MATERNAL AND PERINATAL DEATHS IN FACILITIES AND IN COMMUNITY

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Nutrition counselling

Photo: World Bank

AGENDA

- Introductions and START overview
- Review objectives of work order
- Literature review
- Summarize data review
- Summarize key informant interviews
- Synthesis of all three evidence streams
- Recommendations
- Question period





PROJECT TEAM





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START OVERVIEW



Leverages leading content expertise from across the University of Washington



Provides high quality research and analytic support to the Bill & Melinda Gates Foundation and global and public health decision-makers



Provides structured mentorship and training to University of Washington graduate research assistants





Identify the existing data on:

- 1) differential mortality outcomes among mothers and their babies at home versus in a facility
- 2) the specific evidence for interventions that can be delivered at home in the intrapartum or immediate postpartum period

ADDITIONAL ELEMENTS

- 1) Who delivers at home and why
- 2) Review of databases: locations, parameters, how they are being analyzed

OBJECTIVES



DEFINITIONS

Maternal mortality Death related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy Maternal mortality rate is per 100,000 live births

Stillbirth

A baby who dies after 28 weeks of pregnancy, but before or during birth Stillbirth rate is per 1000 total births

Neonatal mortality Deaths among live births during the first 28 completed days of life; subdivided into early neonatal deaths, occurring during the first 7 days of life, and late neonatal deaths, occurring after the 7th day but before the 28th completed day of life Neonatal mortality rate is per 1000 live births

Perinatal mortality

Number of stillbirths and early neonatal deaths divided by the number of pregnancies of seven or more months' duration (all live births plus stillbirths)

LITERATURE REVIEW

LITERATURE REVIEW

- Reviewed ~700 abstracts before expanding to other geographies
- Main constraint was specific stratification by location
- Frequent finding of no significant effects after adjustment for individual characteristics of mothers and/or health system characteristics
- Additional interventions reviewed but not covered here
- No ideal data
 - Where do people intend to give birth?
 - Combined maternal and child outcomes
 - Cross-sectional studies/data collection



WHO AND WHY

PEOPLE WHO GIVE BIRTH AT HOME

- First-time mothers
- Women who have not attended antenatal care visits, or attended only one
- Rural residents
- Women without access to mass media
- Women with lower levels of formal education and socioeconomic status
- Women who live farther from health facilities, often operationalized as more than 30 minutes away
- Women with a history of delivering a previous child at a facility





WHO AND WHY

COMMON REASONS



- Concerns about the quality of services or discomfort at facility
- Concerns about privacy during delivery
- Stigma against delivering in facilities; association with having something, such as adultery, to hide
- Distance and cost of transport to facility
- Labor and delivery perceived as quick, without complication
- Home birth perceived as normal or traditional
- Desire to have family support during delivery
- Trust in traditional birthing assistants



WHO AND WHY: INDIA





Sharma B, Giri G, Christensson K, K V R, Johansson E. The transition of childbirth practices among tribal women in Gujarat, India - a grounded theory approach. *BMC Int Health Hum Rights*. 2013;13:41. Published 2013 Oct 3. doi:10.1186/1472-698X-13-41

































NIGERIA AND ETHIOPIA

COUNTRY	STUDY DETAILS	DELIVERY SITE (%)	MORTALITY OUTCOME ESTIMATE/COUNT
Nigeria	Oti et al., 2011 DHS survey, 2003	Facility birth: 34%	Perinatal mortality aOR, 0.8 (0.52, 1.21) <i>Not significant</i>
Nigeria	Owa et al., 1998 Hospital data on admitted neonates	Facility birth: 55%	Perinatal mortality at other facilities and at home: 182/1000 Perinatal mortality at facilities: 66/1000
Ethiopia	Tesfaye, 2003 Master's thesis in single rural region of Dire Dawa	Facility birth: 57%	Perinatal mortality at home: 38/1000
	Ŭ		Perinatal mortality at facilities: 35/1000



INDIA

COUNTRY	STUDY DETAILS	DELIVERY SITE (%)	MORTALITY OUTCOME ESTIMATE/COUNT
India	Gupta et al., 2010 Survey in Rajasthan Case-control study	Facility birth: 24%	Maternal mortality aOR, 5.7 (4.0, 7.2) <i>Facility birth is protective</i>
India	Lee et al., 2022 National Family Health Survey, 2015 and 2016	Facility birth: 81%	Neonatal mortality aOR, 0.95 (0.8, 1.12) <i>Not significant</i>
India	Upadhyay et al., 2011 Case-control study	NA	NA



OTHER COUNTRIES

COUNTRY	STUDY DETAILS	DELIVERY SITE (%)	MORTALITY OUTCOME ESTIMATE/COUNT
Ivory Coast, Mali, Niger, Mauritania, Burkina Faso, and Senegal	Population-based survey	Facility birth: 82%	Maternal mortality aOR, 0.46 (0.2, 1.2) <i>Not significant</i>
Senegal	Population-based survey	Facility birth in Saint-Louis: 57%	Maternal mortality in Saint- Louis: 151/100,000
		Facility birth in Kaolack (Kaffrine, Fatick): 70%	Maternal mortality in Kaolack: 874/100,000
Democratic Republic of the	Population-based observational study	Facility birth: 20%	40 stillbirths in homes
Congo			17 stillbirths in facilities



OTHER COUNTRIES

COUNTRY	STUDY DETAILS	DELIVERY SITE (%)	MORTALITY OUTCOME ESTIMATE/COUNT
Zambia	Population-based observational study	Facility birth: 75%	Perinatal mortality aOR, 0.63 (0.45, 0.88) <i>Home birth is protective</i>
Sub-Saharan Africa	Meta-analysis	Home births ranged from 17% to 75%	Perinatal mortality aOR, 1.21 (0.79, 1.84) <i>Not significant</i>
Uganda	Community-based prospective cohort study	Facility birth: 59%	Perinatal mortality aRR, 3.7 (1.8, 7.4) <i>Facility birth is protective</i>



LIMITATIONS TO LITERATURE REVIEW

Data collection problems

Research question required important specifications

Study locations, nature of problem make generalizing difficult

Interventions did not match what our key informants suggested

Publication bias



SYSTEMATIC REVIEW



- What is the effect of facility delivery on neonatal mortality?
- Significant difference in 10 studies; no significant difference in 9 studies
- Pooled effect size of 0.64 (95% CI: 0.48, 0.85) for health facility delivery as compared to home delivery
- Effect is higher in areas with more health coverage
- Evidence of publication bias; final effect size 0.71 (0.54, 0.87)

Tura, G., Fantahun, M. & Worku, A. The effect of health facility delivery on neonatal mortality: systematic review and meta-analysis. BMC Pregnancy Childbirth 13, 18 (2013). https://doi.org/10.1186/1471-2393-13-18 27

LITERATURE REVIEW CONSIDERATIONS





DATA REVIEW

DATABASE OVERVIEW



Overview of geography, methodology, and type of data in each database



Independent analysis of publicly available datasheets

Available published literature using the databases





FUNDED BY BMGF

4 key databases for MNCH: COMSA, AMANHI, INDEPTH Network, CHAMPS





MNCH DATABASES: PREGNANCY OUTCOMES

- 1. COMSA: Countrywide Mortality Surveillance for Action (2017)
- **2. AMANHI:** Alliance for Maternal and Newborn Health Improvement (2012)
- INDEPTH Network: Health and Demographic Surveillance System (HDSS) in LMICS in Africa, Asia and Oceania (1998)

Database Coverage: AMANHI, INDEPTH, COMSA

(Coverage of MNCH Databases for pregnancy outcomes and site of delivery





MNCH DATABASE: UNDER 5 MORTALITY

Database Coverage:CHAMPS (Coverage of MNCH Database CHAMPS for Stillbirth and Under 5 mortality



CHAMPS: Child Health and Mortality Prevention Surveillance (2017)

- Bangladesh
- Ethiopia
- Kenya
- Sierra Leone
- South Africa
- Mali
- Mozambique



DATABASES IN KEY GEOGRAPHIES

DATABASE	NIGERIA	ETHIOPIA	INDIA
INDEPTH	Cross River, Nahuche	Arba Minch, Butajira, Dabat, Gilgel Gibe, Harar, Kersa, Kilite Awlaelo	Ballabgarh, Birbhum, Vadu
AMANHI			Haryana, Uttar Pradesh
CHAMPS		Oromia region–Harar, Kersa	
COMSA			



DATABASES

METHODOLOGY AND DATA COLLECTED

DATABASE	METHODOLOGY	TYPE OF DATA COLLECTED
COMSA	Community Surveillance Assistants (CSA) through questionnaires and Verbal and Social autopsy (VASA)	Population data, births summary and deaths summary, <u>facility/non-facility deaths</u> , cause of death
AMANHI	Community health workers through VA Biobank- repository of maternal, newborn and paternal biological samples)	ANC, delivery and Postnatal data and, <u>Pregnancy</u> and birth outcomes including site of delivery
INDEPTH Network	Integrated population and health facility data systems-frequent scheduled household visits	Vital events and migration data, cause-specific mortality obtained by VA, site of delivery data
CHAMPS	Minimally invasive Tissue Sampling (MITS), Verbal autopsy, clinical data and tests	Categories of Stillbirth, neonatal death, infant and child death-site of delivery for the deceased



COMSA WEBSITE DATA VISUALIZATIONS/REPORT

KEY TAKEAWAYS

ADULT (15-49 years)

Cause-specific mortality fraction (%) for adults 15-49 years, n=2507



80 % Male % Female 60 40 25 24 20 hiv other infections other maternal cancer tuberculosis injury

Cause-specific mortality fraction (%) for adults 15-49 years by sex, n=1312 Male, n=1195 Female

- Data visualizations updated for 2022 available
- Maternal deaths contribute to 17% of female deaths in 15-49 age group

Method: InSilicoVA Source: COMSA (updated 2022-03-14)



COMSA MORTALITY REPORT 2019

64.5% of births took place in a health facility, with the lowest in Zambezia (43.5%) and Cabo Delgado (44.9%) and highest in Maputo City (97.7%)

44.7%, (n=72) of maternal (pregnancy-related) deaths, 63.3%, (n=517) of stillbirths and 35%, (n=419) of neonates occurred at a health facility

Top three causes of death among neonates- prematurity, intrapartum related events (i.e. birth asphyxia), and infections

Pregnancy complications or Labor/Delivery complications that began at home were largely prevalent among women with a stillbirth or neonatal death (90%)



COMSA PREGNANCY OUTCOMES

Pregnancy Outcomes: N=42,680 women (2021)





AMANHI DATA: PERINATAL MORTALITY

	COMPARISON	OR
	Public health facility delivery vs. home birth (Sylhet, Bangladesh, 2018)	2.40 (95% CI: 2.08-2.76)
	Private health facility delivery vs. home birth (Sylhet, Bangladesh, 2018)	1.32 (95% CI: 1.06-1.64)
	Women with intrapartum complications who delivered in a public health facility vs. at home (Sylhet, Bangladesh, 2018)	0.57 (95% CI: 0.42-0.78)
	Women with intrapartum complications who delivered in a private health facility vs. at home (Sylhet, Bangladesh, 2018)	0.42 (95% CI: 0.28-0.63)
	Women with intrapartum complications at home vs. with no complications at home (Sylhet, Bangladesh, 2018)	3.45 (95% CI: 3.04-3.91)





INDEPTH NETWORK

KEY TAKEAWAYS

Data sheets publicly available: Single/multi-site data on births/deaths, but do not have site of delivery

Literature Review:

 India (Haryana): Infant mortality rate: 46.5/1000 live births, out of which 54.3% were neonatal deaths (2016)

INDICATOR	LOWEST (SITE)	HIGHEST (SITE)
Maternal MR/100,000 livebirths (2012)	128 (Ouagadougou, Burkina Faso)	461 (Farafenni, The Gambia)
Neonatal MR/1000 livebirths (2021)	19 (Kintampo, Ghana)	36 (Bandim, Guinea Bissau)
Infant MR/1000 livebirths (2021)	27 (Matlab, Bangladesh)	53 (Bandim, Guinea- Bissau)
Under 5 mortality rate/1000 livebirths (2021)	35 (Matlab, Bangladesh)	67 (Bandim, Guinea- Bissau)



INDEPTH NETWORK: LITERATURE REVIEW

MATERNAL MORTALITY RATES PER 1,000 PERSON-YEARS

WHO 2012 VA CAUSE CATEGORIES FOR 14 INDEPTH SITES



CHAMPS WEBSITE DATA VISUALIZATIONS/REPORT

UPDATED DATA BREAKDOWN AVAILABLE IN STILLBIRTH, NEONATE, INFANT, AND CHILD MORTALITY AT ALL SITES



DELAY IN TREATMENT: DATABASE REVIEW

		INDEPTH Network: India			CHAMPS: Sierra Leone
Levels of delay		Infant death %	Neonatal death %	Post-Neonatal death %	aOR for neonatal death
1	Delay in identification of danger signs and decision to seek care	27.5	32.4	17.6	0.62 (0.21, 1.80)
2	Delay in arriving at care facility	7.8	2.9	17.6	1.60 (0.40, 6.40)
3	Delay in receiving care after reaching facility	7.8	8.8	5.9	19.15 (3.90, 94.19)

LIMITATIONS

- Restricted coverage of key geographies
- Most data sheets that are publicly available have coded data that are not aligned with the data dictionary
- Data sheets that are publicly available do not contain the site of delivery (INDEPTH) → difficult to obtain data on pregnancy outcomes by site of delivery
- Maternal mortality data < stillbirth, neonatal or post neonatal deaths





KEY TAKEAWAYS

Extensive surveillance network for MNCH across geographies, but limited in the key geographies

Regional estimates help in making health interventions that are both global as well as socio-culturally acceptable locally

Protective effect of facility birth on stillbirth and neonatal deaths, and perinatal deaths among women with intrapartum complications

Key finding: lack of education and awareness of potential health problems contribute to delay in seeking facility care

Healthcare system strengthening with capacity building



KEY INFORMANT INTERVIEWS

DR. ANURADHA ROSE, MA, MHSc

CHRISTIAN MEDICAL COLLEGE, VELLORE

- Roughly 30% of pregnant people in the tribal region deliver at home
- Data on maternal and perinatal mortality likely significantly underestimates real figures
- Monetary incentives do not appear to be effective at increasing facility delivery rates
- Migration is a significant issue
- Effective strategies center on building trust within communities





ACHIEVING HEALTH NIGERIA INITIATIVE (AHNi)

AKWA-IBOM MNCH-HIV PROJECT TEAM - NIGERIA

- Traditional birth attendants (TBAs) are in organized union; 3% are retired healthcare practitioners; 20% have some formal education
- Compared to other regions, South-South has the highest number of facility delivery; most women in communities prefer home births
- Cultural belief that women who have facility births are weak or have something to hide may be a significant factor
- TBAs reduce homebirth mortality by referring at point of death in order to maintain credibility, which invariably increases facility deaths
- Effective strategies center on training TBAs to recognize at risk situations





PROFESSOR HADIZA GALADANCI

PROFESSOR OF OBSTETRICS AND GYNECOLOGY, BAYERO UNIVERSITY, KANO FOUNDING DIRECTOR OF AFRICAN CENTRE OF EXCELLENCE IN POPULATION HEALTH AND POLICY – NORTHERN NIGERIA

- 88% of births in Northeast Nigeria happens at home
- Educational level of women and patriarchal traditions are the most common reasons of home birth
- Puerperal sepsis and hemorrhage are the most common causes of death for home births
- TBA trainings proves difficult because of the nature of TBAs
- Proper implementation and sustainability is a big challenge with big donors and Nigerian government
- Some women give birth completely alone
- Effective interventions include the use of community mobilisers to distribute Misoprostol





SYNTHESIS OF INTERVIEWS

Homebirths are generally preferred

Facility births are generally safer

Data are heavily confounded

Deaths at home are probably under-reported, especially during the pandemic

Educational and awareness interventions improve facility outcomes



SYNTHESIS OF INTERVIEWS

Training TBAs can be difficult

Governments may discourage home births (India and Nigeria)

Accurate reporting of deaths may influence reputation of facilities, providers

Programs must be sustainable to be successful

Programs must be multi-faceted to be successful



SYNTHESIS OF EVIDENCE & RECOMMENDATIONS

HI VILLAGE HEALTH CENTRE.

COMPLEXITY

Data collection and use are extremely limited

DATA

Confounding, generalization, bias, other epidemiological issues Multi-faceted problems

Location- and culture-specific work Known successes

OPPORTUNITY

MCI.

Interventions are feasible in both communities and in facilities

RECOMMENDATIONS

Conduct and evaluate additional location-specific formative research

Examine both encouraging facility births and making home birth safer

Develop plans to integrate TBAs into the local formal healthcare network

Longitudinal and mixed-methods data in multiple target areas

Combine interventions to avoid potential problems



THANK YOU



APPENDIX SLIDES



CITATIONS: ETHIOPIA, INDIA, NIGERIA

Gupta SD, Khanna A, Gupta R, Sharma NK, Sharma ND. Maternal mortality ratio and predictors of maternal deaths in selected desert districts in rajasthan a community-based survey and case control study. Womens Health Issues. 2010;20(1):80-85. doi:10.1016/j.whi.2009.10.003

Lee, HY., Leslie, H.H., Oh, J. et al. The association between institutional delivery and neonatal mortality based on the quality of maternal and newborn health system in India. Sci Rep 12, 6220 (2022). https://doi.org/10.1038/s41598-022-10214-y

Oti S, Odimegwu C: Perinatal Mortality in Nigeria: Do place of delivery and delivery assistants matter?. The Open demography Journal. 2011, 4: 1-10. 10.2174/1874918601104010001.

Owa JA, Osinaike AI: Neonatal Morbidity and Mortality in Nigeria. Indian J Pediatr. 1998, 65: 441-449. 10.1007/BF02761140.

Tesfaye Y: Assessment of pregnancy outcome with emphasis on perinatal and neonatal mortality in Dire Dawa town. 2003, Ethiopia: Master's thesis. Addis Ababa University, School of Public Health

Tura, G., Fantahun, M. & Worku, A. The effect of health facility delivery on neonatal mortality: systematic review and metaanalysis. *BMC Pregnancy Childbirth* **13**, 18 (2013). 10.1186/1471-2393-13-18

Upadhyay R, Dwivedi P, Rai S, Misra P, Kalaivani M, Krishnan A: Determinants of Neonatal Mortality in Rural Haryana, India: A Retrospective Population Based Study. Indian Pediatr. 2012, 49 (4): 291-294. 10.1007/s13312-012-0044-2.



CITATIONS: OTHER COUNTRIES/AREAS

Bouvier-Colle MH, Ouedraogo C, Dumont A, et al. Maternal mortality in West Africa. Rates, causes and substandard care from a prospective survey. Acta Obstet Gynecol Scand. 2001;80(2):113-119.

Chinkhumba J, De Allegri M, Muula AS, Robberstad B. Maternal and perinatal mortality by place of delivery in sub-Saharan Africa: a meta-analysis of population-based cohort studies. BMC Public Health. 2014;14:1014. Published 2014 Sep 28. doi:10.1186/1471-2458-14-1014

de Bernis L, Dumont A, Bouillin D, Gueye A, Dompnier JP, Bouvier-Colle MH. Maternal morbidity and mortality in two different populations of Senegal: a prospective study (MOMA survey). BJOG. 2000;107(1):68-74. doi:10.1111/j.1471-0528.2000.tb11581.x

Manasyan A, Chomba E, Moore J, et al. Association between birth attendant type and delivery site and perinatal outcomes. Int J Gynaecol Obstet. 2019;145(2):187-192. doi:10.1002/ijgo.12786

Matendo RM, Engmann CM, Ditekemena JD, et al. Challenge of reducing perinatal mortality in rural Congo: findings of a prospective, population-based study. J Health Popul Nutr. 2011;29(5):532-540. doi:10.3329/jhpn.v29i5.8908

Nankabirwa V, Tumwine JK, Tylleskär T, Nankunda J, Sommerfelt H; PROMISE EBF Research Consortium. Perinatal mortality in eastern Uganda: a community based prospective cohort study. PLoS One. 2011;6(5):e19674. Published 2011 May 9. doi:10.1371/journal.pone.0019674



CITATIONS: DATASETS

AMANHI-Alliance for Maternal and Newborn Health Improvement (AMANHI) mortality study group. Population-based rates, timing, and causes of maternal deaths, stillbirths, and neonatal deaths in south Asia and sub-Saharan Africa: a multi-country prospective cohort study. Lancet Glob Health. 2018 Dec;6(12):e1297-e1308. doi: 10.1016/S2214-109X(18)30385-1. Epub 2018 Oct 22. PMID: 30361107; PMCID: PMC6227247.

CHAMPS- Preslar, J.P., Worrell, M.C., Kaiser, R. *et al.* Effect of Delays in Maternal Access to Healthcare on Neonatal Mortality in Sierra Leone: A Social Autopsy Case–Control Study at a Child Health and Mortality Prevention Surveillance (CHAMPS) Site. *Matern Child Health J* **25**, 1326–1335 (2021). https://doi.org/10.1007/s10995-021-03132-4

INDEPTH-Rai SK, Kant S, Srivastava R, *et al*Causes of and contributors to infant mortality in a rural community of North India: evidence from verbal and social autopsy*BMJ Open* 2017;**7:**e012856. doi: 10.1136/bmjopen-2016-012856

INDEPTH-Nareeba, T., Dzabeng, F., Alam, N. *et al.* Neonatal and child mortality data in retrospective population-based surveys compared with prospective demographic surveillance: EN-INDEPTH study. *Popul Health Metrics* **19** (Suppl 1), 7 (2021). https://doi.org/10.1186/s12963-020-00232-1

AMANHI-Khanam R, Baqui AH, Syed MIM, Harrison M, Begum N, Quaiyum A, Saha SK, Ahmed S; Projahnmo Study Group in Bangladesh. Can facility delivery reduce the risk of intrapartum complications-related perinatal mortality? Findings from a cohort study. J Glob Health. 2018 Jun;8(1):010408. doi: 10.7189/jogh.08.010408. PMID: 29564085; PMCID: PMC5857205.









STUDY QUALITY CHECKLIST

Effectiveness

- Clear description of trial
- Eligibility criteria
- Sampling method
- Sample size
- Clear description of intervention
- Clear description of randomization
- Participants
- Clear description of outcomes
- Counterfactual analysis

Sustainability and scalability

- Is addressing the problem consistent with national, state, or regional policy directions or priorities?
- Is there any information or commentary about sustainability?
- Is there any information or commentary about scalability?

