nine additional districts, covering a total of 612 health facilities in 13 districts. This was never scaled nationally because of no ongoing donor funding.³⁸

After the time period of the case study, changes in health system management are happening, with a recent MOH report noting that the 2015 constitution has further mandated the local levels to deliver the package of basic health services.³⁹ While the development of standards and policies, management of hospitals, regulation of medicines, addressing the outbreaks and disasters, and international cooperation will remain with the federal and provincial governments, significant actions are underway to further transition towards local control, including reorganization of authority; funding; governance and reporting; annual reviews which take place at local, provincial and federal levels; and capacity building for elected local government members and health workers on new structure and roles. Nepal has also re-organized its sub-national units (replacing regions with seven provinces) and made changes to the Village Development Committees in 2017.

Human Resources for Health

Between 1995 and 2008, Nepal had only modest growth in the number of trained health care workers.⁴⁰ In the period of 2004 to 2006, the World Bank estimated approximately one physician for every 4,700 people, one nurse or midwife for every 2,100 people, and five hospital beds per 1,000 people in Nepal. By comparison, India in 2004 had one physician for every 1,700 people; Bhutan had one per 5,400 people.¹

One 2016 study described the MNCH system staffing structure prior to 2015 as follows:⁴¹

- Each VDC (catchment population from ~1,000 to ~10,000 (average of ~5,000)) has a sub-health post, a health post at each illaka (local sub-unit) level, and a Primary Health Care Center for each electoral constituency (area represented by a member of parliament) to provide primary health care services.²⁴
- A sub health post is staffed by an auxiliary health worker, a female maternal and child health worker (MCHW), and a village health worker (VHW). As noted below, there has been recent work to upgrade some of the MCHWs as auxiliary nurse midwives.
- The health posts are staffed with a health assistant as the in-charge, an auxiliary health worker, auxiliary nurse midwives, and a VHW.
- A Primary Health Care Center is staffed by a medical officer with staff under the MO, including a health assistant, an auxiliary health worker, auxiliary nurse midwives, and a staff nurse.

Since the end of the case study period, a number of other changes were made. MCHWs were upgraded to auxiliary nurse midwives through trainings and VHWs were upgraded to AHWs to expand the services able to be provided. Additionally, sub health posts have been upgraded to health posts.⁴²

Community Health Program (see also Contextual Factors)

Prior to 1988, community-based education and outreach around basic maternal and child health awareness, including family planning, was provided by a group known as community health leaders. They



included both male and female volunteers but the males were not easily accepted by female service users. In 1988, the Female Community Health Volunteer (FCHV) Program in Nepal was started by the Ministry of Health and Population to address these challenges. It was designed originally to improve community participation and enhance the outreach of health services through volunteer women who reside in the villages.⁴³ The initial program called for one FCHV per ward in rural areas and national implementation was completed in 1992. Recognizing the differences in number of individuals in an FCHV's catchment area, population-based FCHV program was implemented in 28 districts in the mid 1990's, which had a large impact both on the numbers of FCHVs and the average population they cover. Population-based districts have, on average, 16 FCHVs per VDC instead of the nine that are found under the ward-based program. In addition, FCHVs were recruited in urban areas, leading to a current total of nearly 50,000 FCHVs in Nepal. Nationally, the MOH's Family Health Division is responsible for the management of this program. USAID provides support through the FCHV subcommittee, under the Reproductive Health Committee, to coordinate and develop policies and guidelines.⁴⁴ For example, USAID supported the development of the revised National FCHV Program Strategy in 2006, which was designed to facilitate collaboration between the Government of Nepal and other development partners to provide coordinated, continuous, and consistent support to FCHVs.

The scope of FCHVs' work has significantly expanded over the years in a number of health program areas, mostly focused on reproductive health and child health, although they may have also received brief training in many other public health programs of the Ministry of Health (more details are included in the Contextual Factors section). Their work is divided between education of the public, promotion of government health services, and direct provision of select services.

These services include:

Family Planning

- Education and promotion regarding all family planning methods
- Provision of pills and condoms

Maternal and Newborn Health

- Education in pregnancy and promotion of antenatal care, iron supplements and tetanus toxoid
- Provision of iron supplements in selected districts
- Promotion of birth preparedness, including use of a skilled birth attendant and/or emergency preparations (particularly in selected districts)
- Promotion of good newborn care practices
- Provision of vitamin A to post-partum mothers

Child Health

- Promotion of good nutrition and hygienic and healthy behaviors
- Treatment of simple pneumonia with cotrimoxazole and referral of serious cases
- Treatment of diarrhea with oral rehydration solution (ORS) and zinc
- Distribution of high dose vitamin A and deworming tablets twice yearly to targeted children under age five



- Support for childhood immunizations and provision of polio drops during national immunization days

Other Conditions

- Provision of education and promotional services for other diseases (e.g., HIV/AIDS)
- Provision of limited first aid/treatment of minor illnesses

Administrative Duties

- Activate and serve as the secretary for the local mother's group
- Report to the local health facility monthly using the ward register and through local supervisor

Health Financing

The government has consistently increased the health sector's budget, from NPR 6.5 billion (USD\$88 million) in 2004/05 to NPR 36.7 billion (USD\$228 million) in 2016/17. This represents a per capita annual expenditure on health of USD\$40, a decline from USD\$68 per capita in 2011, according to IGME.³³ The figure ranks near the bottom of South Asian countries, higher than only Pakistan and Bangladesh.

The health sector's share of the national budget is about 5%. Reflecting the goal of decentralization, over the past five fiscal years more funds have been distributed to the 75 districts and less to the central Ministry. The general government's expenditure represents about 40% of total health expenditures, with the remainder covered by private sources, mainly by Nepali households with out of pocket expenditures. In 2009, out of pocket expenditures by households represented 53% of total health expenditures.⁴⁵

Donor Funding for Health (see also Contextual Factors)

Donor funding for health care constituted almost half (48%) of total health financing in 2009/10, but dropped to 40% in 2010/11. In 2014/15, donor funding represented less than one-third of total health financing.⁴⁶ The level of total spending, while initially dropping in 2012 as donor funding declined in 2014/15, increased back to 2010 levels due to increased spending from the government.

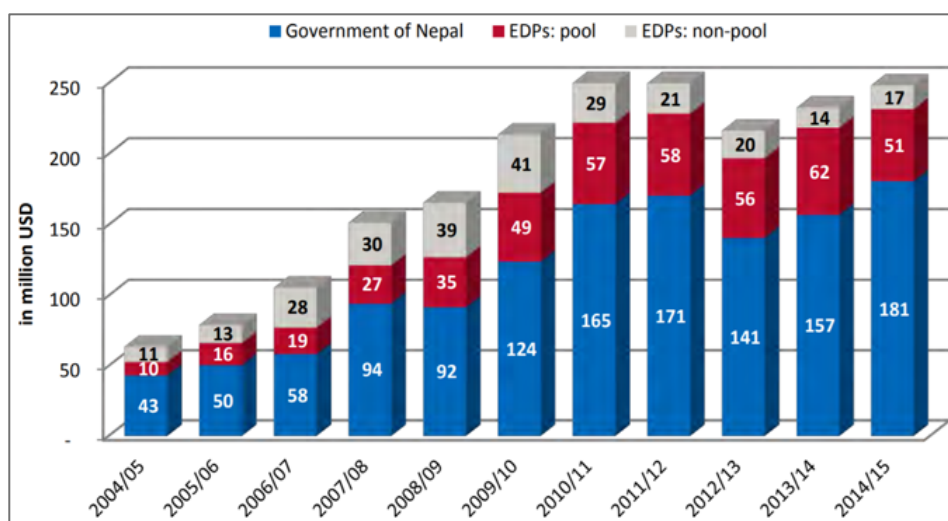


Figure 12: Trend in MOH expenditure by source of financing (Source: USAID, 2016)

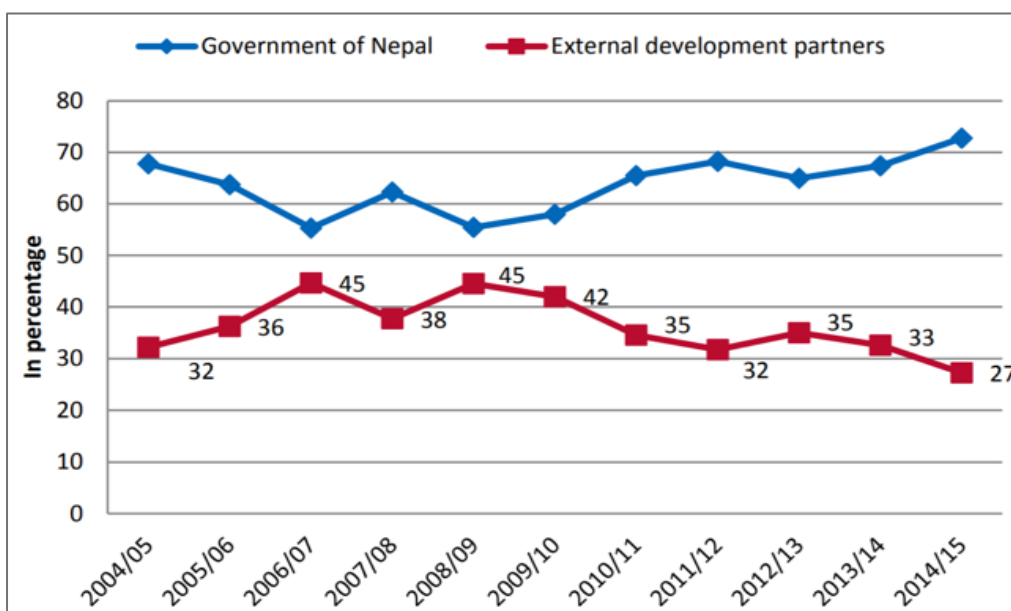


Figure 13: Share of government and EDPs in total MOH expenditure (Source: USAID, 2016)

Health Equity

Inequity was present in both wealth and geography, with challenges regarding access to health care services well documented due to the natural terrain, certain castes and other populations who have not been equitably reached, and financial barriers. The Countdown composite coverage index, which is a 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

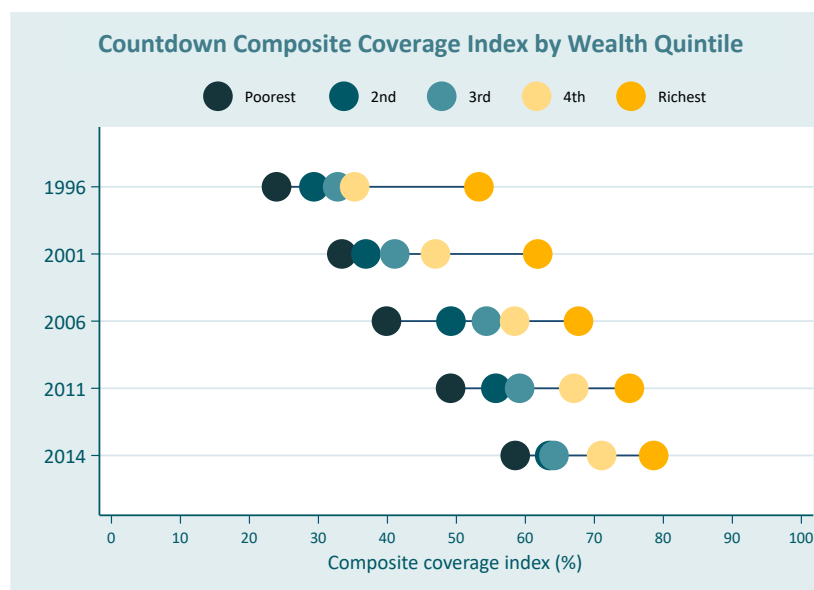


Figure 14: Composite Coverage Index in Nepal by Wealth Quintile and Year (Source: Victora et al, Countdown 2030 Equity Profile)

ANC visits and SBA), immunization (BCG, three doses of DTP, and measles) and management of child illness (ORS for diarrhea and care seeking for children with symptoms of pneumonia), shows a shift towards greater equity regarding wealth quintile, with gaps remaining (Figure 14). Another area that shows promise for health equity is the CCI regarding mother's education. In Nepal, the coverage of the CCI interventions was 62 for mothers with no education and 70 for mothers with secondary education or higher in 2014. For

comparison, in Bangladesh the CCI for mothers with no education was 57 and 70 for mothers with secondary education or higher in 2014 and in Pakistan these measures were 45 for no education and 69 for secondary or higher education in 2012.⁴⁷

Inequity in outcomes of U5M are also seen in geography (Figures 15 and 16). This is due in part to challenges of geographic access due to the natural terrain as well as certain castes and other populations who have not been equitably reached. These challenges reduced but are still persistent and some interventions, such as insurance schemes, occurred largely after the study period. Interventions and outcomes are detailed in contextual factors section.

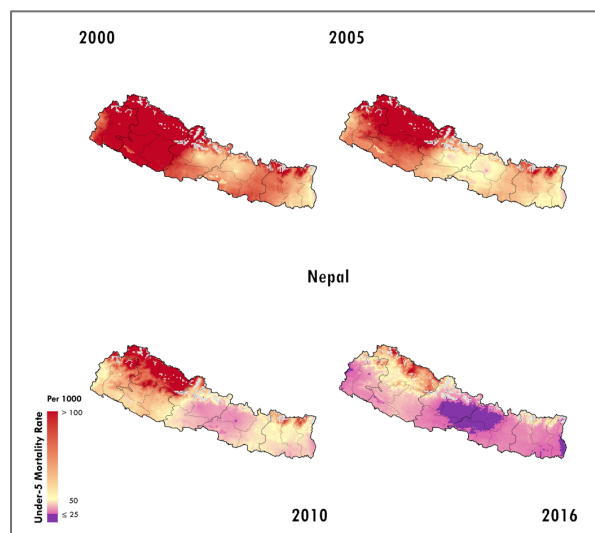


Figure 15: Maps of change in U5M rates in from 2000 to 2016 showing overall reduction but persistence in geographic differences (Source: Local Burden of Disease collaborators, IHME)

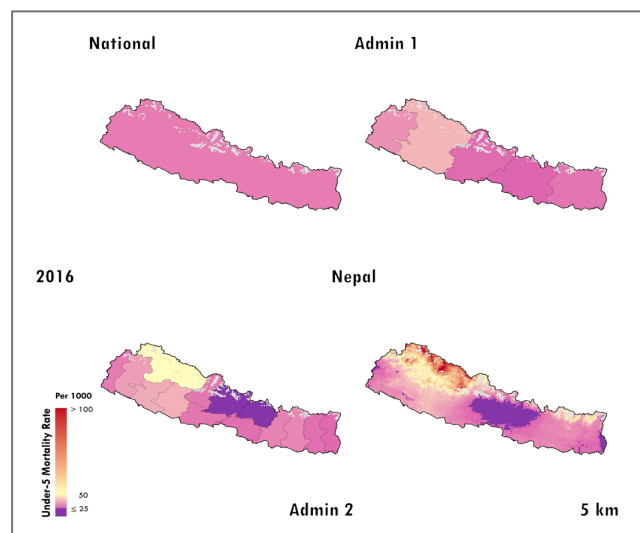


Figure 16: Maps of U5M rates in 2016 showing variability of rates of U5M at different administrative levels of the country (Source: Local Burden of Disease collaborators, IHME)

Education

A major initiative nationally and also related to women's empowerment was a focus on increasing literacy. As a result, Nepal's overall literacy rate had increased from 33% in 1990 to 49% in 2001 and currently is approximately 60%. However, it is still below the South Asia average of 67%. (See also Gender Equity.)

Gender Equity

Gender inequity in Nepal remains a challenge and is marked by low levels of women's parity with men in economic opportunity, educational attainment, and political empowerment. The country ranked 110 out of 144 in gender equity in the World Economic Forum's 2016 Global Gender Gap Report.⁴⁸ Similarly, the literacy rate for adult females in Nepal, while increasing, was estimated at 53.1% in 2015, which was significantly lower than male literacy rate estimate of 76.4% (2015), and also below the South Asia average of 57% (2010).^{1,25} Additional challenges have included marriage at young age for girls and decision making autonomy.

3 Methods for Case Study

The methodology was designed to achieve the following goals of generating new and actionable insights through applying implementation science methods to selected Exemplar countries to:

- Identify and evaluate the methods of deciding on the policies and EBIs to reduce under-5 mortality and their implementation strategies and execution
- Understand supporting and obstructing contextual factors from these countries

3.1 Project Framework

Both the desk review and the primary research are informed by an implementation science framework designed specifically for this project (see Appendix A). While we are often able to identify policies and EBIs chosen by a country to reduce U5M, the key lessons in how these were chosen, adapted, implemented, and sustained are often missing from available published or gray literature. Because the same policies and interventions brought different results in different countries, implementation science offers important tools for how to think more holistically about how and why countries were able to reduce U5M, and from where lessons in replication can be drawn. To guide the overall work, we developed a framework to understand the contribution of contextual factors and the different levels of actors involved: global, national, ministry, subnational, facility, and community. Details and the framework can be found in the appendix.

3.2 Desk Review

The bgC3 and UGHE teams undertook an extensive review of available information and published data on the rates and progress of U5M, including policies, strategies, EBIs available to potential exemplar countries, and the uptake and implementation of these EBIs in Nepal. Initial secondary research was performed through MEDLINE (PubMed) and Google Scholar using the search terms “child mortality” or “under-5 mortality” and Nepal. Further searches included specific EBIs, causes of death, or contextual factors as search terms (e.g. “insecticide-treated nets,” “malaria,” or “community health workers”). Initial desk research by bgC3 was synthesized and then reviewed by the UGHE team for accuracy and completeness. Following this, additional support was provided by the UGHE team to increase the capture of published literature relevant to the work.

The desk review was an iterative process, with ongoing additions occurring throughout the primary research process as additional sources (published articles, reports, case studies) were identified. We purposely did not include in-depth reviews of important broad interventions that contributed to U5M reduction, including education, poverty reduction, water and sanitation, and programs designed to improve nutritional status, but have worked to include some evidence of increased coverage where available.

3.3 Primary Research

In collaboration with our consultant in Nepal, Nepal Public Health Foundation (NPHF), a health research institution in Nepal, we identified key informants reflecting a broad range of experience and viewpoints. KIs were chosen based on the topics identified in the desk review and the close collaboration with NPHF, prioritizing those EBIs that were reported as most successful, as well as any major EBIs for which no

evidence of implementation was found in the literature. These KIs included current and former Ministry of Health employees responsible for overall direction or identified key specific disease or intervention areas. We also interviewed key individuals from NGOs, multilateral organizations, or donor organizations who had managed partner-supported or partner-led activities. We focused on individuals active in the time period between 2000 and 2015, but were able to also capture some experiences from 1995-2000 and after 2015.

Informed by the framework and review of relevant literature on contextual factors and implementation outcomes, we developed core interview guides for four main routes of inquiry. These were:

- Global and national level actors (donors, other ministry);
- Ministry of Health (MOH) actors;
- Project managers and implementers for specific causes of death or EBIs
- Academics; and
- Other partners

A total of 21 individuals were interviewed in person or by the phone. Note: Some KIs represented more than one view point based on their experience over the 15 years and were interviewed for each of their multiple viewpoints

The interviews were designed to address the EBI implementation process, from decision to implementation to sustainment. This includes critical contextual factors at the relevant global, national, ministry, and local levels. The interviews also identify additional sources of data and information which could be added to the knowledge base and understanding already developed from the desk review.

Interviewees were informed about the goals and structure of the project, and consent for participation and recording was obtained separately from the interview (recording was solely for the purpose of reviewing notes). Interviews were led by one of the project PIs (Lisa Hirschhorn), Research and Project Coordinator, or a member of the consulting team from NPHF, with one to two note-takers. Following the close of the interview, notes were combined and the tape recording (if allowed) was used to clarify areas as needed.

3.4 Analysis and Synthesis

The UGHE team used a mixed methods explanatory approach, applying the framework to understand the progress (or lack thereof) for each cause of death and coverage of chosen EBIs, as well as facilitators and barriers at the local, national, and global levels. This approach aimed to create a better understanding of what, how, and why the Government of Nepal was able to achieve success in decreasing U5M and what the challenges were. The analyses were also informed by the extensive work completed by other initiatives, including Countdown 2015, WHO maternal and child health initiatives, the International Center for Equity in Health, and others.

KI interviews were coded by the researchers and the framework was used to extract the EPIS steps and contextual factors. A priori codes for contextual factors were adapted and expanded as emerging themes were identified. Due to resource constraints and the range and diversity of interviewees, qualitative analysis using software was not planned.



3.5 Human Subjects Review

The work was approved by and conducted with the support of the Ministry of Health and the Nepal Health Research Council. This research project received approval from the NHRC ethical review board prior to the start of the data collection period. The project was conducted entirely retrospectively, using de-identified data and desk reviews of existing reports, with informed consent obtained from all interview participants.

No quotes or specific viewpoints are included which are identifiable to the source without explicit permission. All recordings and interviews had names removed and are kept in password protected computers and storage is on a limited access Google Drive. All recordings will be destroyed once the interview coding has been completed.



4 Specific Causes of Death and Evidence-Based Interventions

This section will focus on evidence-based interventions designed to address specific causes of death for children under-5 in Nepal. See Appendix A for a complete listing of U5M causes of death and EBIs considered in this case study.

Table 4: Evidence Based Interventions and prevalence of selected causes of death available from the DHS (Source: Nepal DHS 2001, 2006, 2011, 2016; DHS STATcompiler)

U5 Cause of Death	Intervention	2001	2006	2011	2016
Lower Respiratory Infections	Care-seeking for pneumonia	26.8%	40.1%	53.9%	89.5%
	Vaccination: 3 doses of PCV	Not implemented			45.5%
	Vaccination: Hib	Not implemented			Not found*
	U5 with symptoms of ARI – 2 weeks preceding survey	22.8%	5.3%	4.6%	2.4%
Diarrheal Diseases	Oral rehydration therapy	30.7%	28.2%	43.4%	57.7%**
	Vaccination: 3 doses of rotavirus	Not implemented			
	Care-seeking for diarrhea	21.9%	26.8%	39.3%	70.1%
	U5 with diarrhea – 2 weeks preceding survey	20.4%	11.9%	13.8%	7.6%
Malaria	Households with mosquito nets		61.3%	67.8%	75.1%
	Care-seeking for fever	25%	32.9%	42.6%	78.7%
	Treatment of children with fever by ACT	Not found	Not found	Not found	Not found
	Prompt treatment of children with fever by ACT	Not found	Not found	Not found	Not found
	U5 with fever – 2 weeks preceding survey	32%	16.9%	18.7%	21.2%
Measles	Vaccination: Measles	70.6%	85.0%	88.0%	90.4%
Malnutrition	Exclusive breastfeeding from 0-5 months	68.3%	53.0%	69.6%	66.1%
	U5 receiving vitamin A supplements in the six months preceding survey		87.5%	86.8%	82.5%
	U5 stunted	57.2%	49.3%	40.5%	35.8%
	U5 wasted	11.2%	12.6%	10.9%	9.6%
HIV	HIV counseling during antenatal care				13.2%
	HIV testing during antenatal care				21%
Other vaccine preventable diseases	Full vaccination coverage with 3 doses DPT, 3 doses polio, measles and BCG	65.6%	82.8%	87%	77.8%
Neonatal Causes of Death	Antenatal care: 1+ visits by a skilled provider	27.9%	43.7%	58.3%	83.6%
	Antenatal care: 4+ visits by a skilled provider	14.5%	30.3%	51.6%	70.4%
	Antenatal care: 1 st antenatal visit in the 1 st trimester	16.4%	27.7%	49.7%	65.1%
	Vaccination: Tetanus protection at birth		77.8%	82.1%	88.7%



Neonatal Causes of Death (cont'd)	Delivery in a health facility	9.8%	19.1%	40.6%	62.3%
	Delivery attended by skilled provider	11.9%	20.2%	40.5%	62.7%
	Delivery by C-section	1%	3%	5.3%	9.6%
	Postnatal care: Postnatal visit for baby within 2 days of birth			30.1%	56.6%
	Postnatal care: Postnatal visit for mother within 2 days of birth			44.5%	56.7%
	Median birth interval (months)	31.8	33.6	36.2	36.7
	Teenagers who have begun childbearing	21.4%	18.5%	16.7%	16.7%
	* DPT vaccinations included DPT/HepB as well as DPT/HepB/Hib, cannot distinguish Hib vaccine coverage in 2011 DHS ** through 2011, ORT includes ORS and/or increased fluids; in 2016, ORS, recommended home fluids, and/or increased fluids				

4.1 Pneumonia, Diarrhea, and Malaria

There are a range of EBLs that target these major causes of death for children under-5. In Nepal in 2000, these causes accounted for 37.6% and 29.9% by IHME and IGME estimates, respectively, of all U5 deaths.^{49,50} However, malaria did not have a major impact by that year, reflecting progress prior to the study period. One approach globally has been the use of Integrated Management of Childhood Illness (IMCI), which was developed by WHO and UNICEF in 1996. IMCI focuses on improving health providers' abilities to diagnose and treat common illnesses in high child mortality countries and improving family and community health behaviors through integrating health education.⁵¹ Strategies include both facility-based and community-based care (Integrated Community Case Management (ICCM) and Community IMCI (cIMCI)).

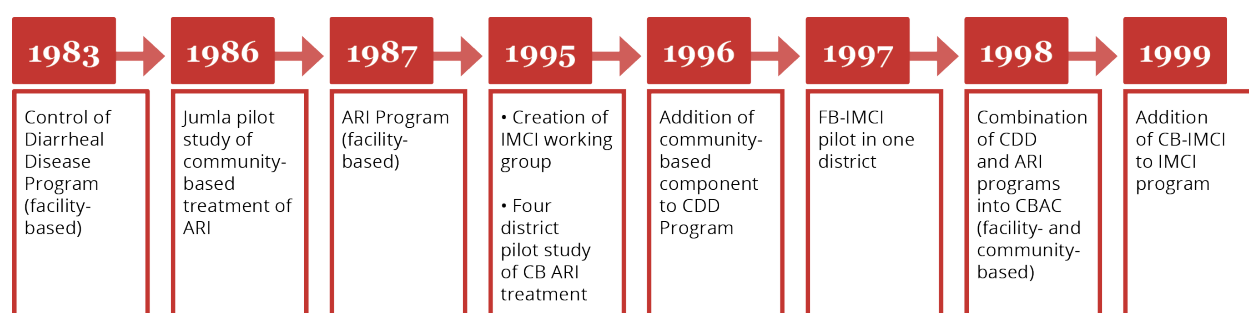


Figure 4: Timeline of IMCI Program and Precursors

4.1.1 Facility-Based Integrated Management of Childhood Illness (FB-IMCI)

Table 5: Facility-Based IMCI Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Engagement of partners in preparation and implementation• Engagement across sectors• Local stakeholder engagement• Adaptation of existing training and guidelines to reflect local context• Expansion and adaptation of existing programs• Integration of program into existing structures• Piloting• Strengthening management and M&E• Data driven adaptations for cost and feasibility• ToT and cascade to district control and responsibility• Integrate supervision into existing district health offices

EXPLORATION

The Ministry of Health (MOH) in Nepal started the Control of Diarrheal Disease (CDD) Program in health facilities in 1982. The Acute Respiratory Infection (ARI) Program was then started in 1987, also focusing on facility-based treatment. A shift to community-based treatment for childhood diarrhea and pneumonia occurred in the mid-1990s, when both the diarrheal disease and the ARI programs incorporated community health workers (at the time this included CHWs, MCHWs, and FCHVs). Both the facility-based and community-based diarrheal disease and ARI programs were combined to create the Community-Based Management of ARI/CDD (CBAC) Program in 1998, which was distinct from IMCI.

PREPARATION

After the first meeting with WHO consultants in 1995, the MOH formed an IMCI working group, including a wide range of representatives from the MOH (Child Health Division, the National Health Training Centre, Epidemiology and Disease Control Division, Logistics Management Division, Planning and Foreign Aid Division, and National Health Communication Information and Communication Centre), pediatricians from the Institute of Medicine and Kanti Children's Hospital in Kathmandu, and members of partner organizations, including WHO, USAID, UNICEF and JSI.¹⁰ This working group identified a pilot district based on size, ease of access, reliable communication and electric supply, and active local health centers. In 1996 and 1997, the working group adapted existing WHO training modules and guidelines, reflecting local contextual factors, and translated the trainings into Nepali. These included changes in training in areas with no malaria; choice of antibiotics considering local availability, prevalence, and resistance patterns; national immunization schedules; and locally available foods for childhood nutrition. Treatment for diarrheal disease and ARI were not adapted as Nepal's management guidelines were already similar to IMCI.¹⁰ Further local research was performed as necessary to answer questions of adaptation; for example, there were studies of local food availability and terminology in different geographic contexts. Starting in late 1997 through 1999, facility-based IMCI was piloted in the chosen (Mahottari) district, with an evaluation meeting in mid-1998 to make recommendations for expansion.

Due to the success of the pilot program for the other MOH initiative incorporating facility and community-based (the CBAC Program) in 1998, the IMCI working group chose to similarly add community-based care



to the IMCI program. (see CB-IMCI section below) Therefore, in 1999, the scope of the IMCI program in Nepal was expanded to also include community-based care. To support the management of the community-based program, the training for facility-based workers was adapted to include program management skills, including recording and reporting, supervision and monitoring of community-based workers, and logistics management to better facilitate the referral and monitoring processes required to support CB-IMCI health workers.¹⁰ This combined facility-based and community-based IMCI program was then piloted in three more districts in 1999 and 2000.

IMPLEMENTATION AND ADAPTATION

Training of health facility workers in IMCI was organized and performed by the Nepal Paediatric Society (NEPAS), due to limited human resources within the MOH. The specific group was selected due to members' experience in IMCI across South and Southeast Asia. Health facility staff who worked with children under-5 underwent an 11-day training course, with nine days dedicated to IMCI and two days dedicated to program management. Training took place using a cascade (ToT) system, from district health facilities downwards. Involving the district health offices in all trainings taking place in their district improved organization of activities and district ownership, but frequent movement of health workers presented a barrier to consistent quality and efficiency of training.¹⁰ All trainings were then followed by a monitoring visit by the District Health Office to reinforce learned skills and identifying problems in the program. No evidence on specific systems strengthening (i.e. supplies) was identified in our desk review and interviews.

Recognizing the challenges, adaptation after initial implementation included reduction in the training of health facility workers in IMCI from 11 days to seven days to decrease costs and time away from facilities. Data collected after trainings showed that health workers had the same levels of knowledge and skill following seven days of training versus the original 11 days.⁵² The actual program was implemented nationally in all 75 districts in Nepal by 2009 with increase in care-giver reported care seeking (Figure 18).

Table 6: Facility-Based IMCI Implementation Strategy and Outcomes

	Implementation Strategy	Implementation Outcomes
Acceptability		(+/-): A 2017 assessment of IMCI programs in Nepal by the WHO found that facilities have far fewer cases than expected for their catchment population, mostly because parents prefer to bring their children to private clinics. ⁵³
Feasibility	The MOH piloted the FB-IMCI program in one district with easy access for monitoring and supervision to best assist in evaluation and eventual adaptation, as well as to maximize chances of success in implementing the pilot. The training program was shortened from 11 days to seven over time. Strategies included integration into existing district structure.	(+): IMCI was implemented in all 75 districts by 2009.

	Early engagement across sectors needed to support initiative and create sense of ownership.	
Effectiveness and Reach	Training occurs using a cascade (training of trainers) system to reach providers from the central MOH level to the District Health Office (as local leads) to the facility to the community. Supervision integrated into District Health Offices.	(+): IMCI was implemented in all 75 districts by 2009 (+): Care seeking for children under-5 with diarrhea increased from 14% in 1996 to 47% in 2014; for pneumonia increased from 18% in 1996 to 50% in 2014; for fever increased from 15% in 1996 to 46% in 2014. (Figure 18)
Fidelity	The IMCI working group adapted WHO IMCI training materials for Nepal's specific needs and translated them into Nepali.	(-): A 2017 assessment of the IMCI program reported 30% of facilities experienced stockouts in the previous 3 months ⁵³ (-): The same assessment found only 65% of facility health workers had been trained in IMCI ⁵³
Equity	While the pilot district for FB-IMCI was specifically chosen in the terai region, rather than the hilly or mountainous regions to increase chance of early success, the scale-up expanded the program to all districts over 10 years, ensuring equity of coverage.	(+): In 2014, care seeking for children under-5 with diarrhea was almost equal in rural and urban areas (47.4% and 45.6% respectively). Care seeking for pneumonia was 49.3% and 54.9% respectively, and care seeking for fever was 45.7% and 50.8%, respectively. (-): In 2014, care seeking for diarrhea was 45.1% for the lowest economic quintile and 53.0% for the highest. Care seeking for pneumonia was 40.3% for the lowest quintile and 67% for the highest.

SUSTAINMENT

In addition to shortening training to decrease days when healthcare workers were not at the facility, in response to the high healthcare worker turnover, JSI developed a three-day orientation for health facility workers who transfer into a district using IMCI pending their broader training.⁵² The shortened orientation for IMCI helps maintain standards of care for new healthcare workers between the availability of full IMCI training sessions. Integrating supervision into the existing structure and training facility providers on management also may contribute (see also below fidelity for CB-IMCI).

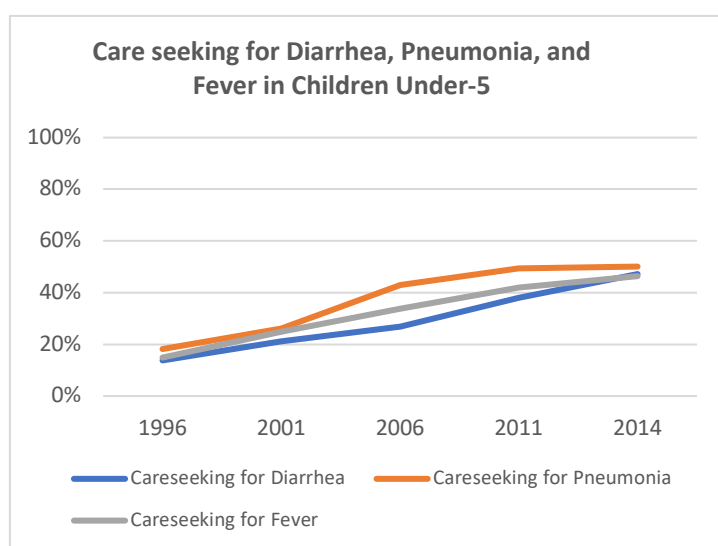


Figure 5: Care seeking for Diarrhea, Pneumonia, and Fever in U5 (Source: DHS 1996, 2001, 2006, and 2011, and MICS 2014)

4.1.2 Community-Based Integrated Management of Childhood Illness (CB-IMCI)

Table 7: Community-Based IMCI Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Local research• Pilot testing• Expansion and adaptation of existing programs• Capitalization on existing community-based programs• Integration into existing community worker capacity• Adaptation of existing training materials and guidelines• Facility staff trained in management and monitoring and evaluation• Integrating monitoring and evaluation with supervision, using results for adaptation• Initial and ongoing training through refresher courses• Engagement of partners for implementation• Stakeholder/community engagement for local support• Engagement of traditional healers

EXPLORATION

While facility-based management of diarrhea and ARIs had been provided through facilities since the 1980s, the only MOH-promoted community-based management was the home-based treatment of diarrhea with *nun chini pani*, a salt-sugar-water solution that was mixed in the home.

Recognizing that referral was not a reasonable option for children with ARIs in remote districts at the time due to geographic inaccessibility of health centers, the MOH studied the community-based treatment of ARI in one rural district (Jumla) for three years, from 1986 to 1989.⁵⁴ Jumla is situated in the western mountainous regions of the country, where access to many essential health services is lowest. The study recruited community health volunteers, with ARI case detection using respiratory rate and subsequent treatment with cotrimoxazole. It showed a 28% reduction in the risk of death from all causes for children under-5.

PREPARATION

Despite these data, due to concern about the ability of CHWs and FCHVs, many of whom were illiterate, to treat children with antibiotics, the MOH required further assessment of a program based on community-based treatment or only referral to health facilities.⁹ After six years of policy discussion, in 1995, expansion of the facility-based ARI program to include community-based care was piloted in four districts. The pilot compared identification of pneumonia and referral (referral model) in two districts, with diagnosis and treatment with cotrimoxazole by the CHWs (treatment model) in the other two districts. The treatment model was found to be both more effective and more popular in the community, with negligible overuse of antibiotics.¹⁰ KIs in the MOH emphasized the use of pilot studies of the different components of IMCI prior to replicating nationwide (KI 1). Based on the results of this study, the evaluation team recommended expansion of the community-based ARI treatment program.

“They do pilot study and if those models are successful then we try to replicate in other parts of the country, and there are so many researches, those carried out in a small scale



and later on replicated for example: CB-IMCI program, which was started from few pilot districts, but now it's throughout the country.” (KI 5 – MOH)

In 1998, the CBAC program was created, which combined community- and facility-based ARI and diarrheal programs. CBAC was implemented in six districts, all with the treatment model used in the ARI program pilot study. In 1999, CBAC was combined with nutrition and vaccination programs to create the comprehensive CB-IMCI program.^{10,20} The program used the existing FCHV and CHW workforce in the country at the time as community-based providers. Similar to the process for FB-IMCI, CB-IMCI training materials and guidelines from WHO were modified to reflect the adaptations identified during the preparation for FB-IMCI introduction, including changes in training in areas with no malaria; choice of antibiotics considering local availability, prevalence, and resistance patterns; national immunization schedules; and locally available foods for childhood nutrition. As noted above, additional training for monitoring and evaluation of CHWs and FCHVs was added to the IMCI training for facility-based supervisors. Due to limited human resources, NGOs were hired to conduct the training of community-level health workers.

IMPLEMENTATION AND ADAPTATION

Along with the FB-IMCI, the CB-IMCI program in Nepal expanded over 10 years (from 1999 to 2009) to cover all 75 districts in the country. Expansion occurred first in districts with existing community-based programs related to diarrhea, pneumonia, or other health interventions, for ease of implementation.¹⁰ Similar to the FB-IMCI program, training was organized by an independent NGO, the Nepal Technical Assistance Group (NTAG), who had conducted much of the community-level training for the vitamin A program in Nepal. CHWs and FCHVs received a five-day IMCI training course, designed by WHO SEARO and CARE INDIA, and translated into Nepali. NTAG used a train-the-trainers, cascade method, using health-facility IMCI-trained workers to then train the community-level health workers. CHWs and FCHVs received the five-day training in ARI diagnosis and treatment, with the last day including a meeting with the local mothers' group, Village Development Committee, and local NGOs to emphasize the importance of the FCHVs and CHWs' role in treating children under-5.²⁰ The CB-IMCI trainers also ran an orientation specifically for traditional healers, encouraging them to refer children with diarrhea or ARI to the community health workers trained in IMCI. According to one KI in the MOH, the most important aspect of the community-based training is creating a local environment of support for the health workers (KI 3). The CHWs and FCHVs then have a two-day follow-up training on diarrhea management, nutrition counseling, and immunization two to three months after the ARI training. Health facility staff trained in monitoring and supervision of the CB-IMCI providers then perform technical support visits to CHWs and FCHVs, to strengthen ties between the facility and community programs and to continue improving quality of services. Every six months, the FCHVs or CHWs travel to the health facilities to participate in supervision meetings with the health facility workers and report any problems they have had. The FCHVs and CHWs “are a bridge between the health system and the community” (KI 3).

Further adaptation of the CB-IMCI program occurred in 2011, with the addition of community-based neonatal care to the program, creating the Community-Based Integrated Management of Neonatal and Childhood Illness (CB-IMNCI) Program. See the “Neonatal Mortality Interventions” section below for more detail on the community-based interventions specific to neonates.

Table 8: Community-Based IMCI Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Acceptability	Trainings in CB-IMCI specifically include sensitization orientations for important community groups, including traditional healers, mother's groups, and local NGOs. Use of FCHVs	(+): "The most important thing behind FCHVs are that they are selected by the local community ... They are regularly in touch and are the bridge between the health system and the community" (KI 3) (-): See fidelity issues below
Feasibility	Use of existing FCHVs and CHWs to implement community-based care for children (now only FCHVs due to phasing out of other CHW programs). Scale-up over 10 years, with expansion first to districts already with existing community-based health programs. Cascade training and ownership for training at local level Partner engagement for training and other implementation support	(+): Implementation plan able to be followed including training and supervision and reduced costs by using existing FCHVs, scaled up over 10 years nationally
Effectiveness^b and Reach		(+): In 2009-2010, over 50% of children under-5 receiving treatment for pneumonia or diarrhea received their care from FCHVs9 (+): CB-IMCI expanded to all 75 districts across Nepal by 2009.
Fidelity	Follow-up monitoring and supervision meetings occur in the community and at health facilities between the FCHVs/CHWs and health facility supervisors, District Health Officers, and NGO trainers.	(-): According to the MOH Annual Report in 2015, although FCHVs fulfill their role of promoting health behaviors in their communities, they perform poorly in service delivery (poor). The report also identifies problems with frequent stockouts at the district and community levels, poor data quality, and poor referral mechanisms. ⁴² This was supported by a qualitative study in one area citing lack of community trust and satisfaction in the quality of care as challenging access and uptake. (-): Multiple key informants expressed concerns about the quality of the CB-IMCI program as FCHVs are given increasing numbers of responsibilities. (-): A 2017 assessment of CB-IMCI programs reported 30% of facilities experienced stockouts of essential IMCI medications in the previous 3 months. ⁵³ In the same report, 92% of FCHVs offered community treatment for diarrhea, but only 42% for ARI.

^b The 2015 MOH annual report notes that Nepal has not done an impact evaluation for IMCI, so full effectiveness cannot be determined

SUSTAINMENT

By 2009, CB-IMCI had expanded to all 75 districts in Nepal. However, concerns remain about the quality of care provided by the FCHVs and whether the services can be sustained with quality (effective coverage). According to the MOH Annual Report in 2015, although FCHVs fulfill their role of promoting health behaviors in their communities, they perform poorly in service delivery. The report identifies problems with frequent stockouts at the district and community levels, poor data quality, and poor referral mechanisms. Multiple KIs expressed concerns about the sustainability and quality of the CB-IMCI program as FCHVs are given increasing numbers of responsibilities. The MOH identified the necessity of improving on-site supervision and training, supply chains, and quality improvement mechanisms to continue the CB-IMCI program (now known as CB-IMNCI). According to a 2017 assessment of the IMNCI program in Nepal by WHO, all of the FCHVs interviewed for the report had up-to-date registers, conducted monthly mother's group meetings in their communities, and submitted monthly reports to the health facility.⁵³ While 91.7% provided oral rehydration therapy (ORT) for children with diarrhea, and 76.4% provided zinc, only 42% reported providing treatment for ARI, primarily due to use of direct referral to health facilities, lack of availability of medications, and WHO advising not to treat ARI with cotrimoxazole.⁵⁵

4.1.3 Other Diarrhea Interventions

Table 9: Other Diarrhea Interventions' Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Building on community health worker program (use of FCHVs)• Engagement of partners and donors in preparation• Integration into existing programs and structures• Cascade training / human resources strengthening• Community education and sensitization• Engagement of private sector and use of public-private partnerships• National training guidelines• Local research and data collection prior to implementation• Supply chain strengthening

4.1.3.1 Oral Rehydration Therapy (ORT)

IMPLEMENTATION AND ADAPTATION PRE-2000

While ultimately part of IMCI, the original adoption of use of ORT to treat diarrhea in children started in 1982 in Nepal with the establishment of the Nepal Control of Diarrheal Disease Program and home-based ORT.^{56,57} The program included establishing oral rehydration corners in health facilities (both district hospitals and health centers), community mobilization, training FCHVs and traditional healers in diarrheal case management and supplying them with prepackaged ORT packets, and health workers

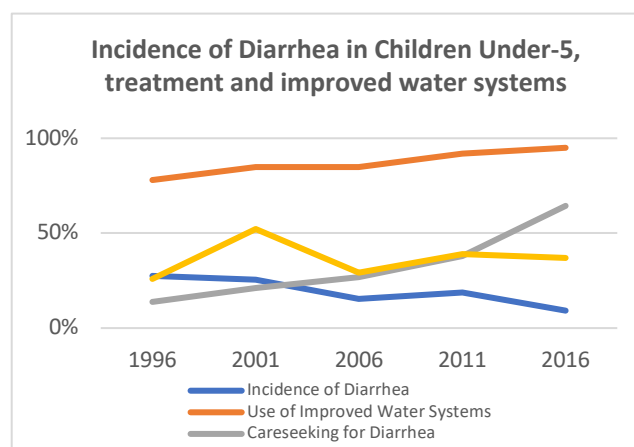


Figure 6: Incidence of Diarrhea in Children Under-5 (Source: DHS 1996, 2001, 2006, 2011, and 2016)



adding ORT to their case management. The ORT program was designed by a working group comprised of MOH officials and development partners. Over the course of the 1980s and 1990s, the MOH promoted use of prepackaged oral rehydration salts or a home-made mixture of salt, sugar, and water (*nun chini pani*) at different points in time. The MOH stopped promoting *nun chini pani* due to concerns about availability of ingredients and imprecision in the mixture making it ineffective.⁵⁷ By 1996, 95% of mothers were aware of the use of ORT packets for treatment of diarrhea in children, although only 26% of children with diarrhea used ORT packets for treatment of diarrhea.⁵⁸ As noted above, in 1999, ORT was included into the treatment protocols for the developing community-based IMCI program in Nepal.⁵⁶

IMPLEMENTATION AND ADAPTATION AFTER 2000

ORT continued to be a fundamental aspect of management of diarrhea in children, whether from facility-based or community-based providers, through IMCI and other sources of care (pharmacies, private sector). However, use of ORT packets remained low, with coverage rates peaking at 52%, according to the 2001 DHS, and remaining at 29-39% since that time, with variability based on source of care.^{27,28} For example, the 2006 DHS data indicated that although FCHVs treated diarrhea with ORT in 88% of cases they saw, private clinics, public clinics, and pharmacies only provided ORT 60%, 54%, and 20% of the time, respectively.⁵⁹ A study using 2006-2007 HMIS data found that districts with community-based treatment of diarrhea with ORT had higher reported episodes of diarrhea (possibly due to increased rates of diagnosis) but significantly lower episodes of diarrhea with dehydration as compared to those districts without the intervention, reflecting more effective management, as noted above.⁵⁶ As the number of districts with the intervention increased from 2004 to 2007, rates of diarrhea with dehydration or severe dehydration among children with diarrhea decreased nationwide.⁵⁶

Interestingly, although knowledge of ORT for treatment of diarrhea is almost universal among mothers in Nepal, adoption remains low.^{27,28,60} In 2016, 60.3% of children with diarrhea received treatment at health facilities, (12.6% were seen at government health facilities and 47.7 at private health facilities (including private pharmacies)), with overall low rates of reported ORT use, per the DHS (see Figure 18, with increasing careseeking for diarrhea, increasing use of improved water systems, and consistently low rates of reported ORT use over time).^{c 28} Key informants and

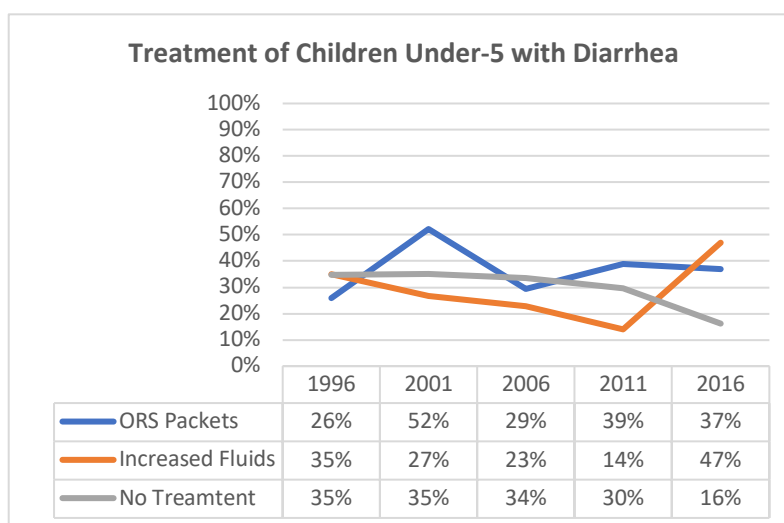


Figure 20: Treatment of U5 with Diarrhea (Source: DHS 1996, 2001, 2006, 2011, and 2016)

^c Of note, higher rates were reported in the HMIS

prior studies suggest a variety of possible reasons for this gap, including poor understanding of the causes of diarrhea, reliance on traditional treatments, and desire for medication rather than ORT (Figure 20).^{61,62}

Table 10: Oral Rehydration Therapy Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Feasibility	ORT is included the case management for diarrhea in facilities and in the FCHV training program and all FCHVs are provided with ORT packets. Integration into IMCI.	(+): In 2006, diarrhea was treated with ORT in 88% of cases seen by FCHVs.
Fidelity	(Pre-2000) Due to concerns over unreliable and ineffective or dangerous preparations, the MOH only promotes pre-packaged oral rehydration salts, rather than home-made solutions. Training of facility- and community-based providers in ORT as treatment for diarrhea.	(+/-): In the 2016 DHS, caregivers reported only 37% of children with diarrhea were treated with ORT packets although HMIS data from the same year reported that 92% of children with diarrhea were treated with ORT and zinc. ⁶³ HMIS represents children coming to care, although information on data quality was not identified.
Effectiveness and Reach	ORT started as a component of the Control of Diarrheal Disease Program, but was merged into the IMCI program.	(+): From 2000 to 2009, ORT as a component of CB-IMCI expanded from five districts to all 75 districts in the country (+): In 2006, districts with community-based treatment had higher rates of diarrhea (possibly due to increased rates of diagnosis) but significantly lower episodes of diarrhea with dehydration as compared to those districts without the intervention. ⁵⁶ As the number of districts with the intervention increased from 2004 to 2007, rates of diarrhea with dehydration or severe dehydration among children with diarrhea decreased nationwide. ⁵⁶

4.1.3.2 Zinc Supplementation

Table 11: Zinc Supplementation Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none"> • Donor support • Supply chain • Integration into existing district supervision structure • Pilot testing • Community education • Provider training/Human resources strengthening • Private sector engagement (for both provision and manufacturing) (PPP) • Local manufacturing with QA • Community education/awareness

EXPLORATION (See also Figure 21)

In 2004, the WHO and UNICEF released a joint statement on treatment of acute diarrhea in children recommending zinc supplementation for 10-14 days, in addition to ORT.⁶⁴ The same year, the director of the Child Health Division at the MOH attended an international conference in Lima, Peru related to micronutrient supplementation, with a keynote address that emphasized the benefits of zinc therapy for childhood diarrhea.^{65,66} In response, the MOH created a **national Zinc Task Force** in 2004 to prepare for implementing zinc treatment in line with the WHO recommendations, becoming one of the first countries in the world to do so.^{67,68}

PREPARATION

When the task force was established in 2004, zinc supplements for children were not available in Nepal through the private or public sectors.⁶⁹ Soon thereafter, USAID funded two programs to promote zinc supplementation in Nepal: 1) a component of the Nepal Family Health Project (NFHP), which was more focused on public sector, and 2) the Social Marketing Plus for Diarrhoeal Disease Control: Point of Use Water Disinfection and Zinc Treatment (POUZN) project, which included the private sector and a public-private partnership.^{52,70} While NFHP was solely in Nepal, POUZN, funded by USAID, was implemented in 13 different countries.

NFHP was piloted in two districts in late 2005 and early 2006, including training, technical assistance, and supplies for public-sector healthcare providers to adopt zinc therapy into their practice.⁶⁹ In one district, where IMCI had not yet been introduced, zinc was **included in the IMCI trainings** for all public healthcare workers (both facility- and community-based). In the other district, where IMCI training had already occurred, a separate one-day zinc training was given. Both districts used **cascade training**, with NFHP program officers training district supervisors, who then trained health facility staff, who then trained FCHVs.⁶⁵ **Zinc tablets were procured through external development partners** as they were not available in Nepal at the time. The project had financial and technical support from the MOH, USAID, and UNICEF and was implemented by JSI. An assessment of the two districts during the pilot showed challenges with quality (poor fidelity and reach): Only 29% of children under-5 with diarrhea during the prior month received zinc treatment, and only 41% of treated children received zinc treatment for the full 10 days recommended by the WHO and the pilot program.⁷¹

In 2007, the POUZN project was piloted in three districts around Kathmandu, **working predominantly in the private sector, with additional targeted support to the public sector**; supporting local manufacturing of zinc tablets; and organizing a national media campaign. POUZN targeted both sectors because the public sector program had not been initiated at that time in Kathmandu Valley; they facilitated the introduction of zinc in the private- and public-sector settings.^{65,72} POUZN had technical support from two implementing partners, Abt Associates and PSI. In 2008, the implementing partner changed to the Academy for Education and Development (AED).⁶⁷ The POUZN project used the strategy of **strengthening human resources by training providers**. The program trained 5,800 licensed private care providers, almost all chemists, and 2,243 public-sector providers using **training materials provided by the MOH** and behavior change communication materials.⁶⁹



Although both NFHP and POUZN project originally procured zinc sulphate tablets for the Ministry of Health and Population, the POUZN project also promoted the **manufacturing of tablets by local companies**. The project provided technical assistance and quality assurance testing to help prepare for national approval of the medications.⁶⁵ By August 2007, three local manufacturers had started producing and distributing zinc sulphate tablets.⁶⁹ The media campaign for POUZN included **local sensitization** in these three pilot districts, using radio to promote the use of zinc in addition to ORS for treatment of childhood diarrhea and advertising the availability of zinc from public and private chemists.⁶⁹ However, while knowledge increased, actual use remained low and the campaign was limited in time.⁶⁸

IMPLEMENTATION

The public sector program rolled out to 18 additional districts over the course of 2006. In ten districts, using the strategy of **integrating into an existing program**, zinc treatment was included in the CB-IMCI roll-out happening concurrently. For the private sector-focused program, within one year, the POUZN project was scaled up to 30 of 75 districts in the country. These 30 districts were those implementing IMCI and included approximately 50% of the national population, mainly in the

terai and hill regions, with only two districts in the harder to reach mountain region. As IMCI expanded to all 75 districts by 2009, the public-sector zinc programming expanded with it, but the POUZN private-sector programming remained limited to 30 districts in part due to donor funding. By 2010, the three local manufacturers of zinc were able to expand their supply to meet the demand for zinc tablets in all 30 districts where POUZN had been implemented.⁷³ POUZN-supported manufacturers set zinc prices at what most (72%) zinc buyers considered “either inexpensive or affordable” for purchase at private sector facilities, according to a POUZN household survey of 26 out of the 30 target districts.”⁷²

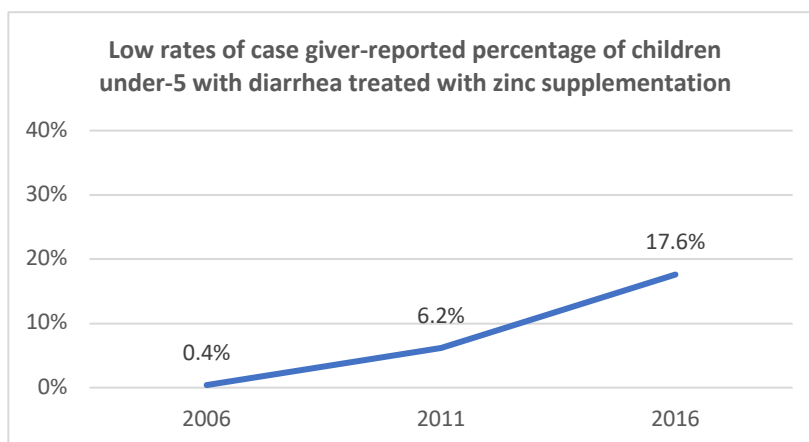


Figure 7: Percentage of Children Under-5 with Diarrhea Treated with Zinc Supplementation (Source: DHS 2006, 2011, and 2016)

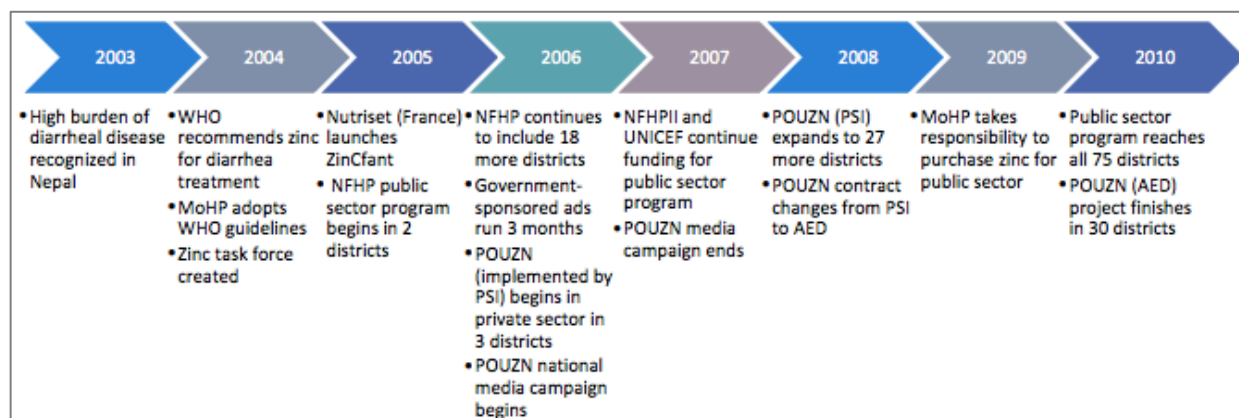


Figure 22: Timeline of Zinc Program Scale-Up (Mosites et al)

into ORT, these messages were then changed to link zinc supplementation with the use of ORT, building on the work of the Ministry of Health and Population promoting ORT for several years.⁶⁹ A study of the 30 districts where the POUZN project was active showed that 68% of parents heard at least one message about diarrhea treatment, primarily from radio or television. Respondents who had heard the message were more than four times more likely to treat their child's diarrhea with ORS and zinc, as compared to those who had not heard the message.⁶⁹



Table 12: Zinc Supplementation Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Acceptability	Television and radio spots 9-16 times daily during diarrhea season Integration into CB-IMCI	(+): Parents who heard these messages about diarrhea treatment were more than 4 times as likely to treat their child's diarrhea with ORS and zinc ⁶⁹ (-): Only 38.5% of those parents reported treating their children with zinc, and only 15.4% of children overall were treated with zinc after diarrhea ⁶⁹
Feasibility	Zinc treatment was added to existing IMCI programs, guidelines and trainings. Local production	(+): The zinc program expanded to all 75 districts nationwide as the IMCI program expanded

Feasibility cont'd	Zinc has been added to the essential medications list offered at no cost by the MOH at public facilities.	(+): 10 day zinc treatment cost \$0.19-0.52 USD during initial rollout in private facilities and for free at public facilities. ^{65,73} (+): By 2008, locally manufactured zinc tablets were available in all 30 districts where POUZN was active. ⁶⁷
Fidelity	Sensitization messages on radio, television and billboards, specifically including information about indications for zinc treatment and length of treatment Provider education through trainings of physicians, nurses, chemists, and local-level health workers; supervision; use of national guidelines	(-): In 2016, only 30% of children receiving zinc treatment for diarrhea had a full 10-day course ²⁸ (-): A mystery client study at pharmacies in Kathmandu in 2008 showed only 31% of chemists recommended zinc treatment for diarrhea, and 82% still recommended antidiarrheals. ⁶⁷
Equity	NFHP was implemented in every district in Nepal by 2010 and zinc was provided for free through government facilities ⁶⁵ POUZN was focused on 30 districts in the hill and <i>terai</i> zones and the POUZN-supported manufacturers set zinc prices at what most (72%) zinc buyers considered "either inexpensive or affordable" for purchase at private sector facilities, according to a POUZN household survey of 26 out of the 30 target districts." ⁷²	
Effectiveness and Coverage		(-): Reported zinc coverage remains low at 17.6% in the 2016 DHS and few children complete the full course. Different results from HMIS data find >90% of facility treated children with diarrhea receive zinc.
Sustainability	Public-private partnerships to develop local manufacturing of zinc supplements Zinc treatment for diarrhea was incorporated into national guidelines and training for IMCI	(+): Three domestic manufacturers offer a total of five different forms of zinc tablets in Nepal (-): Low coverage and national coverage limited

SUSTAINMENT

NFHP and the provision of zinc treatment through public providers and FCHVs was incorporated into the national IMCI program, which is now in place in all 75 districts nationwide to support sustainability. The POUZN project expanded only to 30 districts and then ended in all districts by 2010, although zinc production in Nepal continues. According to HMIS data from 2016, 92.1% of children with diarrhea seen at a facility are treated with ORS and zinc. However, DHS data from 2016 reported that while 64% of children with diarrhea were taken for medical care, only 17.6% of children with diarrhea in the 2 weeks were reported by mothers to have received zinc.^{d 28}

^d The difference may be due to a number of factors. 1. HMIS reports on facility treatment as reported to the national program while DHS is for any child with diarrhea in the previous 2 weeks and maternal self-report. We also did not find information on HMIS data quality.

4.1.3.3 Rotavirus Vaccination

The rotavirus vaccine was first recommended by WHO in 2009, but had not been implemented in Nepal by 2015. Work is currently underway to implement the vaccine.

EXPLORATION

In 2000, rotavirus was the most common diagnosed cause of diarrhea in children in Nepal, causing up to 39% of cases in a study.¹⁶ While the WHO recommended rotavirus vaccine in 2009, the Nepali National Immunization Program did not add introduction of the rotavirus vaccine until their 2011-2016 Comprehensive Multi-Year Plan, with the aim of rolling out the vaccine in 2016.¹⁷

PREPARATION

Since 2000, studies have been performed in Nepal to better understand the incidence of rotavirus in different age groups, seasonal patterns of disease, and the most common serotypes in preparation for vaccine rollout.^{76–80} This preparation also includes an assessment of intussusception rates in Nepal, to establish a baseline prior to introduction of the rotavirus vaccine to detect any adverse effects.⁸¹

Cold chain assessment was also undertaken as part of the creation of the 2011-2016 Comprehensive Multi-Year Plan, with the creation of a 10 year plan to replace cold chain equipment as it becomes non-functional.¹⁷ The preparation process also involves approval for adoption from the Logistic Management Division and the Ministry of Finance. As well, the MOH prepares **training manuals for providers and educational materials for communities** specific to rotavirus vaccine (KI).

IMPLEMENTATION

Roll-out of the rotavirus vaccine was planned to start in 2018 in Nepal, and is outside of the scope of this case study. However, there were some delays in implementing the vaccine related to final preparation and system, which several KIs noted. The government has recently put the rollout on hold and will plan to implement it once all preparations are set (according to one KI-Implementer). One implementer said, “It [rotavirus] has recently reached in the cold chain of Logistic Management Division and is in the process [to go to the periphery]..in coming days the child will get rotavirus vaccine”.

Similarly, another implementer said:

“Government had prepared a bit late for the process ... and it's really a long process for submitting proposal to Gavi for approving co-funding grants for vaccines and related expenses and also there is another process of submitting proposal for increasing cold chain capacity and its procurement. Secondly, it has to be approved by health, financial, and other authorized ministry, thus went a long process. And now, when everything is fixed, there are many preliminary things to be planned before implementation, like ensuring vaccine availability, preparing manuals, educations materials, etc. “

4.1.4 Other Pneumonia Interventions

4.1.4.1 Pneumococcal Vaccination

See “Vaccine-Preventable Diseases Section”



4.1.4.2 Haemophilus Influenzae B Vaccination

See “Vaccine-Preventable Diseases Section”

4.1.5 Other Malaria Interventions

Table 13: Other Malaria Interventions Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Monitoring and evaluation and data use for preparation, M&E of implementation, target setting and adaptation of programs• Local research• Community engagement and education/sensitization and behavior change communication• Culture of learning and adaptation• Development of national guidelines• Quality assurance• Engagement of implementing partners and donors• Planning for sustainability• Donor funding

The national malaria eradication program started in 1958 in Nepal as the first national health program in the country. It focused primarily on the flat terai region of the country, targeting the areas with the majority of the malaria burden. In addition to the CB-IMCI and FB-IMCI programs, Nepal used a number of strategies to further reduce malaria cases and transmission through implementation of indoor residual spraying (IRS) and insecticide treated nets (ITNs). After the study period, starting in 2017, Nepal piloted a new approach, in addition to existing work (such as CB-IMCI) called “Community test, treat, and track”, in which FCHVs in endemic areas were trained to inform the health facilities on suspected cases through SMS, and the health worker would visit the community and test the suspected case.^{63,82} However, this was not scaled throughout the country as of 2018. Additionally, FCHVs were charged with monitoring adherence to the program components. However, this component has not proven to be that effective. As a result, FCHVs’ role in malaria has been mostly in terms of social mobilization and health education, such as discussing health topics, including malaria, in the monthly mothers group meetings.⁶³ However, the combination of prevention and treatment through community and facility based interventions was very successful, with a sharp decline in cases and **no recorded deaths due to malaria since 2011**, although challenges have been increasing (see below).

5.1.5.1 Indoor Residual Spraying (IRS)

IMPLEMENTATION PRE-2000

IRS has been the primary form of vector control for malaria in Nepal since the start of the malaria control program. IRS is carried out twice annually, during March and April, prior to peak malaria transmission season, and during June and July, following the peak transmission season. **The choice of districts or communities for IRS** is based on incidence of malaria annually, prevalence of Plasmodium falciparum or drug-resistant species, local outbreaks, and previously epidemic-prone areas.⁸³



IRS with dichloro-diphenyl-trichloroethane (DDT), combined with treatment with antimalarials, was initially successful and large parts of Nepal were practically malaria-free.⁸⁴ However, due to issues with financial, administrative, and logistical aspects of the program; new vectors for the disease; and DDT resistance, there was a resurgence of malaria cases in the 1970s and 1980s (KI). Through the 1990s, the MOH continued to support extensive IRS efforts, again combined with malaria treatment interventions, with a change from DDT to pyrethroids following the recommendations of WHO Global Plan for Insecticide Resistance Management.^{82,83}

IMPLEMENTATION AND ADAPTATION AFTER 2000

Since the year 2000, Nepal has had a relatively low incidence of malaria. Estimates show that in the year 2000, there were approximately 18 new cases of malaria per 1,000 persons at risk, which is well below the South Asia average. However, there were 13 high-risk districts for malaria remaining and ongoing transmission (Figure 24).

Malaria control efforts expanded in Nepal starting in 2004. This was informed by research and data collected by the Nepal MOH with the Epidemiology and Disease Control Division (EDCD), which performs malaria surveillance across the country and recorded a peak in disease incidence (ex. Figure 23). **The EDCD used data on malaria prevalence to stratify risk** down to the ward level (although the national government used larger districts for policy purposes), which was then used to target interventions such as IRS and insecticide treated nets (ITNs). From 2006 to 2008, the Global Fund to Fight AIDS, Tuberculosis, and Malaria (“the Global Fund”) accounted for 70-80% of the total national funding for malaria control in Nepal.⁸⁵ The Global Fund supported expansion of the malaria program to include rapid diagnostic testing (RDT), artemisinin combination therapy (ACT), and ITN distribution in the 13 high-risk districts. The MOH also noted in the 2006-2011 strategic plan, that individuals generally preferred ITNs to IRS for vector control. As a result, **the MOH implemented policy to phase out IRS in communities where over 80% of the homes had adequate ITNs.**

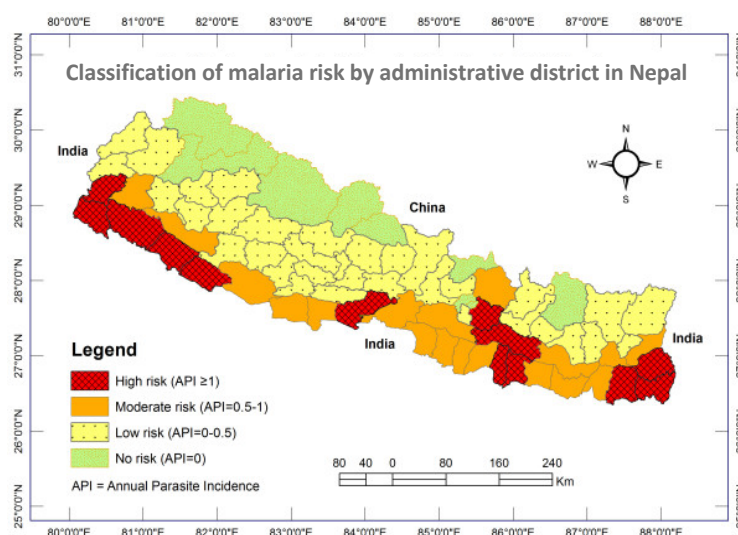


Figure 24: Classification of Malaria Risk by Administrative District in Nepal 2010 (Source: Dhimal et al)

In 2011, the Global Fund supported the further scale-up the program to cover the additional 18 moderate risk districts based on data from the EDCD showing confirmed cases of malaria in non-high risk districts. According to one key informant in the MOH, **the Ministry is constantly “improving our programs learning from the evidence,”** including the expansion of malaria programs to account for changing data about malaria prevalence and use of micro-stratification (KI 1).

The focus on monitoring and data quality was also important, although challenges exist.⁸² District health offices have recruited malaria inspectors in the malaria endemic districts who monitor the overall malaria program under the leadership of a district health officer. There are M&E officers in each of the malaria endemic districts (currently with Global Fund support) who are responsible for monitoring and evaluation. Regular data verification is done in the districts through monthly review meetings. Similarly, quarterly review meetings in the district, regional, and national level are mandatory.

Table 14: IRS Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Acceptability	Community engagement to understand preferences	(+): Changing priority to ITNs and stopping IRS when coverage goals were met
Feasibility	Donor funding Data-driven prioritization	(+): IRS in targeted areas and ability to expand based on data
Fidelity	Not found	Not found
Effectiveness and Coverage	Change in IRS insecticide due to resistance, tracking of cases including expansion post 2015 to other areas using micro-stratification ⁶³	
Sustainability	Not found	

4.1.5.2 Insecticide-Treated Nets (ITNs)

EXPLORATION

Although ITNs had already been a recommended intervention by the WHO for prevention of malaria transmission for many years, according to one key informant who was in the MOH during the 1960s and 1970s, bed nets were not even discussed as a possible intervention at that time given that rates of cases were dropping (KI 3). However, the EDCC at the MOH had identified increasing malaria transmission starting in the early 2000s, prompting the expansion of national malaria control efforts. Long-lasting ITNs were therefore added to the Nepal malaria control program in 2005 following the involvement of the Global Fund, as noted above.

PREPARATION

The EDCC procured the first small lot of approximately 40,000 ITNs in 2005.⁸³ The EDCC also developed **distribution guidelines** for the ITNs, recommending **distribution only in high risk districts**, with a goal of one ITN per two adults in a house. All ITNs distributed were **WHO Pesticide Evaluation Scheme approved for quality control**.

IMPLEMENTATION

From 2006 to 2008, PSI and the MOH, **in partnership with PSI**, distributed a small number of ITNs through social marketing, with 56,167 distributed over three years.⁸³ In 2008, EDCC moved to scale up ITN distribution across the 13 high-risk target districts. Between 2006 and 2010, 1,209,322 LLINs were distributed with the government of Nepal providing LLINs free of cost (supported by the Global Fund) to the people living in VDCs in high risk districts. Since 2008, LLINs were also provided free to all pregnant women attending ANC clinics at the government facilities in these targeted VDCs. As the ITNs used in Nepal

had an estimated three year life span, once initial distribution was complete, **the program was designed to continue with replacement of existing ITNs.**⁸⁶ IRS was continued for the first two years in those households not receiving ITNs, but **ITNs then replaced IRS** as the preferred method of vector control and disease prevention. PSI also implemented **behavior change communication programs** to educate individuals about ITN use and malaria risk using health education technicians.^e This sensitization campaign primarily focused on pregnant women and children under-5.⁸⁶ It included individual outreach to households with printed materials, such as posters and flyers in the ITN packages, radio ads, television spots, street performances, celebrity outreach, and school-based educational events. PSI performed **annual monitoring and evaluation** of their activities and the outcomes in the target populations. Outcomes included success in the targeted coverage of ITNs and use in high risk areas (Figure 25), from 34% in mountains (lower risk) to 61% in the hills and 95% in the highest risk terai areas, which were targeted for distribution.

Table 15: ITN Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Acceptability	Behavior change communication strategies, including radio and television spots, school-based outreach, and celebrity engagement	(+): Children under-5 in high-risk areas sleeping under ITNs increased from 48.2% in 2006 to 91.5% in 2009.
Reach	The EDCC and PSI partnered with local NGOs and community-based organizations to distribute the ITNs. ITNs were also provided to all women attending ANC appointments at public health facilities starting in 2008.	(+): From 2006 to 2010, 1,209,322 ITNs were distributed in Nepal. ⁸³ (+): In high-risk districts, the percentage of children sleeping under an ITN the previous night rose from 48.2% in 2006 to 91.5% in 2009. ⁸⁴ Overall coverage of nets is 95% in high risk areas (Figure 25)
Effectiveness	Use of surveillance to understand changes in risk areas	(+/-): National incidence of malaria increased from 2004-2008, but then started to decline in 2009 onward associated with prevention and treatment initiatives, although rates began to increase again. ^{84,87} (+): 2015 estimates ~3 new cases of malaria per year per 1,000 population at risk, (well below the average for South Asia), from the peak of approximately 42,000 in 1985, and no recorded death from malaria since 2011, although cases have been increasing recently (indigenous and imported cases)
Feasibility	ITNs were provided free of cost in the target districts, with funding from the Global Fund and the Government of Nepal	(+): ITN coverage and use increased in targeted districts
Fidelity	Behavior change communication campaigns focus on the correct usage of and upkeep of ITNs, including methods of washing, drying and hanging the bed nets	(+): High risk areas were targeted, IRS was replaced by ITNs when coverage reached threshold

^e Health education technicians are the staff at district health office/district public health office who are responsible for overall health educational and promotional activities in the district. For example:
http://dphobara.gov.np/downloads/annual_report_barra.pdf

4.1.5.3 Ongoing Challenges for Malaria Control and Treatment

2015 estimates show that Nepal has approximately three new cases of malaria per year per 1,000 members of the population at risk, well below the average for South Asia. However, more recently, the number of cases has been increasing, with 991 recorded cases in 2015, and rising to 1,128 in 2016, with more imported than indigenous (636 versus 492). In response, the National Malaria Strategic Plan (NMSP) 2014-2025 was developed based on the epidemiology of malaria derived from 2012 micro-stratification, with a goal of “Malaria Free Nepal by 2026”.⁶³

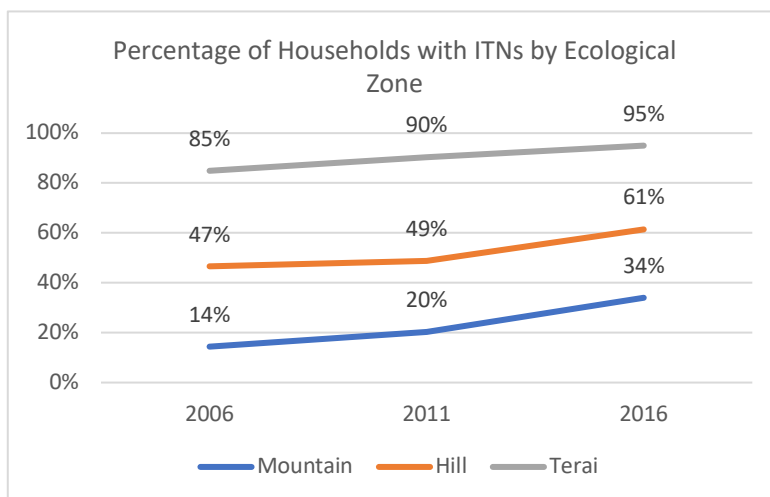


Figure 25: Percentage of Households with ITNs by Ecological Zone (Source: DHS 2006, 2011, and 2016)

Main areas of ongoing malaria transmission in Nepal are primarily along the southern border with India. As noted, the majority of the imported cases in Nepal are brought by adult male laborers who traveled from malaria endemic regions of India back to Nepal.⁸⁴ In 2000, Nepal, India, Bhutan, and Bangladesh, with assistance from USAID and WHO, started a **cross-border collaboration** to monitor and control cases of malaria, leishmaniosis, and Japanese encephalitis (JE). However, this effort has not significantly reduced the regional burden of disease or imported cases to Nepal. Additionally, as Nepal offers free treatment for malaria at government facilities, KIs suggested that Indian nationals living in the border region can cross the border for treatment at Nepal health facilities, further contributing to reported cases of malaria and potential for transmission (KI 5, KI 13).⁸⁷

Changing vector patterns also present a challenge to Nepal's sustenance of their malaria control. Although Nepal expanded their program from the original 13 districts to 31 high- and moderate-risk districts, cases of malaria have been increasingly reported in previously districts previously identified as low-risk. Although malaria was traditionally contained to the flat terai region of the country, increases in infrastructure and roads, construction of dams and ponds, and changes in weather and temperature patterns could all be contributing to both changing vector and disease patterns (KI 5, KI 1), which will require ongoing adaptation of national and local strategies.^{84,87,88}

4.2 Other Vaccine-Preventable Diseases

Table 16: Other Vaccine-Preventable Diseases Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none"> • Local research, data collection, and evidence-based decision-making • National policy and planning • Use of FCHVs as community health educators • Focus on equity and “reaching the unreached” • Building on existing systems and programs • Assessment and strengthening of supply chains • National guidelines and training materials • Community engagement, education, and sensitization

In 2000, vaccination coverage remained a challenge in the hardest to reach areas and among the poorest citizens. According to the 2001 DHS, only 43.3% of children age 12-23 months had received all basic immunizations (BCG, three doses of DPT, measles, and three doses of polio).²⁷ By 2016, this had increased to 77.8%, with an increase in vaccines in the national guidelines.²⁸

In 2000, Nepal’s immunization program provided six vaccinations for children: oral polio vaccine, DPT vaccine, tetanus toxoid, BCG, and measles vaccine. From 2000 to 2015, Nepal introduced six new vaccines to their national immunization program, including hepatitis B vaccine, Haemophilus influenza B vaccine (HiB), rubella vaccine, Japanese encephalitis vaccine, injectable polio vaccine, and pneumococcal vaccine.

According to key informants in the MOH, **the choice of new vaccines for implementation was based on local data and evidence of need, in addition to international funding.** This need to collect local prevalence data and assess the appropriateness for implementation in Nepal was important for local ownership but also contributed to delays in roll-out of some new vaccines (KI 16).

The MOH created a series of **comprehensive multi-year immunization plans** for 2007-2011, 2012-2016, and 2017-2022. Strategies used by the MOH to increase vaccination rates included **community engagement, strengthening of supply chains, and increasing access through outreach and mobile clinics, including FCHVs.**⁸⁹ Overall, the immunization program has had good results in addressing gaps in vaccination and increasing equity (Figure 26). The MOH, in collaboration with NGOs, has

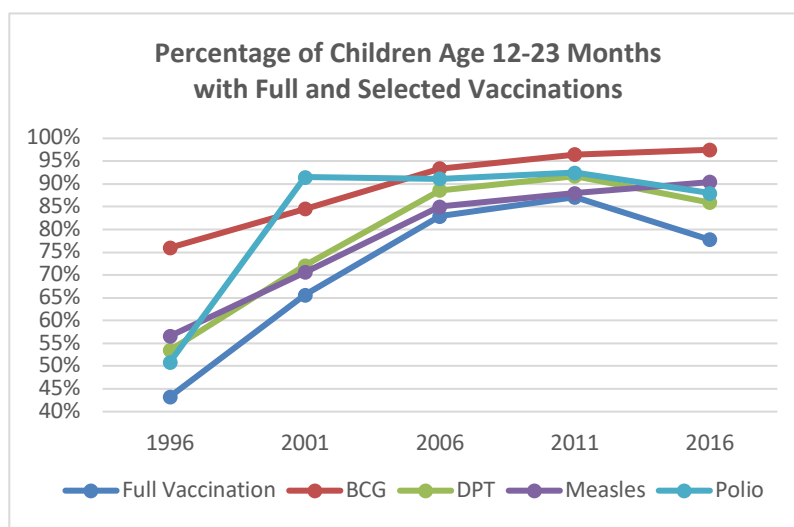


Figure 26: Rates of vaccination coverage between 1996-2016
(Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)

focused on poor and remote populations with low immunization coverage, reflecting the MOH priority of, “**reaching the unreached.**” As one MOH official described, in some regions, the only way to get the vaccine to the local communities was by airlifting it in, and planes are far less reliable and more costly than other parts of the supply chain (KI 10). However, while increases were seen across wealth quintiles, disparities remain (Figure 27).

4.2.1 Measles Vaccination

IMPLEMENTATION PRE-2000

Measles vaccination was first introduced in Nepal in 1979 in a limited number of districts, and was scaled up nationally in 1989, although coverage remained low at 56.6% in 1996 and only 70.6% in 2001.⁹⁰ Our focus was on efforts after 2000 to increase the coverage, which reached 90.4% according to the 2016 DHS.

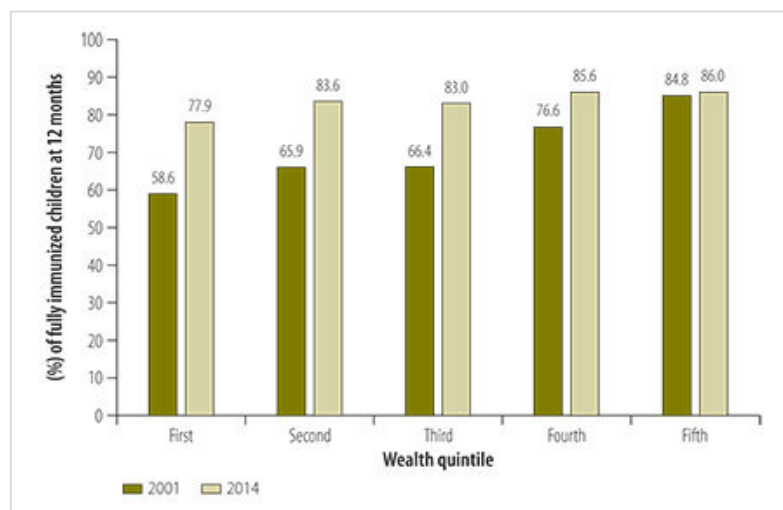


Figure 27: Percentage of Children Fully Immunized at 12 Months of Age by Wealth Quintile (Source: KC et al, 2017)

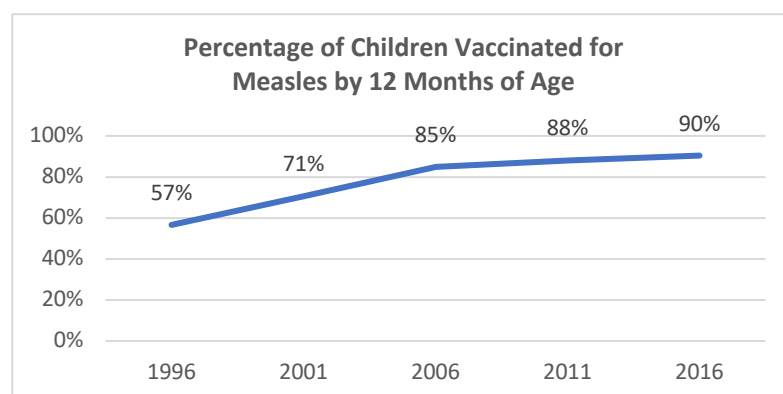


Figure 28: Percentage of Children Vaccinated for Measles by 12 Months of Age (Source: DHS 1996, 2001, 2006, 2011, and 2016)

IMPLEMENTATION AND ADAPTATION AFTER 2000

Nepal worked to improve coverage through **better surveillance** and work **targeted the most hard to reach and poorest communities** through outreach, communication campaigns, and partnering with NGOs. Building on existing surveillance systems, Nepal strengthened the surveillance to determine the burden of measles to increase data to target areas where increased access was needed. Measles surveillance in Nepal is reported as a part of the **HMIS system**.

Until 2003, this was the exclusive method of measles surveillance, but it did not provide the level of detail or timely reporting needed for response to measles outbreaks.⁹¹ Due to these limitations, the MOH supplemented HMIS with a more detailed measles surveillance system (as well as other vaccine preventable diseases, such as Japanese encephalitis), **building off of the existing surveillance system for acute flaccid paralysis, which had been in existence in 1996**. This network collects weekly reports from health care centers in every district on cases of suspected measles based on clinical symptoms. If there are five or more cases of suspected measles in a two-week period in one geographic area, an outbreak investigation is initiated by a surveillance team. This team collects blood samples for confirmation of measles cases,

investigates reasons behind the outbreak, and starts an immunization campaign for unvaccinated individuals in the outbreak area (KI 3).

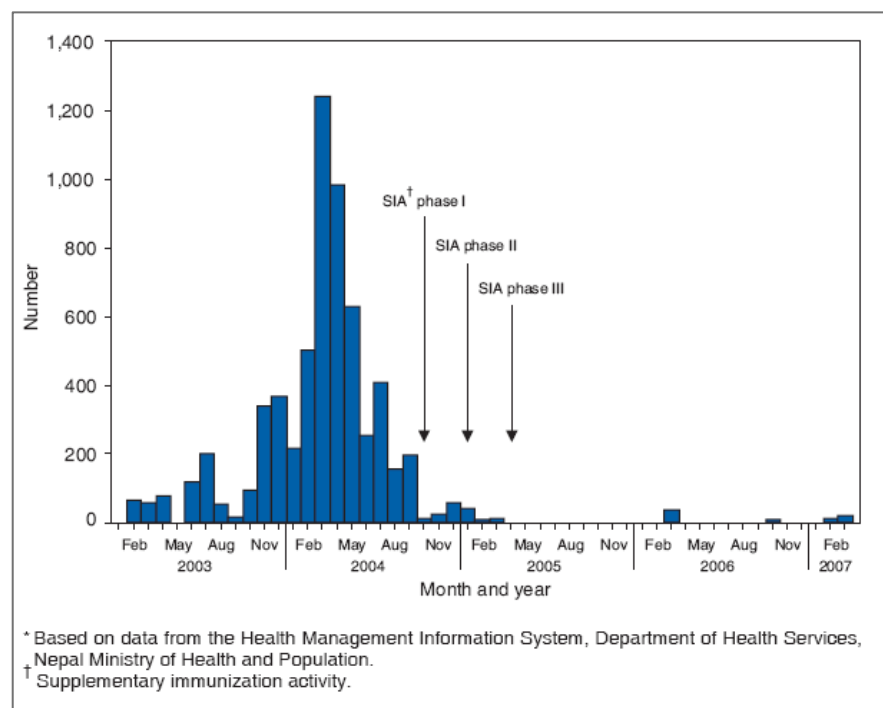


Figure 29: Progress in Measles Elimination in Nepal, 2000-2006 (Source: CDC)

After implementation of the new surveillance system, data showed that measles was continuing to occur and that approximately 90% of cases of confirmed measles outbreaks were in children under 15 years of age.⁹¹ Based on these data, the MOH chose to conduct a **“catch-up” secondary immunization** campaign targeting children aged 9 months to 15 years for measles vaccination. Three secondary immunization campaigns were conducted in 2004-2005, 2008, and 2012-2013. Good reach was

seen, with estimated measles vaccination coverage for the targeted population ranging from 93% to 105% during these campaigns, based on estimated numbers of eligible children.^{90,91} Effectiveness was seen with the number of reported measles cases in HMIS reduced from an annual average of 10,425 from 2000 to 2003 to 1,935 in 2006 and 25 in 2014.^{90,91} The number of districts with ≥ 2 confirmed cases increased after surveillance started but has since declined.

Equity in coverage improved from 2000 to 2016 as well. In 2001, 69.9% of children in rural areas were vaccinated for measles, versus 80.6% of children in urban areas.²⁷ By 2016, these rates of vaccination were 89.5% and 91.2% respectively.²⁸ In 2001, the lowest wealth quintile had a measles vaccination rate of 61.1% compared to 83.2% for the highest wealth quintile.²⁷ By 2016, these rates were 94.0% for the lowest wealth quintile and 89.8% for the highest wealth quintile.²⁸

According to key informants in the MOH, cases of measles outbreaks still occur primarily in rural geographic regions or poor or low-caste communities (KI 3). These communities have less access to or knowledge of immunization for their children. The MOH maintain their surveillance and reporting systems in order to respond rapidly to outbreaks with treatment and immunization campaigns.

4.2.2 Pneumococcal Vaccination

EXPLORATION

The WHO released a position paper recommending the use of PCV-7 in vaccination of children in LMICs in 2006, with an update recommending the PCV-10 or PCV-13 vaccine in 2012.^{11,12} Gavi started the Advanced Market Commitment, with the goal of increasing pneumococcal vaccine use in developing countries in 2009, with the first country introducing the vaccine under their program in 2010. According to key informants in the MOH, Nepal **chose to adopt PCV based on evidence of high child mortality due to pneumonia** (KI 10). As with other vaccines in the country, Nepal performed **multiple local studies to assess for national need** for this intervention, which delayed their national adoption of PCV. Starting as early as 2004, the South Asian Pneumococcal Alliance (SAPNA) started a study of cases of pneumococcal disease in children at the largest children's hospital in Kathmandu.⁹² This three-year study aimed to establish prevalence of pneumococcal disease, patterns of drug resistance, and serotype distributions explicitly with the goal of providing an evidence base for future decisions of when and how to adopt PCV. The study found an invasive pneumococcal disease incidence rate of 52.4 cases per 100,000 children under-5. PCV-10 and PCV-13 covered the serotypes in 56% and 63% of cases, respectively.

PREPARATION

The Government of Nepal applied for **financial support from Gavi** for implementation of the PCV vaccine in September 2012, with plans to introduce the vaccine in August 2014 (eight years after WHO recommendations, with actual rollout in 2015).¹³ Reflecting the delay, 47 Gavi-assisted countries (out of 73) introduced PCV before Nepal.⁹³ Nepal considered both PCV-13 and PCV-10 for introduction. Although initially the MOH wanted to introduce PCV-13 to cover more serotypes, they chose to introduce PCV-10 due to **limitation in cold chain space**.¹⁴ With PCV-10, Nepal did not have to expand cold chain storage space beyond what had already been established for other vaccines in the past (KI 10). Other steps in preparation for the introduction of PCV included developing **guidelines and training manuals**; writing advocacy and **sensitization materials** for health staff, local leaders, media, and NGOs; organizing **advocacy meetings** with national political and professional leaders and local community leaders; and **training vaccinators**.¹³

Prior to the adoption in Nepal, WHO recommended a 3+0 schedule for PCV in infants in LMICs, although a booster dose at age two was used in HICs. However, ongoing disease surveillance at Patan Hospital in Kathmandu showed that the highest proportion of disease in Nepal occurred in **late infancy and early childhood**. Therefore, a randomized control trial of a 2+1 PCV schedule as compared to the 3+0 PCV schedule was performed at Patan Hospital, with the theory that the booster dose would be beneficial in preventing infections later in childhood.⁹⁴ The study showed non-inferiority, and the 2+1 schedule was adopted as the nationally recommended vaccination schedule for PCV to address the disease in late infancy.

IMPLEMENTATION AND SUSTAINMENT

As PCV was introduced nationally in Nepal in 2015, the implementation and sustainment of the vaccine lie primarily outside this case study's time period of interest. Because of the 2+1 schedule, which includes a booster at nine months (representing a separate visit), vaccination with all three doses of PCV at age two (versus full recommended vaccine coverage at one year, which was high) remained low at 5% in 2015 and at 46% in 2016.⁹⁵



4.2.3 Haemophilus Influenzae Type B (Hib) Vaccination

EXPLORATION

Gavi started funding introduction of the Hib vaccine in LMICs in 2001, and WHO recommended the addition of Hib vaccine to all routine immunization schedules in 2006. The MOH and academics undertook **studies to assess the burden of Hib in Nepal**, including looking at nasopharyngeal carriage rates in children, mathematical modeling of the burden of disease, and attempted surveillance of cases in four hospitals across the country.^{96,97}

PREPARATION

The Government of Nepal applied for support from Gavi in 2007 to introduce the pentavalent vaccine (DPT-HepB-Hib). That year, the Government of Nepal performed a **cold chain assessment** with the assistance of WHO, finding that cold chain capacity was insufficient for rollout of the pentavalent vaccine.⁹⁶ The government built an **additional cold storage room** at the central level in 2008 in preparation for the additional space needed for the pentavalent vaccine. The government planned to use **existing distribution and logistics plans** and existing HMIS data collection system that were already in use for the quadrivalent vaccine (DPT-HepB), with no adjustments needed made for the pentavalent replacement. Due to concern for high vaccine wastage due to use of multi-dose vials (recorded wastage was >70% for the BCG vaccine at the time), the Government of Nepal also chose to use single dose vials of vaccine rather than multidose.⁹⁶ The Government of Nepal also designed additional implementation plans prior to the introduction of the vaccine, including development of **guidelines and training manuals** for vaccination; development of **advocacy materials** for community leaders and health professionals; development of **radio and TV messages** promoting vaccination; and **national, regional, district and sub-district planning meetings**.⁹⁶

IMPLEMENTATION

The pentavalent vaccine was introduced in 25 districts in March 2009, and rolled out to all 75 districts by December 2009.⁹⁸ Vaccination was **performed at the community-level by health workers with each district health office**. The rollout proceeded in phases due to districts finishing existing stocks of the quadrivalent vaccine prior to initiating the pentavalent, accompanied by monitoring for adverse events following immunization.⁹⁸ In early 2010, there was an international recall of the pentavalent vaccine produced by the manufacturer used in Nepal due to safety and quality concerns.⁹⁹ This led to a nationwide stockout for three months until a new manufacturer could be contracted.¹⁰⁰ Despite this challenge, high rates of coverage were rapidly achieved. (Figure 30)

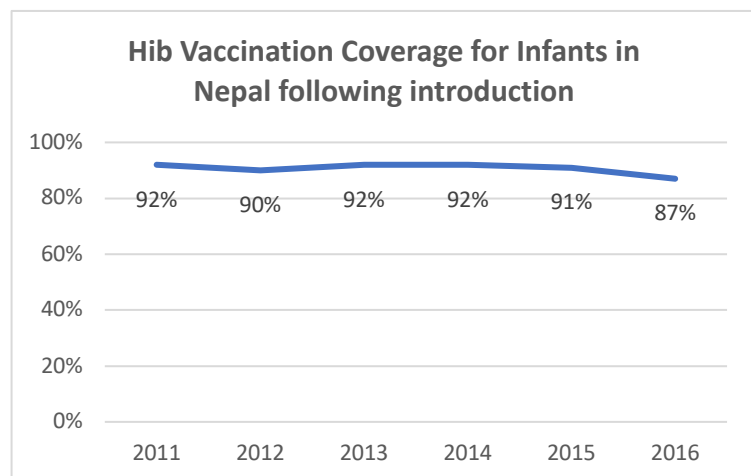


Figure 8: Hib Vaccination Coverage for Infants in Nepal (Source: Nepal: WHO and UNICEF estimates of immunization coverage)

SUSTAINMENT

Vaccination rates for Hib have remained stable over time, varying from 87% to 92% from 2011 to 2016. One potential factor associated with sustainability of high rates of coverage of Hib versus PCV was the use of pentavalent vaccine, which included Hib and was part of routine broader coverage, versus PCV, which required additional visits, per national protocols.

4.2.4 Rotavirus Vaccination

See “Other Diarrhea Interventions” section.

Selected overall implementation strategies and outcomes for vaccine preventable diseases are detailed below.

Table 17: Overall Vaccine Preventable Diseases Implementation Strategies and Outcomes

	Implementation Strategy (all vaccines)	Implementation Outcomes
Acceptability	Use of FCHVs as health educators promoting vaccination at the community level Sensitization activities during roll-out of vaccines included training of local community and religious leaders, training of health care professionals, radio and television ads promoting vaccination, meetings with professional organizations, and vaccination launch celebrations	(+): High levels of acceptance in the community, according to MOH officials and implementing partners
Feasibility	Building on existing systems, such as the surveillance program for acute flaccid paralysis Use of existing HMIS and distribution and delivery systems, such as those for the quadrivalent vaccine being replaced by the pentavalent vaccine Expansion of cold chain capacity prior to vaccine roll-out	(+/-): Delivery of vaccines was achieved across the country, although some disparities remain
Effectiveness and Coverage	Establishment of outreach clinics and mobile vaccination clinics to reach remote and unserved communities	(+): Increases in coverage for vaccination in all geographic districts and both urban and rural areas
Sustainability	Integration into existing vaccine schedule (or not for PCV) Ongoing surveillance (measles, polio, etc.)	See data above

4.3 HIV

Table 18: HIV Program Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Engagement of partners and donors• Pilot testing• Data availability and use for evidence-based decision making• Use of FCHVs and CHWs• Integration into existing programs and structures• Community engagement, education, and sensitization• Monitoring and evaluation• Adaptation of interventions for changing evidence and available treatments• National policies and treatment guidelines



4.3.1 Prevention of Mother to Child Transmission (PMTCT)

In 1988, the first case of HIV was detected in Nepal, increasing to its peak during the early 2000s, transitioning from ‘low-level epidemics’ to ‘concentrated epidemic with rapid spread among key populations’.¹⁰¹ These included men having sex with men, injection drug users, sex workers and their clients, and male labor migrants, with sexual transmission the most common route of infection. In the early 2000s there was an estimated 6,000 new infections.¹⁰¹ We focus on PMTCT as the most important intervention to reduce U5M due to HIV/AIDS.

EXPLORATION

The transmission of HIV from mother to child in the early 2000s was increasing due to high prevalence of HIV among injection drug users, female sex workers, and migrant men, a significant proportion of whom were married.

As in other countries, the most frequent source of HIV infection in children in Nepal was vertical transmission.¹⁰² According to National Center for AIDS and STD Control (NCASC) 2005 data, out of an estimated 900,000 pregnancies that year, 1,800 pregnancies were suspected to occur in HIV-positive women (based on 0.2% of HIV prevalence among pregnant women), suggesting that between 450 and 810 infected infants were born annually, reflecting the delay in PMTCT until 2005.

PREPARATION

The **National PMTCT Working Group** worked with a wide range of partners, including WHO, UNFPA, UNICEF, the Joint United Nations Programme on HIV/AIDS (UNAIDS), and USAID/Family Health International (FHI).¹⁰³ NCASC/MOH **piloted comprehensive PMTCT services in February 2005** at three hospitals - Paropakar Maternity and Women’s Hospital in Kathmandu, Bheri Zonal Hospital in Nepaljung, and B.P. Koirala Institute of Health Sciences (BPKIHS) in Dharan. This service package included voluntary counseling and testing (VCT), antiretroviral (ARV) prophylaxis of pregnant women and exposed infants, safe obstetric care, infant feeding counseling and support, family planning, and referral care and support of HIV infected women and children.¹⁰⁴

One implementer key informant (KI 2) explained its initiation, stating, **“The concept of PMTCT came from various evidences**, such as statistics on detection of HIV positive cases and children born with HIV. Since PMTCT had good results in many other countries, we also started it with pilot projects in 2-3 hospitals, UNICEF and UNAIDS donated and helped in setting up programs in some hospitals. This is how it began and was later scaled up nationwide.”

The NCASC, UNICEF, and other members of the National PMTCT Working Group did an **operational review of pilot programs** of PMTCT services in early 2007. This review found that the existing program had a strong focus on hospital-based services, with weaker work to “reach” the community through prevention-based interventions and the provision of care, treatment, and support for people living with HIV/AIDS (PLHA).¹⁰⁵

The principal recommendations of the review included:

1. **Integration of PMTCT activities with community-based maternal and neonatal health services.**
2. Increased **involvement of FCHVs** and other community-based health workers.



3. **Involvement of sub-national authorities** at the district level and civil society organizations to manage and support PMTCT services.
4. Strengthened role of the NCASC in overall program management and governance.¹⁰³

IMPLEMENTATION

Following these recommendations to increase national access, the Government of Nepal, in collaboration with community-based organizations and partners, including UNICEF Nepal and FHI360, launched the Community-Based Prevention of Mother to Children Transmission (CB-PMTCT) program in 2009. **Building on existing strength of community support**, the CB-PMTCT program increased ANC coverage as well as HIV counseling and testing (HCT) uptake among pregnant women. The CB-PMTCT program was expanded throughout the country, and HIV screening and counseling is done for every ANC visitor at the district level.⁶³ **Linkages were also established between PMTCT sites and sexual and reproductive health-targeted interventions** and family planning and counseling services.⁶³ Demand for counseling and testing was expanded through **community-based campaigns**, including “HIV testing at Street” and “HIV testing at festivals” in Kathmandu, although these were not scaled up nationally.

Implementation strategies chosen also included **integration of the AIDS response into the general health sector**, including reproductive services, and **increased and improved monitoring and evaluation** through the Monitoring and Evaluation section of the Strategic Information (SI) Unit at NCASC, supported by the National Guidelines on Monitoring and Evaluation of HIV Response (2013) framework. This included monthly and bimonthly reports, regular field visits to sites for supportive monitoring, and comprehensive annual reviews of programs by districts.¹⁰³ One key informant working with an implementing partner organization (KI 2) also noted the commitment of the staff and support from other organizations to be key facilitators for the success of this program.

There were challenges in achieving coverage as planned, with **only ~40% of facilities offering the needed counseling and testing** and PMTCT, although the numbers of PMTCT sites have continued to increase, from 41 sites in 2012 to 95 sites across 45 districts in 2014.^{106,107} However, the number and proportion of women attending ANC who were tested remained relatively stagnant - 142,043 (19.3%) in 2013 to 158,146 (20.7%) in 2014. Issues around stigma and knowledge were also identified as challenges despite the demand-targeted work.¹⁰⁷

Coverage of prophylaxis was also limited. By the end of 2014, only 127 (25.5%) infants born to HIV positive pregnant women received ARV prophylaxis, a slight increase from the 136 (20%) in 2013.¹⁰⁷ Exposed infant testing has expanded from 3% in 2013 to 24.4% in 2014, but gaps remain.¹⁰⁷ As of the end of 2014, there were still only six sites providing early infant diagnosis (EID) services in Nepal.¹⁰⁷ During national scale up, ARV guidelines were reviewed again in 2010 and from 2011, which caused a change to more effective combination treatment of zidovudine or tenofovir, lamivudine, and efavirenz from 14 weeks through delivery, and continuing in postpartum for one year until cessation of breast feeding.¹⁰⁴ In 2014, the rate of MTCT was still estimated at 35.7%, with PMTCT coverage increasing from 3% in 2010 to 33%.¹⁰⁷

One key informant noted, *“The major challenges for the program are lack of knowledge and awareness among people, social stigma, and lack of trust in service provider. Along with that, we also have problems*

related to budget, human resources, and training.” Other challenges included stock outs of test kits and follow-up of mother-infant pairs for EID, as well as the supportive monitoring visit at service delivery points from the district and center.⁶³

Despite these challenges, overall the epidemic has decreased. At its peak in the early 2000s, there were nearly 8,000 new HIV cases in a calendar year. This has declined by 88%, with the total number of new cases at 942 in 2016. The prevalence of HIV dropped from 0.14% in 2004 to 0.17% in 2016. That same year, there were an estimated 32,735 adults and children living with HIV in Nepal, with children up to age 14 (1,197) representing 3.6% of the people living with HIV/AIDS.⁶³

Table 19: PMTCT Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Reach	Decentralization of PMTCT services and engagement of Female Community Health Volunteers (FCHVs) and Community Home Based Care (CHBC) teams Expanding the demand for services C and T including community-based campaigns for “HIV testing at Street” and “HIV testing at festivals” in Kathmandu	(+/-): Geographic reach expanded but actual coverage remained low although increasing: ART for HIV(+) women increase from 20.9% in 2013 to 32.5% in 2014, infant prophylaxis from 13.9% in 2012 to 25.5% in 2014 and early infant diagnosis at 6.4% in 2014 from 3.1% in 2012 ¹⁰⁷ (+): Increased decentralized coverage and access to PMTCT at district level in collaboration with private sectors, communities, and NGOs ¹⁰⁷ (+): HIV screening and counseling and ARV medicines available in all districts of Nepal ¹⁰⁸
Effectiveness	Develop monitoring and evaluation tools for use in reporting of ongoing activities and every supervisory visit, change in PMTCT regimen (Option B+ in 2016)	(+): MTCT rate slightly declined from 40% in 2012 to 35.7% in 2014 ¹⁰⁷
Feasibility	Integration of maternal and neonatal health services since 2009 in districts with community-based PMTCT services ¹⁰⁷	(+): This service reached 70% of the districts and close to 50% of the health facilities by the end of 2016 ¹⁰⁸ (See also reach)
Fidelity	Monitoring and evaluation including routine data and surveys	(+/-): While HIV C&T for pregnant women has remained low representing poor fidelity, there has been increase in provision of prophylaxis to mothers increased to 35% in 2015 and jumped to 67% with a lag in prophylaxis of exposed infants from 8.40% in 2010 to 25.5% in 2015 (see Figure 24)

SUSTAINABILITY AND MOVING TO ELIMINATION OF VERTICAL TRANSMISSION (EVT)

In order to achieve maximum coverage, synergy, and benefit, the program has been integrated and delivered through maternal health services and efforts to expand continue. In 2015, Option B+ was introduced, providing lifelong ART for all HIV positive pregnant women and breastfeeding mothers, regardless of their CD4 count, along with prophylactic treatment for their infants. This change is designed

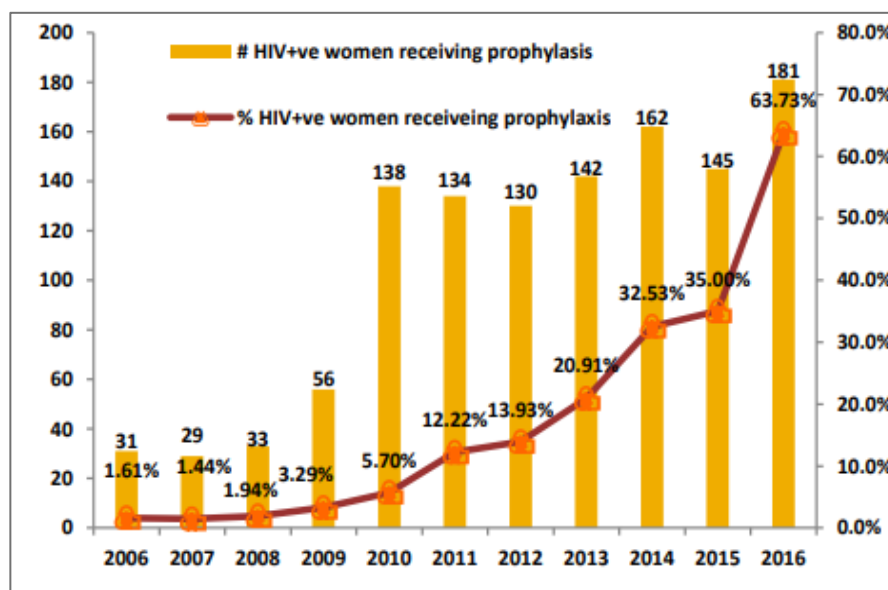


Figure 9: Coverage of PMTCT program in Nepal (2006-2016) (Source: PMTCT Factsheet 2017)

improve maternal health, prevent vertical transmission, and reduce the transmission of HIV to sexual partners.¹⁰⁹ In the **National HIV Strategic Plan 2016–2021**, the government not only aimed to prevent but also to eliminate vertical transmission and keeping mothers alive and well by 2021. The change to Option B+ was accompanied by an increase in mothers receiving prophylaxis to 63.7% in 2016 (Figure 31).¹⁰⁸ The country has continued scaling up PMTCT services, adding to the CB-PMTCT program by integrating it with HIV counseling and testing, ART, and related services to ensure access to a continuum of care for pregnant women with HIV.

In line with PMTCT services, human resources for maternal and child health care have been trained and preparation and updating of training manuals has taken place simultaneously.

4.4 Malnutrition

Table 20: Malnutrition Program Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none"> • Data collection and use for evidence-based decision making • Engagement of partners and donors • Pilot testing • Integration into existing programs and structures • Collaboration across sectors

While malnutrition is a contributing risk factor for U5M, we focused on management of severe acute malnutrition (SAM) as a direct cause of death. The stunting case study provides additional information on work to reduce stunting in Nepal.¹¹⁰ The program to address severe acute malnutrition was implemented and adapted based on evaluation results and goals of integration into existing programs. These included

community-based management of acute malnutrition (CMAM) in 2007, Multi-Sector Nutrition Plan (MSNP) in 2011, and, after the strategic planning cycle 2014-2015, the planning of integrated management of acute and chronic malnutrition, which was implemented in 2016.

EXPLORATION

In the 2006 DHS, the national prevalence of acute malnutrition in U5 children in Nepal was reported as 13.4%, with SAM at 2.6%, translating to more than 90,000 cases of SAM in children in Nepal. Variations in rates were found across the nation.⁷⁴ Further evidence was produced from a **nutrition survey** carried out in 2008 in Bardiya District, located in Mid-Western Region (Province 5) of Nepal. The survey identified global acute malnutrition (GAM) rates of 16.2% and SAM rates of 2.8%. The survey labelled the situation “critical” and recommended the implementation of a nutrition intervention to address SAM in the district.¹¹¹

PREPARATION

In order to address SAM in Nepal, CMAM was introduced. This included community mobilization, a supplementary feeding program, an outpatient therapeutic program, and a stabilization center/inpatient care. For the implementation of CMAM, UNICEF conducted a **feasibility study** to explore the potential of CMAM. The results concluded that if CMAM was integrated into routine health services provided through the Ministry of Health and Population (currently MOH), it could be an effective tool for management of SAM. The feasibility study also suggested that CMAM should be linked with the IMCI program.¹¹²

In 2007, an evaluation was conducted to identify and select the possible partners for CMAM pilot projects. The **partners were selected among existing NGOs and other organizations working in those areas**. In 2007-2008, Concern Worldwide, a supporting INGO, carried out its own assessment to determine feasibility and potential role in supporting CMAM in the country. The health system assessment provided further insights into the opportunities and challenges of implementing an integrated CMAM pilot in Bardiya district. These studies, coupled with the approval of the Emergency Nutrition Policy (which included CMAM pilots) by the Ministry of Health and Population in May 2008, paved the way for the start of the **pilot program** planning (at national level) and implementation (at district level) in the first half of 2009.^{113,114}

Reflecting the geographic diversity in Nepal, the program was further piloted in four additional districts of Nepal, from various agro-ecological regions (Mugu, Kanchanpu, Ascham, and Jajarkot) in collaboration with the national, regional, and district health authorities and through the existing health structures. The implementation process of CMAM in Nepal was supported by the pool fund of WHO/ WFP/Sub Committee on Nutrition/UNICEF (WHO/WFP/SCN/UNICEF).¹¹⁵ The results of the pilot CMAM was that “CMAM is an effective model for the community-level identification and treatment of SAM” from the pilot evaluation.

113

Other strategies included **community mobilization/outreach training of the FCHVs** on an ongoing basis to identify acutely malnourished children at the community level to enable widespread early detection and referral before worsening of the condition.



IMPLEMENTATION

The identified partners assisted in effective implementation of the programs. In 2011, an evaluation by UNICEF found that the project had increased the outreach of services for management of SAM in community level and that it could be a sustainable program within the regular health services, **optimizing utilization of existing resources**. A joint review of maternal and child health care (MCHC) was also conducted by MOH in coordination with other stakeholders in the same year. Both these studies, however, highlighted the **existing loopholes in Moderate Acute Malnutrition (MAM)**, which led to the development of national MAM guidelines. The evaluation of CMAM also recommended that the approach improve links across the sectors and with malnutrition prevention strategies and programs in addition to curative services as part of a comprehensive approach.¹¹⁴

Following the MAM guidelines, **the multi-sectoral nutrition program (MSNP)** was implemented in 2012. This focused on a number of implementation strategies, including **integration of services across sectors** and prevention as well as treatment; decentralized care, including outpatient when possible and inpatient when indicated; monitoring and evaluation, including **integration into the current HMIS system**; coordination at the ministry level; and leadership through incorporation of community-based management of severe acute malnutrition into the National Health Sector Program II (NHSPII), which runs until 2017, and into the MSNP 2013-17.¹¹⁴

In 2012, in collaboration with Action Contre La Faim (ACF) and UNICEF, the Ministry of Health and Population decided to further scale up CMAM for infants less than six months of age starting in six additional districts of Nepal. The program expanded in 2012 to the **Integrated Management of Acute Malnutrition** including infants under six months of age (IMAMI) in six new districts.¹¹²

In order to further support the objectives of MSNP 2012, in 2016, UNICEF, Valid International, WFP, Nepal Youth Foundation, and the Child Health Division of the Nepal MOH developed **IMAM guidelines** to accelerate scale-up of the program. Synergized with the Maternal Infant and Young Child Nutrition promotion and support, the IMAM guidelines outline the integration of nutrition support across health and early childhood development, incorporating prevention efforts including WASH and social protection sectors for the continued rehabilitation of cases and to widen program and services. The main goal of this program is to act as a bridge to prevent mortality and morbidity due to acute malnutrition among children age 6-59 months at the community level in emergency and development nutrition interventions.^{63,114}

In 2016-2017, the IMAM program was being implemented 11 districts and scaled up in 10 MSNP districts, including the Himalayan region (Kalikot, Humla, Dolpa), hilly region (Khotang, Dadeldhura, Bajhang, Bajura), and terai region (Baitadi, Panchthar, Parsa) with technical and financial support from UNICEF.⁶³

Through these evolving programs, 21,782 cases of severely malnourished children received life-saving intervention in Nepal between 2010-2014 with an 86.5% cure rate.¹¹⁶ The success of nutrition integrated with prevention, including WASH, was also effective, with the percentage of severe wasting of children decreasing from 2.7% in 2001 to 1.8% in 2016.^{27,28} UNICEF and the government planned to further scale up IMAM by 2017 in 35 districts by strengthening community outreach and integrating other nutrition-specific and sensitive interventions as well as strengthening the response to crises, such as natural disasters.¹¹⁷





One KI (researcher) noted, “There was not much improvement in nutritional area especially in chronic nutrition and acute nutrition. But has been changed because of nutrition related interventions. Though not remarkable but slowly there is reduction in SAM cases.” The intervention scaled, but did not reach national coverage.

Figure 32: Display of healthy food items in the health post corner. (Image credit: Anustha Mainali, Nepal Public Health Foundation)

Table 21: Severe Acute Malnutrition Program Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Reach	Leveraging community-based structure to identify cases and refer. Expansion of access through establishing appropriate levels of care with Community-based or outpatient decentralized care for uncomplicated SAM decentralized health structures (e.g. Health posts), with option for inpatient therapeutic care inpatient management of complicated cases of SAM at tertiary level facilities according to WHO protocol. Integration into CB-IMCI.	(+): In 2014/2015, 11 IMAM districts have admitted 4,680 severely acute malnourished children at outpatient’s therapeutic program and discharged 5,483 children. ⁶³ (+): In 2016-2017 15,633 children were admitted in outpatient therapeutic program with SAM in 21 districts. (-): National scale was still underway in 2016.
Effectiveness	Monitoring of the program by assessing the effectiveness of treatment (i.e. proportion of clients treated effectively) and program coverage (i.e. proportion of the target group reached with treatment) and appropriateness of the program for communities. Integration into current HMIS system Intersectoral including prevention (nutrition, WASH).	(+): 15,633 children in 2016-2017 were admitted in outpatient therapeutic program with SAM in 21 districts. Out of which, 13,378 were discharged with 10,651 (80%) with complete recovery. Among all discharged SAM cases, less than 1% died and 10% were defaulters, which are within the SPHERE (organization working on nutrition during disaster situations) standards of effectiveness of IMAM Program ⁶³ Reduction in wasting (and stunting) was also seen.
Feasibility and Sustainability	National leadership with incorporation of community-based management of severe acute malnutrition in NHSP II and MSNP, coordination across ministries and sectors Appropriate sites for care (outpatient for	(+): Community outreach is widespread and IMAM services are delivered through 165 outpatient therapeutic sites to patients with SAM without medical complications and 13 stabilization centers (for children with SAM with medical complications).

	uncomplicated SAM, inpatient when needed). Integration of IMAM into existing health services and structures including CB-IMCI ¹¹⁴ Willingness to adapt and evolve the program over time.	
Fidelity	Development of national IMAM guideline with support of UNICEF Nepal Training and supportive supervision to identify weaknesses in the performance of activities, taking immediate action and apply shared corrective solutions.	

SUSTAINABILITY

The Nutrition Assessment and Gap Analysis (NAGA) in 2009 represented a first step in planning for sustaining improvements in the nutrition field. The recommendations of the NAGA helped to bring about the MSNP 2012, specifically highlighting the need for a multi-sectoral approach to nutrition.¹¹⁰ MSNP highlighted the importance of the intersectoral coordination between related ministries of Nepal such as the Ministries of Agricultural Development, Education, Federal Affairs and Local Development, Health and Population, Urban Development, and Finance.¹¹⁸

Further planning for success and sustainability also included the integration of IMAM and the

multisector approach described above to tackle some of the determinants of undernutrition (WASH, social protection, and local governance mechanisms, focusing on the **1,000 day critical window**) and ensure that treatment is linked to support for continued rehabilitation of cases and to these wider malnutrition prevention programs and services focused on the 1,000-day window.¹¹⁴ In addition, community based management of SAM was incorporated in the 5-year NHSP II with the management of acute malnutrition integrated into the ongoing routine health services at all levels through IMAM.¹¹⁴

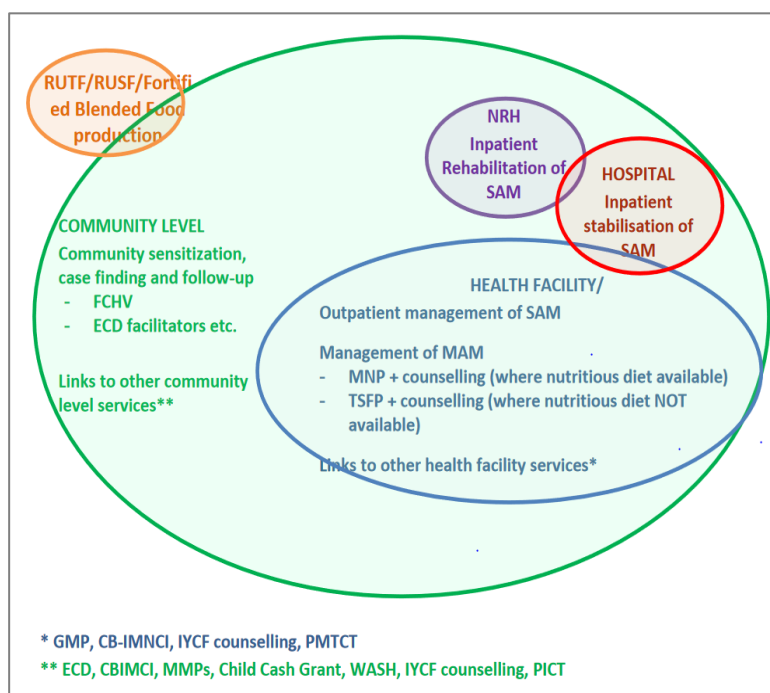


Figure 33: Structure of SAM Program (Source: IMAM Guidelines Draft 7)

4.5 Vitamin A

Table 22: Vitamin A Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none">• Local research for evidence-based decision making• Use of FCHVs• Integration into existing programs and structures• Pilot testing• Community engagement• Donor support (financial and technical assistance)

Vitamin A deficiency is an underlying determinant of child mortality, increasing risk of morbidity and mortality from common causes of death, including respiratory issues, measles, and diarrheal diseases.¹¹⁹ Several studies carried out in different countries have also demonstrated that vitamin A supplementation (bi-annual dosing with high-dose capsules) significantly reduces mortality among children 6-59 months of age.¹¹⁹

EXPLORATION

Vitamin A deficiency was an important health problem in Nepal before the National Vitamin A program was implemented, with 2–8% of preschool-aged children experiencing xerophthalmia or severe vitamin A deficiency in the 1990s.¹¹⁹ One key informant working with a partner organization explained about prioritizing Vitamin A supplementation: “It was prioritized because vitamin A deficiency was a big public health problem in 1980s as lots of cases of night blindness and keratomalacia were very common during that time.” (KI 11)

Work began with studies in Nepal. A field trial carried out by Nepal Nutrition Intervention Project, Sarlahi (NNIPS) and John Hopkins University among 30,000 children in the southern Nepal plains district of Sarlahi in 1989 demonstrated that periodic vitamin A supplementation could reduce infant and child mortality by about 30%. In 1991, a field trial conducted by JSI in Jumla, in the western hills, showed 30% decreased mortality among children who took vitamin A compared to those who did not.¹¹⁹

Another key informant with a partner organization reflected about the trials, stating, “Vitamin A field trials were done in Sarlahi and Jumla started small and presented the evidence to the government. Since they were done under the direct government vigilance, it had a good acceptance from them and later on it was incorporated in the national plan and then expanded gradually” (KI 14).

PREPARATION

Based on this evidence, by November 1992, **guidelines for implementation** of the National Vitamin A Deficiency Control Program were adopted (twice-yearly distribution in April and October of each year with vitamin A capsules with age-based dosage). In 1993, the MOH, with assistance from USAID and UNICEF, initiated the National Vitamin A Program (NVAP) with a plan to ultimately scale to all 75 districts in the following decade. USAID continued support the program beyond the end of the initial grant (VITAL program) through the Opportunities for Micronutrient Interventions Project (OMNI). In 1995, OMNI subcontracted Hellen Keller International (HKI) to provide technical assistance, supported by the NTAG, a



private sector consortium of professionals funded by USAID, the Australian international aid agency (AusAID), and UNICEF, for the implementation of the NVAP. This included training, supervision, monitoring, and community mobilization.¹²⁰ Implementation strategies chosen included:

- Leveraging external donors
- Using the **FCHVs**, supported by training to conduct biannual distribution
- Accelerating expansion into new districts through the **existing National Immunization Day activities** to provide one dose of vitamin A as a temporary measure until NVAP reached those districts with its routine twice-yearly supplementation¹¹⁹

IMPLEMENTATION

The program rolled out as planned, initially covering eight districts. By the time of the 1996 DHS survey, the distribution of vitamin A capsules had covered 27 districts in the country and, by October **2002, covered all 75 districts.**¹²¹ The **strengthening and leveraging of the existing decentralized care delivery** was key to the success of the program in achieving coverage. FCHVs distributed the vitamin A supplements to children age 6-59 months and successfully organized the distribution days, mobilizing the communities and visiting all the households in their catchment area before each distribution round to make sure that people knew about the dates and location of distribution.¹²² One KI stated, “The pillar of vitamin A program are the Female Community Health Volunteers (FCHVs).” (KI14)

Distribution and monitoring also played a major role in establishing a program in each district for introduction of the NVAP. These interrelated activities strengthened the link between the program and the community and was designed for sustainability by planning to transfer ownership to the districts. Technical support was provided by NTAG in each district to initiate the program for two rounds of capsule distribution. Subsequently, the district continued managing the program on its own.

A study conducted in 2005 showed that vitamin A supplementation reduced the odds of dying at age 12-59 months by slightly more than half.¹²³

Reflecting the field level data of HMIS (2013-2014) showing low coverage of vitamin A in the 6-11 months age group in 2014/2015 (Figure 34), a new strategy of vitamin A supplementation to infants aged 6-11 months was introduced as a **pilot in five districts** in all three geographical regions, which allowed health facilities and FCHVs to provide vitamin A to children immediately after they reached six months of age. Under this strategy, children receive the second dose at the regular biannual supplementation events. A majority of the districts in provinces 2, 6, and 7 are supplementing vitamin A with this new service delivery mechanism, although national scale up was not achieved and leadership changed in the Child Health Division.⁶³

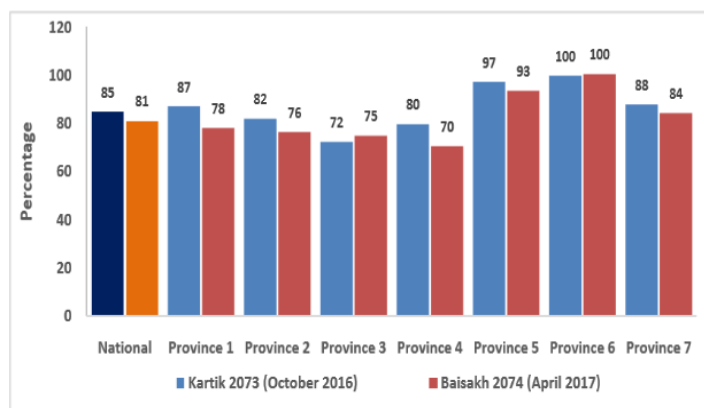


Figure 34: Coverage of vitamin A Supplementation
(Source: HMIS/MD/DoHS)

SUSTAINABILITY

The vitamin A supplementation program was designed for sustainability through the implementation strategies employed, including a **broad multi-sectoral and community-based approach**, with integration of different sectors to provide comprehensive health services. Transition was planned from the technical assistance partners to the district and ownership was developed with different sectors and government and community workers, facilitating social mobilization along with widespread awareness and support for the program. There have been meaningful efforts to **involve the community in all aspects of the program**, enabling a self-managed, self-reliant, sustainable intervention.¹²⁰

The program also has had sustained financial support and high visibility, oversight, and monitoring from both the government – MOH – and the donors. Since 1999, the Micronutrient Initiative, through support from the Canadian International Development Agency (CIDA), has provided vitamin A capsules for the NVAP, and AusAID has financially contributed to the training component.¹²¹

The vitamin A program also became an **integrated part of delivery of preventive and treatment initiatives** to address the high prevalence and morbidity of worm infestation in Nepal, including malnutrition, anemia, and cognitive function impairment in children.⁶³ In 1999, the success of the NVAP led to integration of deworming tablets distribution to children 12-59 months old with the biannual vitamin A supplementation. Deworming was implemented phase-wise and it covered all 75 districts by 2004.¹²⁰

Table 23: Vitamin A Supplementation Program Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Reach	Decentralization of structure and leveraging existing FCHVs Distribution of vitamin A capsules to children and post-partum women by FCHVs Resource mobilization through strong engagement with donors and technical assistance to scale up in each district	(+): The average coverage has been consistently high at 85% or higher for the past 15 years ^{27,28,74,75} (+): The program scaled to all 75 districts
Effectiveness	Adaptation based on data of mortality Full national coverage	(+): A study conducted in 2005 showed that vitamin A supplementation reduced the odds of dying at age 12-59 months by slightly more than half ¹²³ (+): The Nepal Micronutrient Status Survey and DHS recorded a drop in anemia in U5 anemia from 78% to 48% in 2006 and 46.2% in 2011
Feasibility and Fidelity	Training and support to the FCHVs by NTAG M&E of the program by MOH and NTAG, with donors providing sustained financial support, oversight, and monitoring ¹²¹ Periodic surveys by DHS and biannual mini surveys as a means of self-evaluating the program and its coverage on an ongoing basis ¹²⁴	(+): 98% FCHVs participated in NVAP with 90% of both FCHV service users and non-users receiving vitamin A from FCHVs
Acceptability	Pilot testing and leveraging of the FCHVs, community engagement, resource mobilization through strong donor engagement	See reach and effectiveness

Sustainability	Planning for transition from implementing partners to district, leveraging existing FCHVs Integration of distribution of deworming tablets to children 12-59 months with the biannual vitamin A supplementation in 1999 Integration into national strategies	See above
-----------------------	--	-----------

4.6 Neonatal Interventions

Table 24: Neonatal Interventions Key Implementation Strategies

Implementation Strategies
<ul style="list-style-type: none"> • Data availability and use for evidence-based decision making • Local research • Engagement and coordination of partners and donors in preparation and implementation • National policies and guidelines • Broader health systems strengthening • Learning from other countries in the region • Pilot testing • Community and local stakeholder engagement and education • Training of implementers • Integration into existing programs and structures • Use of FCHVs • Monitoring and evaluation

The National Safe Motherhood Program in Nepal began in 1997, designed to reduce the three delays associated with reduction of maternal mortality and morbidities. Reflecting data showing the growing contribution of neonatal mortality to U5M, the program was expanded to explicitly include neonatal health in the **revised Safe Motherhood and Neonatal Health Long Term Plan (SMNHLTP 2006-2017)**.¹²⁵ This program has been credited with driving many of the improvements in maternal and, more recently, neonatal care, although national coverage rates of many of the interventions and services remain incomplete. During the study period, Nepal has undertaken the implementation and strengthening of a number of EBIs, as well as health infrastructure improvements, aimed at addressing care before, during, and after delivery. However, despite many efforts, the challenges in geographic and financial access as well as lack of human resources have hampered Nepal's efforts in reducing neonatal mortality.

EXPLORATION: 2000-2004

Following release of the results of the 2001 Nepal DHS and the 2002 State of the World for Newborns in Nepal, the MOH identified that neonatal mortality represented an important challenge requiring more national efforts. While infant and child death rates both declined at a similar rates, data showed that, the risk of neonatal death (39 per 1,000 live births) was one and half times higher than the risk of post-neonatal death (26 per 1,000 live births).²⁷ Neonatal mortality rates (NMRs) also showed evidence of inequity based on geography and wealth, with rates of 64-5 deaths per 1,000 live births in the far western and mountainous regions and higher rates in rural areas and among poorer populations. In response, the MOH formed the **Newborn Working Group** in early 2002, which included experts in maternal health and child

health, neonatologists, public health leaders, and researchers.¹²⁶ With the technical assistance of donors and experts, this working group developed **the National Neonatal Health Strategy in 2004**, expressing a strong and wide-ranging commitment to improving neonatal health. This strategy included a number of supply-side EBIs (both community and facility-based) and demand generation interventions, as well as policies for broader health systems strengthening (HSS). The government of Nepal supported both the implementation of existing EBIs and exploration of new areas of neonatal causes of death and needed innovations.¹⁸

Table 25: Selected Main Policy Goals of the National Neonatal Health Strategy 2004

Selected Main Policy Goals of the National Neonatal Health Strategy of 2004	
Access	<ul style="list-style-type: none"> Improved referral system Administration of antibiotics by FCHVs for neonatal sepsis
Facility-based HR	<ul style="list-style-type: none"> Skilled-birth attendants Training in neonatology as subspecialty
Guidelines and policies	<ul style="list-style-type: none"> Gender equality in neonatal care Ensuring postnatal care (PNCx4) Essential Newborn care Early breastfeeding Promote piloting of promising interventions followed by scaling up of successful ones Promoting KMC Tetanus vaccination for women of childbearing age Addressing maternal nutrition
Improved quality and competency	<ul style="list-style-type: none"> Standardized training guidelines Integration of neonatal care into CB-IMCI
Data/M&E	<ul style="list-style-type: none"> HMIS strengthening Birth and death registration
New knowledge	<ul style="list-style-type: none"> Facility- and community-based research Death audits
Demand-side	<ul style="list-style-type: none"> Behavior change communication

Based on the ongoing evidence of the continued slow rates of decline in neonatal mortality and the high persisting geographic (Figure 35) and rural-urban equity gaps for maternal and neonatal care in the 2006 DHS, the MOH also performed a **rapid assessment of ongoing neonatal programs** in Nepal.^{126,127} Findings included that the top three causes of death were birth asphyxia, hypothermia, and sepsis.

This, combined with the 2004 national strategy, represented the start of a journey

which incorporated new evidence and data on the successes and challenges of policies and initiatives for neonatal mortality. This included adaptations targeted to improve both supply-side (in the community and in facilities) and demand-side interventions, as well as **broader health systems strengthening efforts** and continued **building on existing health system capacity**, including **reliance on the FCHVs** as central for MNCH interventions (Figure 36). These included strategies started with improving care before and during delivery as well as postnatal care.

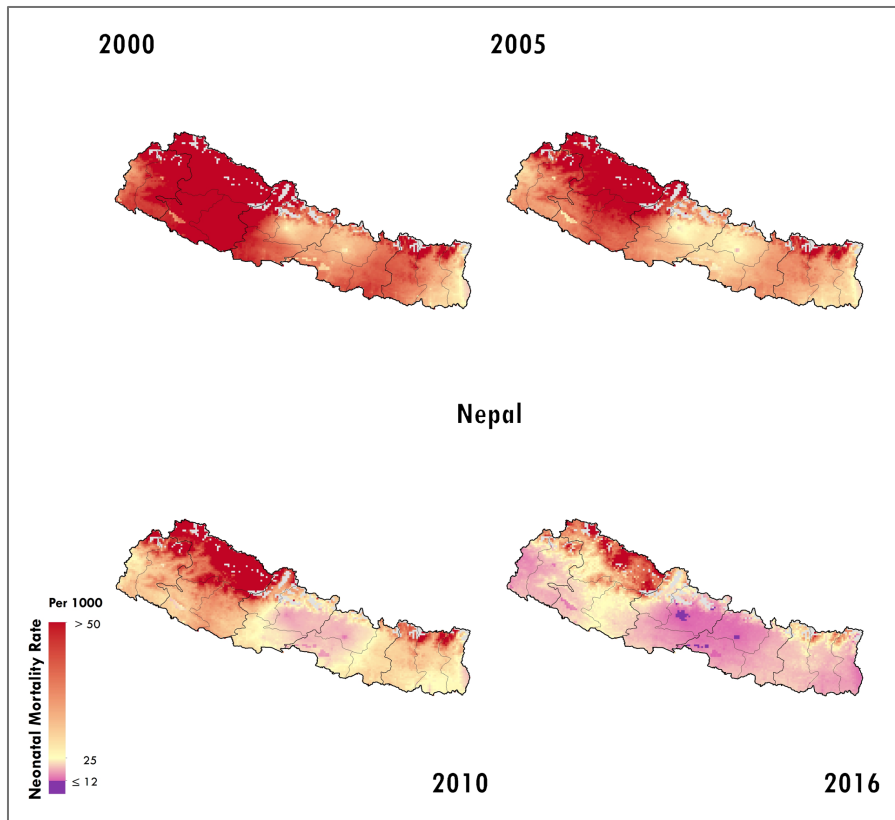


Figure 35: Maps of NMR from 2000-2016 showing persistently high rates in sections of the country (Source: Local Burden of Disease collaborators)

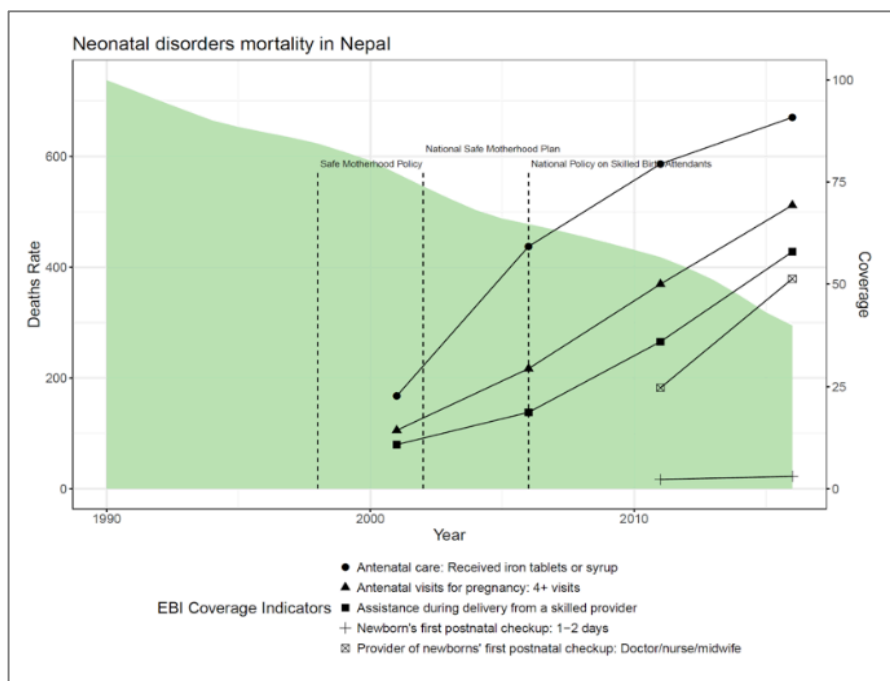


Figure 36: Neonatal disorders mortality and related policy introductions (Source: IHME)

4.6.1 Maternal Nutrition

Given the association between maternal undernutrition and iron deficiency and having low birth-weight (LBW) or small-for-gestational-age infants, nutrition assessments and interventions in Nepal have emphasized maternal nutrition as playing a key role in infant and child health.^{128–130}

EXPLORATION AND PREPARATION

The 2009 NAGA identified maternal undernutrition as a factor associated with LBW infants, based on hospital- and community-based studies in Nepal. One such study, of 3,500 mother and infant pairs in four hospitals in different regions of the country, found a LBW prevalence of 27%, with 70% of these infants measuring “small for date”.¹³⁰

In response to the NAGA results, the 2012 MSNP primary goal was to “improve maternal and child nutrition, which will result in the reduction of Maternal Infant and Young Child (MIYC) under-nutrition, in terms of maternal BMI and child stunting, by one third.” The three major outcomes envisioned for this plan were as follows:

- Outcome 1: Policies, plans and multi-sector coordination improved at national and local levels.
- Outcome 2: Practices that promote optimal use of nutrition ‘specific’ and nutrition ‘sensitive’ services improved, ultimately leading to an enhanced maternal and child nutritional status
- Outcome 3: Strengthened capacity of central and local governments on nutrition to provide basic services in an inclusive and equitable manner”¹³¹

Reflecting an equity lens, the MSNP emphasized serving those in hard-to-reach, most affected, and underserved populations. The plan also outlined plans to address maternal nutrition beginning in adolescence.¹³¹

IMPLEMENTATION

In 2003, the Government of Nepal, UNICEF, Micronutrient Initiative, and WHO began the Integrated Iron Intensification Project in five districts, scaling up to 52 districts by 2008. According to the 2009 NAGA, the program was on track for national scale by 2010. **Coverage of iron supplementation during pregnancy increased from 23% in 2001 to 91% in 2016 and maternal anemia has decreased from 75% in 1998 to 46% in 2016, although this is a slight increase from 42% in 2006.**^{27,28,74,130} The Iron Intensification Project aimed to address common barriers to iron supplementation, such as stock outs, lack of understanding of importance of iron supplementation among health staff and community members, and failures in addressing all causes of anemia. To do so, the program focused on awareness-raising about anemia and training FCHVs in the importance of iron supplementation. The program also recognized importance of **intestinal parasitic worms in maternal anemia and incorporated maternal deworming into activities.**¹³⁰ In addition, WFP activities, in collaboration with the MOH, included MCHC programs with objectives related to maternal nutrition and iron deficiency reduction. In a joint MOH-WFP **program in 12 districts, WFP provided supplemental foods and health services and education** in nutrition to 31,000 pregnant and nursing mothers and their young children (aged six to 36 months).¹³⁰



In a presentation at the 2016 Scaling Up Nutrition Movement Country Network Meeting, the 2012 MSNP was described as instrumental in increasing resources, projects, and programs for nutrition through “specific as well as sensitive sectors”. The presentation highlighted the **integrated manner in which the Ministries of Health, Urban Development, Women & Children, Agriculture Development, Education, and Federal Affairs and Local Development, and the National Planning Commission** coordinate their efforts to address the “intergenerational transmission of growth failure”, with early pregnancy at the center of these activities.¹³² This multi-sectoral approach to maternal and child nutrition has been proven to bear fruit: from 2001 to 2016, average maternal BMI and height have gradually increased.¹¹⁰ In a 2016 analysis of the driving forces of improvements in maternal and child nutrition in Nepal from the mid-1990s to the 2010s, qualitative and quantitative analyses demonstrated that changes at the policy and community levels, and across sectors, contributed to improvements in nutritional status. Specifically, four main factors were credited with the majority of the improvements: improved access to health services (particularly during pregnancy), increased coverage and use of toilets, increased education (particularly among mothers), and wealth accumulation.¹³³

SUSTAINMENT

The maternal nutrition and anemia prevention programs built on the strong foundation and sustained successes of Nepal’s national micronutrient interventions.¹³⁰ By 2016, iron deficiency/anemia prevention and control had been scaled nationally and activities related to the MSNP had been scaled to 16 districts.¹³² The MSNP II (2018-2022) was launched at the end of 2017 to “provide continuity to the achievements of MSNP I”, contribute to achievement of the SDGs, to increase the number of service-delivery points, and to “scale up nutrition specific as well as nutrition sensitive services and capacities at federal, provincial and local level governments.”¹³⁴

4.6.2 Improving Childbirth Delivery Services, Access, and Uptake

Work to improve access to and uptake of quality antenatal and delivery services included interventions to increase the number of skilled birth attendants, improve the range of services available, reduce costs for women, and provide financial incentives for women to deliver in health facilities.

4.6.2.1 Skilled Birth Attendants and Facility Based Delivery

EXPLORATION

Safe birthing was first identified as a priority for the health system in Nepal in the 1991 National Health Policy. This was followed by the Safe Motherhood Action Plan in the mid-1990s and the Safe Motherhood Policy in 1998, both emphasizing the importance of maternal health services. However, despite an increase in facilities, the 2001 DHS showed that only 9% of births in Nepal took place in health facilities. A child from an urban area was six times more likely to be delivered in a health facility than a child from a rural area (45% vs 7%).²⁷ Children living in the mountain ecological zone were the least likely to be delivered in a health care facility, as compared to children living in the hill or terai zones, while women with the highest education level had much higher rates of facility-based delivery than those with the lowest (55% versus 4%). Work focused on increasing facility-based delivery and skilled birth attendants. A study performed in Nepal in 2003 found that over two-thirds of the cost of a delivery in a health facility was due to transportation, identifying a financial barrier as well as geographic challenges.¹³⁵



Nepal's attention to improving rates of deliveries attended by skilled birth attendants (SBAs) began with a **2000 international meeting of the Safe Motherhood Inter-Agency Group in Tunis**, where the group determined that maternal community health workers do not qualify as SBAs based on the criteria set by the International Confederation of Midwives.¹³⁶ In 2004, Nepali stakeholders met to establish who could qualify as an SBA and what minimum skills were required to be considered an SBA in the Nepal context. This group identified the greater need for regulation, accreditation and licensing systems in Nepal. Within a year, the MOH formed a **policy advisory group**, including representatives from the Child Health Division, the National Health Training Centre, the Nepal Medical Association, the Nepal Nursing Council, and the Centre for Technical Education and Vocational Training to draft a formal national SBA policy, which was endorsed in 2006.¹³⁶ The final policy set a target of 60% of births being attended by an SBA by 2015, reflecting in part the low starting rates.

Data from a study by Borghi et al found that the costs of deliveries were substantial and a major barrier to care for families.¹³⁷ Reaching a health facility could account for two-thirds of the total cost of delivery. Other studies by the World Bank, academics, and the National Planning Commission all emphasized the high financial barriers to maternity care faced by Nepalese women, particularly those living in remote areas.¹³⁸ The **growing success of conditional cash transfers in other countries** provided one approach to address some of the challenges. Although the MOH considered adopting free delivery services across all public health centers at that time, it was considered both too expensive and not adequate to address the larger financial burden of transportation to the health facility.¹³⁸ Instead, in 2004 the MOH committee chose transportation cost-sharing, using the program name Maternal Incentives Scheme (later changed to Safe Delivery Incentives Program or SDIP).

Skilled Birth Attendants

PREPARATION

The National Policy on Skilled Birth Attendants outlines a variety of steps the government took to prepare for expanding the number of SBAs in the country. These included restructuring the ANM courses and refresher courses for other health workers to better cover the minimum skills determined necessary for an SBA. The MOH established accreditation and licensure programs for both SBAs and training programs. As well, the MOH established additional birthing centers across the country to accommodate increased number of SBAs and create more geographic accessibility for mothers. For policies and standards for facility-based deliveries, the MOH partnered with professional societies, such as the Nepal Society of Obstetricians and Gynaecologists and the Nursing Association of Nepal, and international experts from WHO and other development partners (KI 8).

IMPLEMENTATION

In 2001, only 11% of deliveries were attended by an SBA.²⁷ By 2016, 58% of deliveries were attended by an SBA, coming close to meeting the goal of 60% originally stated in the 2006 SBA policy.²⁸ This remains below the South Asia average for births attended by skilled staff, which was 75.9% in 2014.¹³⁹



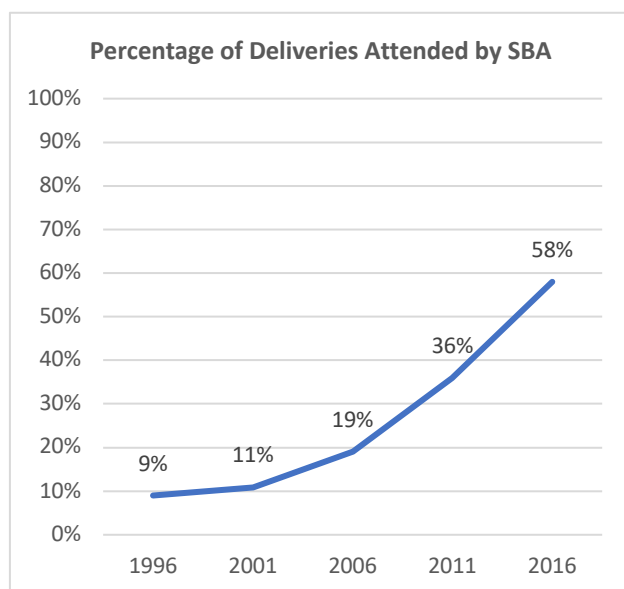


Figure 37: Percentage of Deliveries Attended by SBA (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)

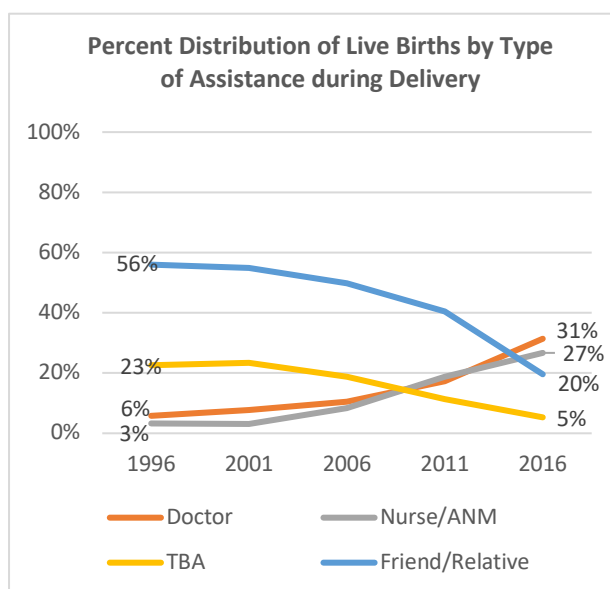


Figure 38: Percent Distribution of Live Births by Type of Assistance during Delivery (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)

SUSTAINMENT

Although notable improvement has been made in the number of deliveries with an SBA present, MOH officials expressed concern about the quality of the SBAs and overall delivery services in Nepal. Remote birthing centers continue to have difficulty finding nurses to work there, and quality of training is variable (KI 2). The MOH has attempted to recruit individuals from remote communities to train as nurses and SBAs and then return to their communities, but this effort has had variable success, with many never returning to their communities (KI 2, KI 20).

Facility-Based Deliveries

PREPARATION

Although the DHS 2006 data showed only 10% of women reporting financial barriers to facility-based delivery, a study in eight districts found that cost of delivery was a financial barrier for many women, with transportation costs accounting for a significant proportion of the expense.¹³⁷ In response, in 2004 the MOH introduced the **Maternity Incentive Scheme**, offering a cash payment for women who deliver in health facilities, designed to reduce transportation expenses and other costs. The interventions expanded to include the **Safe Delivery Incentive Program (SDIP)**, funded by DFID to incentivize facilities.¹³⁸ **Piloting or limited roll-out of the SDIP was rejected by the MOH and the Ministry of Finance due to concerns about equity.**¹³⁸ Therefore, in contrast to other initiatives, the policy was implemented nationwide concurrently. The entire program was designed and organized over the course of just over one year. This speed of preparation was in part related to the political changes at the time and the newly Maoist-led MOH's desire to use success of the program to attract voter support.^{140,141}

These incentives aimed to cover the costs of transport to the health facility and varied based on ecological region (i.e. higher funds for mountain districts).

IMPLEMENTATION

When rolled out in July 2005, the SDIP included 1) cash incentives for women using a facility for delivery; 2) free delivery services in the 25 poorest districts; 3) cash incentives for SBAs for each delivery attended; and 4) an ANC incentive program to provide women attending four or more ANC visits at designated times (months 4, 6, 8, and 9) with \$4 USD. Initially, only women with two or fewer children or those with obstetric complications qualified for the free delivery services.

An evaluation of SDIP by Powell-Jackson et al, however, found a number of **challenges** during initial implementation.¹⁴² These included delayed funds transfer from the central level to the district health offices (an average of 283 days delayed in the first year of implementation) and a lack of coordinated publicity campaigns at the central level. Although district health offices promoted the program in their communities through radio campaigns and FCHV education, this was limited by a **lack of funding** and a **lack of clear national guidelines** for community engagement and education. Two and a half years after the introduction of the incentives program, only one quarter of women who had given birth in the prior three years knew about the program prior to delivery and only 26.5% of women who gave birth in a public facility were given the cash payment.¹⁴³ An evaluation in six districts, however, found that women exposed to the incentive program were 24% more likely to deliver in a public health facility, and 13% more likely to have an SBA at the delivery.¹⁴⁴ Facility-based delivery rates have increased but in the DHS 2016 were still only 57.4% of births, with significant geographic and wealth inequities.²⁸

The MOH made a number of adaptations to SDIP to improve these difficulties in implementation. **Eligibility for the program was expanded** to all women in the 25 qualifying districts. **Financial mechanisms for fund disbursement** from the central level were streamlined, limiting delays. The MOH organized **national awareness and education campaigns** about the program. This program was renamed to the **Aama Program** in 2009 and expanded to support the free delivery policy, with user fees removed for any delivery at public or accredited private facilities in all 75 districts nationwide.

In 2013, the MOH added the *Nyano Jhola*, or Warm Bag, program as an additional incentive for mothers to deliver in public hospitals. Following delivery, each mother receives a gown for the mother and two sets of clothes for the baby. This provides more incentive for delivering at the facility and reduces the risk of neonatal death due to hypothermia or infection.

“Ideally, when a mother comes and delivers at a public facility, she should not be paying anything. She gets the transportation cost fee and gets the clothing.” (KI 2)

Geographic access for FBD

In addition to the transportation incentives and expansion of facilities, the MOH explored including **maternal waiting homes** in the maternal care program, allowing women from more remote areas to stay nearby health facilities prior to delivery. Although UNFPA piloted the program and constructed 27 maternal waiting homes for district hospitals, none of them were used by local women.¹⁴⁵ According to current and

former MOH officials, the lack of use of the maternity waiting homes was due to a woman's responsibilities in her home and in her community. For this reason, it was said by KIs, women could not spend multiple days at a waiting home far from her house (KI 2, KI 8).

SUSTAINMENT

According to key informants in the MOH, there were also concerns that hospitals were making false claims of deliveries in order to collect the reimbursement (KI 2). Therefore, to support effective sustainability, the MOH hired an external organization to do a **thorough audit of the program** and identify false claims, as well as establish a **regular monitoring system** of hospitals. As well, currently the MOH performs annual rapid assessments of the Aama Program to monitor implementation and assess for possible improvements in the program.¹⁴⁶

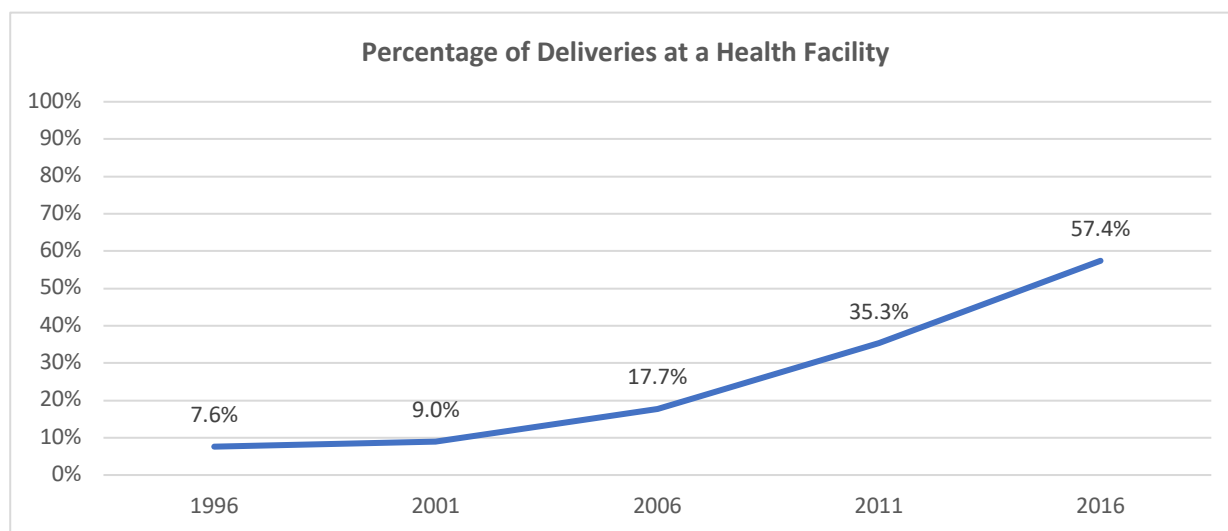


Figure 39: Percentage of deliveries at a health facility (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)

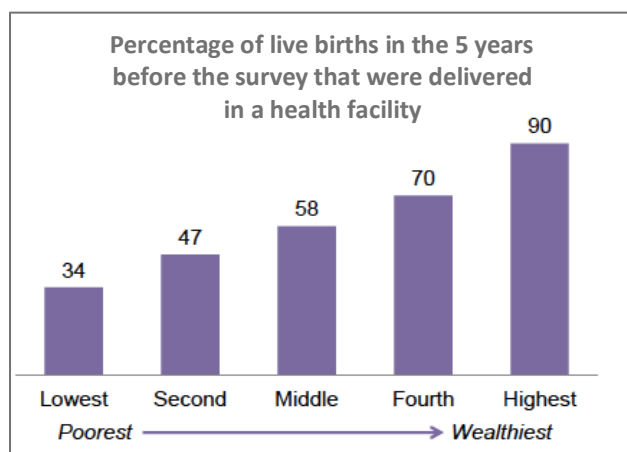


Figure 40: Rates of FBD by wealth quintile (Source: Nepal DHS 2016)

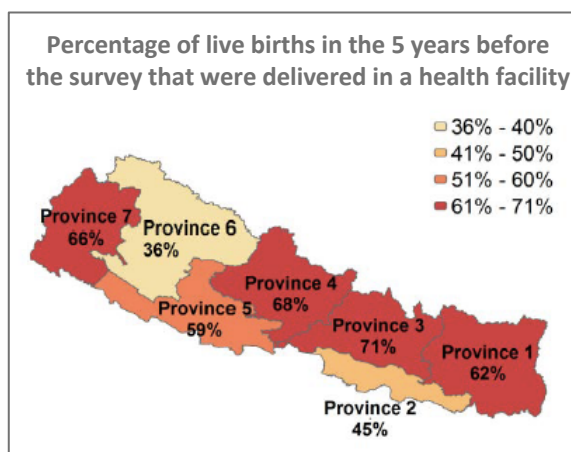


Figure 41: Rates of FBD by geographic area (Source: Nepal DHS 2016)

4.6.2.2 BEmONC and CEmONC

EXPLORATION

According to a former Secretary of Health in Nepal, Emergency Obstetric and Neonatal Care (EmONC) was identified as a supply-side priority for two reasons: 1) increasing international discussion and prioritization of the issue, and 2) Nepal's unique geographical terrain (KI 8). In the early 2000s, Nepal was included in the BMGF and Columbia University multi-country program, Averting Maternal Death and Disability (AMDD), which aimed to expand quality EmONC services in LMICs. In Nepal, UNICEF and DFID were the primary partners of the MOH for the technical and financial support of EmONC programs (KI 8). Because women in Nepal often live hours travel time away from the nearest birthing center, there are significant delays in seeking and receiving care, making widely accessible EmONC services a particular need for the population.

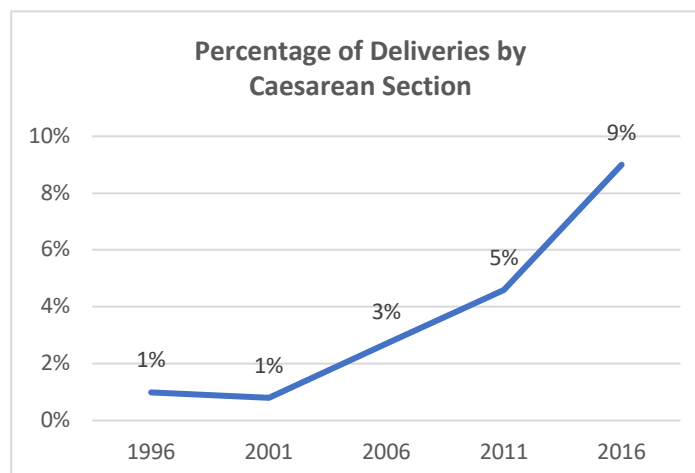


Figure 42: Percentage of deliveries by C-section (Source: Nepal DHS 1996, 2001, 2006, 2011, and 2016)

PREPARATION

The MOH **piloted EmONC services** in a limited number of districts, with the support of UNICEF and DFID in 2000. EmONC was then incorporated into the Aama Program, with all districts expected to have at least one **CEmONC** facility, including capacity for providing C-sections.

IMPLEMENTATION

Scale-up to nationwide coverage took 14 years because of financial, geographic, and human resource challenges.¹⁴⁷

For CEmONC, former MOH officials reported that limitations persist in the coverage of C-section services due to human resources, particularly in remote regions or facilities with frequent turnover of health care workers (KI 2, KI 8, KI 20), with overall rates of C-section low, at 9%, with rates as low as 2.2% in Province 6, a remote northwestern area, but as high as 17.4% in 2016 in Province 3, which includes the city of Kathmandu.²⁸ A publication in 2011 also noted challenges to quality, including lack of quality applicants and retention challenges of human resources in the remote areas, late release of the allocated budget by the government, poor coordination between contracted and permanent government staff, a weak information management system, and the inadequate logistics supply.¹⁴⁷ Similar results were noted in a 2012 survey, which found that 50% of district hospitals did not provide all CEmONC signal functions, and 11% of health posts and 20% of sub health posts that had expired oxytocin.⁷⁵

4.6.3 Community-Based Newborn Care Package

EXPLORATION

Based on the recommendations from a 2006 assessment, the MOH formed a **Technical Working Group** (TWG) to continue to explore community-based care delivery interventions to reduce neonatal deaths. The TWG **reviewed published evidence** on neonatal health interventions and performed **site visits in India, Bangladesh, and Indonesia** to identify and select the interventions best suited to national scale implementation in Nepal.¹⁴⁸ This group of interventions became the Community-Based Newborn Care Package (CB-NCP) in 2008.¹⁴⁹ The interventions were **chosen based on the amount and quality of evidence** available supporting their impact, their feasibility to be implemented nationally in the context of Nepal, and their cost.^{148,149} The components of the CB-NCP include: 1) behavior change communication for newborn health; 2) promotion of institutional delivery and clean delivery practices at home; 3) postnatal care for neonates; 4) community-based case management of pneumonia and severe bacterial infections; 5) care for low birth weight newborns; 6) prevention and management of hypothermia; and 7) recognition of asphyxia and initial stimulation and resuscitation of newborns. The role of the FCHV was emphasized and a broad range of activities were planned (table 26).

Table 26: Original roles of FCHVs in CB-NCP (Source: Healthy Newborn Network)¹⁵⁰

Interventions	Roles
Promotion of institutional delivery and clean delivery practices in case of home deliveries	Awareness creation through BPP focusing on mothers' groups and community resources/influential, and one on one health education by FCHVs - Performance based incentive to FCHVs to accompany the woman to a health facility for delivery or to be present at home delivery
Postnatal care	- FCHVs to provide three postnatal care visits to both mothers and their newborns at home
Community case management of pneumonia/PSBI	- FCHVs used to identify neonatal infection and initiate oral cotrimoxazole previously, but has stopped now due to resistance issues
Care of low birth weight newborns	- FCHVs identify LBW by weighing - Provide home based care including Kangaroo Mother Care (KMC) (Maya ko angaalo), feeding support
Prevention and management of hypothermia and other behavior change communication	Awareness creation through BPP focusing on mothers' groups and community resources and other thought leaders, and one on one health education by FCHVs ¹⁵¹
Recognition of asphyxia, initial stimulation and resuscitation of newborn baby	FCHV present at every home birth in her ward to assess, identify birth asphyxia and resuscitate as per guidelines

PREPARATION

Program strategies included district planning and orientation to relevant stakeholders; training at different levels, including a training of trainers (ToT) system for facility and community workers; community education and sensitization; and M&E and supervision. Expansion of the CB-NCP was initially **piloted in 10 districts** (all hill or terai regions) in 2008 by multiple partners and the MOH. Prior to implementation, each district health office held an **orientation and planning meeting with district level stakeholders**.¹⁴⁸ At this meeting, attendants assessed human resources, plans for trainings, and future monitoring activities. The central MOH provided **standardized planning tools and materials**, but each district developed a district-

specific implementation plan for the Newborn Care Package. The three training programs (one each for FCHVs, CHWs, and facility-based health workers) were developed by the National Health Training Center.¹⁴⁸

IMPLEMENTATION

Training lasted for five to seven days and was led by district-level trainers and health facility staff. Assessments of the pilot program in Bardia and Loti districts showed increases in FBDs, use of clean birthing kits used at home deliveries, and breastfeeding within one hour of birth.¹⁵² However, assessments in others of the 10 pilot districts found no significant effect in these indicators.^{153,154} Despite conflicting evidence, starting in December 2012, the CB-NCP was expanded to 39 districts with plans to quickly scale up to all 75 districts nationally, despite the limited evidence of effectiveness in some district, although HMIS data was more supportive (NPHF). However, in 2013, expansion of the CB-NCP was halted because it was decided that the program would be merged with IMCI due to some concerns about the delivery of the community-based components.

ADAPTATION OF CB-NCP AND IMPLEMENTATION OF CB-IMNCI

An evaluation done when the program was implemented in the 39 districts found problems with implementation process, feasibility, and effectiveness. As a result, the CB-NCP program was adapted and **integrated into the existing CB-IMCI program in 2014**, creating the Community-Based Integrated Management of Childhood and Neonatal Illness program (**CB-IMNCI**). All components of the community-based component were continued, including counseling and education; postnatal visits; and dispensing of essential commodities, including iron, zinc, ORS, and chlorhexidine, with the exception of the community-based asphyxia intervention for the FCHVs. This intervention was dropped because of the FCHVs reluctance to try resuscitation due to fear they would be blamed for the death if unsuccessful (KI 2).

Training for the two combined programs were increased from a single multi-day training to three multi-day trainings each six months apart.¹⁵⁵ The latter trainings focused on review of earlier content as well as providing an opportunity for coaching of health workers and FCHVs. These trainings are ongoing, including ToT and development of selected training sites.

Table 27: FBD, SBA, and EmONC/CEmONC, Community-Based Neonatal Care, and Post-Partum Care Implementation Strategies and Outcomes

	Implementation Strategy	Implementation Outcomes
Adoption	Community engagement Building into work of FCHVs Adaptation	Put into place in targeted districts with delivery of components. Dropped FCHV resuscitation due to lack of acceptability by FCHVs. Cotrimoxazole dropped due to resistance concerns Increase in FBD with expansion of EmONC/CEmONC (Figure 39) and increased availability of C sections.
Feasibility	MOH approached DFID to include program under existing funded maternal health program (funding). Incorporation of EmONC services into the already existing Aama incentives program.	(-): 2006 - Only 29% of eligible women delivering in facilities received cash transfers ¹⁴² (+/-): 2013 - 90% of eligible women received transportation cash transfers, but only 43% received free delivery services ¹⁴⁶

	Incorporation of CB-NCP into existing CB-IMCI program to create combined CB-IMNCI (2015). Use of FCHVs for care delivery	(-): Challenges with fund transfers and accountability (+): EmONC is available in all 75 districts nationwide and increased accessibility to C-sections. (-): Concerns about quality overall and CEmONC signal functions
Effectiveness and Reach	Expansion of all portions of the program (supply and demand), including free delivery services, addressing financial and geographic access (demand and supply) and including community-based and facility-based interventions	(+): Expanded to all 75 districts nationwide by 2009 (+): Increase of FBD to 57% by 2016 and (+) maternal postnatal care increase, but (-) PNC for infants remained <5% even among the wealthiest quintile (MICS 2014) neonatal mortality decreased by 3.1%, after introduction of the free delivery services, and reduced further by 6.9% among lower caste and indigenous ethnic groups ¹⁵⁶
Equity	Roll-out nationwide without piloting of the incentives scheme Adaptation of the program to expand eligibility for free delivery services to all women	(+): Modest reduction in neonatal mortality, but more in lower castes (-): Rates of C-section are as low as 2.2% (compared to 9.0% national average) in remote regions with as high as 17.4% in the region including Katmandu. (-) Postnatal care in 2014 (MICS) was 58% but ranged from 33.7-90.2% for poorest and wealthiest quintile, respectively
Sustainability	Hiring of external organization to audit facilities and claims Annual “rapid assessments” of the Aama Program by the MOH	Unsure

4.6.4 Improving Post-Partum Care

A number of areas within immediate post-partum care and ensure postnatal period were identified as contributing to neonatal mortality, including birth asphyxia, hypothermia, sepsis, and complications of low birth weight. EBIs which were targeted included immediate postpartum period (KMC, resuscitation) and the immediate postnatal period (hypothermia prevention, clean cord care, and postnatal visits, including identification and management/referral of suspected sepsis). Some of these were focused on through increasing facility-based delivery including CeMONC, as well as integration of community-based neonatal care through the FCHVs and are described above in more detail.

4.6.4.1 Birth Asphyxia

As stated above, asphyxia intervention care was previously part of the CB-NCP care protocols for FCHVs, but due to this cadre’s reluctance to try at-home resuscitation, community-based asphyxia intervention has been dropped. Regarding facility-based care, one KI indicated that most SBAs are trained in the Helping Babies Breathe protocol and they are trained in the use of bags-and-masks and suction pumps. An evaluation of the Helping Babies Breathe Quality Improvement Cycle regarding neonatal resuscitation skills in a tertiary hospital in Kathmandu found that bag and mask skills improved immediately after training and were retained after six months, with retention associated with daily bag-and-mask skill checks, preparation for resuscitation before every birth, use of a self-evaluation tool, and attendance at weekly review

meetings.¹⁵⁷ However, Nepal has not addressed key Reaching Every Newborn National 2020 Milestones for birth asphyxia: as of a May 2017 progress report, Ambu bags and masks had yet to be added to the National Essential Medicines List and there was not yet an indicator in HMIS for performance of resuscitation.¹⁵⁸ In the 2016 DHS (which reflected neonatal deaths over the 10 years previous), perinatal asphyxia alone accounted for more than half of the neonatal deaths due to respiratory and cardiovascular disorders (which accounted for 31% of all neonatal deaths).²⁸

4.6.4.2 Chlorhexidine Cord Care

EXPLORATION

A 2002 Save the Children report found that cord care during home-based deliveries varied widely.¹⁵⁹ The cord was cut anywhere from minutes to hours after delivery, with a variety of instruments being reported, including a new or used razor blade, a sickle, or a piece of wood. After the cord was cut, mustard oil, ash, turmeric, or spider web were applied. The most common reason given for applying these substances was to prevent bleeding from the stump and promote early separation of the stump. While the WHO recommends clean and dry umbilical cord care with no application of substances to the stump, a review by WHO found that application of 4% chlorhexidine solution can be indicated in unassisted home delivery settings.¹⁸ Two randomized control trials of chlorhexidine cord care in the southern Sarlahi District of Nepal further supported possible adoption of the intervention. One of the studies found a 28% decrease in neonatal mortality for low birthweight infants with use of chlorhexidine.¹⁶⁰ The other study found a 24% decrease in neonatal mortality for all infants with use of chlorhexidine.¹⁶¹ **The findings from these studies were presented to MOH sub-committees on child and maternal health and to professional associations in Nepal.**¹⁶²

PREPARATION

Based on the evidence from these two Nepal studies, the MOH created **a technical working group**, consisting of MOH officials, academics, partner organizations, professional societies, and pharmaceutical companies.¹⁶³ The TWG supported an **efficacy study on different formulations of chlorhexidine**. In 2009, the MOH decided to **pilot the use of chlorhexidine** for newborn cord care in four districts (two in the terai region and two in the mountains). The pilot study included **training of facility-based and community-based health workers** (including FCHVs) on the use of chlorhexidine, counseling of mothers, and documentation. **FCHVs also participated in hands-on training** using dolls to practice chlorhexidine application and were the primary distributors of chlorhexidine at the community level.^{18,162} The pilot study continued until 2011 and showed high coverage, feasibility, and fidelity.^{18,163}

IMPLEMENTATION

In December 2011, the MOH created a **national policy** recommending use of chlorhexidine for cord care at all deliveries in the country. The intervention was **scaled up using already existing programs** related to maternal and neonatal care. Chlorhexidine cord care was **rolled out with the CB-NCP program** (which later became a part of CB-IMNCI). Training in chlorhexidine use was also **added to the training program for SBAs and ANMs**.¹⁶³ Monitoring of chlorhexidine use was originally performed through the CB-NCP vertical program, but was later added as a metric in the HMIS system in 2014.¹⁶³ Roll-out of the program also included **behavior change communication** components, including radio and television spots, **community engagement by FCHVs**, poster and flyer campaigns, and **engagement of local leaders**.¹⁶³



SUSTAINMENT

Chlorhexidine cord care has been rolled out in all 75 districts in Nepal. Chlorhexidine use has been incorporated into HMIS, DHS, and MICS over time to monitor usage and implementation. It has also been incorporated into national policies, such as long-term strategic and procurement plans.

4.6.4.3 Neonatal Intensive Care Units

Nepal did not start establishing formal NICUs in their health facilities until after the period of interest for this case study. The decision to prioritize other interventions for neonatal health was primarily due to the high cost of building and maintaining NICUs (KI 2).

4.7 Common Implementation Strategies

Nepal was found to have implemented many of the EBIs using a range of implementation strategies, some of which were shared across many or most EBIs, while others were more specific to individual interventions. While some of these strategies were successful in achieving national scale-up for both coverage and reach and also associated with sustained health improvements in the causes of death and diseases targeted, others were implemented with some inconsistency and effectiveness coverage. For example, some EBIs were piloted and scaled to selected districts and regions but did not reach national scale. Others were identified as a priority and proposed for implementation, but stalled in the testing and resourcing of the intervention stages.

Implementation strategies identified across multiple EBIs included:

Engagement for health interventions across sectors

- Focusing on and/or integrating factors beyond amenable health interventions into health programming to capture the greatest range of potential contributors to health outcomes
 - Example: Integration of acute malnutrition work with child development, WASH, and social protection efforts

Local data collection and pilot testing and studies in a limited region prior to national scale-up

- Prior to scaling a new tool, vaccine, protocol, or guideline, EBI testing on a pilot level, with expansion and adaptation of processes after pilot
 - Examples: PCV vaccine, CB-NCP, and chlorhexidine cord care

Leveraging a strong community-based care delivery system

- Nepal started with community health volunteers, a cadre which was transformed into an all-female corps, the FCHV program. This cadre was used to expand a number of key EBIs through community engagement, sensitization, and direct care delivery.
 - Ex.: Expansion of the FCHV role beyond reproductive health to include maternal and child health

Health workforce strengthening and investment in human resources for health

- Utilizing task shifting, training of trainer cascade programs, and initial and ongoing training through refresher courses, and broadening of scopes of work
- Integrating M&E with supervision, using results for program adaptation (variable success)



Integration of new initiatives into existing programs/systems

- New activities were often integrated into the existing systems and health care workforce, as opposed to new vertical programs (either at the start or over time)
 - Ex.: Integration of neonatal initiatives into CB-IMCI

Decentralization and devolution of responsibilities, authority, and resources to local bodies

- Creating bridges between communities and governance structures
- Engaging the community in program development through community representation and education and sensitization efforts
 - Ex.: LSGA reallocating funding away from central level and towards districts; the HFOMCs, including VDC chair, vulnerable population member representation, and health worker representation (variable success)

Engagement and coordination of implementing partners and donors

- Bringing donors and implementing partners together with MOH officials, staff, and researchers to review published evidence and explore feasibility before implementing new EBIs
 - Ex.: IMCI working group, including representatives from the MOH, pediatricians from the Institute of Medicine and Kanti Children's Hospital in Kathmandu, and members from WHO, USAID, UNICEF, and JSI.¹⁰
- Establishing a SWAp and pooled fund (variable success as some large donors do not fully participate)
- Leveraging NGOs in work to test and expand EBIs
 - Ex.: Training in cIMCI, zinc supplementation, chlorhexidine cord care

Adaptation of interventions to local setting

- Most EBI implementation components were adapted, including training and protocols

Community engagement and sensitization

- This was done through a number of approaches but typically included the FCHVs working with village-based mothers' groups

Integration of equity focus into policy and implementation

- Many EBIs were tested in a range of settings, reflecting known geographic inequities
- The right to care is enshrined in national policies and the constitution
- Work has increasingly included a focus on underserved groups and communities and expansion of infrastructure (health care facilities)
 - Ex.: Work to expand access to hospitals across all districts, new initiatives to "reach the unreached"

5 Cross-Cutting Contextual Factors Facilitating U5M Reduction

A number of cross-cutting policies addressing issues beyond the EBI implementation and are detailed in the specific sections below which were implemented before and during the study period. Figure 43 shows the timeline along with modelled causes of death in children U5 (note this is only showing association, not attribution).

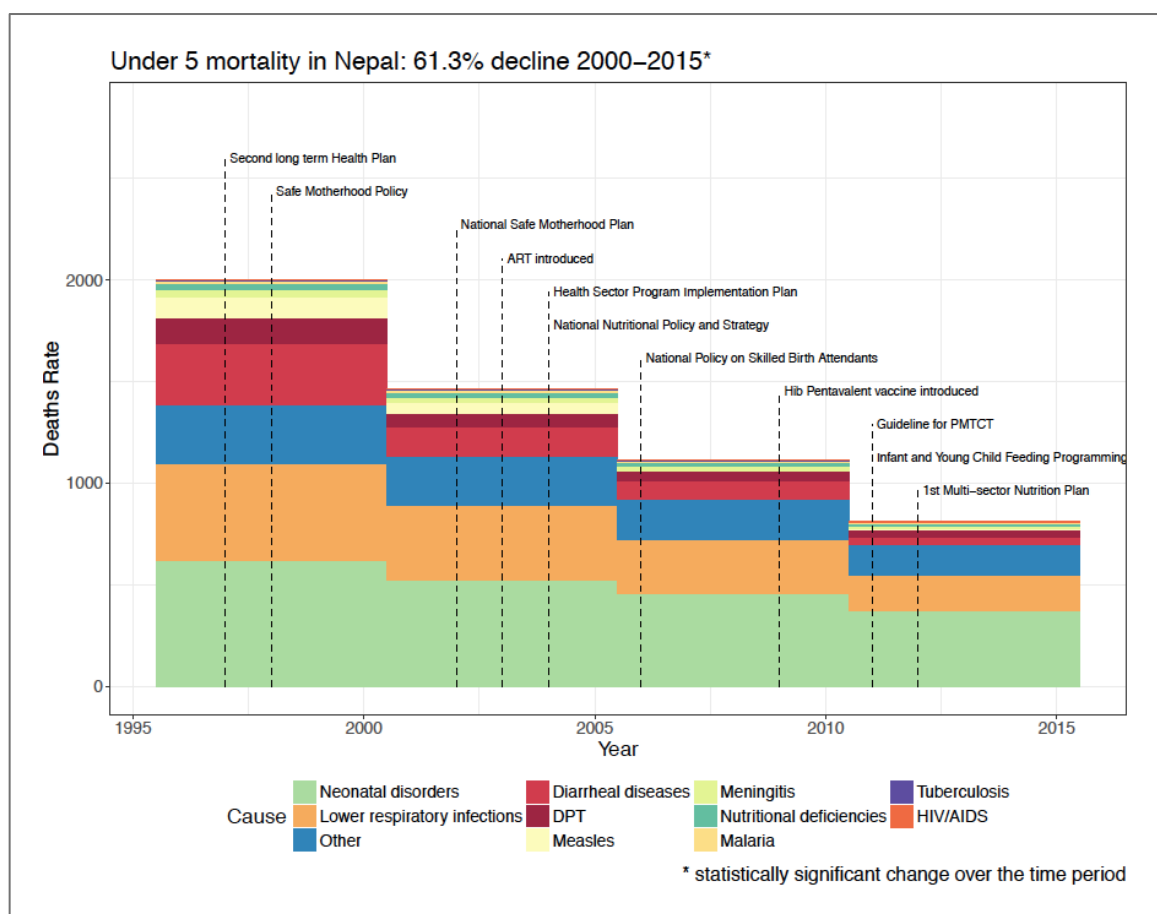


Figure 43: Modeled burden of U5M causes and timing of interventions (Source: IHME)

5.1 Female Community Health Volunteers (FCHVs)

As noted above, Nepal has long had a strong system of community-based health workers, the most prominent cohort between 2000 and 2015 being the FCHVs. These volunteers are viewed as critical to the success of the decline in U5M.^{164,165} One KI from the MOH considered them to have a major role in health sector, noting “FCHVs were behind every major changes and achievements in the health sector and I consider them to be one of the main reasons behind the U5 mortality drop”. This contribution was attributed to a number of strategies employed by the program, including recruiting and selecting FCHVs from the communities they would serve, raising the status associated with the position, connecting FCHVs closely with facilities, and adapting and expanding of the scope from the program’s inception to incorporate emerging interventions to reduce U5M, specifically, and improve maternal and public health more broadly. Of note, this last factor is emerging as a challenge for the sustainability of the work.



Recruitment and selection of FCHVs

The mothers' group in each village selects the FCHV based on criteria detailed in the FCHV strategy. These include: female, permanent resident of the related ward of VDC, interested in working as an FCHV for at least 10 years, between 25 and 45 years old, married, with children under age five, and committed to serving the community. Priority was also given to those who can read and write and are from underprivileged and marginalized groups.¹⁶⁶

Initially, the program had one FCHV per ward in rural areas and national implementation was completed in 1992. Additional FCHVs were recruited in 28 districts (according to a population-based ratio) in the mid-1990s with recruitment of few FCHVs in urban areas of Nepal.

Scope of work

As noted above, the role and scope of the FCHVs has evolved in the three decades since its inception, reflecting changing needs and growing recognition of the key role these women play in improving knowledge of, access to, and utilization of services important to reducing U5M. The FCHV strategy (2010) stated that the goal of the FCHV program is to support achievement of national health goals through community involvement in public health activities. In that role, they continue as critical resources that extend the reach of the public health care system far beyond physical health care facilities, deep into the community.¹⁶⁷

Initially FCHVs' role in service delivery was to promote and distribute family planning, including condoms and oral contraceptive pills. This has evolved over time as new interventions and challenges were identified. Currently, their work focused on U5M reduction through maternal and child health related initiatives can be divided into: a) health promotion and education; b) dispensing of selected preventative commodities; and c) treatment and referral services. While mostly focused on reproductive health and child health, FCHVs may also receive brief training in many other public health programs, such as HIV/AIDS and encouraging good hygiene and health practices.¹⁶⁸

For health promotion and education, FCHVs conduct mothers' group meetings and carry out counseling sessions on birth preparedness, complication readiness, and selected other conditions, such as HIV/AIDS. They also distribute commodities, including iron and folate tablets to pregnant women and family planning tools, including pills and condoms. Additionally, FCHVs have been mobilized to support national campaigns, such as the national polio campaign and other vaccinations, and vitamin A capsule distribution to children under-5.⁴³

"Lots of behavior change and communication was done through the community health workers- we have the Ama Samuha- the women's group and during the mother's group meetings they could specifically discuss about all the issues" - (KI - Planner - MOH)

The treatment and referral role started in 2003 with the introduction of CB-IMCI (see EBI section for details). FCHVs are trained to diagnose symptoms consistent with pneumonia in children, provide oral antibiotic (cotrimoxazole, although this has ceased due to concerns about resistance), and refer, as needed, based on danger signs. For diarrhea, they provide zinc tablets and oral rehydration solution for children

and, again, refer for any danger signs. This and other work is supported by a close connection with the health facilities. Some of this success was related to this close integration of the FCHVs into the facility.

“It has been very clear that the community health workers have to get technical support from the health facility and both should work together... The health workers regularly contact them and even invite them to the health facilities and also try to understand if they have any problems” - (KI - Implementer/Planner - MOH)

Since 2007, FCHVs have also been involved in the Community Based Newborn Care Package (CB-NCP). The package, designed in response to continued elevated levels of neonatal mortality, expanded FCHVs’ role to provide immediate and essential care to newborns and lifesaving care to newborns, including those born at home, with special needs, such as low birth weight, birth asphyxia, and hypothermia.¹⁶⁹ During post-natal care home visits, the FCHVs provide counselling to postpartum women on thermal care for babies with low birth weight and provide referrals for any danger signs for mothers or newborns.⁴³ They also play an essential role in the delivery strategy of infant and young child feeding interventions in Nepal as part of breastfeeding promotion strategies through counseling to mothers and caregivers for breastfeeding and complementary feeding. This initiative was piloted in 2009 in six districts and scaled up nationally in 2015, although with some modifications (see EBI table appendix).

The FCHVs are also involved in community organization and help organize the village women’s group and report monthly using the ward register to the health facility through their supervisor. They also are responsible for maintaining a record of health activities and reporting it to a local health facility.

Table 28: Selected FCHV Activities^{43,170}

	Education and Promotion	Service Delivery
Family Planning	Family planning methods promotion	Provision of oral contraceptives and condoms
Maternal and Newborn Health	Education in pregnancy and promotion of ANC, iron supplements, tetanus toxoid, deworming pills, nutritious food	Provision of iron supplements to pregnant women
	Promotion of FBD and birth preparedness, including use of an SBA and emergency preparations (particularly in selected districts)	Provision of vitamin A supplementation (1993) and deworming (1999)
	Promotion of good newborn care practices, including chlorhexidine	
	Provide education and promotional services for other diseases (e.g., HIV/AIDS)	Support outreach activities in their wards, notably primary health care and immunization outreach services
Childhood	Promotion of good nutrition and hygienic and healthy behaviors	Treatment of simple pneumonia with cotrimoxazole and referral of serious cases (CB-IMCI/CBAC program districts)
		Treatment of diarrhea with ORS and zinc (pilot districts)
Nutrition	Provide counselling on nutritious food to the mother and to the child, breastfeeding, and complementary feeding for infant and young children	Community testing, treating, and tracking of malaria cases

It was clear from a number of KIs that the position of the FCHV as a valued member of the community functioned as a facilitator for a number of EBI implementations. This included both specific EBIs and more general cross cutting work for access, community education, and health promotion. Most communities depended on FCHVs because hospitals and health facilities were not accessible; in some wards the people had to walk more than two days to reach health facilities.

Multiple KIs reflected on the importance and impact of the FCHVs in increasing the programs' reach:

1. Creating awareness:
 - a. *"FCHVs played a major role in creating awareness and promoting community participation"* (KI – Partner)
2. Coverage: Reaching the unreached:
 - a. *"We had 3 immunization outreach clinics in each VDC and with the help of FCHVs we were able to reach them"* (KI – Implementer)
 - b. *"Since FCHVs knew every child from their ward, we could ask them to bring the child to the immunization ward; this is how good coverage was achieved"* (KI – Implementer)
 - c. Role of FCHVs in IMCI: *"The FCHVs used to distribute cotrimoxazole at the community level, which was a success"* (KI - Partner)
3. Behavior change and community acceptance of EBIs:
 - a. Chlorhexidine acceptance: *"The FCHVs played a very big role in convincing people to accept chlorhexidine and through them we managed to achieve success."* (KI - Planner - MOH)
 - b. Vaccine acceptance: *"In the community we have high level of acceptance for immunization, which is due to FCHVs"* (KI - Partner)

However, one KI raised some questions about the robustness of evidence about the contribution to the reduction in NMR, noting that, while there was a *"plausible claim for U5M..."*, it was *"hard to see how FCHVs could reduce neonatal mortality"* given the scope of their work and reach.



Figure 44: Exemplars project team with FCHVs and health workers (Image credit: Anustha Mainali, Nepal Public Health Foundation)

Governance and Management of the FCHV program:

Central Level

The FCHV activities are managed and looked after by Family Health Division (FHD), with major involvement from the Child Health Division, other divisions, and the center of the Department of Health Services. Also, the FHD, where the FCHV committee is based, contributes to policies and strategies pertinent to the FCHV program.

Regional Level

At this level, coordination, monitoring, and guidance are provided by Regional Health Directorates (RHDs), while district public health offices are in charge of implementation of the policies and programs and following up activities, while at the same time promoting involvement of FCHVs in health activities. A family planning supervisor or public health nurse is the focal person for FCHVs at the district level. In cases where a family planning supervisor or public health nurse is not available, a district public health officer often nominates another person with endorsement of the FHD.

VDC Level

The Village Development Committee (VDC) is accountable to the local health institution and is in charge of preparing the activities related to FCHV and following up on their activities. The VHW and the MCHW are focal persons and, in 2006, were upgraded to ANMs (auxiliary nurse midwives) and AHWs (auxiliary health workers) (padnam), if they did not have the qualifications, and to auxiliary nurse midwives and AHW (padasthapana), if they had the qualifications.¹⁷¹ The administrative structure is changing post-2015 and how that will impact the FCHV management structure was not identified.

Mothers' groups for health (MGHs)

The MGHs are important both for accountability and oversight as well as a responsibility for the FCHVs to transmit knowledge and ensure community participation. These groups are formed with the involvement of communities, local health institutions, and local government in each ward of a VDC and including all the interested women of reproductive age. Interested women, including those from marginalized and other underserved communities, are encouraged to become members of MGHs, which meet monthly.

MGHs select a FCHV through general consensus and evaluate the work of the FCHV annually, reporting these evaluations to the local health institution. They also select a new FCHV in the event that an existing FCHV resigns, has undertaken any paid job, is unable to perform her responsibilities due to physical inability, has migrated from her permanent residence, crosses the age limit, or becomes inactive as an FCHV due to personal reasons.

The role of the FCHVs in the MGHs include:

- Convening the meeting of the MGH and setting the agenda
- Sharing knowledge and skills to transmit information to the community with the goal that MGH members disseminate information learned at the meeting to the community to supplement the community education efforts of the FCHVs

Training and Supervision

Training takes place over 18 days through a trainer-of-trainers model. One of the KIs (partner) said: “We trained the health facility workers and they worked as a trainer for village health community worker and community health volunteers so that in the future if there were some issues related to the topic, they could come back to the health facility staff and ask them to explain. It was basically a cascade of training which helped to build a line of accountability to different levels in the district.” This approach has reached high rates of coverage, with virtually all FCHVs (96%) having basic training.¹⁷²

The ANMs and AHWs are local supervisors for FCHVs and often provide supervision at the health facility as well as in the community. One KI from the MOH explained, “Since there are more than 55,000 FCHVs, health workers cannot regularly supervise them (individually), so we call FCHVs to the health facility every six months, which we call supervision meeting - it’s a two-day meeting to discuss on the issues and problems and the kind of work they did last month with reporting.”

This approach has worked. According to 2014 FCHV national survey, almost all FCHVs (96%) reported having some contact with health workers from their local health facility, whom they considered to be their supervisors, over the preceding month. The majority (78%) reported having participated in an FCHV meeting at their local HF within the past month (formal review meeting), and 65% said that they had taken part in a two-day review meeting within the past six months.¹⁷²

Motivation and Incentives

Motivation was described from a number of sources, including opportunity for learning, serving their community, and financial reasons. According to the FCHV 2014 survey, the most important motivating factor for majority of the FCHVs was that they had the opportunity to help the community to acquire new knowledge and skills and to be healthy. Ninety percent rated the respect and recognition they gained in their communities from serving in this role as very important.¹⁷² One KI (partner) noted, “*After polio eradication program and EPI, the FCHVs became very powerful and some of them have even been elevated as the member of the Parliament in some province and since they are the community leaders everybody respects them.*” Another KI from the MOH highlighted the support from mothers’ groups and supervision from local health workers: “*There are many activities to build the morale of the FCHVs, but the most important thing that keeps them motivated is their bonding with the local health workers and mothers’ group.*”

The FCHVs are not paid a salary, but do receive some incentives, such as free essential health care; dress allowance; torches; bicycles (in some VDCs); information, education, and communication (IEC) materials; identity cards; certificates after training completion; and signboards for their houses identifying them as FCHVs. They also receive a retirement stipend of NRS 20,000 when they reach 60 years old (retirement is voluntary). To further increase financial incentives, in 2008 the MOH approved an FCHV fund, which provides access to micro credit funds specially set aside for FCHVs, from which they can borrow money for income generating activities.¹⁷³

Challenges to delivering services

Over the years, a number of challenges to the quality and sustainability of the program have been identified. These have included geography, payment and financial management, aging of the FCHVs with reluctance to voluntarily retire,^f inconsistent oversight/monitoring, and literacy levels of existing FCHVs.^{63,165,172,174,175} The expansion of responsibilities, both health and non-health related, with poor coordination between often vertical programs has also proven difficult.¹⁷² For example, FCHVs are trained on separate tools, such as job aids, treatment protocols, counseling guidelines, etc., for each disease or intervention-specific community health program. This duplication and poor integration also poses a challenge in reporting, sometimes further complicated by the lower education and literacy levels of some FCHVs. The time taken for these trainings and completion of required forms also poses a potential risk to their capacity to deliver important services and outreach and maintain quality.¹⁷⁶ For example, one report from a district found that communities were not always accessing FCHVs for care because of concern around the quality of care and consistency of medication supplies. These challenges have led to a call for action to strengthen and better coordinate the program, as well as potential ways to engage new generations and address financial concerns.^{165,177}

A study done by the MOH, in collaboration with partners, noted:

“FCHVs have been shown to be effective providers of community-based care. However, over the years, they have been given more and more responsibility and have been asked to perform increasingly complex tasks. If this trend continues there is a risk that we will ask too much of them. We must be careful not to overburden the FCHVs.”¹⁶⁴

One KI also noted, *“FCHVS have been trained on somebody’s intake but the effectiveness is the matter to be reviewed.”¹⁶⁷*

5.2 Focus on Universal Health Care and Equity: National Leadership and Commitment

Nepal has had a long tradition of commitment to providing health care, although they have faced implementation, resource, and geographic barriers. The Second Long Term Health Plan (1997–2017) was developed to build upon the 1991 policy and emphasize the improved health status of those whose health needs are often not met, including the most vulnerable groups – women and children, rural populations, the poor, and underprivileged and marginalized people.¹⁷⁸ The leadership commitment is reflected in Nepal's interim constitution in 2007 (and the 2015 constitution), which states that **access to health care is a fundamental right of the people** and, more recently, priorities include “reaching the unreached” and ensuring equity in their health policy.

^f From one KI: *“The FCHVs are very reluctant to take the retirement. I have even seen an 80 years old woman who worked as FCHV brought to the supervision meeting by her daughter in law carrying her in her back”*

In 2010, the Health Sector Gender Equality and Social Inclusion Strategy provided guidance on mainstreaming gender and social inclusion into health care delivery, defining target groups and including the following objectives and strategies:

- Develop policies, strategies, plans and programs that create a favorable environment for integrating (mainstreaming) **gender equality and social inclusion in Nepal's health sector**
- Enhance the capacity of service providers and **ensure equitable access to and use of health services** by the poor, vulnerable, and marginalized castes and ethnic groups within a **rights-based approach**
- Improve health seeking behavior of the poor, vulnerable, and marginalized castes and ethnic groups within the rights-based approach

Initiatives to improve equity and progress to universal health care by reducing financial barriers undertaken before and during the study period included **free basic primary care for all, including 40 essential medicines**. Although there are implementation gaps due to stockouts and absenteeism (KII), there was a 35% increase in new outpatient contacts in 2007-2008, and increased utilization of health services by poor and disadvantaged groups following the introduction of these free services. Another initiative involved reducing barriers to FBD, including use of conditional cash transfers for women delivering in facilities. In addition, the Government of Nepal offered free selected services, including outpatient, inpatient, and emergency services at district hospitals for those in poor, vulnerable, and marginalized groups.

The underlying approach of “reaching the unreached” was a core theme repeated by many of the KIs as a high priority nationally. The National Health Policy 2014 (2071) detailed a number of strategies developed to be implemented with guiding principles urgently addressing regional disparity in health indicators, ensuring access to and delivery of quality care, and increasing patient involvement and people-centeredness. These included:

- *“As a fundamental right of citizens, provision for obtaining quality health care will be ensured.*
- *Right to information related to the health services provisioned for citizens will be ensured.*
- *In order to ensure the health services provisioned by the state is accessible to poor, marginalized, and vulnerable communities; based on equality and social justice, programs will be designed and implemented accordingly.*
- *People will be participated in every kind and level of health services.*
- *Policies and programs related to health promotion, protection, improvement, and rehabilitation will be gradually incorporated into state’s other policies.*
- *Participation of private sector will be promoted ensuring citizen’s easy access to quality health services at fair price.*
- *Resources obtained from internal and external agencies will be mobilized for effective implementation of this policy and the programs formulated under this policy.”¹⁷⁹*

Despite this work, there remain significant gaps in equity of both coverage and outcomes based on wealth as well as location. For example, the most drastic equity gaps are seen in rates of skilled birth attendants at delivery. In 2014, for the highest wealth quintile, 90.7% of women delivered with an SBA, compared to only 27.9% of women for the lowest wealth quintile. In urban areas, 88.3% of women delivered with an SBA, compared to only 50.3% of women in rural areas. Similarly, reductions in U5M and NMR have lagged in selected geographic areas (see Figure 15-16, 35). Nevertheless, as one implementing partner stated, the “commitment to free care is important” despite gaps in coverage (KI). The differential coverage of care for key interventions, based on wealth quintile, urban or rural residence, and region, is displayed in Figures 45-47 below.

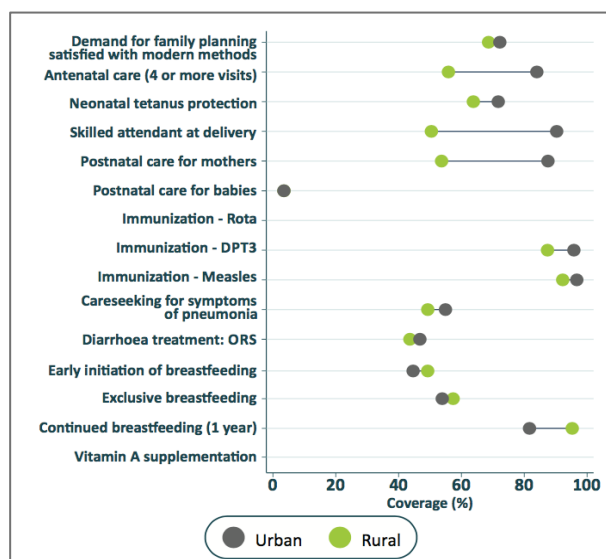


Figure 45: Child health metrics by geography, 2014 (Source: Victora et al, Countdown 2030 Equity Profile)

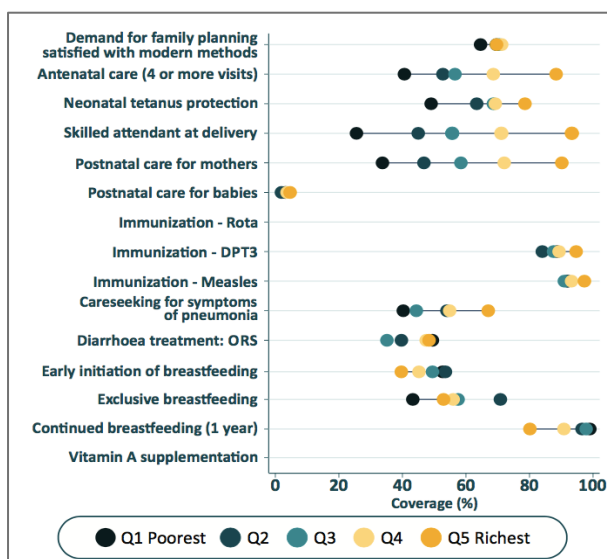


Figure 46: Child health metrics by wealth quintile, 2014 (Source: Victora et al, Countdown 2030 Equity Profile)

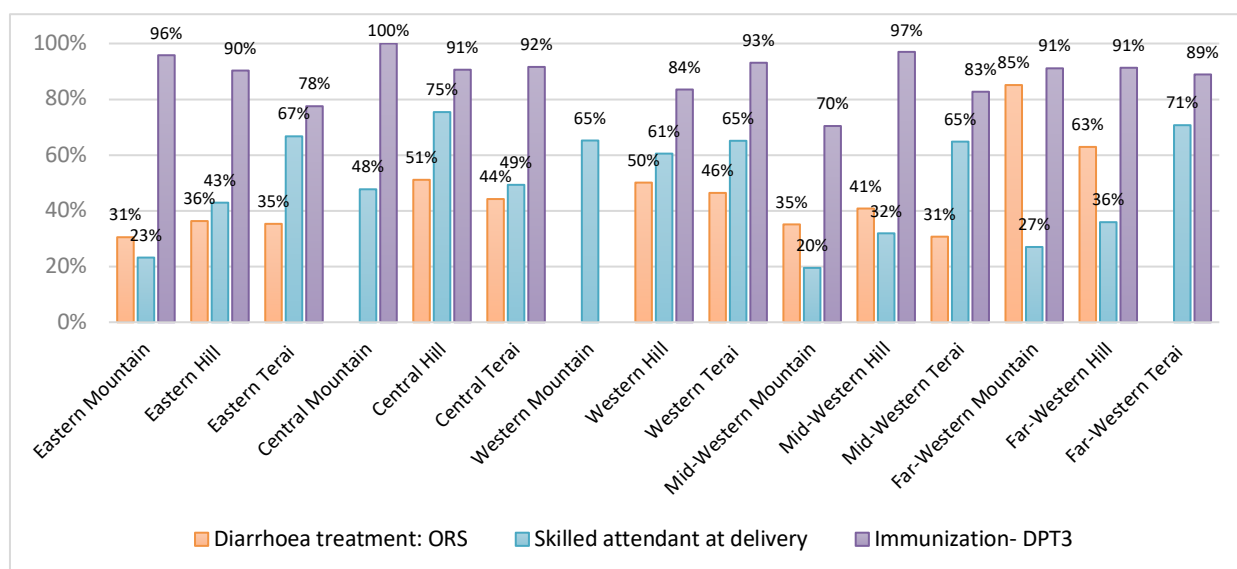


Figure 47: Coverage of ORS, SBA, and DPT3 immunization, by region (Source: MICS 2014)



The recognition of gaps and determination to address them was reflected in the DoHS Annual Report 2016-17, which recognized that:

1. Citizens of all localities, levels, classes, groups, and communities do not have yet easy and affordable access to health care as aspired by the constitution.
2. Health problems created by the situations like climate change, raising food insecurity, and natural disasters are on the rise.
3. There is a need for creating opportunities by strengthening health institutions down to the grass root level and establishment of a social health insurance system so that health services, health education, and information are equally available for all citizens.
4. There is a need for increasing state's investment to the health sector in proportion to population growth.

In addition, Nepal did not have a national health insurance scheme during the period of interest of this case study. Although there were community-based health insurance schemes in the 1970s, these had low enrollment, low retention, and pro-rich bias.³² In 2015, the Government of Nepal started the creation of a legal framework for a national health insurance system, which is currently being implemented (beyond the timeline to determine impact).

5.3 Health System Strengthening (HSS)

A number of areas of health system strengthening (HSS) supported the ability to implement many of the evidence-based interventions, although some also represented challenges. The work of HSS involved strengthening inputs, including facilities and other efforts to address geographic access, as well as human resources for health, including and beyond the FCHVs noted above. Other factors included the work to strengthen leadership and governance at the central, as well as at local levels.

Geographic Access

Prior to the ninth planning period (1997-2002), significant gaps remained in coverage of health facilities and staff capacity. For example, there were many districts without a district hospital and very low rates of C-section coverage nationally. As a result of that plan, HSS was an area of focus starting in the early 2000s. The Government of Nepal increased the number of facilities from 975 to 4,000 over five years and birthing centers from 422 in 2007 to 1,121 in 2011.¹⁶⁴ Other interventions included financial support for transportation. The improvement of the road system has also contributed to improving access (see below). Despite this work, some areas remain with lower coverage and higher mortality, such as the northern-western region.

Human Resources

Staffing has increased over time, although lower rates persist in more remote areas. Nepal expanded the role and responsibilities of the FCHVs to address some of these disparities.

Leadership and Governance in the Health Sector and Beyond¹⁸⁰

Political transformations and instability created opportunity for health sector reforms. These included initiatives to strengthen leadership and accountability and a focus on “local governance mechanisms”. At the macro level, after political transformation in 1990, the MOH became more prominent in government.

The Ministry seized the opportunity to gain high-level support for policies and investment for maternal health (Ex.: Safe Motherhood Policy (1998), maternal health being included in the Essential Health Care Package, and National Safe Motherhood and Newborn Health Long-term Plan (2002–2017)). This was facilitated by Ministry officials who could “influence higher level health officials and decision-makers”, and who had a public health implementation background.¹⁸⁰ There was also a value placed on strategic policy-making and implementation. This included “improved investment and reporting procedures, expanded use of the evidence base, and increased focus on local level needs and priorities”.¹⁸⁰

At the middle, or “meso” level, there was a focus on inter-sectoral partnerships and task-shifting. According to one study, this is the “level at which national policies are refined and re-designed to fit the sub-national or district context”, and where there is a need for partnership within and across sectors.¹⁸⁰ In Nepal, this manifested as decentralization of policy development and service delivery. However, challenges can arise with decentralization, including allocating resources to support decentralized structures, such as trained managerial staff, budgets, infrastructure, and incentives. With appointed, rather than elected, village and district councils, there is a restriction on the ability of the community to provide input and a lack of capacity at district level to plan and budget for delivery chain challenges. To address these weaknesses, Nepal implemented inter-sectoral partnerships and “joint activities and lobbying other ministries to contribute to maternal health programs”, such as infrastructure upgrades and use of government vehicles for health services/ambulances, to leverage existing successes.¹⁸⁰ Regarding task-shifting, ANMs were trained to provide ANC, family planning, immunization, and basic obstetric interventions in cases with no CHWs, to help alleviate maternal health worker shortages at rural health facilities. By 2012, 3,000 additional maternal health workers trained and certified. However, the **aim of training 7,000 by 2015 to meet staffing needs was not met.**¹⁸⁰

At the “micro” (service delivery) level, Nepal focused HSS on community-centered models of care with accessible, well-trained, and incentivized health workers. This included improved access to health care through more efficient referral systems and inclusion of delivery drugs on national essential drugs lists. The FCHVs have also been essential for improving access to maternal and child healthcare at the micro level by extending care into remote regions and increased coverage of “excluded and marginalized women”, as noted previously.¹⁸⁰ There has also been an expansion of the network of community-based health organizations.¹⁸⁰

Table 29: Key Contextual Factors for HSS, Successes and Challenges, adapted in part from Samuels et al.¹⁸⁰

Level	Overarching factors that promote success/drive progress	Nepal-specific drivers of progress	Nepal-specific challenges
Macro	Good leadership Strategic policy making Effective accountability/ transparency mechanisms	High level support post 1990 for MCH Key policies and plans developed Public health focus rather than specialized care Based on evidence and local needs Accountability/transparency processes in place	Limited monitoring mechanisms, which enables corruption
	Improved health financing Increased investments in MCH Critical role of external aid	External aid critical Efforts to improve tax collection	
Meso	Decentralization of decision-making and service delivery		Limited capacity to develop effective plans and budgets and solve delivery chain issues Issues with allocating resources to support decentralized structures – trained managerial staff, budgets, infrastructure, and incentives
	Task-shifting	Nurses and ANM trained to provide: ANC, assist with deliveries, family planning and immunizations and perform basic obstetric interventions	Challenge in achieving goal of 7,000 maternal health workers by 2015 to meet staffing needs
	Partnerships and leveraging achievements with other sectors	Over the past two decades, school attendance rates have increased significantly and secondary education, which has a strong empowering effect on women, has also increased Formal partnerships, and focus on developing multi-sectoral approaches to addressing MCH involves: Lobbying other ministries to contribute to MCH programmes Upgrading infrastructure has been critical and emphasis on improving roads and bridges	
Micro	Community health workers	Cadre of 48,000 FCHVs instrumental in providing health services in remote rural areas, play critical role in reaching excluded and marginalized women	
	Community involvement/engagement	Community ownership fostered through development of cost-sharing practices in for e.g. the birthing centers	Appointed, rather than elected, village and district councils have restricted the ability of community to provide input

5.4 Geography

As noted above, the geography in Nepal has been a major challenge for many years in the work to reduce U5M with regards to access and equity. This was not limited to the mountainous areas, but was also true in the flatlands (terai belt) and hills. A master's thesis analysis of the 2011 Nepal DHS found that the infant mortality rate (infant deaths per 1,000 live births) was 59 (95% CI: 36-81), 44 (35-53), and 40 (33-47) for the mountain, hill and terai zones, respectively.¹⁸¹ The higher risk in the mountain zone was only found among mothers who reported distance to health facility as a major problem (OR=1.55, 95% CI: 1.01-2.40, p=0.04). Consistent with this, almost three quarters (71%) of women in the mountain zone reported that distance to health facilities was a big problem, compared to 60% and 46% in the hill and terai zones, respectively.¹⁸¹

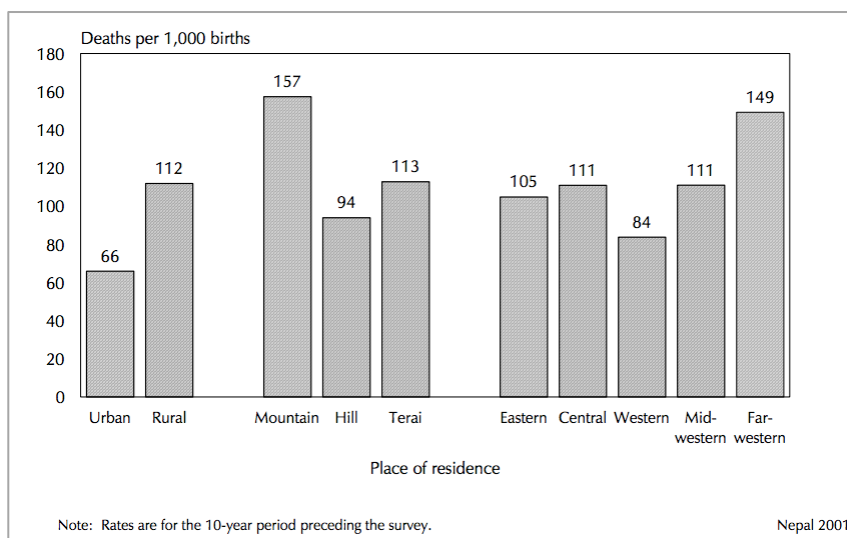


Figure 48: U5M Rates by Place of Residence, 2001 (Source: Nepal DHS 2001)

Several KIs noted these challenges:

“It is the problem of accessibility. Nepal has thousands of rivers and the more you reach towards the north the more you will find rivers and their flow is very high (cannot cross by boats) and there is no suspension bridge and no roads, so during the rainy season it’s difficult to cross those rivers and reach to the villages. Secondly, when the winter season starts there is snowfall and the tracks are very slippery and dangerous, many die falling down to the river. So, we have limited window to reach these villages.” (KI – MOH)

“The challenges were to maintain high level coverage because there was so many remote area and to maintain the coverage it was a challenge in the village and the district area, in the mid-western region the only means was the airlift because we have to supply vaccine, sometimes the plane was cancelled or delayed and there was the problem for the vaccine, so due to remoteness and again to maintain the high level coverage and to reach the un-reach population was the main challenges.” (KI 10)

The Government of Nepal has implemented a number of initiatives to address these access challenges that are described in the health systems strengthening and general infrastructure sections.

These efforts have increased geographic access but the most remote communities still remain challenged in access, as shown by the persisting inequities in coverage and outcomes, data from which have informed the new goal of “reaching the unreached”.

As one of the key informants stated, *“Access to the center is the main problem due to the roads and the transport system which is not available at the time of need, health centers are very far, which is the main challenge then. If something goes wrong, if there is a PPH they do stabilization it need to have referrals that need a lot of time, transport is another and the whole system of referral is the big problem and one of the challenges that government has noted.”* (KI 7 – District Manager)

5.5 Health Financing

KIs noted that improved health financing and increased funding for maternal and child health were important factors. This was aided by commitment of donors and increased investment. Donor confidence was aided by forging and coordinating strategic partnerships and combined funding through “budget support mechanisms”, which balanced with sustaining these funds. However, the reduction in recent years will likely represent a challenge for sustainability of some more heavily-donor supported programs. (see section below 5.9) In addition, external aid was complemented by improved tax collection mechanisms. Although health expenditure as a share of GDP continuously increased from 2006 to 2016, this was mostly driven by out-of-pocket (OOP) spending on health. OOP as a percent of health expenditure was 60.41% in 2015, a percentage that was largely consistent in the decade previous.¹⁸² It is likely that decreasing donor support and low government expenditure on health have been offset by an increasing presence of remittances as part of the Nepali economy. Several studies have indicated that remittance-receiving households spend more on healthcare than non-remittance-receiving households in Nepal, and households that receive remittances are more likely to visit a doctor or utilize higher-priced medical care.^{183,184} Additional information regarding remittances can be found below in section 5.15.

Plans for an insurance scheme were underway at the end of the study period.

5.6 Prioritization of Local Research

Nepal’s MOH relies heavily on local research for health policy adoption and adaptation. KIs in the MOH, academia, and implementing partner organizations all emphasized the importance of doing local research in Nepal prior to the adoption

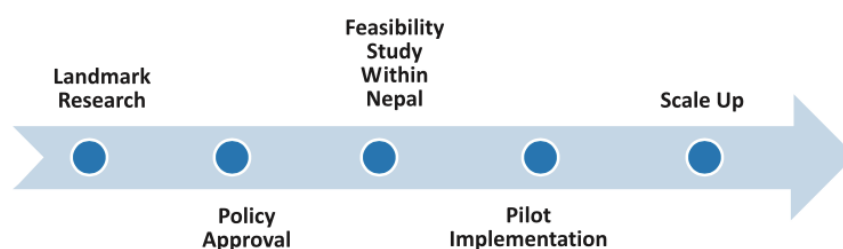


Figure 49: Steps to Scale-Up Health Innovations in Nepal (Source: Khanal et al, 2012)

of interventions to increase acceptability and appropriateness. Both KIs and published literature outline the general steps of using research to create and support health policy in Nepal around U5M.¹⁸ Based on evidence from other countries, recommendations from international bodies or partner organizations, evidence from other local research, or other influences, the MOH approves policy supporting the

consideration of an intervention. With approval and monitoring from the Nepal Health Research Council (NHRC), the MOH and implementing partners organize feasibility studies and small scale (often 1-2 district) pilot studies. Only then will the MOH create a policy for nationwide scale-up of interventions, often occurring after two to three years to complete and analyze the results. The NHRC assesses the local research performed in Nepal; “based on those findings, [the NHRC] see[s] if it’s nationally representative or of good quality, then [they] try to incorporate into upcoming policy and planning.” (KI - Partner)

Nevertheless, evidence from local research and pilot studies does not guarantee nationwide adoption:

“Definitely policy makers also have their own perspectives because policy making is not only driven by the findings. It is also affected by the economic factors, political, cultural aspects and many other factors, but definitely evidence is one. So from evidence’s perspective, [the NHRC and researchers] are responsible for whether that evidence is of quality or not, but from the policymaker’s perspective it’s about political agendas and commitment.” (KI 1 - Partner)

The use of local research in the exploration of and preparation for EBIs can be seen in many of the interventions explored in this case study, including facility- and community-based IMCI, the CB-NCP, zinc supplementation, vitamin A supplementation, and chlorhexidine cord care. Selected examples are included here:

Roll-Out of New Vaccines (Facilitator and Barrier)

Following recommendations of vaccines by the WHO and funding by Gavi, Nepal does not roll-out new vaccines until there is a body of research on local prevalence, disease strains, and feasibility. This pattern was seen for the adoption and implementation of the Hib, pneumococcal, Japanese encephalitis, and rotavirus vaccines (See “Vaccine Preventable Disease” section). Consequently, there is a delay of years between the global introduction of a vaccine and Nepal’s adoption. According to a former MOH official, that delay is because “we need our own evidence... and that took us some time” (KI 16). One implementing partner stated, “there is real value in things going slowly,” if the speed is due to being thoughtful about implementation and impact in complex systems (KI 21).

Community-Based Treatment of ARI

As early as 1986, USAID and JSI performed research on community-based care for acute respiratory infection in Jumla, a remote district in the mountainous region of Nepal. The study showed a 28% reduction in U5M from all causes with the treatment of childhood pneumonia with cotrimoxazole by FCHVs.⁸ Building on this research, the MOH created a technical working group, which then supported further pilot testing of community-based care for childhood pneumonia in four districts. In two of these districts, the FCHVs treated childhood pneumonia with cotrimoxazole (the “treatment arm” of the pilot). In the other two districts, the FCHVs referred children to the nearest health center (the “referral arm” of the pilot). After two years of the pilot project, analysis showed that more than twice as many children received treatment for pneumonia in the treatment districts versus the referral-only districts, with little evidence of misuse of antibiotics by the FCHVs.¹⁸⁵ This evidence encouraged the MOH to support expansion of community-based treatment of childhood pneumonia nationwide, eventually as a portion of the IMCI program.



Morang Innovative Neonatal Intervention (MINI) Program

After starting the community-based IMCI program in 1999, FCHVs in Nepal provided care for children from ages 2 months to 5 years, but not for children under 2 months of age. Following the publication of two studies of community-based neonatal care programs in India and Bangladesh, the MOH included support for pilot projects of community-based neonatal care in the 2004 Neonatal Health Strategy.¹⁸ The MINI Program was piloted in one district from 2005 to 2009, looking at FCHVs' ability to treat neonatal infections with cotrimoxazole, refer to health facilities for IM gentamicin treatment as needed, perform antenatal and postnatal visits, assess newborn weight, and provide newborn care counseling. Treatment of neonatal sepsis in the intervention district increased from 3% to 75% following implementation of the program.¹⁸⁶ Aspects of this pilot program were eventually incorporated into the nationwide CB-NCP.

5.7 Data Use and Availability

Officials from the MOH frequently identified the collection and use of data to set priorities and monitor progress in Nepal as a key contextual factor. According to one official, the MOH is constantly “improving our programs learning from the evidence” (KI 1). Major sources of non-research and routine data include the HMIS system and the national DHS.

HMIS

The MOH uses an HMIS system for regular reports from each district. The integrated HMIS was initially created in 1993 to establish coordinated and centralized feedback across all health programs. Every month, FCHVs and other community-level workers reported to health facilities, who then reported to district health offices, who then enter their reports into the HMIS system to be sent to the central government. According to a former secretary of the MOH:

We identified the gap from the HMIS system then found the reason and came across the most prevalent disease that we have, the major causes of death in the mother and the child, especially neonates and under-five. Once you analyze the data you know the area where to focus on and then we have strategic development meetings where all the experts are there, for example, all the international NGOs (INGOs), and the stakeholders, they all come together and decide where we should intervene. (KI 16)

However, both MOH officials and partner organizations expressed concerns about the reliability and utility of the HMIS data, citing timeliness of reporting, accuracy of data, and feasibility of comprehensive reporting from public and private health facilities and community providers as potential issues (KI 2, KI 5, KI 21). At the national level, data from HMIS are compiled into an annual report, but take almost nine months before publication (KI 5).

DHS (Facilitator)

The first DHS in Nepal was performed in 1996, and has occurred every five years since that time. It was identified as a facilitator in implementation. The national data are used as an indicator of general progress as well as to identify targets for future efforts.

Nepal had already started focusing on neonates with the strategic plan in 2004, but “looking at 2011 data we were surprised to see that we have not been able to reduce neonatal mortality as it was 33 in 2006 and



still 33 in 2011. Then we did in depth analysis of the mortality.” (KI 3) When the 2016 DHS data showed further progress on neonatal mortality, “We were happy with the data but that didn’t mean that we should now stop working for neonatal mortality, so again we are on the road to meet the SDG targets now.” (KI 3)

For example, the 1996 DHS showed that just 43% of children were fully vaccinated. This data caused the MOH to focus on increasing vaccination rates across the country and reaching the children that were not being vaccinated. (KI 5) The MOH also uses data to choose which vaccines to implement. “Our first priority is based on high mortality rates like Japanese encephalitis and measles. So we choose on the basis of mortality that contributes to under-5, infant and neonatal mortality, and our second priority is cases with high morbidity like whooping cough.” (KI 12)

Other Examples of Data Use

Data were heavily used in decision-making regarding malaria. The MOH performs a detailed breakdown of the surveillance data for malaria cases, which is then used to classify districts as high, medium, and low risk. These classifications determine where the MOH carries out different malaria interventions. Over time, the surveillance data have shown changes in risk levels that have changed due to changing climate, vector patterns, and international migration. The MOH has therefore increased the number of districts with malaria intervention coverage from 13 to 31 in 2011 based on data from the Epidemiology and Disease Control Division (EDCD).

Other programs had variable use of data for evaluation and to drive adaptation and adoption. According to an individual working at an implementing partner organization for the CB-NCP, many of the implementing partners performed baseline, midterm, and endline surveys to evaluate the implementation and effect of the intervention package (KI 15). However, in the districts where implementation was performed directly by the MOH, assessment was not performed. Although the assessments done by the partner organizations found limited or no effect on target metrics, the MOH chose to scale the CB-NCP nationwide.^{152–154}

5.8 Quality Assessment/Improvement

KIs noted some concerns about quality as a **potential challenge** to the effectiveness of EBIs, supported by data noted above. The MOH drafted a Quality Assurance Policy in 2009 to “ensure the quality of services provided by governmental, non-governmental, and private sector according to set standard.”¹⁹ However, with no resource backup, the implementation of the policy remains poor.¹⁹ Another arm focused on quality includes various regulatory bodies (Medical Council, Nursing Council, Pharmacy Council, Health Council, Ayurvedic Council, and National Health Research Council) responsible for ensuring quality of human resources for health, health care, drug supplies, and research.

There has been some work to establish more formal approaches to quality assessment and improvement from a national level, but these were implemented towards the end of the study period. For example, the Nepal Health Sector Strategy focuses on improving the quality of care at points of service delivery with the National Health Policy 2014, including an autonomous accreditation body to be established for quality assurance of health services in public and private sectors. The strategy also emphasizes further strengthening of research, promoting the use of evidence, and increasing the use of modern technologies for better health information management, increased access to health services, better management of

procurement and supply chain, and more effective and efficient construction of health facilities. Nepal established a National Commission on Quality in collaboration with the Lancet Global Health Commission on High Quality Health Systems reflecting a commitment to strengthening measurement and improvement at the national level.¹⁸⁷

5.9 Donor and International Partner Resources and Coordination

Donor Resources

The availability of donor funding and resources, including from multilaterals, such as The Global Fund and Gavi; bilateral partners, including USAID, India, and China; and the pooled funds described below, was repeatedly identified as a facilitator both for early pilot work as well as the expansion of EBIs. About 17% of the national health budget is pooled grant money. However, the variable participation in national coordination (see below), as well as donor-led projects, which, even if successful were not scaled nationally, were seen as challenges to implementing a number of nationally effective U5M EBIs.

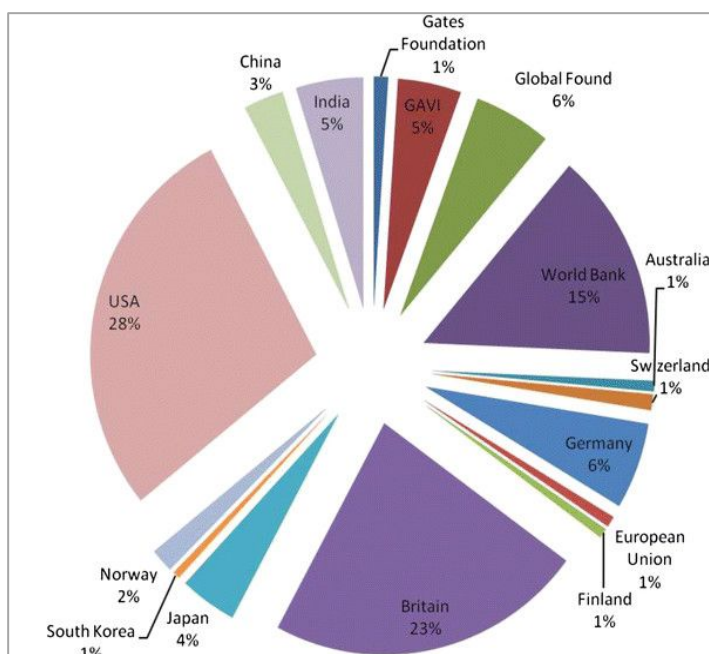


Figure 50: Development assistance for health from donors for Nepal from 2000 to 2009 (Source: Yang et al)

Donor Coordination: Funding

In 2004, Nepal started its own health Sector Wide Approaches (SWAp), changing emphasis from a vertical, project-based funding approach to a horizontal approach to support the health sector. The approach included a pool fund, although participation was voluntary. *“Nepal health sector program is an umbrella program with sector wide approach, health sector reform, donors putting pool fund.”* (KI 12 – MOH). One KI notes, *“We used to talk and organize the meeting with the finance and national planning commission, the SWAp has a high-level committee, to sort out the differences”*.

While 11 donors participate fully in the SWAp, grants or other funding can also be given directly and not pooled.¹⁸⁸ Major donors are not participating in a number of these coordinating activities.³³ These include India and China (5% and 3% respectively of health sector funding).¹⁸⁹ This has been described as a challenge as they do not participate in the Joint Annual Review meetings or the health sector development forum.¹⁹⁰ USAID is also a significant donor not participating in the pooled fund, representing 28% of development assistance for health, which supports a wide range of initiatives from pilots through support for expansion.¹⁸⁹

One KI (MOH) noted, “... in Nepal funding comes from the world bank, some part of it is donation and take it in the pooled fund from the partners, except for USAID, they do not give the money to pooled funds as they run their own programs and fund their own INGOs and NGOs. From the pooled fund and from other partner’s programmers buy whatever is needed and the government has its contribution too. The partners pool in 60% and government 40%.”

Another noted that there were some successes in coordination (“Global multilaterals had a big role in pushing a large project, but absolutely had to work within the government”) but that challenges still remain (“When you think about the NGO sector (overall) in Nepal, it’s huge and unregulated and a very low barrier to entry.”)

Despite these challenges, a 2009 World Bank report stated that, with SWAp, achievements were made in Nepal in reproductive health service delivery, child health, and family planning and health system strengthening, reducing duplication of work and strengthening the partnership between the Government of Nepal and the external development partners.¹⁸⁸

There also were some concerns noted about local management and that grants given to the national government for local projects are allocated accordingly.¹⁸⁸

Implementation

In most of the EBIs, donors were directly engaged or engaged through their funded implementing partners as members of technical working groups to provide input into guidelines (ex. PMTCT) or direct implementers of pilots (ex. chlorhexidine, acute malnutrition management). This was viewed as a facilitating factor, particularly for new initiatives, but sometimes resulted in projects which ended before reaching national scale and were not integrated into national policy and strategy and so not sustained.

5.10 Infrastructure and Communications

Nepal has engaged in a number of infrastructure works, which was also identified as a facilitating factor for successful implementation of EBIs and reducing U5M within and beyond amenable causes. These have included improvements to roads, schools, electricity, and communication. This included increased paved roads (5,925 km in 1985 to 62,579 km in 2013). The increase in mobile phone coverage has also facilitated access and has the potential to increase communication between health centers, a critical step in reducing maternal and neonatal mortality.

5.11 Addressing social determinants and other contributors to U5M

The country has also focused on a number of broader programs to improve health care and reduce U5M, including women empowerment including expanded access to family planning and education, WASH, and physical infrastructure, including roads. A number of these are discussed below. One study used modelling and reported that “the reduction in fertility, changes in education and wealth, improvements in components of the human development index, gender empowerment, and anemia each explained more than 10% of the district variation in maternal mortality.”¹⁹¹

5.12 Women's Education/Empowerment

In the mid 1990s, a major initiative began in Nepal to increase women's rights.¹⁹² This effort established the Ministry of Women & Social Welfare, with a mandate of "coordinating and monitoring of development programmes targeted to women". By 1997, the Ministry of Women & Social Welfare developed the "National Plan of Action (NPA) for Gender Equality and Women's Empowerment". This involved cross-sectoral, community, and academic inputs, and which was reflected in the Ninth Five Year Plan. This plan identified "women's development and empowerment as a key development" action. By the early 2000s, a follow-up national plan set a target of increasing the Gender Development Index from 0.452 in 2001 to 0.55 in 2003.¹⁹²

Work to achieve gender equality and the empowerment of women occurred through a range of activities, including addressing poverty, increasing economic rights and financial opportunity with microcredit programs aimed at women, and other work to improve asset ownership. Increased economic rights, and some improvements in autonomy have occurred, although wealth and geographic inequity in these areas remain, according to the 2016 DHS.²⁸ Other empowerment efforts have focused on increasing education for women. In the 2001 DHS, only 35.3% of women were literate. By 2016, the rate had increased to 69.1%, although gender gaps remain, as well as geographic inequity.^{27,28}

According to key informants, women's empowerment has also come from other sources, including the social standing of government-sponsored village mothers' groups; the importance and authority of FCHVs in communities; and the absence of husbands, either due to the civil war or their emigration for employment reasons (KI 2, KI 3, KI 4).

"So the awareness among women and the community, community participation, the system of FCHV, and active mothers clubs were some of the contributing factors [to reductions in U5M]. So I would not say it's only because of medical interventions that child mortality has reduced." (KI 4)

Women's increased autonomy has resulted in increased interest and ability among women to seek better care for themselves and their children.¹⁹³ For example, KIs in the MOH described seeing obvious changes in women's ability and desire to seek immunization for their children and post-natal care for themselves over the study period. Full immunization of children with basic vaccines increased from 65.6% in 2001 to 85.8% in 2014.^{27,194} Postnatal care for women increased from 33.2% in 2006 to 58.0% in 2014.^{74,194} Additionally, empowerment efforts have resulted in increased women's reproductive rights (including legalization of abortion), as discussed in the next section. This work has also included increasing female representation at the national level, with World Bank data showing an increase from 6% in 2006 to 30% of MPs women from 2014-2017.¹⁹⁵

The work in Nepal to improve gender equity and women's empowerment has continued post-2015. Due to changes in national election laws in 2018 requiring certain gender quotas in the local government, over 90% of the vice-mayors in the country are now women. As one MOH official stated, with women in positions of political power, "I believe that things will start changing very fast" (KI 3). However, Nepal has areas which

still need further work, including in underserved areas and in ensuring the rights of women from vulnerable populations such as the *Dalits*. According the World Economic Forum’s Global Gender Gap Report in 2011, Nepal ranked 124 out of 144 countries for gender equity, with only a small improvement by 2016.⁴⁸

5.13 Improved Access to Family Planning, Increased Birth Spacing, and Decreased Fertility Rates

KIs also cited significant “opening of reproductive rights” and increasing access to reproductive health care and family planning services during the period of interest (KI 3, KI 4, KI 8, KI 21) as a source of improvement for U5M. Despite the ongoing civil war and restrictions from international donors like USAID, Nepal passed legislation legalizing abortion in 2002; expanded abortion services to include doctors, nurses and midwives as providers; and, in 2009, affirmed access to abortion as a human right.¹⁹⁶ The Tenth Plan for poverty reduction by the National Planning Commission in 2002 identified gender equity as a high priority, including specifically the health policy aims of reducing unwanted pregnancy, increasing adolescent reproductive health awareness, increasing access to contraceptives, and promoting equal participation of men and women in reproductive health decisions.¹⁹⁷ Contraceptive use increased from 28.5% of reproductive age women in 1996 to 52.6% of reproductive age women in 2016.^{28,58}

“Frequent pregnancies was one of the causes of increased childhood mortality. If there is not enough spacing or even limiting done with your child bearing, then you end up having more children, and children are not taken care of. [And the] mother dies and the children are worse off.” (KI 8)

From 2001 to 2016, the median birth interval increased from 31.8 to 36.7 months and the percent of teens who had begun childbearing decreased from 21.4% to 16.7%.^{27,28}

Table 30: Fertility rate in Nepal (Source: DHS 1996, 2001, 2006, 2011, and 2016)

Fertility rate (births/woman)					
	1996	2001	2006	2011	2016
Total	4.6	4.1	3.1	2.6	2.3
Urban	2.9	2.1	2.1	1.6	2.0
Rural	4.8	4.4	3.3	2.8	2.9
Lowest wealth quintile	N/A	N/A	4.7	4.1	3.2
Highest wealth quintile	N/A	N/A	1.9	1.5	1.6

5.14 WASH

The work to improve WASH has likely been a contributing contextual factor to reducing the incidence of diarrhea and, in doing so, reducing the contribution of diarrhea as a cause of U5M. There has been a concerted effort to improve sanitation and safe water in Nepal. The work has been ongoing for decades, with sanitation initiatives in Nepal dating back to the 1970s. In 1980, the Government of Nepal signed the UN Declaration of the International Decade of Drinking Water Supply and Sanitation. After this declaration, sanitation became an integral component of water supply related projects in Nepal, supported by a number of efforts. UNICEF started Community Water Supply and Sanitation in Nepal in 1987 and from 1993 to 1996, the Nepali government piloted “*Janatako Khanepani ra sarsafai karyaram*” (JAKPAS), which means “People’s drinking water and sanitation program”, with the support of the World Bank. In 1996, the Rural Water Supply and Sanitation Fund Development Board in 1996 was formed, which implemented Rural Water Supply and Sanitation Project (RWSSP) that ended in 2003.¹⁹⁸ In 1998, a national level sanitation steering committee was formed which brought together different partners, including ministries, donors, and international and national NGOs. In 1999, the Basic Sanitation Package was developed and implemented in most districts of Nepal.¹⁹⁹

These efforts began to be more organized after the Nepali government’s commitment to the MDGs in 2000, in which Nepal committed to achieving a number of targets related to health, water, and sanitation. These included halving the proportion of people without access to safe drinking water, as well as increasing hygienic sanitation, by 2015.²⁰⁰ The Tenth Five Year Plan of Nepal (2002-2007) explicitly included a national plan for water supply and sanitation improvement.²⁰¹ A sanitation network was formed in 2004 to further increase the magnitude of sanitation coverage, involving several organization, such as Plan Nepal, WaterAid Nepal, NEWAH, Lumanti Support Group for Shelter, the Nepal Red Cross Society, Environment and Public Health Organisation, Helvetas, and the Gorkha Welfare Society.²⁰² This work included an approach called “Community Led Total Sanitation”, introduced in 2006 with elements subsequently replicated and spread nationally. Similarly, another approach, called “School Led Total Sanitation”, was initiated in 2005 as a pilot project that integrated the rewarding and funds aspect of Basic Sanitation Package and participatory techniques of CLTS.¹⁹⁹

According to a UNICEF evaluation, in 1990, the national sanitation coverage of Nepal was only 6%.²⁰³ In 2011, the Central Bureau of Statistics reported that the sanitation coverage had increased to 62%. By 2015, WHO/UNICEF reported that over 90% of Nepal’s population had access to improved water, although some concerns remained about safety. Coverage for sanitation was lower, at 46%, with one third of the population still practicing open defecation. Even in places where coverage is not complete, however, reductions in diarrhea have been reported.²⁰⁴

Table 31: Nepal’s achievement of MDG targets related to water and sanitation (Source: Nepal MDGs Final Status Report, 2016)²⁰⁵

	1990	2000	2015	Target 2015
% population using an improved drinking water source	46	73	73	83.6
% population using sanitation facility	6	30	80	81

5.15 Economic Growth

Nepal's steady economic growth was also identified as an important contributor to the successes seen in the health sector. KIs also noted that the increase in Nepalese people working overseas not only improved the economic status and related increased financial access to health care (remittances accounted for 28.3% of national GDP in 2017, fifth in the world), but their exposure to other health care systems also influenced their family to have higher expectations of care, and therefore demand better quality.¹

5.16 Conflict

As noted above, from 1996 to 2006, Nepal had a period of armed conflict between the Government of Nepal and the Maoist insurgency. Over 13,000 people died because of the conflict and thousands more were internally displaced.²⁶ Although the Government of Nepal maintained control of the capital throughout the conflict, the Maoist rebels controlled vast regions of the rural areas. Nevertheless, the majority of Nepal's key health metrics steadily improved during the conflict, including U5M, vaccination rates, ANC visits, and access to safe drinking water.²⁶ KIs maintained that neither side in the civil war disrupted health services, but instead supported the continuation of national health campaigns during the conflict. A MOH official involved in vaccination campaigns during the time described the campaigns as *"conflict sensitive. If the government was going there and if the babies were being vaccinated then the government soldiers did not do anything and the Maoists also did not do anything because their children were getting vaccination. So, we did not take anybody's side and went to the villages as scheduled to give the vaccination and that worked. We did not give any details to them, we only recorded the child's age"* (KI 12). The Maoist party's commitment to health as a human right and free access to services was also important in increasing the ongoing work of the Government of Nepal to ensure access to care. As one MOH official described, *"the communists had just come and they thought making everything free would help and we could not say no to [free facility-based deliveries]"* (KI 2). With these conscious efforts by both sides of the civil war to not only separate the health sector from the conflict but to also actively promote health, Nepal limited the negative effects of armed conflict on the nation's health and some areas were able to move forward in addressing U5M.

A 2010 analysis of health outcomes during the armed conflict agreed, noting that the insurgency did not purposely disrupt the delivery of health services. For example, special national campaigns, such as the National Immunization Day for polio and measles immunization, bi-annual vitamin supplementation, and family planning campaigns, were not heavily affected. KIs also noted the rebels put pressure on the health care providers to continue to provide care and to ensure consistent drug supplies. Despite the security threat, 78% of staff positions in hospitals, 75% in primary health care centers (PHCCs), 96% in health posts, and 90% in sub-health posts were filled during the conflict.²⁶



6 CROSS CUTTING AND REMAINING CHALLENGES

Continuing and Emerging Challenges to Further Reducing U5M and Meeting Relevant SDG Goal

Despite the progress made, Nepal has been challenged by a number of factors which have prevented them from achieving equity in coverage and outcomes as well as threats to sustaining and continuing the progress. These include:

- Increase in natural disasters and climate-change related events
- Sustainability of the FCHV system, which is under stress due to the scope of activities, increasing program demands, alternate sources of health care as financial and geographic barriers are addressed, concerns about quality, and aging of the cadres, among a number of issues as well as discussions about payment
- Rising causes of death for U5 that require higher levels of care (ex. prematurity) and continued geographic access
- Quality and coverage in a number of areas
- Donors' health contribution decreasing further in light of Nepal's plan to graduate to the status of a lower-middle income country by 2022
- High out of pocket expenses
- Ongoing inequity: based on wealth, social group (Dalits), geography, and gender
- Ongoing gap in gender equity
- Rise in proportional morbidity among newborns related to LBW and prematurity
- Need for ongoing monitoring to detectre-emergence of diseases (measles, malaria) or new ones
- Need to determine how to integrate traditional healers into the discussions given ongoing use by population



7 Transferrable Knowledge for Other Countries

There were a number of replicable strategies from Nepal that would be relevant for other countries looking to accelerate decline in U5M, learning from Nepal's successes and challenges. These included investing in the health system (infrastructure and health workers) to reflect local constraints and needs; a commitment to equity in access (geographic, financial), which was also reflected in intersectoral initiatives and policies; building a strong community health program, which was used to integrate multiple initiatives and expand access and community engagement; a strong commitment to other initiatives which impacted environmental and social determinants, including women's empowerment, infrastructure, and WASH; generating local evidence to inform implementation of new EBIs; and integrating accountability at the local level. Other areas, which were important but introduced later or towards the end of the study period, included quality of care and strengthening human resources.

Areas of strength and recognized challenges:

1. Planning for equity from the beginning

Nepal had mixed results initially to address equity both for wealth as well as geography. In the last few years, explicit goals, including reaching the unreached and using data to identify where care is not being received, have supported work to address persistent gaps. Nepal has also led in policies which are designed specifically with equity in mind, although challenges in implementation were described, due in part to available resources and the need to further customize implementation strategies to different populations. Some transferable lessons include:

- ***Using a rights-based approach and integration of this approach into policies and legal framework at the national level***
 - The 1991 policy emphasized the goal of improved health status of those whose health needs are often not met, including the most vulnerable groups. The Interim Constitution in 2007, and later the permanent national constitution, affirmed health as a fundamental right, and assured free basic health services to all citizens
 - The National Health Policy 2014 (2071) detailed a number of strategies developed to be implemented with guiding principles urgently addressing regional disparity in health indicators, ensuring access to and delivery of quality care, and increasing patient involvement and people-centeredness
 - National policies beyond health, such as the 2010 Health Sector Gender Equality and Social Inclusion Strategy, aimed to address inequity
 - The Tenth Plan for poverty reduction by the National Planning Commission in 2002 identified gender equity as a high priority, including specifically the health policy aims of reproductive rights
- ***Integrating an equity agenda into health system strengthening for national challenges (for Nepal: wealth, gender, caste, and geography)***
 - This was a major initiative which increased during the study period with needs for ongoing adaptation and review of data to refocus and intensify efforts where ongoing inequity exists. Some practical lessons included:
 - Ensure that building of new facilities reflect local access and need drive by data

- Disaggregate data by more than wealth to identify where inequities exist (caste, geography)
 - Consider when to pilot versus national coverage to ensure equity: Piloting or limited roll-out of the Safe Delivery Incentives Program (SDIP) was rejected by the MOH and the Ministry of Finance due to concerns about equity. The policy was implemented nationwide concurrently
- ***Equity agenda in geographic access***
 - Nepal represents a country with considerable geographic access to care. While the types of challenges may differ between countries, lessons how to differentially target efforts and resources can provide some insights. The government of Nepal has implemented a number of initiatives to address geographic access challenges. This has included:
 - Build infrastructure (Nepal increased facilities from 975 to 4,000 over 5 years and birthing centers from 422 in 2007 to 1,121 in 2011)
 - Establish a strong CHW system
 - Explicitly include equity in national policies
 - The National Health Policy 2014 (2071) detailed a number of **strategies** developed to be implemented with guiding principles urgently addressing regional disparity in health indicators, ensuring access to and delivery of quality care, and increasing patient involvement and people-centeredness. These included:
 - Build health management and accountability at every local level
 - Ex. Create the mothers' group in each village that selects the FCHV, see also decentralization local group oversight
 - Address other geographic access issues
 - Financial support for transportation.
 - Advocate for improvement of the road system
- ***Ensuring financial accessibility through systems designed to ensure equity***
 - Nepal has done a number of initiatives designed to reduce financial barriers to care, although out of pocket expenses remain high. The approach has addressed barriers to access and in care receipt and made care more comprehensive. These initiatives have included transportation support (identified as a gap), which is scaled based on distance and cost; offering of free primary care services, both general and MCH in district hospitals, initially targeting the more vulnerable populations; free facility-based deliveries for all women; and, more recently, free selected essential drugs. Insurance work is being implemented but impact is beyond the scope of the study.
- ***Including a focus on reproductive rights and access reflecting national not donor priorities***
 - Nepal worked to ensure local values and priorities (and not those of donors) were implemented: Despite restrictions from international donors like USAID, Nepal passed legislation legalizing abortion in 2002 and affirmed access to abortion as a human right

2. Building on existing health system capacity through integrating new initiatives while strengthening the underlying health system



Integration of new programs in existing structures and programs was important to reduce risk for vertical projects and duplication of work while providing resources to increase overall capacity. This was at the local and sub-national care delivery level and central level in protocols, policies, and management. Notable examples of this include:

- Following the MAM guidelines, a **multi-sectorial nutrition plan** (MSNP) was implemented in 2012. This focused on a number of implementation strategies, including **integration of services across sectors** and prevention as well as treatment; decentralized care, including outpatient when possible and inpatient when indicated; and monitoring and evaluation, including **integration into current HMIS system**
- NFHP used the strategy of **integrating into an existing program** when zinc treatment was included in the CB-IMCI
- **Broader health systems strengthening efforts** and continued **building on existing health system capacity** with **the program of FCHVs** as central for MNCH interventions
 - This combined with the 2004 national strategy represented the start of a journey which incorporated new evidence, data on the success and challenges of policies and initiatives and adaptation of interventions to improve both supply side in the community and in facilities and demand, as well as **broader health systems strengthening efforts** and continued **building on existing health system capacity**
- Nepal strengthened the surveillance to determine the burden of measles to increase data to target areas where increased access was needed. Measles surveillance in Nepal is reported as a part of the **HMIS system**. Until 2003, this was the exclusive method of measles surveillance, but it did not provide the level of detail or timely reporting needed for response to measles outbreaks.⁹¹ Due to these limitations, the MOH supplemented HMIS with a more detailed measles surveillance system, **building off of the existing surveillance system for acute flaccid paralysis**
- Integrating multiple interventions into the community-based program. In 1998, the CBAC program combined community- and facility-based ARI and diarrheal programs. CBAC was implemented in 6 districts, all with the treatment model used in the ARI program pilot study. In 1999, CBAC was combined with nutrition and vaccination programs to create the comprehensive CB-IMCI program.^{10,20} The program **used the existing FCHV and CHW programs** in the country at the time as community-based providers. Similar to the process for FB-IMCI, CB-IMCI **training materials and guidelines from WHO were adjusted**. This program was later expanded again to include neonatal interventions.

3. Developing a community health worker program with standardized education, management, and accountability system that involves community and health professionals

The FCHVs were repeatedly noted as core to the success in dropping U5M. Multiple EBIs were incorporated into their scope of work rather than creating new cadres. The success was also related to the strong governance from the mothers group (who chose the FCHVs), minimum criteria, the authority FCHVs had, and the respect they garnered from their communities and that they were from and so knew the community. However, as noted previously, expansion and new generations with broader employment opportunities are issues that highlight the potential need to adapt even established programs as contextual factors change. In addition, the danger of success is expanding the scope too broad. Finally given global



changes as well as expanded job opportunities, Nepal will have to determine if this will or will not remain as a volunteer position.

4. Using evidence-based decision making and create policies and strategies based on global and local scientific evidence and feasibility and valuing the local generation of research and evidence

Nepal had a strong practice of exploring globally emerging EBIs and then requiring local pilot testing to determine need or impact of potential EBIs before adoption, often by local researchers but also through implementing partners. While this often increased ownership, it also posed some challenges in time to implement (ex. rotavirus) at all, or even the capacity to scale. Specific lessons included:

- ***Developing and using local routine data to identify emerging challenges, gaps, and drive change***
Nepal worked to improve coverage through better surveillance and targeted the hardest to reach and poorest communities through outreach, communication campaigns, and partnering with NGOs. For example, building on existing surveillance systems, Nepal strengthened the surveillance to determine the burden of measles by increasing data collection in target areas where increased access was needed. Measles surveillance in Nepal is reported as a part of the HMIS system and was used effectively to address reemergence of the disease. This has also worked for malaria, but evidence of use of other HMIS data was not a strong theme found in our research and some large differences between DHS and HMIS-derived results raised questions about which source best reflected the delivery and coverage of services.
- ***Prioritizing local research***
 - Nepal found that before adopting a new EBI, testing new protocols or guidelines, or making improvements to existing programs, it was imperative to collect data and/or use evidence from DHS, HMIS, or supervision to inform decision-making. Examples included PCV vaccine, community-based neonatal care, and chlorhexidine
 - To expand community based work to reduce NMR, Nepal combined evidence from **published evidence** with **site visits in India, Bangladesh, and Indonesia** to identify and select the interventions best suited to national scale implementation in Nepal to create a country tailored Community-Based Newborn Care Package (CB-NCP) in 2008.¹⁴⁹ The interventions were **chosen based on the amount and quality of evidence** available supporting their impact, their feasibility to be implemented nationally in the context of Nepal. The CB-NCP was initially **piloted in 10 districts** by partnership between multiple implementing partners and the MOH.
 - Prior to implementation, MOH decided to **pilot study the use of chlorhexidine** for newborn cord care and produced evidence leading to national implementation.

5. Consultations and participation: Engaging and consulting stakeholders and leveraging expertise across sectors and levels, including MOH, donors, academics, implementing partners, and community members

This approach ensured both better acceptability and potential for scale through broad engagement at the start and leveraging of available technical knowledge. This was typically done through TWGs as well as identifying technical experts to lead the pilot testing, which was characteristic of the implementation start of EBIs. The TWG scope included review of published evidence, exploration of feasibility before implementing new EBIs, design of pilot testing and adaptation of existing EBI programs. **There were some**



practical successes such as the **Newborn Working Group**, which included local experts in maternal health, child health, neonatologists, public health leaders, and researchers and has had input into ongoing work to reduce NMR, and the **National PMTCT Working Group**, including WHO, UNFPA, UNICEF, UNAIDS, and USAID/FHI.¹⁰³ These successes can inform similar work.

- ***Leveraging and coordinate donor and NGO activities***
 - Nepal has had significant donor support, which has driven a number of innovative and effective initiatives. However, a number of others were never scaled nationally or not sustained because of the time-limited available funding and lack of integration into national long-term planning across all donors. Some lessons included:
 - The development of their SWAP and creation of a pooled fund was partially effective to transform a project-based funding approach to a horizontal approach in support of the health sector. However, the impact was limited by voluntary participation in both the pooled funding and the national review meetings.
 - Work to strengthen this coordination was articulated in the National Health Policy 2014, which noted that resources obtained from internal and external agencies will be mobilized for effective implementation of this policy and the programs formulated under the new policy. The means to transform this policy into practice will need to be further explored.
- ***Ensuring participation of communities in program implementation***
 - Nepal integrated community participation through the FCHVs, as well as establishment and empowerment of village mothers' groups who participate in community education and select the FCHV based on criteria detailed in the FCHV strategy. Other examples include:
 - Community engagement, education, and sensitization: Substantial efforts to **involve the community in all aspects of the** vitamin A program
 - Taking in account community preference in decision making: Preference of bednets versus IRS

6. Ensuring accountability through local empowerment and capacity building

- ***Decentralizing health system authority, responsibility, and governance***
 - Nepal has been gradually decentralizing health governance at a district level with mixed results and offers lessons in success and also where change is potentially needed. Strategies which could be transferred include:
 - Use of policy (LSGA) for devolution of responsibilities, authority, and resources to local bodies and reallocation of funds to the 75 districts, with less funding allocated to the central level.
 - Establish and build capacity for multisector local management groups, which include representation of vulnerable groups, health care workers, and local elected officials (Health Facility Operation and Management Committees) to bridge between the government and local communities and a mandate to represent all community members and work with local governments to identify health service gaps, oversee health planning, and mobilize funds and resources.
 - Recognize and address challenges in supporting and empowering the group to ensure effectiveness and sustainability of this work.

- **Engaging and empowering community leadership and authority**

- MGHs are important both for accountability and oversight as well as a responsibility for the FCHVs to transmit knowledge and ensure community participation. These groups are formed with wide involvement of communities, local health institutions, and local government in each ward of a VDC and including all interested women of reproductive age including those from marginalized and other underserved communities.
- The VDC is accountable to the local health institution

7. Pursuing quality service delivery

One lesson was to ensure this happens early and throughout implementation and is scalable to national coverage with measurement to ensure impact, although this was not a main strategy early in some of the work studied. Although some work was integrated into the EBI implementation, the overall strategies represented the priority to measure and improve quality, an identified gap. However, this focus has increased over time and this new work offers practical approaches, including a recommitment at the national level. Strategies included:

- Ensuring training to the local level through cascade of training
- Integrating quality assurance into national policy
 - MOH drafted a Quality Assurance Policy in 2009 to “ensure the quality of services provided by governmental, non-governmental and private sector according to set standard”. However, there must be resources allocated for these activities, as the experience was that with no resource backup, the implementation of the policy remained limited.
 - The National Health Policy 2014 detailed a number of strategies with guiding principles to urgently address regional disparity in health indicators, ensuring access to and delivery of quality care, and increasing patient involvement and people-centeredness.
- Establishment of a national commission for quality with political leadership

8. Multisectoral collaboration to address health and health-related determinants

Through engagement of multisectoral work, a number of interventions were critical and supported addressing other determinants of health. These included WASH, roads, women’s empowerment, education, and other work. For example, there was a multisectoral approach to tackle the determinants of undernutrition (WASH, social protection, and local governance mechanisms) in addition to health sector work. This also needs to include roads, agriculture as critical to addressing access and nutrition.

9. Developing locally responsive, demand-side interventions and combine with supply side interventions to improve care delivery

Nepal identified where barriers existed that could be addressed through locally adapted demand-side interventions including transport support and community sensitization to increase acceptability and demand using opinion leaders (ex. MGHs and FCHVs). Examples include transportation vouchers and conditional cash transfers for women receiving facility-based deliveries.

10. Planning for sustainability

Nepal used a range of strategies to ensure sustainability, including local data production to drive adaptation and acceptability (see previous), ensuring programs are reflected in national policy, engaging the private

sector (ex. zinc production), and basing interventions in leveraging community engagement. There were notable successes with sustainability efforts, as well as challenges reflecting, in part, the reliance on donor funding.

11. Addressing other factors related to U5M

Nepal made significant improvements in infrastructure not related directly to health, which likely contributed to successes in U5M. These included:

- Broader infrastructural investment, including improvements to roads, schools, electricity, and communication, combined with Nepal's steady economic growth, have contributed to the successes seen in the health sector
- Addressing underlying causes, such as safe water and sanitation
- Women's empowerment
- An equity agenda, including financial wellbeing, education, reproductive rights, and legal protections

12. Strengthening health systems to support EBI implementation and build the ability to address emerging issues

Nepal built the infrastructure, including facilities, and increased human resources, which provided the staff and space needed to deliver the EBIs. They have recently identified existing gaps and are further investing to "reach the unreached". While Nepal has steadily increased investments in the health sector, the total and relative amount (5% of national budget) has been lower than many regional neighbors and has relied on donor funding, which is currently decreasing, and out of pocket expenditure, which challenges sustainability. This is further challenged by the relative contribution to health in the national budget. However, leadership had a strong role in implementing several programs/policies related to maternal and child health in Nepal and supporting the work to decrease in U5M. Much of this was accomplished through integration into national initiatives and policies, which ensured continuity of some of the work, despite the challenges due to multiple transitions in the government that may have impacted the effectiveness of the implementation of policies.

8 CONCLUSIONS

Nepal has achieved remarkable drops in U5M and neonatal mortality despite challenges in political instability and geographic access. The increase in coverage of EBIs has been more variable overall for some groups based on geographic area, wealth, and caste. Improvements outside the health system and a strong commitment to other initiatives, which impacted environmental and social determinants, including WASH, women's empowerment and reproductive rights, roads, and economic development, were identified as key factors influencing U5M. The strong community health workforce, through the FCHV program, was credited with many of the successes, whether directly or through community sensitization and engagement. Challenges remain in areas including quality, sustaining the community workforce as the country continues in its pursuit of reaching the unreached, funding for health, and continuing to strengthen the health system to address causes of U5M requiring higher levels of care.



Sources

1. World Development Indicators | DataBank. The World Bank Group. <http://databank.worldbank.org/data/reports.aspx?source=2&country=SSF>. Published 2017. Accessed January 5, 2018.
2. United Nations Development Programme. Human Development Data (1990-2017). Human Development Reports. <http://hdr.undp.org/en/data>. Published 2017. Accessed October 18, 2018.
3. World Bank. *Country Poverty Brief: Nepal.*; 2017. http://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Archives-2017/Global_POV_SP_CPB_NPL.pdf. Accessed July 30, 2018.
4. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci.* 2009;4(1):50. doi:10.1186/1748-5908-4-50.
5. Aarons GA, Hurlburt M, Horwitz SM. Advancing a Conceptual Model of Evidence-Based Practice Implementation in Public Service Sectors. *Adm Policy Ment Heal Ment Heal Serv Res.* 2011;38(1):4-23. doi:10.1007/s10488-010-0327-7.
6. Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Heal Ment Heal Serv Res.* 2011;38(2):65-76. doi:10.1007/s10488-010-0319-7.
7. *Nepal Equity Profile - Countdown to 2030 - Maternal, Newborn & Child Survival.*; 2014.
8. Pandey MR, Daulaire NM, Starbuck ES, Houston RM, McPherson K. Reduction in total under-five mortality in western Nepal through community-based antimicrobial treatment of pneumonia. *Lancet (London, England).* 1991;338(8773):993-997. <http://www.ncbi.nlm.nih.gov/pubmed/1681351>. Accessed January 26, 2018.
9. Houston R. Early Initiation of Community-based Programmes in Nepal: A Historic Reflection. *JNHRC.* 2012;10(2). <https://pdfs.semanticscholar.org/e8d0/d3bb8f71e7a8716ecd094f78ac45dddee40c.pdf>. Accessed July 9, 2018.
10. Child Health Division D. Development of Integrated Management of Childhood Illness (IMCI) in Nepal. 2002. http://dohs.gov.np/wp-content/uploads/chd/IMCI/Development_of_IMCI_in_Nepal_1995_2002.pdf. Accessed July 9, 2018.
11. SAGE pneumococcal conjugate vaccine working group. *Detailed Review Paper on Pneumococcal Conjugate Vaccine.*; 2006. http://www.who.int/immunization/SAGE_wg_detailedreview_pneumoVaccine.pdf. Accessed July 20, 2018.
12. WHO. Pneumococcal Vaccines WHO Position Paper - 2012. *Wkly Epidemiol Rec.* 2012;14(87):129-144. <http://www.who.int/wer>. Accessed June 20, 2018.
13. Nepal G of. *Application Form for Country Proposals For Support to Routine New Vaccines Support and Preventive Campaign Support.*; 2012.
14. Gavi. *Nepal Vaccine Support Decision Letter.*; 2014.
15. Nepal: WHO and UNICEF estimates of immunization coverage: 2016 revision. 2017. https://data.unicef.org/wp-content/uploads/country_profiles/Nepal/immunization_country_profiles/immunization_npl.pdf. Accessed April 6, 2018.
16. Shariff M, Deb M, Singh R. A study of diarrhoea among children in eastern Nepal with special reference to rotavirus. *Indian J Med Microbiol.* 2003;21(2):87-90. <http://www.ncbi.nlm.nih.gov/pubmed/17642988>. Accessed April 20, 2018.
17. Nepal Ministry of Health and Population Child Health Division. *National Immunization Program Comprehensive Multi-Year Plan 2068-2072 (2011-2016).*; 2011. http://dohs.gov.np/wp-content/uploads/chd/Immunization/cMYP_2012_2016_May_2011.pdf. Accessed April 20, 2018.
18. Khanal L, Dawson P, Silwal RC, Sharma J, Kc NP, Upreti SR. Exploration and innovation in addressing maternal, infant and neonatal mortality. *J Nepal Health Res Counc.* 2012;10(21):88-94.
19. *Nepal Health Sector Strategy: 2015-2020.* Kathmandu, Nepal; 2015. http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/nepal/nhss-english-book-final-4-21-2016.pdf. Accessed September 7, 2018.
20. Nepal Family Health Program Technical Brief #3 Overview of Community-Based Integrated Management of



- Childhood Illnesses. http://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=12142&lid=3. Accessed December 22, 2017.
21. Population Education and Health Research Center (as submitted to the Government of Nepal M of P& E. *Nepal Population Report 2016*. Kathmandu, Nepal; 2016. [http://www.mope.gov.np/downloadfile/Nepal Population Report 2016_1481259851.pdf](http://www.mope.gov.np/downloadfile/Nepal%20Population%20Report%202016_1481259851.pdf). Accessed December 12, 2018.
 22. World Bank Open Data (total population based on estimates from United Nations Population Division). <https://data.worldbank.org>. Published 2018. Accessed December 10, 2018.
 23. Kathmandu. Maternal and Child Health in Nepal: The Effects of Caste, Ethnicity, and Regional Identity Further Analysis of the 2011 Nepal Demographic and Health Survey. 2011. <https://www.dhsprogram.com/pubs/pdf/FA73/FA73.pdf>. Accessed December 11, 2017.
 24. *National Population and Housing Census 2011 (Village Development Committee/Municipality)*. Kathmandu, Nepal; 2012. [http://cbs.gov.np/image/data/Population/VDC-Municipality in detail/VDC_Municipality.pdf](http://cbs.gov.np/image/data/Population/VDC-Municipality%20in%20detail/VDC_Municipality.pdf). Accessed September 6, 2018.
 25. South Asia:: Nepal. The World Factbook — Central Intelligence Agency. <https://www.cia.gov/library/publications/the-world-factbook/geos/np.html>. Published 2018. Accessed October 4, 2018.
 26. Devkota B, Van Teijlingen ER. Understanding effects of armed conflict on health outcomes: the case of Nepal. doi:10.1186/1752-1505-4-20.
 27. *Nepal Demographic and Health Survey 2001*. Kathmandu, Nepal; 2002.
 28. *Nepal Demographic and Health Survey 2016*. Kathmandu, Nepal; 2017.
 29. Neonatal Mortality - United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). UNICEF Data. <https://data.unicef.org/topic/child-survival/under-five-mortality/>. Published 2018.
 30. United Nations Inter-agency Group for Child Mortality Estimation. *Levels & Trends in Child Mortality: Report 2017, Estimates Developed by the UN Inter-Agency Group for Child Mortality Estimation*. New York; 2017. https://www.unicef.org/publications/files/Child_Mortality_Report_2017.pdf. Accessed April 30, 2018.
 31. Institute for Health Metrics and Evaluation. Direct request for modeled estimates.
 32. Shiva Raj Mishra¹, Pratik Khanal, Deepak Kumar Karki, Per Kallestrup and UE. National health insurance policy in Nepal: challenges for implementation. doi:10.3402/gha.v8.28763.
 33. *Nepal Health Facility Survey 2015 - Final Report*. Kathmandu, Nepal; 2017.
 34. Nepal National Health Policy, 1991. [http://www.mohp.gov.np/app/webroot/upload/files/National Health Policy-1991.pdf](http://www.mohp.gov.np/app/webroot/upload/files/National%20Health%20Policy-1991.pdf). Accessed February 15, 2018.
 35. Dhakal R, Ratanawijitrasin S, Srithamrongsawat S. Addressing the challenges to health sector decentralization in Nepal: an inquiry into the policy and implementation processes. *Nepal Med Coll J*. 2009;11(3):152-157. <http://www.ncbi.nlm.nih.gov/pubmed/20334060>. Accessed October 3, 2018.
 36. Prasai SR. *Decentralization in Nepal: Two Decades of One Mission and Its Progress*. <https://www.ciesin.columbia.edu/decentralization/English/CaseStudies/Nepal2.pdf>. Accessed October 3, 2018.
 37. Nepal Health Facility Management Strengthening Program. *Nepal Fam Heal Progr II Tech Br #*. 2012;17. www.nfhp.org.np. Accessed February 15, 2018.
 38. USAID. *Nepal Family Health Program II Final Project Report*.; 2012. <http://nfhp.jsi.com/Docs/NFHPIIFinalProjectReport.pdf>. Accessed June 29, 2018.
 39. *Progress of the Health Sector: Report for Joint Annual Review 2018*. Kathmandu, Nepal; 2018. https://nhssp.org.np/Resources/JarReports/1.JAR_Report_Progress_of_the_Health_Sector_2018.pdf. Accessed September 6, 2018.
 40. Adhikari D, Leader T, Devi Prasad Prasai or. Overview of Public-Private Mix in Health Care Service Delivery in Nepal. *Minist Heal Popul Budg Anal*. 2010. https://www.rti.org/sites/default/files/resources/42_nepal_overviewpublicprivate.pdf. Accessed February 16, 2018.
 41. Acharya D, Paudel R, Gautam K, Gautam S, Upadhyaya T. Knowledge of Maternal and Newborn Care Among Primary Level Health Workers in Kapilvastu District of Nepal. *Ann Med Health Sci Res*. 2016;6(1):27-32. doi:10.4103/2141-9248.180266.
 42. *Annual Report: Department of Health Services 2071/72 (2014/2015)*. Kathmandu, Nepal; 2016. http://dohs.gov.np/wp-content/uploads/2016/06/Annual_Report_FY_2071_72.pdf. Accessed September 6,



- 2018.
43. *An Analytical Report on National Survey of Female Community Health Volunteers of Nepal.*; 2007. https://www.dhsprogram.com/pubs/pdf/FR181/FCHV_Nepal2007.pdf. Accessed February 2, 2018.
44. Justice J, Pokhrel S, Raj Sharma J, et al. TWENTY-FIVE YEAR REVIEW OF ASSISTANCE TO NEPAL'S HEALTH SECTOR. 2016. http://pdf.usaid.gov/pdf_docs/PA00MC7N.pdf. Accessed February 16, 2018.
45. Shrestha BR, Gauchan Y, Gautam GS, Baral P. *Nepal National Health Accounts, 2006/07 – 2008/09*. Kathmandu, Nepal; 2012. <http://nhsp.org.np/wp-content/uploads/2016/08/NNHA-III.pdf>. Accessed November 15, 2018.
46. Yasobant S, Vora KS, Shewade HD, et al. Utilization of the state led public private partnership program “Chiranjeevi Yojana” to promote facility births in Gujarat, India: a cross sectional community based study. *BMC Health Serv Res*. 2016;16(1). doi:10.1186/s12913-016-1510-7.
47. Education, Data by country - Reproductive, maternal, newborn and child health interventions (RMNCH) combined. Health Equity Monitor - Global Health Observatory data repository. <http://apps.who.int/gho/data/node.main.nHE-1583?lang=en>. Published 2018. Accessed December 12, 2018.
48. World Economic Forum. Global Gender Gap Report 2016: Nepal. <http://reports.weforum.org/global-gender-gap-report-2016/economies/#economy=NPL>. Published 2016. Accessed July 30, 2018.
49. Institute for Health Metrics and Evaluation (IHME). GBD Compare Data Visualization.
50. Under-five Mortality - United Nations Inter-agency Group for Child Mortality Estimation (UN IGME). UNICEF Data. <https://data.unicef.org/topic/child-survival/under-five-mortality/>. Published 2018. Accessed September 10, 2018.
51. WHO. Integrated Management of Childhood Illness (IMCI). WHO. http://www.who.int/maternal_child_adolescent/topics/child/imci/en/. Published 2017. Accessed December 20, 2017.
52. *Nepal Family Health Program Technical Brief #4: Innovations in Community-Based Integrated Management of Childhood Illnesses*. https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=12143&lid=3. Accessed July 12, 2018.
53. World Health Organization, Nepal Development Research Institute. Assessment of community based integrated management of neonatal and childhood illness program. 2017;(April).
54. Pandey MR, Daulaire NM, Starbuck ES, Houston RM, McPherson K. Reduction in total under-five mortality in western Nepal through community-based antimicrobial treatment of pneumonia. *Lancet (London, England)*. 1991;338(8773):993-997. doi:10.1016/0140-6736(91)91847-N.
55. *Revised WHO Classification and Treatment of Pneumonia in Children at Health Facilities: Evidence Summaries*. Geneva, Switzerland; 2014. http://apps.who.int/iris/bitstream/handle/10665/137319/9789241507813_eng.pdf;jsessionid=5FCF75AA01FC2D12CD60C5331FCC7DA9?sequence=1. Accessed October 3, 2018.
56. Ghimire M, Pradhan YV, Maskey MK. Community-based interventions for diarrhoeal diseases and acute respiratory infections in Nepal. *Bull World Heal Organ*. 2010;88:216-221. doi:10.2471/BLT.09.065649.
57. Nepal Child Survival Case Study. http://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=4178&lid=3. Accessed February 23, 2018.
58. *Nepal Demographic and Health Survey 1996*. Kathmandu, Nepal; 1997. <https://dhsprogram.com/pubs/pdf/FR78/FR78.pdf>. Accessed January 18, 2018.
59. Health, Population, Government, Nepal, Ramshahpath, Kathmandu. The Treatment of Childhood Illness in Nepal Further Analysis of the 2006 Nepal Demographic and Health Survey. 4423;722:977-1. <http://www.measuredhs.com>. Accessed June 28, 2018.
60. Jha N, Singh R, Baral D. Knowledge, attitude and practices of mothers regarding home management of acute diarrhoea in Sunsari, Nepal. *Nepal Med Coll J*. 2006;8(1):27-30. <http://www.ncbi.nlm.nih.gov/pubmed/16827086>. Accessed June 28, 2018.
61. Ansari M, Ibrahim MI, Hassali M, Shankar P, Koirala A, Thapa N. Mothers' beliefs and barriers about childhood diarrhea and its management in Morang district, Nepal. *BMC Res Notes*. 2012;5(1):576. doi:10.1186/1756-0500-5-576.
62. Ghimire PR, Agho KE, Renzaho AMN, Dibley M, Raynes-Greenow C. Association between health service use



- and diarrhoea management approach among caregivers of under-five children in Nepal. *PLoS One*. 2018;13(3):e0191988. doi:10.1371/journal.pone.0191988.
63. *Annual Report: Department of Health Services 2073/74 (2016/17)*. Kathmandu, Nepal; 2018. http://dohs.gov.np/wp-content/uploads/2018/04/Annual_Report_2073-74.pdf. Accessed July 29, 2018.
 64. World Health Organization, UNICEF. *WHO/UNICEF Joint Statement: Clinical Management of Acute Diarrhoea*.; 2004. https://www.unicef.org/publications/files/ENAcute_Diarrhoea_reprint.pdf. Accessed April 19, 2018.
 65. Mosites E, Hackleman R, Weum KLM, Pintye J, Manhart LE, Hawes SE. *Nepal Zinc Case Study*. Seattle, WA; 2012. [https://www.shopsplusproject.org/sites/default/files/resources/Nepal_Zinc Case Study_0.pdf](https://www.shopsplusproject.org/sites/default/files/resources/Nepal_Zinc_Case_Study_0.pdf). Accessed June 29, 2018.
 66. *Report of the XXII International Vitamin A Consultative Group Meeting: Vitamin A and the Common Agenda for Micronutrients*. Lima, Peru; 2005. http://ilsi.org/researchfoundation/wp-content/uploads/sites/5/2016/04/IVACG_vitaminA_and_the_common_agenda_for_micronutrients.pdf. Accessed June 29, 2018.
 67. MacDonald V, Mitchell S. *Introducing Zinc through the Private Sector in Nepal for the Treatment of Childhood Diarrhea: Results and Lessons Learned*. Bethesda, MD; 2009. https://www.shopsplusproject.org/sites/default/files/resources/5280_file_Nepal_Brief_FINAL.pdf. Accessed June 28, 2018.
 68. Wang W, MacDonald VM, Paudel M, Banke KK. National scale-up of zinc promotion in Nepal: results from a post-project population-based survey. *J Health Popul Nutr*. 2011;29(3):207-217. <http://www.ncbi.nlm.nih.gov/pubmed/21766556>. Accessed April 19, 2018.
 69. Wang W, MacDonald VM, Paudel M, Banke KK. National scale-up of zinc promotion in Nepal: results from a post-project population-based survey. *J Health Popul Nutr*. 2011;29(3):207-217. doi:10.3329/JHPN.V29I3.7868.
 70. *Review of Activities Undertaken by NFHP and Its Partners to Strengthen the Partnership between Community and Health Facilities*. Kathmandu, Nepal; 2007. http://nfhp.jsi.com/Res/Docs/review_intraction_comm-hf.pdf. Accessed November 15, 2018.
 71. Houston R, Acharya B. *Use of Zinc in the Management of Diarrhea: The Public Sector Experience in Nepal*.; 2011. https://www.shopsplusproject.org/sites/default/files/resources/Robin_Houston_zinc_and_diarrhoea_presentation-Final.pdf. Accessed June 29, 2018.
 72. *Introducing Zinc Through the Private Sector in Nepal for the Treatment of Childhood Diarrhea: Results and Lessons Learned*. Bethesda, Maryland; 2009. http://www.zinctaskforce.org/wp-content/uploads/2012/11/6_Nepal_Brief_FINAL.pdf. Accessed November 16, 2018.
 73. Mitchell S. *Getting to Know You: Building a Coordinated Public-Private Sector Strategy for Increasing Use of Zinc in Nepal*.; 2009. https://www.shopsplusproject.org/sites/default/files/resources/5329_file_Mitchell_Partnerships_FINAL_2.pdf. Accessed June 29, 2018.
 74. *Nepal Demographic and Health Survey 2006*. Kathmandu, Nepal; 2007. <http://www.measuredhs.com>.
 75. *Nepal Demographic and Health Survey 2011*. Kathmandu, Nepal; 2012. <http://www.measuredhs.com>.
 76. Pun SB, Pandey BD. Human rotavirus associated diarrhea and strain diversity in Nepal. *Nepal Med Coll J*. 2012;14(2):88-92. <http://www.ncbi.nlm.nih.gov/pubmed/23671953>. Accessed February 2, 2018.
 77. Pandey BD, Pun SB. Trends of rotavirus in Nepal. *Kathmandu Univ Med J (KUMJ)*. 9(33):32-35. <http://www.ncbi.nlm.nih.gov/pubmed/22610806>. Accessed February 2, 2018.
 78. Pun SB. Rotavirus infection: an unrecognised disease in Nepal. *Kathmandu Univ Med J (KUMJ)*. 8(29):135-140. <http://www.ncbi.nlm.nih.gov/pubmed/21209522>. Accessed February 2, 2018.
 79. Dhital S, Sherchand JB, Pokhrel BM, et al. Molecular epidemiology of Rotavirus causing diarrhea among children less than five years of age visiting national level children hospitals, Nepal. doi:10.1186/s12887-017-0858-0.
 80. Sherchand JB, Yokoo M, Sherchand O, Pant AR, Nakogomi O. Burden of Enteropathogens Associated Diarrheal Diseases in Children Hospital, Nepal. *Sci World*. 2010;7(7):71-75. doi:10.3126/sw.v7i7.3830.
 81. Rayamajhi A, Thapa A, Kumar M, et al. Preparing for rotavirus vaccine introduction – A retrospective assessment of the epidemiology of intussusception in children below 2 years of age in Nepal. *Vaccine*. November 2017. doi:10.1016/J.VACCINE.2017.11.022.



82. *Nepal Malaria Strategic Plan: 2014-2025*. Kathmandu, Nepal; 2014.
<http://www.edcd.gov.np/resources/download/nepal-malaria-strategic-plan-2014-2015>. Accessed September 10, 2018.
83. *Nepal Malaria Strategic Plan 2011-2016*. Kathmandu, Nepal; 2011.
<http://static1.1.sqspcdn.com/static/f/471029/20810332/1351638302043/Nepal+Strategic+Plan+2011-2016.pdf?token=nWYAdQ7Y9YMVX0ydfBODxHdOxFQ%3D>. Accessed February 28, 2018.
84. Dhimal M, Ahrens B, Kuch U. Malaria control in Nepal 1963–2012: challenges on the path towards elimination. doi:10.1186/1475-2875-13-241.
85. Trägård A, Shrestha IB. System-wide effects of Global Fund investments in Nepal. doi:10.1093/heapol/czq061.
86. Line B, Impact H, Sector P, Decentralization E. TRAC SUMMARY REPORT PSI DASHBOARD Nepal (2009): Malaria TRaC Study Evaluating LLIN Use among General Population and Children Under 5 Years of Age in 13 High-Risk Districts Sponsored by : Contacts : 2009:1-22.
87. Kakchapati S, Ardkaew J. Modeling of malaria incidence in nepal. *J Res Health Sci*. 2011;1(1):7-13.
88. Dhimal M, Ahrens B, Kuch U. Species composition, seasonal occurrence, habitat preference and altitudinal distribution of malaria and other disease vectors in eastern Nepal. *Parasit Vectors*. 2014;7(1):540. doi:10.1186/s13071-014-0540-4.
89. KC A, Nelin V, Raaijmakers H, Kim HJ, Singh C, Målqvist M. Increased immunization coverage addresses the equity gap in Nepal. *Bull World Health Organ*. 2017;95(4):261-269. doi:10.2471/BLT.16.178327.
90. Khanal S, Sedai TR, Choudary GR, et al. Progress Toward Measles Elimination — Nepal, 2007–2014. *MMWR Morb Mortal Wkly Rep*. 2016;65(8):206-210. doi:10.15585/mmwr.mm6508a3.
91. CDC. *Progress in Measles Control --- Nepal, 2000--2006*.; 2007.
<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5639a4.htm>. Accessed February 28, 2018.
92. Shah AS, Deloria Knoll M, Sharma PR, et al. Invasive Pneumococcal Disease in Kanti Children's Hospital, Nepal, as Observed by the South Asian Pneumococcal Alliance Network. *Clin Infect Dis*. 2009;48(s2):S123-S128. doi:10.1086/596490.
93. Gavi. *ADVANCE MARKET COMMITMENT FOR PNEUMOCOCCAL VACCINES Annual Report 1 January - 31 December 2016*.; 2016.
94. Hamaluba M, Kandasamy R, Upreti SR, et al. Comparison of two-dose priming plus 9-month booster with a standard three-dose priming schedule for a ten-valent pneumococcal conjugate vaccine in Nepalese infants: a randomised, controlled, open-label, non-inferiority trial. *Lancet Infect Dis*. 2015;15(4):405-414. doi:10.1016/S1473-3099(15)70007-1.
95. Nepal: WHO and UNICEF estimates of immunization coverage: 2016 revision. 2017.
http://www.who.int/immunization/monitoring_surveillance/data/npl.pdf. Accessed February 6, 2018.
96. Government of Nepal Ministry of Health & Population. Nepal: Application for Support to Immunization Services and New and Under-Used Vaccines. 2007. <https://www.gavi.org/country/nepal/documents/>.
97. Kathmandu U, J Williams NE, Lewis J, et al. Haemophilus influenzae Type b Carriage and Novel Bacterial Population Structure among Children in. *J Clin Microbiol*. 2011;49(4):1323-1330. doi:10.1128/JCM.02200-10.
98. The Government of Nepal. Annual Progress Report 2008-2009. 2009.
<https://www.gavi.org/country/nepal/documents/>.
99. Joint WHO-UNICEF Statement 2 WHO RECOMMENDS RECALL AND DESTRUCTION OF ALL LOTS OF SHAN5 VACCINE AS A PRECAUTIONARY MEASURE. 2010.
http://www.who.int/immunization_standards/vaccine_quality/who_unicef_joint_statement_Shan5_26apr10.pdf. Accessed April 6, 2018.
100. The Government of Nepal. GAVI Alliance Annual Progress Report 2010. 2011.
<https://www.gavi.org/country/nepal/documents/>.
101. *National Consolidated Guidelines on Strategic Information of HIV Response in Nepal*. Kathmandu, Nepal; 2017.
http://www.aidsdatahub.org/sites/default/files/publication/NCASC_Guidelines_on_Strategic_Information_of_HIV_Response_in_Nepal_2017.pdf.
102. *National HIV Testing and Treatment Guidelines 2017*. Kathmandu, Nepal; 2017.
[http://www.searo.who.int/nepal/documents/communicable_diseases/national_hiv_testing_and_treatment_guidelines_2017_\(23june2017\).pdf](http://www.searo.who.int/nepal/documents/communicable_diseases/national_hiv_testing_and_treatment_guidelines_2017_(23june2017).pdf).



103. *National Guidelines for Prevention of Mother-to-Child Transmission of HIV in Nepal: Fourth Edition.* Kathmandu, Nepal; 2011. <http://nnfsp.gov.np/PublicationFiles/153e0066-e45b-424b-a836-f0e74af3485e.pdf>.
104. Shrestha M, Chaudhary P, Tumbhahangphe M, Poudel J. Prevention of Mother to Child Transmission (PMTCT) Program at Paropakar Maternity and Women's Hospital: A Review. *Nepal J Obstet Gynaecol.* 2014;7(2):25-28. doi:10.3126/njog.v7i2.11138.
105. *Annual Report: Department of Health Services 2067/68 (2010/2011).* Kathmandu, Nepal; 2012. http://dohs.gov.np/wp-content/uploads/2014/04/Annual_report_2067_68_final.pdf. Accessed February 2, 2018.
106. *2011 United Nations General Assembly Political Declaration on HIV / AIDS: 2013 Mid-Term Review of the 10 Targets and Elimination Commitments - Nepal Country Report.* Kathmandu, Nepal; 2013. <https://reliefweb.int/sites/reliefweb.int/files/resources/mid-term-review.pdf>.
107. *Country Progress Report - Nepal.* Kathmandu, Nepal; 2015. http://www.unaids.org/sites/default/files/country/documents/NPL_narrative_report_2015.pdf.
108. *Factsheet 5: Prevention of Mother to Child Transmission (PMTCT) in Nepal, as of Asar 2074 (July 2017).* Kathmandu, Nepal; 2017. http://www.aidsdatahub.org/sites/default/files/publication/NCASC_Factsheet_5_PMTCT_2017.pdf.
109. *Annual Progress Report of Health Sector Fiscal Year 2015/16.* Kathmandu, Nepal; 2017. http://www.nationalplanningcycles.org/sites/default/files/planning_cycle_repository/nepal/nepal_jar_2015-2016_july07.pdf. Accessed January 16, 2018.
110. Akseer N, Subedi RK, Conway K, et al. *Exemplars in Global Health Stunting Nepal, 2018.*; 2018. [link not available yet].
111. *Nutritional Survey Report: Bardiya District, Nepal, May/June 2008.*; 2008.
112. *Evaluation of Community Management of Acute Malnutrition Community (CMAM): Nepal Country Case Study.* New York, New York; 2012. https://www.unicef.org/evaldatabase/files/Nepal_CMAM_formatted_final_draft_Geneve_version_26sept2012.pdf. Accessed September 11, 2018.
113. *Final Evaluation of Concern Worldwide / MoHP Community-Based Management of Acute Malnutrition (CMAM) Pilot Programme, Bardiya District, Nepal.*; 2010. https://www.concern.net/sites/default/files/resource/2010/04/4447-evaluation_cmam_nepal.pdf.
114. *NEPAL Integrated Management of Acute Malnutrition (IMAM) Guideline Draft 7: 8 February 2016.*; 2016. [http://www.chd.gov.np/downloads/1 Nepal IMAM Guideline.pdf](http://www.chd.gov.np/downloads/1%20Nepal%20IMAM%20Guideline.pdf).
115. WHO/WFP/SCN/UNICEF. *Community-Based Management of Severe Acute Malnutrition: A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund.*; 2007. doi:10.7196/SAMJnew.7782.
116. *Community Based Management of Acute Malnutrition (CMAM) Program Review and Advocacy Workshop - Workshop Report: Summary.* Saptari, Nepal; 2014. <http://www.nnfsp.gov.np/PublicationFiles/a04aecd36d0-4ae6-ad73-3165d612c0bf.pdf>. Accessed March 27, 2019.
117. Kunwar M. Trends of Community-based Management of Acute Malnutrition (CMAM) Performance in Nepal 2009-2014. 2016. <https://cdr.lib.unc.edu/.../uuid:0b09cbda-1625-4f02-af95-9eba62fe8f72?dl=true%0A>.
118. *Learning From Nepal's Multi-Sectoral Nutritional Plan Implementation in Three Priority Districts: "Pathways to Better Nutrition" Study - Summary of District Findings.* Arlington, Virginia; 2016. https://www.spring-nutrition.org/sites/default/files/publications/briefs/nepal-pbn-brief_web-tagged_1.pdf#inbox/_blank. Accessed September 11, 2018.
119. Gottlieb J. *Case 4: Reducing Child Mortality With Vitamin A in Nepal.*, 8 (2007). https://www.cgdev.org/doc/millions/MS_case_4.pdf. Accessed September 11, 2018.
120. *Nepal Family Health Program Technical Brief #2: Vitamin A Supplements for Children.* https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=12141&lid=3. Accessed September 11, 2018.
121. Thapa S. High and Equitable Coverage of Vitamin A Supplementation Program in Nepal. *Community Med Heal Educ Thapa J Community Med Heal Educ.* 2014;4. doi:10.4172/2161-0711.1000272.
122. *National Vitamin A Programme - Nepal (2002).* 2002. <https://www.unicef.org/french/evaluation/.../nepal2002nationalvitaminaprogramme.doc>.



123. Thapa S, Choe MK, Retherford RD. Effects of vitamin A supplementation on child mortality: evidence from Nepal's 2001 Demographic and Health Survey. *Trop Med Int Heal*. 2005;10(8):782-789. doi:10.1111/j.1365-3156.2005.01448.x.
124. Houston R. *Why They Work: An Analysis of Three Successful Public Health Interventions. Vitamin A Supplementation Programs in Ghana, Nepal, and Zambia - Unpublished Report*. Arlington, Virginia; 2003.
125. *National Safe Motherhood and Newborn Health - Long Term Plan (2006-2017)*. Kathmandu, Nepal; 2006.
126. Newborn Health and Programs in Nepal A Rapid Assessment of Newborn Health in Nepal. 2007. http://www.healthynewbornnetwork.org/hnn-content/uploads/Nepal_Newborn_Assessment-2007.pdf. Accessed May 7, 2018.
127. Collaborators LB of D under-5 mortality. Unpublished estimates from the Local Burden of Disease study. 2018.
128. Black RE, Victora CG, Bhutta ZA, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013;382. https://ac-els-cdn-com.ezp-prod1.hul.harvard.edu/S014067361360937X/1-s2.0-S014067361360937X-main.pdf?_tid=cbc7275e-c52e-4e37-a4bd-b669644f70ec&acdnat=1542817191_0f702d258e984f344b8c3cf6c679a5e4. Accessed November 21, 2018.
129. *Health Area Brief: Maternal Anemia*. Washington, District of Columbia; 2014. doi:10.1016/S0140-6736(13)60993-9.
130. Pokharel RK, Houston R, Harvey P, et al. *Nepal Nutrition Assessment and Gap Analysis: Final Report*.; 2009. https://pdf.usaid.gov/pdf_docs/pnaea792.pdf. Accessed November 21, 2018.
131. National Planning Commission. *Multi-Sector Nutrition Plan For Accelerated Reduction of Maternal and Child Undernutrition in Nepal 2013-2017*.; 2012. <http://www.nnfs.gov.np/PublicationFiles/e3ccdbda-e8ab-4b20-80c2-3f65e19e0fd4.pdf>. Accessed September 6, 2018.
132. Marasini MK. 22nd SUN Movement Country Network Meeting: Country Presentation Nepal. 2016:15. <http://scalingupnutrition.org/wp-content/uploads/2015/12/Nepal-Presentation-January-2016-Teleconference.pdf>. Accessed November 21, 2018.
133. Cunningham K, Headey D, Singh A, Karmacharya C, Rana PP. Maternal and child nutrition in Nepal: examining drivers of progress from the mid-1990s to 2010s. (Special Issue: Stories of change in nutrition.). *Glob Food Sec*. 2017. internal-pdf://228.60.152.103/Cunningham-2017-Maternal and child nutrition i.pdf.
134. Press release: Government of Nepal launches Multisector Nutrition Plan II (2018-2022). 2017:2. https://www.unicef.org/eu/css/Press_Release_-_English-MSNP_II_Launch-final.pdf. Accessed November 21, 2018.
135. Bhatt H, Tiwari S, Ensor T, Ghimire DR, Gavidia T. Contribution of Nepal's Free Delivery Care Policies in Improving Utilisation of Maternal Health Services. *Int J Heal Policy Manag*. 2018;1-11. doi:10.15171/ijhpm.2018.01.
136. National Policy on Skilled Birth Attendants. <http://www.moh.gov.np/app/webroot/upload/files/Safe Motherhood and SBA Policy.pdf>. Accessed May 2, 2018.
137. Borghi J, Ensor T, Neupane BD, Tiwari S. Financial implications of skilled attendance at delivery in Nepal. *Trop Med Int Heal*. 2006;11(2):228-237. doi:10.1111/j.1365-3156.2005.01546.x.
138. Ensor T, Clapham S, Prasai DP. What drives health policy formulation: insights from the Nepal maternity incentive scheme? *Health Policy*. 2009;90(2-3):247-253. doi:10.1016/j.healthpol.2008.06.009.
139. UNICEF, State of the World's Children, Childinfo and D and HS. Births attended by skilled health staff (% of total). World Bank. <https://data.worldbank.org/indicator/SH.STA.BRTC.ZS?locations=8S>. Published 2018. Accessed October 3, 2018.
140. Ensor T, Bhatt H, Tiwari S. Incentivizing universal safe delivery in Nepal: 10years of experience. *Health Policy Plan*. 2017;32(8):1185-1192. doi:10.1093/heapol/czx070.
141. Witter S, Khadka S, Nath H, Tiwari S. The national free delivery policy in Nepal: early evidence of its effects on health facilities. *Health Policy Plan*. 2011;26:84-91. doi:10.1093/heapol/czr066.
142. Powell-Jackson T, Morrison J, Tiwari S, Dev Neupane B, Costello AM. The experiences of districts in implementing a national incentive programme to promote safe delivery in Nepal. *BMC Heal Serv Res BMC Heal Serv Res*. 2009;9(9). doi:10.1186/1472-6963-9-97.
143. Powell-Jackson T, Hanson K. Financial incentives for maternal health: Impact of a national programme in Nepal. *J Health Econ*. 2012;31(1):271-284. doi:10.1016/J.JHEALECO.2011.10.010.



144. Witter S, Khadka S, Nath H, Tiwari S. The national free delivery policy in Nepal: early evidence of its effects on health facilities. *Health Policy Plan*. 2011;26:84-91. doi:10.1093/heapol/czr066.
145. Shrestha SD, Rajendra PK, Shrestha N. Feasibility Study on Establishing Maternity Waiting Homs in Remote Areas of Nepal. *SEARO Reg Heal Forum*. 2007;11(2):33-38.
http://apps.searo.who.int/PDS_DOCS/B1498.pdf#page=39. Accessed July 18, 2018.
146. Senendra Raj Upreti A, Baral S, Lamichhane P, et al. *Nepal Health Sector Support Programme (NHSSP) Ministry of Health and Population Ramshahpath*. <http://nhsp.org.np/wp-content/uploads/2016/08/DSF-Rapid-Assessment-7-Final.pdf>. Accessed July 29, 2018.
147. Devkota M, Shakya G, Pratap KC N, et al. *Readiness of Comprehensive Emergency Obstetric and Neonatal Care in Nepal*. Kathmandu, Nepal; 2011.
http://www.nhssp.org.np/NHSSP_Archives/ehcs/CEONC_readiness_december2011.pdf. Accessed September 11, 2018.
148. A PYUSKNTKSPSPDJADASPDPKSBAKC, Pradhan Y V, Upreti SR, et al. Fitting Community Based Newborn Care Package into the health systems of Nepal. *J Nepal Heal Res Counc*. 2011;9(2):119-128.
149. KC A, Thapa K, Pradhan Y V, et al. Developing Community-Based Intervention Strategies and Package to Save Newborns in Nepal. *J Nepal Health Res Counc*. 2011;0(0).
150. Community Based Newborn Care Program, Nepal (CB-NCP). Healthy Newborn Network.
<https://www.healthynewbornnetwork.org/partner/community-based-newborn-care-program-nepal-cb-ncp/>. Published 2018. Accessed September 20, 2018.
151. *Community-Based Newborn Care Package (Unofficial Translation)*. Arlington, Virginia www.thelancet.com,. Accessed September 20, 2018.
152. Poudel DC, Acharya B, Pant S, Paudel D, Pradhan Y V. Developing, piloting and scaling-up of Nepal's neonatal care program. *J Nepal Health Res Counc*. 2012;10(2):95-100.
<http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=medl&NEWS=N&AN=23034369%5Cnhttp://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=emed11&NEWS=N&AN=23034369>.
153. Paudel D, Shrestha IB, Siebeck M, Rehfuess E. Impact of the community-based newborn care package in Nepal: a quasi-experimental evaluation. *BMJ Open*. 2017;7(10):e015285. doi:10.1136/bmjopen-2016-015285.
154. Acharya Y. Effects of a community-based neonatal care package program. *Health Policy Plan*. 2018;33(4):592-601. doi:10.1093/heapol/czy021.
155. A Concept note and Terms of Reference on Assessment of Community-Based Integrated Management of Neonatal and Childhood Illness (CB-IMNCI) Program.
http://www.searo.who.int/nepal/mediacentre/concept_note_tor_on_cbimnci_assessment.pdf. Accessed May 8, 2018.
156. Lamichhane P, Sharma A, Mahal A. Impact evaluation of free delivery care on maternal health service utilisation and neonatal health in Nepal. *Health Policy Plan*. 2017;32(10):1427-1436.
doi:10.1093/heapol/czx124.
157. KC A, Wrammert J, Nelin V, et al. Evaluation of Helping Babies Breathe Quality Improvement Cycle (HBB-QIC) on retention of neonatal resuscitation skills six months after training in Nepal. *BMC Pediatr*. 2017;17(1):103.
doi:10.1186/s12887-017-0853-5.
158. *Reaching the Every Newborn National 2020 Milestones: Country Progress, Plans and Moving Forward*. Geneva, Switzerland; 2017. <http://apps.who.int/iris/bitstream/10665/255719/1/9789241512619-eng.pdf>. Accessed December 31, 2017.
159. STATE OF THE WORLD'S NEWBORNS: NEPAL SAVING NEWBORN LIVES SAVE THE CHILDREN. 2002.
<https://www.healthynewbornnetwork.org/hnn-content/uploads/State-of-the-Worlds-Newborns-Nepal-2002.pdf>. Accessed February 9, 2018.
160. Tielsch JM, Darmstadt GL, Mullany LC, et al. Impact of newborn skin-cleansing with chlorhexidine on neonatal mortality in southern Nepal: a community-based, cluster-randomized trial. *Pediatrics*. 2007;119(2):e330-40. doi:10.1542/peds.2006-1192.
161. Mullany LC, Darmstadt GL, Khatry SK, et al. Topical applications of chlorhexidine to the umbilical cord for prevention of omphalitis and neonatal mortality in southern Nepal: a community-based, cluster-randomised trial. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2367116/pdf/nihms-44680.pdf>. Accessed January 2, 2018.



162. JSI Research & Training Institute. *Introducing Chlorhexidine in Nepal*.; 2013. https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=13822&lid=3. Accessed July 31, 2018.
163. JSI Research & Training Institute. *Scaling-Up the Use of Chlorhexidine for Umbilical Cord Care: Nepal's Experience*.; 2017. <https://www.healthynewbornnetwork.org/hnn-content/uploads/Scaling-Up-Chlorhexidine-Nepal-Experience.pdf>. Accessed July 31, 2018.
164. Ministry of Health and Population Nepal, Partnership for Maternal, Newborn & Child Health, WHO WB and A for HP and SR. *Success Factors for Women's and Children's Health: Nepal*. Geneva, Switzerland; 2014. http://www.who.int/pmnch/knowledge/publications/nepal_country_report.pdf. Accessed September 6, 2018.
165. Khatri RB, Mishra SR, Khanal V. Female Community Health Volunteers in Community-Based Health Programs of Nepal: Future Perspective. *Front Public Heal*. 2017;5(July):1-4. doi:10.3389/fpubh.2017.00181.
166. Nepal's Female Community Health Volunteer Program. Toolkits by K4Health. <https://www.k4health.org/toolkits/country-experiences-chw-programs/nepals-female-community-health-volunteer-programs>. Accessed September 6, 2018.
167. *National Female Community Health Volunteer Program Strategy - Unofficial Translation*. Kathmandu, Nepal; 2010. https://www.advancingpartners.org/sites/default/files/nepal_national_female_chv_program_strategy.pdf. Accessed September 6, 2018.
168. *National Female Community Health Volunteer Program Revised Strategy*. http://mohp.gov.np/downloads/FCHV_Strategy.pdf. Accessed November 22, 2018.
169. *Assessment of the Community-Based Newborn Care Package*. Kathmandu, Nepal; 2012. http://dohs.gov.np/wp-content/uploads/chd/Newborn/CBNCP_Assessment_Report_Feb_2014.pdf.
170. KC A, Bhandari A, Pradhan Y V, et al. State of maternal, newborn and child health programmes in Nepal: what may a continuum of care model mean for more effective and efficient service delivery? *J Nepal Health Res Coun*. 2011;9(2):92-100. <http://www.ncbi.nlm.nih.gov/pubmed/22929837>.
171. Ministry of Health and Population. *Nepal Health Service Act, 1997 (Amended 1999, 2001, 2001, 2006, 2010)*. Nepal; 1997:1-60. <http://www.dda.gov.np/download/nepal-health-service-act-2053-1997.pdf>.
172. *Female Community Health Volunteer - National Survey Report 2014*. Kathmandu, Nepal; 2014. https://www.advancingpartners.org/sites/default/files/sites/default/files/resources/fchv_2014_national_survey_report_a4_final_508_0.pdf. Accessed February 15, 2018.
173. *Nepal Family Health Program II Technical Brief # 1 - Female Community Health Volunteers*.; 2012. <http://nfhp.jsi.com/Res/Docs/TB1-FCHV.pdf>. Accessed September 7, 2018.
174. *Annual Report: Department of Health Services 2066/2067 (2009/2010)*. Kathmandu, Nepal; 2011. http://dohs.gov.np/wp-content/uploads/2014/04/Annual_Report_2066_67.pdf.
175. *Annual Report: Department of Health Services 2068/2069 (2011/2012)*. Kathmandu, Nepal; 2013. <http://www.nnfs.gov.np/PublicationFiles/ac2400f4-ea6b-4054-ad9a-e44e19d14854.pdf>.
176. Khatri R, Mishra S, Khanal V, Gelal K, Neupane S. Newborn Health interventions and challenges for implementation in Nepal. *Front Public Heal*. 2016;4:7. doi:10.3389/fpubh.2016.00015.
177. Miyaguchi M, Yasuoka J, Kumar Poudyal A, Chandra Silwal R, Jimba M. Female community health volunteers service utilization for childhood illness-improving quality of health services only is not enough: a cross-sectional study in mid-western region, Nepal. *BMC Health Serv Res*. 2014;14(383). doi:10.1186/1472-6963-14-383.
178. Kathmandu. Nepal Second Long Term Health Plan 1997-2017. 1997. <http://www.mohp.gov.np/app/webroot/upload/files/Second Long Term Health Plan.pdf>. Accessed March 7, 2018.
179. Nepal National Health Policy 2014. 2014. <http://nhsp.org.np/wp-content/uploads/2016/08/New-health-policy-2014-Unofficial-translation.pdf>. Accessed January 8, 2018.
180. Samuels F, Amaya AB, Balabanova D. Drivers of health system strengthening: Learning from implementation of maternal and child health programmes in Mozambique, Nepal and Rwanda. *Health Policy Plan*. 2017;32(7):1015-1031. doi:10.1093/heapol/czx037.
181. Dev R. Topographical Differences of Infant Mortality in Nepal: Demographic and Health Survey 2011. 2014. https://digital.lib.washington.edu/researchworks/bitstream/handle/1773/26864/Dev_washington_02500_1



- 3266.pdf?sequence=1. Accessed September 7, 2018.
182. *Health Financing Profile 2017: Nepal*.; 2017. <http://apps.who.int/iris/bitstream/handle/10665/259643/HFP-NEP.pdf?sequence=1&isAllowed=y>. Accessed December 10, 2018.
 183. Thapa S, Acharya S. Remittances and Household Expenditure in Nepal: Evidence from Cross-Section Data. *Economies*. 2017;5(2):16. doi:10.3390/economies5020016.
 184. Chezum B, Bansak C, Giri A. Are Remittances Good for Your Health? Remittances and Nepal's National Healthcare Policy. *East Econ J*. 2018;44(4):594-615. doi:10.1057/s41302-018-0106-9.
 185. Dawson P, Pradhan Y, Houston R, et al. From research to national expansion: 20 years' experience of community-based management of childhood pneumonia in Nepal Lessons from the field. *Bull World Health Organ*. 2008;86(5). doi:10.2471/BLT.07.047688.
 186. Khanal S, Sharma J, GC VS, et al. Community health workers can identify and manage possible infections in neonates and young infants: MINI--a model from Nepal. *J Health Popul Nutr*. 2011;29(3):255-264. <http://www.ncbi.nlm.nih.gov/pubmed/21766561>. Accessed May 8, 2018.
 187. Sharma J, Aryal A, Thapa GK. Envisioning a high-quality health system in Nepal: if not now, when? *Lancet*. 2018;6. doi:10.1016/S2214-109X(18)30322-X.
 188. Giri A, Khatiwada P, Shrestha B, Chettri RK. Perceptions of government knowledge and control over contributions of aid organizations and INGOs to health in Nepal: a qualitative study. *Global Health*. 2013;9. <http://www.globalizationandhealth.com/content/9/1/1>. Accessed March 14, 2018.
 189. Yang H, Acharya SP, Liu P, Guo Y. Development assistance for health given to Nepal by China and India: a comparative study. *Global Health*. 2014;10(1):76. doi:10.1186/s12992-014-0076-6.
 190. RTI International. *The Sector-Wide Approach in the Health Sector: Achievements and Lessons Learned*. Research Triangle Park, NC, USA; 2010. www.hsrsp.org. Accessed July 30, 2018.
 191. Hussein J, Bell J, Ilang MD, Mesko N, Amery J, Graham W. An Appraisal of the Maternal Mortality Decline in Nepal. <http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0019898&type=printable>. Accessed January 25, 2018.
 192. Bhadra C. *Review of the Implementation of the Beijing Platform for Action and the Outcome Documents of the Twenty-Third Special Session of the General Assembly*.; 2004. <http://www.un.org/womenwatch/daw/Review/responses/NEPAL-English.pdf>. Accessed September 7, 2018.
 193. Acharya DR, Bell JS, Simkhada P, van Teijlingen ER, Regmi PR. Women's autonomy in household decision-making: a demographic study in Nepal. *Reprod Health*. 2010;7(1):15-26. doi:10.1186/1742-4755-7-15.
 194. Central Bureau of Statistics. *Nepal Multiple Indicator Cluster Survey 2014, Final Report*. Kathmandu, Nepal; 2015. https://mics-surveys-prod.s3.amazonaws.com/MICS5/South Asia/Nepal/2014/Final/Nepal 2014 MICS_English.pdf. Accessed July 31, 2018.
 195. Proportion of seats held by women in national parliaments (%) - Nepal. World Bank Data. <https://data.worldbank.org/indicator/SG.GEN.PARL.ZS?locations=NP>. Published 2018.
 196. Wu W-J, Maru S, Regmi K, Basnett I. Abortion Care in Nepal, 15 Years after Legalization: Gaps in Access, Equity, and Quality. *Health Hum Rights*. 2017;19(1):221-230. <https://cdn2.sph.harvard.edu/wp-content/uploads/sites/13/2017/06/Basnett.pdf>. Accessed July 31, 2018.
 197. *National Review on the Implementation of the Beijing Declaration and Platform for Action (1995) and the Outcomes of the Twenty-Third Special Session of the General Assembly (2000)*.; 2014. https://sustainabledevelopment.un.org/content/documents/13142Nepal_review_Beijing20.pdf. Accessed March 27, 2019.
 198. *Implementation Completion and Results Report - Second Rural Water Supply and Sanitation Project - Nepal*.; 2013. <http://documents.worldbank.org/curated/en/375231468124161970/pdf/ICR15650P071280IC0disclosed03010130.pdf>. Accessed September 7, 2018.
 199. Adhikari S, Shrestha NL. School Led Total Sanitation: A successful model to promote school and community sanitation and hygiene in Nepal. In: James Wicken, Joep Verhagen, Christine Sijbesma, Carmen Da Silva PR, ed. *Beyond Construction: Use For All*. WaterAid; IRC International Water and Sanitation Centre; 2008:113-125. <https://nl.ircwash.org/sites/default/files/Adhikari-2008-School.pdf>. Accessed September 7, 2018.
 200. *Nepal Millennium Development Goals: Progress Report 2013*. Kathmandu, Nepal; 2013. https://www.npc.gov.np/images/category/Nepal_MDG_2013.pdf. Accessed September 7, 2018.
 201. *Tenth Plan (2002-2007): His Majesty's Government, National Planning Commission, Nepal - Unofficial*



- Translation*. Kathmandu, Nepal; 2002. https://www.npc.gov.np/images/category/10th_eng.pdf. Accessed September 7, 2018.
202. Karn SK. *Community Led Total Sanitation (CLTS) An Approach; Empowering Healthy Living Habits: Documentation of CLTS Program in Rautahat/Bara 2007*. Birgunj, Nepal; 2007. http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/CLTS_documentation_report_final.pdf. Accessed September 7, 2018.
 203. *Evaluation of the WASH Sector Strategy "Community Approaches to Total Sanitation": Nepal - Country Visit Report.*; 2013. https://www.unicef.org/evaldatabase/files/CATS_Evaluation_NEPAL_Country_Report_FINAL.pdf. Accessed September 7, 2018.
 204. Shrestha A, Sharma S, Gerold J, et al. Water Quality, Sanitation, and Hygiene Conditions in Schools and Households in Dolakha and Ramechhap Districts, Nepal: Results from A Cross-Sectional Survey. *Int J Environ Res Public Heal Artic.* 2017;14(89). doi:10.3390/ijerph14010089.
 205. *Nepal and the Millennium Development Goals: Final Status Report 2000-2015*. Kathmandu, Nepal; 2016. [http://www.np.undp.org/content/dam/nepal/docs/reports/millennium development goals/MDG-Status-Report-2016_.pdf](http://www.np.undp.org/content/dam/nepal/docs/reports/millennium%20development%20goals/MDG-Status-Report-2016_.pdf). Accessed September 7, 2018.
 206. El Arifeen S, Masanja H, Ehsanur Rahman A. Child mortality: the challenge for India and the world. *Lancet.* 2017;390. doi:10.1016/S0140-6736(17)32469-8.
 207. Gaglio B, Shoup JA, Glasgow RE. The RE-AIM Framework: A Systematic Review of Use Over Time. *Am J Public Health.* 2013;103(6):e38-46. doi:10.2105/AJPH.2013.301299.
 208. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci.* 2009;4(1):50. doi:10.1186/1748-5908-4-50.

APPENDIX A

EXEMPLARS IN UNDER-5 MORTALITY METHODOLOGY AND FRAMEWORK

The University of Global Health Equity is working with the team at bgC3 to explore approaches to better understand the successes of countries in reducing under-5 mortality (U5M). This work is initially designed with two aims: 1. Developing and testing an implementation framework and mixed methods approach to understand the success of these countries and 2. Extracting actionable knowledge focused on implementation strategies and key contextual factors to inform other countries working towards the same goal. The scope of mortality was limited to amenable causes of death - those which are potentially preventable with a stronger and higher quality health care system. The work was divided into a number of activities. These included 1) identifying evidence-based interventions (EBIs) in use in LMICs; and 2) understanding how the evidence-based interventions implemented by a country were I through both existing publicly available sources and primary key informant interviews. **The work was guided by the development of a framework which was informed by a number of existing frameworks in use for U5M (e.g. Countdown 2015, WHO) and from existing implementation science frameworks (see below).**

Identifying evidence-based interventions to reduce U5M in LMICs

The initial work included identifying EBIs found to directly reduce U5M, dividing the work between those targeting the neonatal period (birth to 28 days) and the infant and child period (28 days to 4 years). This work included literature review, discussions with experts in the area and revisions with them as the work progressed. We focused on those interventions that were relevant to resource-constrained settings, those that were directly related to preventing potential life-threatening conditions (e.g. vaccinations, safe birth practices, insecticide treated nets), and those treating illness or other complications (e.g. antibiotics, antimalarial medication, neonatal resuscitation). We included interventions that were at the individual process level (e.g. administering the right antibiotic and the right time) as well as those targeting inputs (e.g. development of NICUs) and systems needed to deliver the EBIs meeting the definitions of quality including effectiveness, safety, timeliness and equity (e.g. community health workers). For neonatal mortality we also expanded to a limited set of prenatal and intrapartum interventions proven to reduce neonatal death. We did not focus on those interventions that resulted in reductions in stillbirths, as those are not included in the assessment of U5M rates. This was driven in part by the changing epidemiology of neonatal causes of death seen in some countries, with low birth weight (LBW) and prematurity increasing in importance in causes of mortality.^{206 g}

^g IHME U5 Paper

Table 32: Infant and Child Under-5 Mortality Evidence Based Interventions

Cause of Death	Evidence-based interventions	
Lower respiratory infections	Antibiotic treatment	
	Vaccination: PCV	
	Vaccination: Hib	
	Community-based management	
	Facility-based management	
Diarrheal diseases	Oral rehydration therapy	
	Zinc supplementation	
	Vaccination: Rotavirus	
	Community-based management	
	Facility-based management	
Malaria	Antimalarial combination therapy	
	Rapid diagnostic testing	
	Insecticide-treated nets	
	Indoor residual spray	
	Intermittent preventative therapy for high-risk groups	
	Community-based management	
	Facility-based management	
Measles	Vaccination: Measles	
	Vitamin A supplementation (prior to vaccination)	
Malnutrition	Exclusive breastfeeding for 6 months	
	Continued breastfeeding and complementary feeding after 6 months	
	Vitamin A supplementation	
	Management of severe acute malnutrition (ready-to-use food, rehydration, antibiotics)	
HIV	Antiretroviral treatment for infants and children	
	HIV testing of children born to HIV+ mothers	
	Prevention of mother-to-child transmission	Early diagnosis of pregnant women (or pre-pregnancy)
		PMTCT treatment for mothers* and post-partum to exposed infants
		Elective C-section for untreated HIV+ mothers**; replacement feeding**
		Antiretroviral treatment for mother for life as prevention (started in 2012)
Meningitis	Exclusive breast feeding	
	Vaccination: PCV meningococcal	
	Vaccination: Hib	
	Vaccination: Meningococcal	
	Antibiotic treatment	
Other vaccine preventable diseases	Chemoprophylaxis during acute outbreaks	
	Vaccination: Tetanus	
	Vaccination: Diphtheria	
	Vaccination: Pertussis	
	Vaccination: Polio	

* No longer recommended (PMTCT versus ART for life)

**No longer recommended for women on ART with suppressed VL



Table 33: Neonatal Mortality Evidence-Based Interventions

Period of risk	EBI	
Preconception	Folic acid supplementation	
Antenatal	Tetanus vaccination	
	Malaria prevention and treatment	Intermittent presumptive treatment ITNs
	Iodine supplementation (in endemic iodine deficient settings)	
	4 or more antenatal visits (ANC4)	
	Prevention and treatment of preeclampsia and eclampsia	Calcium supplementation*
		Low-dose aspirin for high-risk women*
		Antihypertensive treatment for severe hypertension
		Magnesium sulfate Early delivery
Intrapartum	Antibiotics for PPROM	
	Corticosteroids for preterm labor	
	C-section for breech or obstructed labor	
	Active management of delivery (including partograph)	
	Clean delivery practices (incl. clean cord-cutting)	
	Trained birth attendant	
	Facility-based delivery	
	Basic emergency obstetric and newborn care (BEmONC)	
	Comprehensive emergency obstetric and newborn care (CEmONC)	
	Timely transport for higher level care for mother	
Postnatal	Newborn resuscitation	
	Immediate breastfeeding	
	Prevention and management of hypothermia	Immediate drying and wrapping
		Delayed bathing
		Skin-to-skin
		Baby warming
	Kangaroo care for LBW/prematurity	
	Timely transport for higher level care for mother	
	Post-partum visits to identify danger signs and provide active referral	
	Antibiotics for suspected or confirmed infection	
	Surfactant therapy for RDS and prematurity	
	Neonatal intensive care units (equipped, trained staff, standards and protocols established and followed)	

* Further assessment needed in literature review

Both the desk review and the primary research are informed by an implementation science framework informed by a number of existing frameworks and designed specifically for this project. While we are often able to identify policies and evidence-based interventions chosen by a country to reduce U5M, the key lessons in how these were chosen, adapted, implemented and sustained are often missing from available published or gray literature. Because the same policies and interventions brought different results in different countries, implementation science offers important tools for analyzing and understanding how to think more holistically about how and why countries were able to reduce U5M and from where lessons in replication can be drawn. To guide the overall work, we developed a framework to understand the contribution of contextual factors and the different levels of actors involved: global, national, ministry, subnational, facility, and community.

We reviewed existing implementation science frameworks and have combined a number of commonly applied ones as well as insights from work underway by Dr. Binagwaho to guide how we interpret existing evidence and to design tools for primary research.

The primary frameworks and implementation science resources we drew from include:

1. **Exploration, Preparation, Implementation, Sustainment (EPIS):**⁵ This framework walks through four key steps of the implementation process needed to achieve long-term change-starting. Within each phase there are important contextual factors which may influence success.

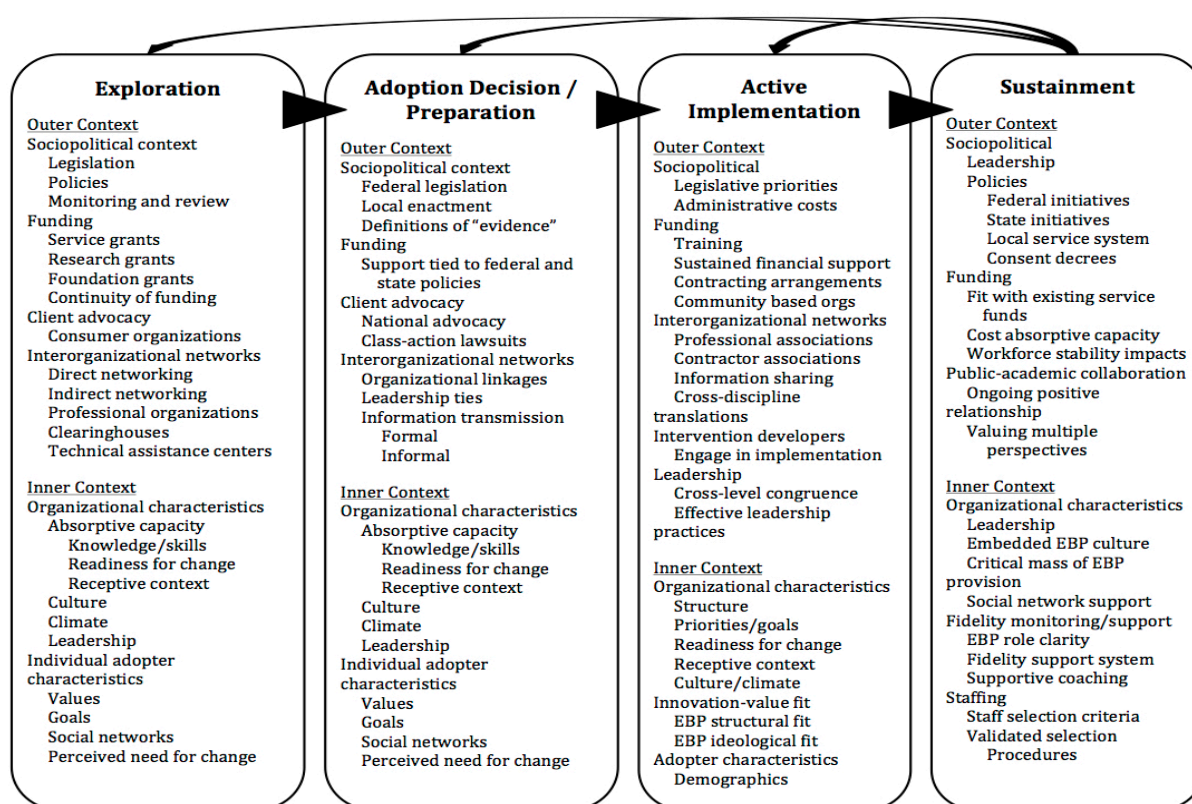


Figure 51: EPIS model of implementation (Source: Aarons, et al)

2. **Re-AIM:**²⁰⁷ This evaluation framework breaks down implementation outcomes into Reach (coverage), Effectiveness, Adoption (range and proportion of individuals and organizations willing to participate), Implementation (fidelity, time, cost and adaptations made) and Maintenance (institutionalization into routine care and policies and long-term impact). It is designed to better understand the range of factors that influence success or failure at the individual and broader levels.
3. **Consolidated Framework for Implementation Research (CFIR):**²⁰⁸ This framework serves as a guide to understand the contextual factors that influenced the success or failure of implementation of a specific intervention. These include the outer context, the inner (organizational) context, the characteristics of the intervention, the implementation approach, and the individual actors responsible for implementation.
4. **Implementation Outcomes (Proctor et al):**⁶ This approach distinguishes implementation outcomes from the more traditionally measured intervention and system outcomes. It identifies and defines key areas that are critical to achieving overall effectiveness, core goals of initiatives targeting U5 mortality. Outcomes include: acceptability, adoption, appropriateness, costs, fidelity, feasibility, penetration (reach) and sustainability.

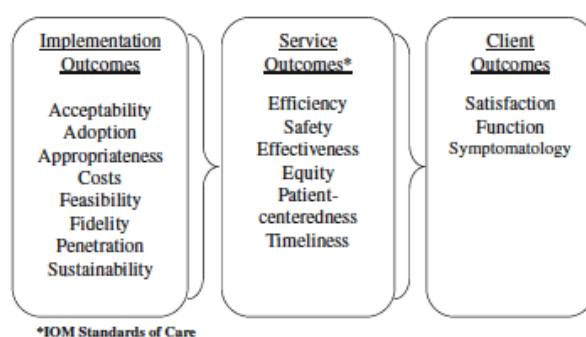
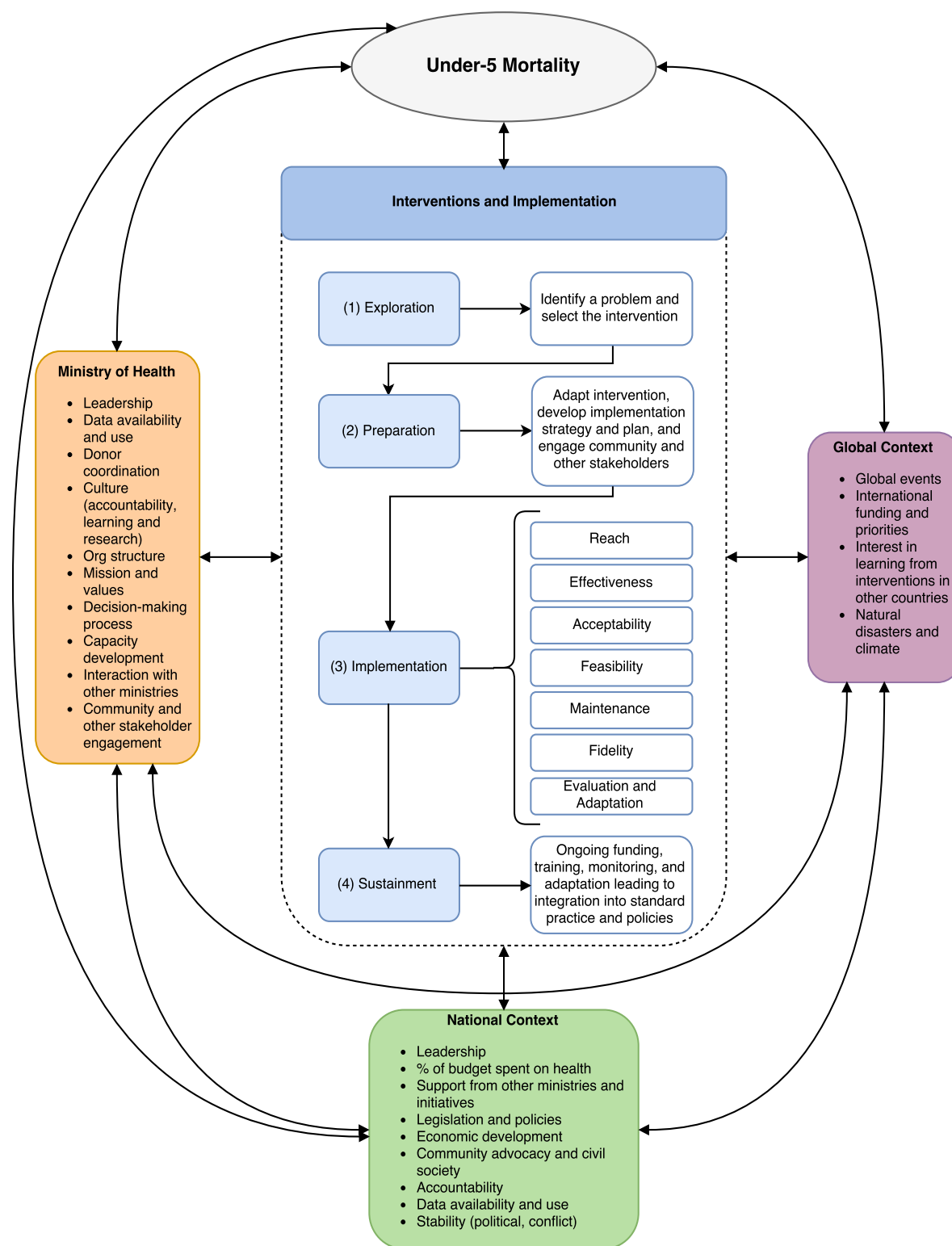


Figure 52: Types of outcomes in implementation research (Source: Proctor, et al)

5. **The implementation principles for managing all levels of a health sector as described in the book in progress by Doctor Binagwaho:** This book is written to share her experiences on what was successful, what failed, why and how, when she served in technical and political positions in the health sector in Rwanda between 1996 and 2016.

None of the frameworks alone were felt to cover the complexity the implementation strategies and steps undertaken at the national, subnational, and care-delivery levels. By combining them we have developed a framework that will be used to guide how we prioritize areas for primary research, interpret the secondary research, and form the themes for synthesis of the entirety of our work.

Figure 53: Framework for understanding interventions to reduce under-5 mortality (copyright UGHE)



Desk Review: (Led by bgC3 with in-depth support from UGHE team)

The team undertook an extensive review of available information and published data on the rates and progress of U5M, policies, strategies, specific EBIs available to potential exemplar countries, and the uptake and implementation of these EBIs in 5 exemplar countries defined as countries which have reduced U5 mortality beyond expectations based on regional or resource comparators (see appendix). Initial secondary research was performed through MEDLINE (PubMed) and Google Scholar, using the search terms “child mortality” or “under-5 mortality” and the country’s name. Further searches included specific EBIs, causes of death, or contextual factors as search terms (e.g. “insecticide-treated nets,” “malaria,” or “community health workers”). Initial desk research was synthesized and then reviewed by the UGHE team for accuracy and completeness. The desk review is an iterative process, with ongoing additions occurring throughout the primary research process. As noted, the initial review was limited to causes of death were limited to those felt to be “amenable” with effective interventions and targeted all U5M, from neonatal through infancy and early childhood. While maternal health is a critical determinant of child survival, given the extensive work already underway and the limited resources and time of the contract, we did not include an exhaustive review of these EBIs but focused on those more directly related to the childbirth period or primary data analysis. This will be supplemented by selected maternal interventions. We purposely did not include in-depth reviews of important broad interventions that contributed to U5M reduction including education, poverty reduction, water and sanitation and programs designed to improve nutritional status. These will be captured as important contextual factors in the country case studies.

Primary Research: (Led by UGHE team)

A more in-depth analysis will be performed for two of the five exemplar countries (Rwanda and a country in Asia TBD) to better understand the decisions, actions, and successes in those countries. Informed by the framework and review of relevant literature on contextual factors and implementation outcomes, we developed core interview guides for 1. Global and national level actors; 2. Ministry of Health actors; 3. project managers and implementers for specific causes of death or EBIs; and 4. other partners. This approach was designed to elicit an explanatory evaluation of the results from the desk review, as well as to identify additional areas of research and to fill identified gaps in understanding. Key informants are chosen based on the topics identified in the desk review and the close collaboration of in-country collaborators, prioritizing those EBIs which were reported as most successful as well as any major EBIs for which no evidence of implementation was found. The interviews are designed to address the intervention implementation process, from decision through implementation to sustainment. This includes critical contextual factors at the relevant global, national, ministry, and local levels. The interviews will also identify additional sources of data and information which could be added to the knowledge base and understanding already developed from the desk review.

The exploratory work to explain the reductions in U5M will be reviewed and approved by the relevant regulatory agencies at the national level. This work is not considered human subjects research as individuals will not be identifiable in any of the dissemination products, and all tapes and notes will be kept in a secure online folder. No names or quotes will be used without explicit permission from the interviewee. Interviewees will be asked for consent for the interview and for recording. At least 2 note takers will be present in person or by phone. Following the interview, LH and/or CB will extract key steps and themes from

the interview in the focused area using the framework. It is expected that over time, as new themes emerge, the framework will also evolve. Due to resource constraints, no formal coding through qualitative analytic software and no attempt to reach saturation is planned.

Analysis and Synthesis

The UGHE team used a mixed methods explanatory approach, applying the framework to understand the progress (or lack thereof) for each cause of death, including choice of and implementation of EBIs (drawing from EPIS), as well as facilitators and barriers at the local, national and global levels (drawing from CFIR) and reflect on available reports of both coverage and mortality changes. This approach aims to create a better understanding of what, how and why the targeted countries were able to achieve success in decreasing U5M. This work will also be informed by the extensive work completed by other initiatives, including Countdown 2015, WHO maternal and child health initiatives, the International Center for Equity in Health, and others. For the two in-depth countries, this work will include qualitative analysis and synthesis of the key informant interviews, desk research results, and additional resources identified relevant to the understanding of pathways and work to reduce U5M. For the desk review-only countries, we will explore to the limits of available information the pattern of EBIs chosen, implementation successes, and broader lessons learned to add to the knowledge base. If resources and time allows, we may try to do a limited number of targeted phone interviews if major gaps in knowledge in implementation and context are missing.

During the work to analyze the data from each country and compile the results into case studies, we will begin to categorize cross-cutting themes and lessons. These may be across countries overall or within specific cause of death and EBI work. These results will be summarized into a cross-country report, along with recommendations for next steps in dissemination and potential further explanatory exemplar work in other countries.

Final Products

The work done by UGHE and bgC3 will result in new knowledge examining the implementation strategies for developing needed policies and identifying, adapting and scaling EBIs, supporting and obstructing contextual factors from countries successful in reducing U5M using an implementation science approach. The final products will include (1) the generally-applicable implementation science framework shown here, (2) two in-depth case studies of exemplar countries using primary and secondary research, (3) summaries of desk research on reductions of U5M in three other exemplar countries, and (4) a cross-country synthesis of insights from all five exemplar countries. Although many countries deserve deeper research on and analysis of their successes in U5M reduction, limitations in resources and time bound the scope of this project. The work done related to these five exemplar countries will serve as a proof of principle of the added value of applying implementation science to the research of U5M interventions and successes. The products from this work will be disseminated through a larger online platform created by bgC3 to highlight actionable lessons from exemplar countries on a variety of health topics.