

## Chapter 57

# Using Mobile Technology to Address the ‘Three Delays’ to Reduce Maternal Mortality in Zanzibar

**Rachel Hoy Deussom**  
*IntraHealth International, USA*

**Marc Mitchell**  
*Harvard School of Public Health, USA*

**Julia Dae Ruben**  
*D-Tree International, USA*

### ABSTRACT

*The hallmark article by Thaddeus and Maine (1994) presented a framework to reducing maternal mortality by addressing the delays: (1) deciding to seek care; (2) reaching care; and (3) receiving adequate care. This project developed a phone-based system used by traditional birth attendants to address the three delays in two districts in rural Zanzibar. Mobile phones provided: clinical algorithms to screen pregnant mothers for danger signs; phone numbers and mobile banking to arrange and pay for transportation; and contacts for health facility staff to alert them of referrals. 938 mothers participated in the “mHealth for Safer Deliveries” project. The intervention achieved a 71.0% facility delivery rate in the project zone, compared to the regional average of 32.0% (NBS and ICF Macro, 2011). This project demonstrated the effectiveness of mobile technology in addressing childbirth’s three delays and its potential to impact maternal mortality in low-income countries.*

### BACKGROUND

Losing a mother to childbirth is a tragic loss to a family, community, and society. Worldwide, there were an estimated 287,000 maternal deaths in

2010 (UNFPA, UNICEF, WHO, and World Bank, 2012). The United Nations Millennium Development Goal 5, to reduce maternal mortality by 75%, will not be achieved in many countries (United Nations, 2012). This is in part due to the persistent

DOI: 10.4018/978-1-4666-8756-1.ch057

challenges of addressing the complex and diverse underlying determinants and causes that contribute to maternal mortality (Stokoe, 1991).

Reducing maternal mortality requires a co-ordinated, multi-pronged approach, including interventions at the family and community levels that involve efforts to improve female education, nutrition, and socioeconomic status (WHO, 1999; Jokhio et al, 2005; Kidney et al., 2009). In addition, high quality antenatal, obstetric, and postnatal services must be delivered by a functional health system that links the community and facility (Campbell and Graham, 2006). Only when demand for qualified care can be met by an adequate supply of qualified care do maternal health outcomes improve (Kidney et al., 2005).

The hallmark article by Thaddeus and Maine (1994; Maine et al., 1997) presented a compelling framework for reducing maternal mortality in low-income countries. The article suggested the following three delays to be critical barriers to reducing maternal mortality: (1) the delay in seeking care for the woman in labor; (2) the delay to arrange transportation and reach the health facility; and (3) the delay in receiving care at the health facility. Further, the theory states that reducing only one or two of the delays will not impact health outcomes; rather all three must be addressed in order to significantly reduce the high numbers of women and newborns who die in delivery and/or the postpartum period in low-income countries.

Many interventions aimed at reducing maternal mortality have been unsuccessful because they fell short of addressing the three delays in a comprehensive manner, thus failing to meet the complex needs of mother and child along the continuum of care, especially in resource-constrained contexts (Campbell & Graham, 2006; Prata et al., 2011; Hasan et al., 2013). Supply-side interventions in particular may not always reach the most vulnerable mothers. A joint statement from the World Health Organization, the United Nations Population Fund, the United Nations Children’s

Fund, and the World Bank acknowledged, “[T]he settings where the problem of maternal mortality is most acute are precisely those where it is least likely to be accurately measured” (WHO, 1999, p. 10). Health systems may not always have an adequate monitoring and information system to track maternal deaths (Hill et al., 2007; Prata et al., 2011). The high-level Commission on Information and Accountability for Women’s and Children’s Health recommended that by 2015, all countries “have well-functioning health information systems that combine data from facilities, administrative sources, and surveys” (2011, p.2) in order to effectively improve maternal and child health and reduce mortality.

In Zanzibar, additional efforts are needed to improve maternal health indicators and address the three delays faced by women in childbirth. Zanzibar is a semi-autonomous part of the United Republic of Tanzania. It is composed of two islands, Unguja and Pemba, and a population of 1.3 million, of whom over two-thirds live in rural zones and half live on less than \$2 per day (RGOZ MOHSW, 2010a). Zanzibar’s population health is governed by an autonomous Ministry of Health and Social Welfare. Nearly 99% of the Zanzibari population is Muslim. In 2010, the maternal mortality ratio was estimated to be 454 per 100,000 live births (NBS and ICF Macro, 2011). The main causes of maternal death are hemorrhage, pregnancy-induced hypertension, obstructed labor, infection, and unsafe abortion (RGOZ MOHSW, 2010a).

In Zanzibar, the Ministry of Health is committed to improving maternal and neonatal health through its Reproductive and Child Health program. Zanzibar’s 2006-2011 Health Sector Strategic Plan set reproductive and child health as a top priority. The ministry defined among its targets to increase the percentage of births delivered in health facilities to 60%. They proposed achieving this target through several core interventions, such as the early referral of obstetric emergencies, and improving the quality of delivery services at the

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/using-mobile-technology-to-address-the-three-delays-to-reduce-maternal-mortality-in-zanzibar/138449](http://www.igi-global.com/chapter/using-mobile-technology-to-address-the-three-delays-to-reduce-maternal-mortality-in-zanzibar/138449)

## Related Content

---

### Technology for Integrated eCare

Wil Rijnen, Ilse Bierhoff, Rafael Llarena Gómez, Eleftheria Vellidou and Pantelis Angelidis (2014). *Achieving Effective Integrated E-Care Beyond the Silos* (pp. 89-107).

[www.irma-international.org/chapter/technology-for-integrated-ecare/111377](http://www.irma-international.org/chapter/technology-for-integrated-ecare/111377)

### Utilization of TETRA Networks for Health Information Transfer

Konstantinos M. Siassiakos, Konstantinos Ioannou and Athina A. Lazakidou (2011). *Wireless Technologies for Ambient Assisted Living and Healthcare: Systems and Applications* (pp. 30-38).

[www.irma-international.org/chapter/utilization-tetra-networks-health-information/47119](http://www.irma-international.org/chapter/utilization-tetra-networks-health-information/47119)

### Diagnosis of Breast Cancer Using Intelligent Information Systems Techniques

Ahmad Al-Khasawneh (2016). *International Journal of E-Health and Medical Communications* (pp. 65-75).

[www.irma-international.org/article/diagnosis-of-breast-cancer-using-intelligent-information-systems-techniques/144229](http://www.irma-international.org/article/diagnosis-of-breast-cancer-using-intelligent-information-systems-techniques/144229)

### A Decentralized Privacy Preserving Healthcare Blockchain for IoT, Challenges, and Solutions

Kamalendu Pal (2022). *Prospects of Blockchain Technology for Accelerating Scientific Advancement in Healthcare* (pp. 158-188).

[www.irma-international.org/chapter/a-decentralized-privacy-preserving-healthcare-blockchain-for-iot-challenges-and-solutions/298570](http://www.irma-international.org/chapter/a-decentralized-privacy-preserving-healthcare-blockchain-for-iot-challenges-and-solutions/298570)

### Human Fall Detection Using Efficient Kernel and Eccentric Approach

Rashmi Shrivastava and Manju Pandey (2021). *International Journal of E-Health and Medical Communications* (pp. 62-80).

[www.irma-international.org/article/human-fall-detection-using-efficient-kernel-and-eccentric-approach/266239](http://www.irma-international.org/article/human-fall-detection-using-efficient-kernel-and-eccentric-approach/266239)