

High burden of vaccine preventable diseases as cause of death: using innovative post-mortem sampling, Kersa, Ethiopian case

Hiwot Yigzaw, MPH¹; Mussie Berhane, MSc¹; Tseyon Tesfaye, MPH¹; Mersan Deresa, BSc¹; Mulu Berihun, MSc¹; Joe Oundo, PhD^{1,2}; Nega Assefa, PhD¹, Lola Madrid, PhD^{1,2}

1. College of Health and Medical Sciences, Haramaya University, Harar, Ethiopia; 2. Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, United Kingdom

Background

- Full immunization coverage prevents approximately 3 million childhood deaths annually, but still, ~1.5 million children still die every year due to vaccine-preventable diseases.
- In Ethiopia, only 4 out of 10 children (43%) have received all basic vaccinations, with roughly 2 in 10 (19%) not having received any vaccine. Minimally invasive tissue sampling (MITS) is an innovative diagnostic tool, especially accurate to determine infectious diseases as cause of death (CoD) in children, including vaccine-preventable diseases (VPDs).
- Child health and mortality prevention surveillance (CHAMPS) aim to determine definitive CoD among stillbirth and under five children by using MITS and sophisticated laboratory technology in seven South Asia and, Sub-Saharan African sites, including Ethiopia.

Methods

A mortality surveillance of stillbirths and under five children in Ethiopia started in Haramaya University Health and Demographic Surveillance area (HDSS), Harar and Kersa, in February 2019.

In Kersa HDSS, death notifications were received from health facilities and from the community, through a death notification systems implemented to detect MITS eligible cases, stillbirth and under five children died who belong to the study area in the previous 24h.

Samples of MITs were analyzed by conventional microbiology, multiplex PCR through TAQman Array Cards and histopathological examination, including molecular pathology and immunohistochemistry.

A final CoD was assigned after analyzing demographic and clinical information, laboratory results and verbal autopsy by a panel discussion with experts from local CHAMPS site.

Results

Since February 2019, 43 MITS were done from cases belong to Kersa DSS. Among them, 35 (81%) were assigned a cause of death by November 2020. Of those 35 cases, 17 (49%) were stillbirth, six were neonates (17%) and 12 (34%) were infants and children over neonatal period (figure 1). Among the 12 infants and children over neonatal period, sepsis was determined as immediate CoD in 41% of the children in this age group and pneumonia in 27% of cases (figure 2). Among all cases, pneumonia, sepsis and meningitis were contributing to the CoD being in the chain of event in 78% of cases (figure 3). Seven out of those 12 infants and children (58%) had a vaccine-preventable disease. The most common vaccine-preventable pathogens found were *Streptococcus pneumoniae*, *Neisseria meningitidis* and measles (figure 4).

Figure 1: Age distribution among MITS cases with CoD

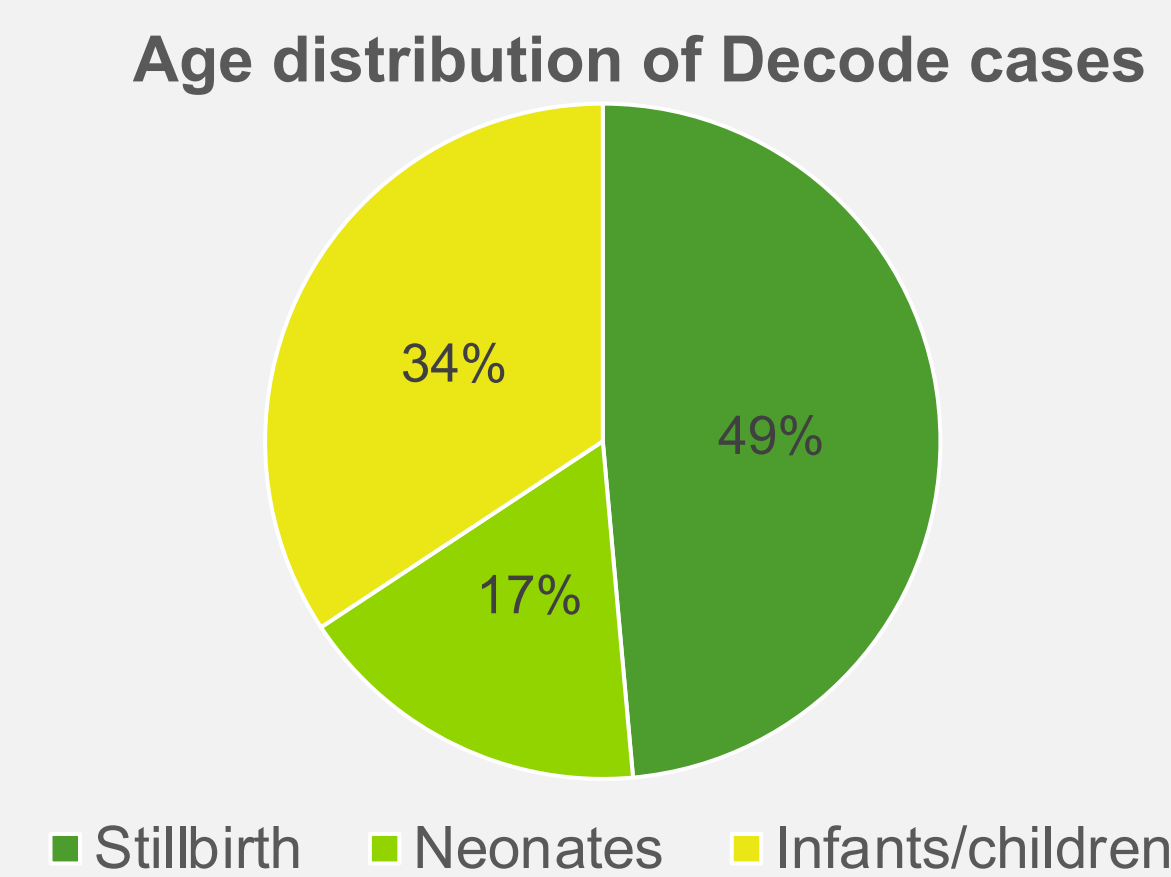


Figure 3: Causal pathway conditions- infants and children out of neonatal period

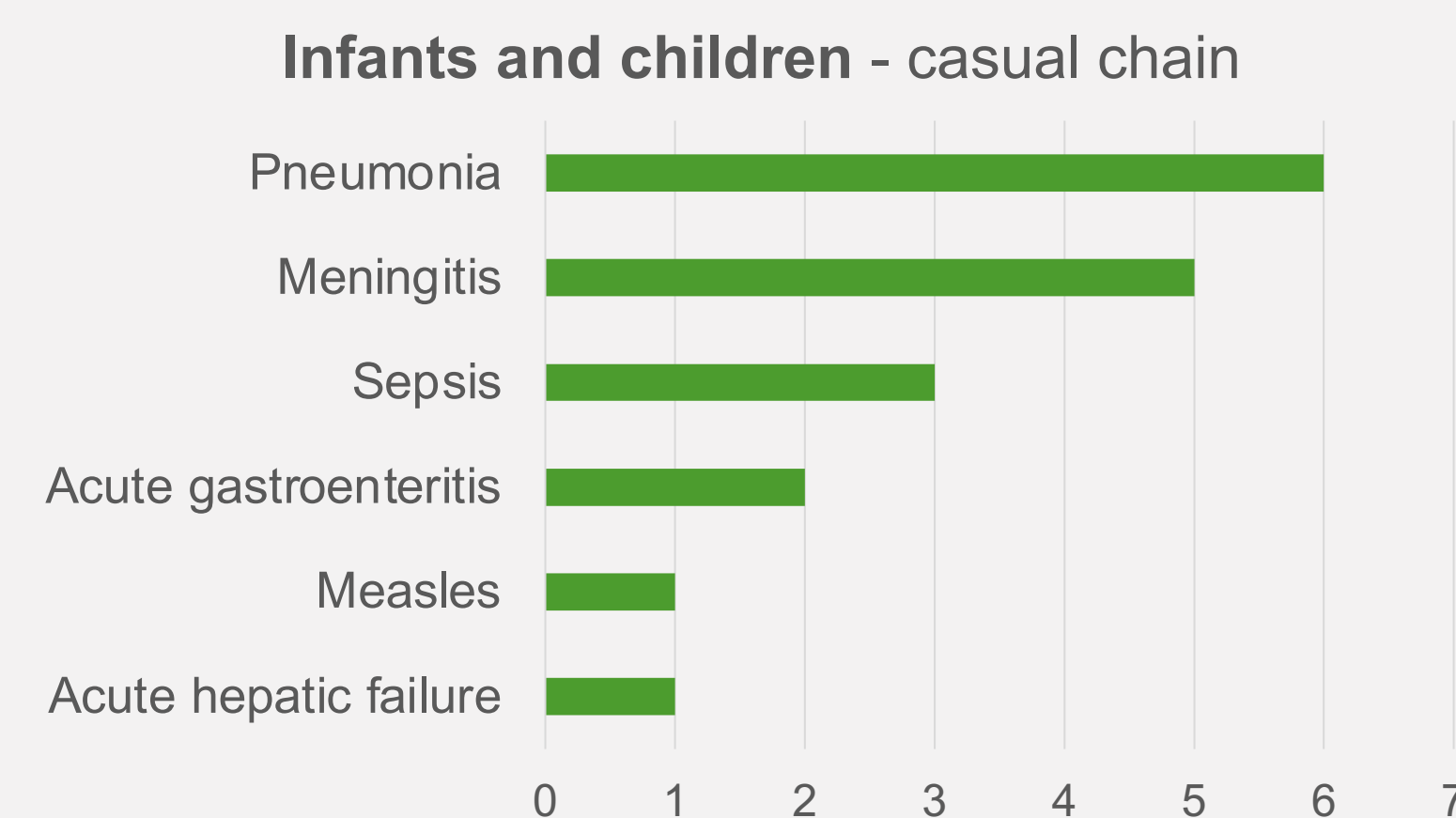


Figure 2: Immediate cause of death among infants and children out of neonatal period

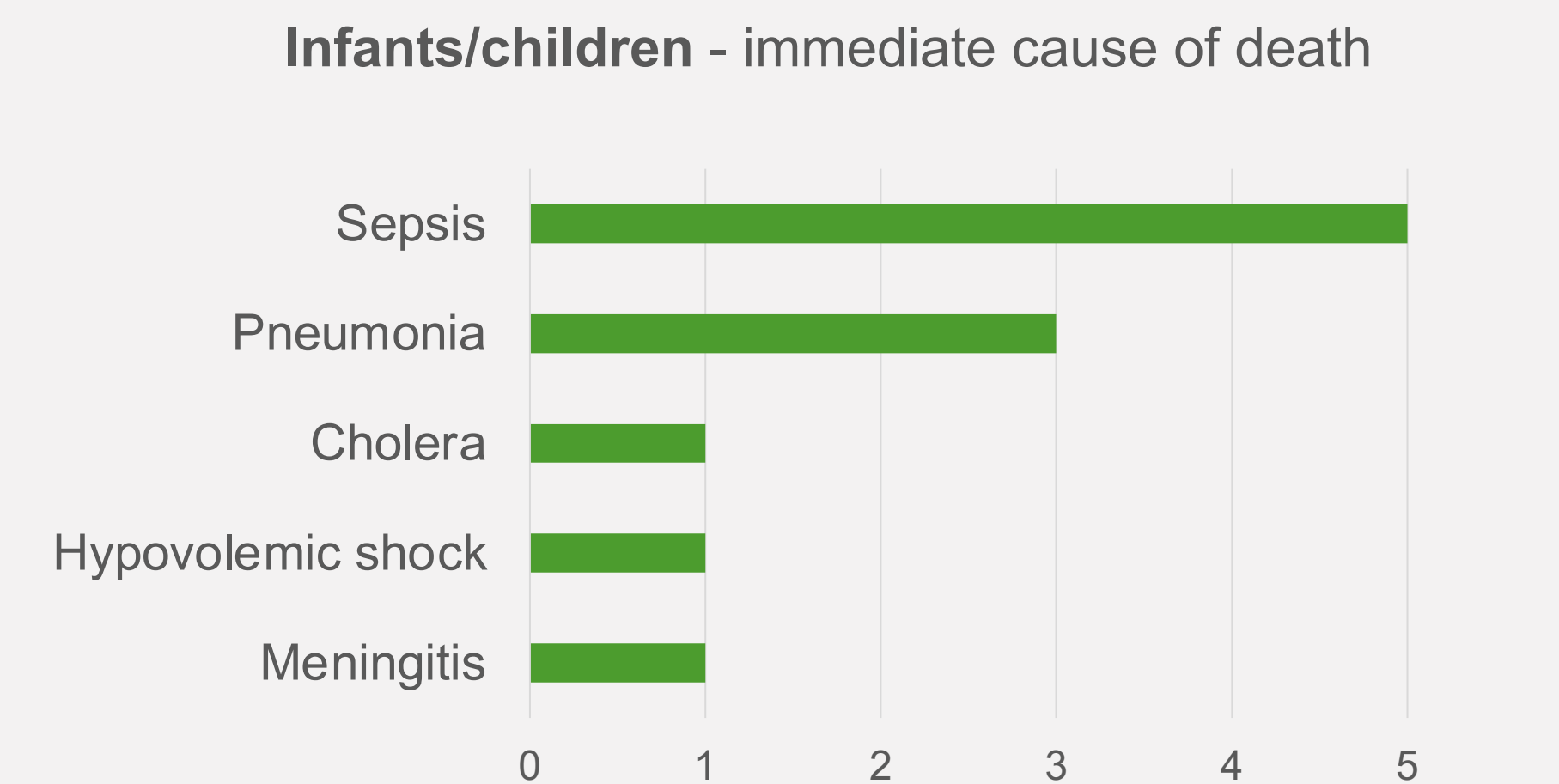
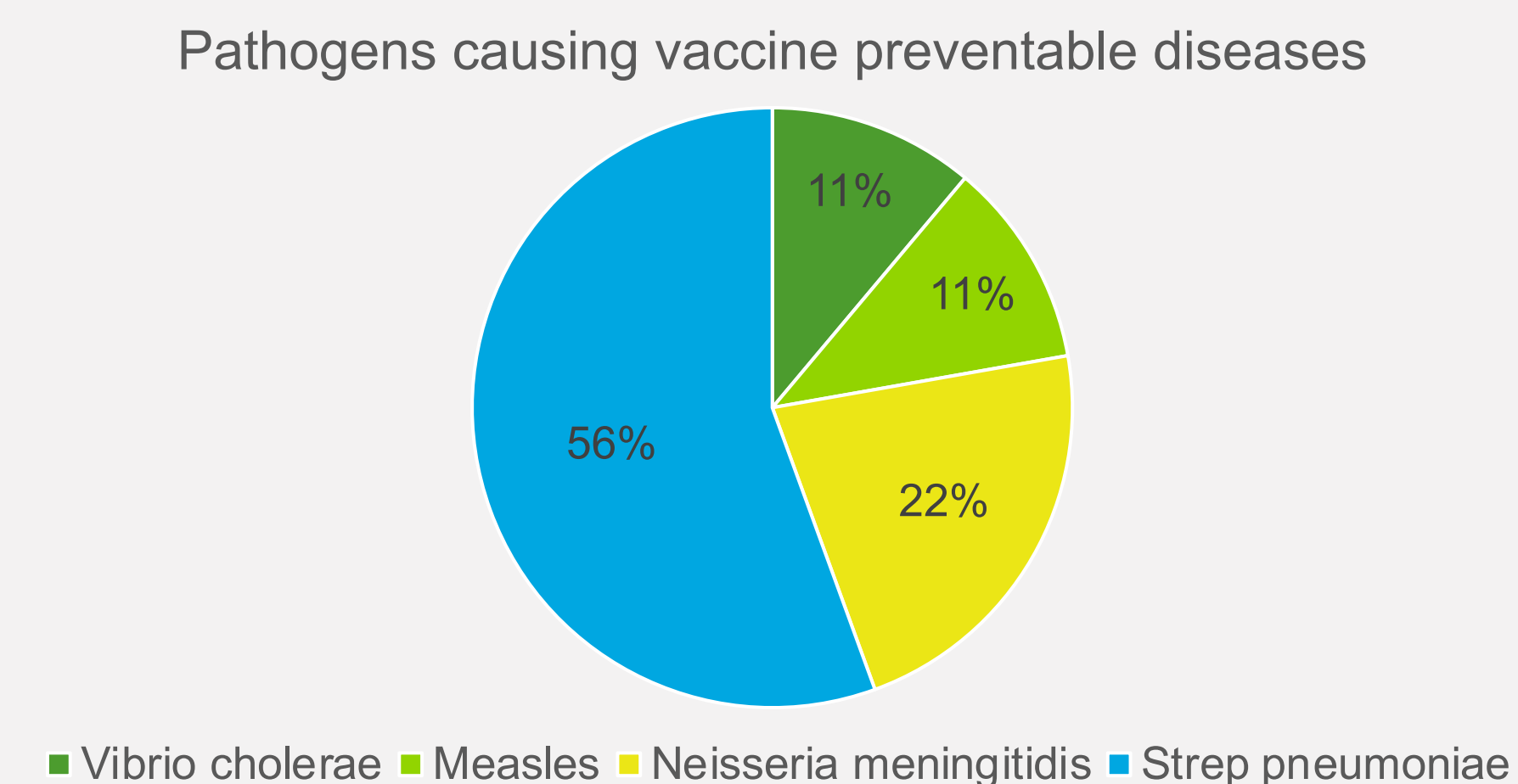


Figure 4: Causal pathway conditions- infants and children out of neonatal period



Conclusions

- Although MITS could only be collected on a small percentage of deaths, the process provided high quality data on CoD, being able to accurately detect infectious diseases as CoD.
- VPDs cause child deaths in a country where universal immunisation is offered for free in all regions.
- A better understanding on how vaccines are not reaching properly to the children, community barriers and health system limitations on delivering vaccines is needed.
- Given the unacceptably high childhood mortality rates in Ethiopia, greater access and wider use of immunizations are important to reduce child mortality.

References

1. EPHI & ICF. 2019. "Ethiopia Mini Demographic and Health Survey 2019: Key Indicators." Rockville, Maryland, USA: EPHI and ICF
2. Taylor AW, Blau DM, Bassat Q et al. CHAMPS Consortium. Initial findings from a novel population-based child mortality surveillance approach: a descriptive study. Lancet Glob Health. 2020 Jul;8(7):e909-e919.

See more data at
champshealth.org



Contact Information

Hiwot Yigzaw
CHAMPS Network
Haramaya University
+251911885895
hewigeza@gmail.com

Lola Madrid
CHAMPS Network
LSHTM
+251946038857
lola.madrid-castillo@lshtm.ac.uk