Maternal Mortality
Then, Now, and Tomorrow
The Experience of Tigray Region, Northern Ethiopia

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Abstract

Background: Maternal mortality is one of the most sensitive indicators of the health disparities between poorer and richer nations. It is also one of the most difficult health outcomes to measure reliably. In many settings, major challenges remain in terms of both measuring and reducing maternal mortality effectively. This thesis aims to quantify overall levels, identify specific causes, and evaluate local interventions in relation to efforts to reduce maternal mortality in Tigray Region, Northern Ethiopia, thereby providing a strong empirical basis for decision making by the Tigray Regional Health Bureau using methods that can be scaled at national level.

Methods: This study employed a combination of community-based study designs to investigate the level and determinants of maternal mortality in six randomly selected rural districts of Tigray Region. A census of all households in the six districts was conducted to identify all live births and all deaths to women of reproductive age occurring between May 2012 and September 2013. Pregnancy-related deaths were screened through verbal autopsy with the data processed using the InterVA-4 model, which was used to estimate Maternal Mortality Ratio. To identify independent determinants of maternal mortality, a case-control study using multiple logistic regression analysis was done, taking all pregnancy-related deaths as cases and a random sample of geographical and age matched mothers as controls. Uptake of ambulance services in the six districts was determined retrospectively from ambulance logbooks, and the trends in pregnancy-related death were analyzed against ambulance utilization, distance from nearest health center, and mobile network coverage at local area level. Lastly, implementation of the Family Folder paper health register, and its potential for accurately capturing demographic and health events, were evaluated using a capture-recapture assessment.

Results: A total of 181 deaths to women of reproductive age and 19,179 live births were documented from May 2012 to April 2013. Of the deaths, 51 were pregnancy-related. The maternal mortality ratio for Tigray region was calculated at 266 deaths per 100,000 live births (95% CI 198-350), which is consistently lower than previous “top down” MMR estimates. District-level MMRs showed strong inverse correlation with population density (r2 = 0.86). Direct obstetric causes accounted for 61% of all pregnancy-related deaths, with hemorrhage accounting for 34%. Non-membership in the voluntary Women’s Development Army (AOR 2.07, 95% CI 1.04-4.11), low husband or partner involvement during pregnancy (AOR 2.19, 95% CI 1.14-4.18), pre-existing history of other illness (AOR 5.58, 95% CI 2.17-14.30), and never having used contraceptives (AOR 2.58, 95% CI 1.37-4.85) were associated with increased risk of maternal death in a multivariable regression model. In addition, utilization of free ambulance transportation service was strongly associated with reduced MMR at district level. Districts with above-average ambulance utilization had an MMR of 149 per 100,000 LB (95% CI: 77-260) compared with 350 per 100,000 (95% CI: 249-479) in districts with below average utilization. The Family Folder implementation assessment revealed some inconsistencies in the way Health Extension Workers utilize the Family Folders to record demographic and health events.

Conclusion: This work contributes to understanding the status of and factors affecting maternal mortality in Tigray Region. It introduces a locally feasible approach to MMR estimation and gives important insights in to the effectiveness of various interventions that have been targeted at reducing maternal mortality in recent years.

Key Words: Maternal mortality, intervention, ambulance, family folder, case-control, cross-sectional survey, verbal autopsy, Tigray, Ethiopia