



Wired Mothers

Mobile phones as a health communication tool to improve maternal and neonatal health in Zanzibar

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MATERNAL AND NEONATAL HEALTH

Maternal deaths 273 500

Neonatal deaths 3.072.000

Stillbirths 2.650.000



Sources: *Lozano et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. Lanet 2011

** Lui et al. Global, regional, and national causes of child mortality: an updated systematic analysis for 2010 with time trends since 2000. Lancet 2012



MATERNAL AND NEONATAL HEALTH IN ZANZIBAR

99% attend one time ANC

51% institutional delivery

MMR [2006]: 528 / 100,000

NMR: 28 / 1,000

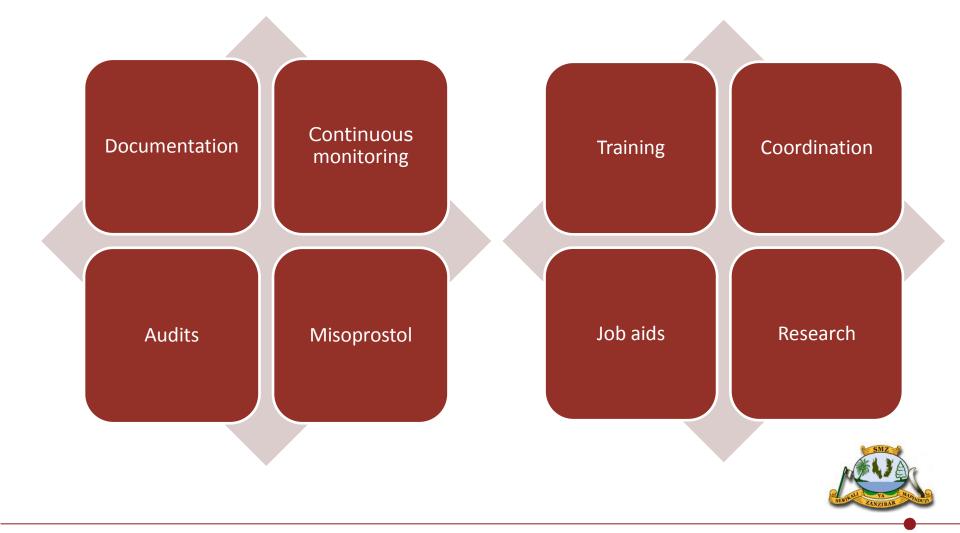
Stillbirths ????

Sources: Tanzania Demographic and Health Service 2010 Zanzibar Ministry of Health. Annual Health Bulletin 2010 Lund et al. Facility Based Maternal Mortality in Zanzibar 2005-2007

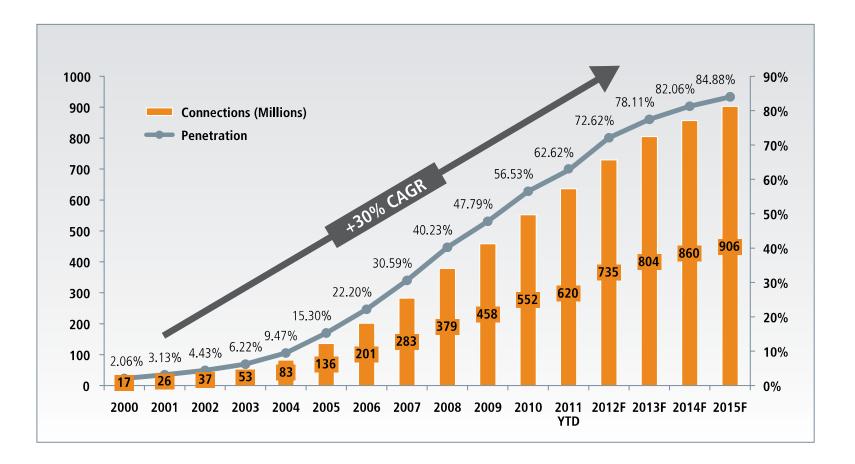




STRATEGIC INITIATIVE



AFRICAS MOBILE REVOLUTION



mHEALTH



mHEALTH

Data and Image Transfer Using Mobile Phones

Images sent by mobile internet

Feedback to sender by text message

Strengthen Microscopy-Based Diagnostics such as malaria, tb, bacterial vaginosis, stool parasites and eggs

Sources: Tuijn et al. Data and Image Transfer Using Mobile Phones to Strengthen Microscopy-Based Diagnostic Services in Low and Middle Income Country Laboratories. PLOS December 2011





mHEALTH

Very few studies of sufficient quality

Limited evidence of actual and wide-scale impacts/outcomes

Even less from developing countries



Sources: Noordam et al. Improvement of maternal health servcies throug Health, 2011

Tamrat et al. An Analysis of mHealth in Maternal and Newborn Health Programs and Their Outcomes Around the World. Matern Child Health J 2011



WIRED MOTHERS OBJECTIVES

To link pregnant women to the health care system through mobile phones

To improve attendance to antenatal and postnatal care

To improve attendance to skilled delivery attendance

To improve access to emergency obstetric care

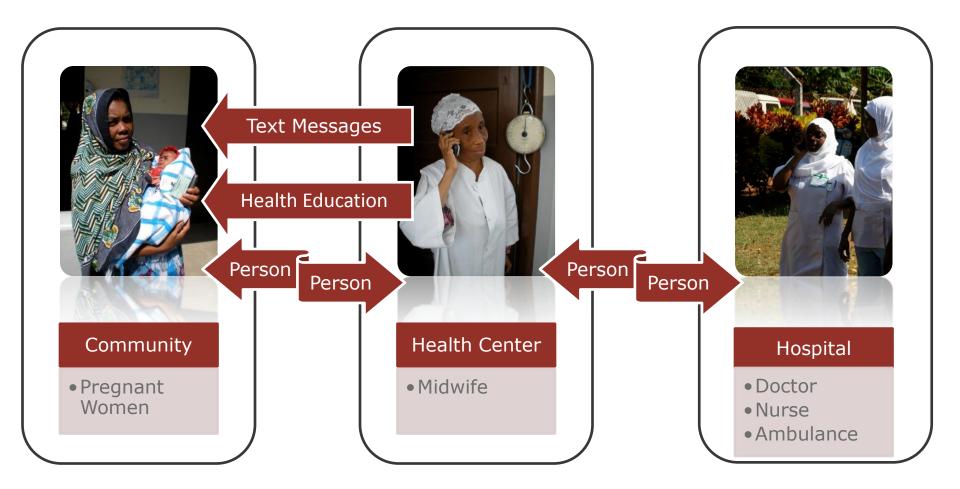
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WIRED MOTHERS



METHODOLOGY

Cluster randomised-controlled trial

24 health facilities, 2550 women

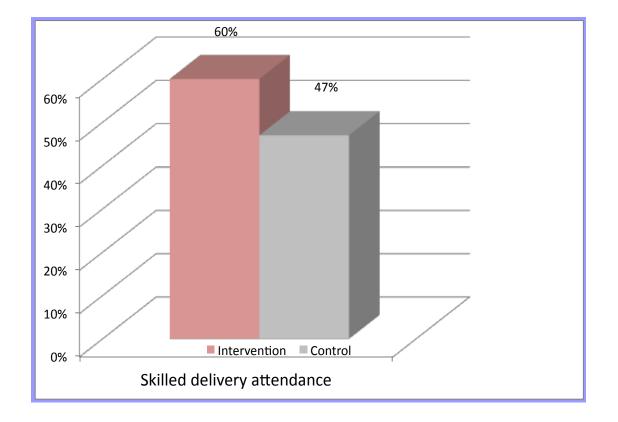
Randomisation at facility level

Participants women attending 1st ANC visit

Followed until 42 days after delivery



SKILLED DELIVERY ATTENDANCE





SOCIO-ECONOMIC SUBGROUPS

| Variable | Skilled delivery in intervention group n/N (%) | | | | | | Unadjusted OR (95% CI) |
|--------------------------------|--|---------|----------|-------------|---|---|------------------------------|
| Occupation* | | | | | | | |
| Housewife | 430/675 (64%) | | | | | | 1.36 (0.63-2.95 |
| Farmer | 95/283 (34%) | - + | | | | | 1.66 (0.71-3.90 |
| Sales women | 91/128 (71%) | - | | | | | 2.09 (0.90-4.82 |
| Government | 46/51 (90%) | + | E.1 | | | | |
| Student | 16/22 (73%) | + | | | | | |
| Other | 82/118 (70%) | + | • | | | | - 2.01 (0.74-5.48 |
| Education** | | | | | | | |
| No | 79/203 (39%) | 1 | - | | | | 2.10 (0.73-6.03 |
| Primary | 258/449 (58%) | + | | | _ | | 1.74 (0.85-3.50 |
| Secondary and above | 401/558 (72%) | - | | _ | | | 1.34 (0.61-2.9 |
| Other | 7/41 (17%) | - | - 1994 P | | | | |
| Mobile phone status*** Owns | | | - | | | | 1.61 (0.78-3.34 |
| Does not own | 410/796 (52%) | + | • | | | | 1.53 (0.68-3.4 |
| Parity**** | | | | | | | |
| Prime | 190/260 (73%) | | - | | - | | 1.63 (0.73-3.63 |
| 1-2 | 258/418 (62%) | - + | - | | | | 1.58 (0.73-3.43 |
| 3-4 | 160/287 (56%) | - | - | | | | 1.24 (0.51-3.00 |
| 5+ | 142/299 (48%) | + | • | | | | 1.79 (0.72-4.40 |
| Residence status***** | | | | | | | |
| Rural | 317/734 (43%) | | | | | | 0.83 (0.36-1.92 |
| Urban | | | - | | | _ | + 4.45 (1.36-14.5) |
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Source: Lund S et al Mobile phones as a health communication tool to improve skilled attendance at delivery in Zanzibar: a cluster-randomised controlled trial. BJOG 2012; DOI: 10.1111/j.1471-0528.2012.03413.x.



SKILLED DELIVERY ATTENDANCE

Table 2. Association between mobile phone intervention and skilled delivery attendance by residence status*

| | Skilled delivery (%) | Unskilled delivery (%) | Unadjusted OR** (95% CI) | Adjusted OR*** (95% CI) |
|-----------------|-------------------------|---------------------------|-----------------------------|----------------------------|
| All women | 1326 (53) | 1159 (47) | | |
| Intervention | 766 (60) | 518 (40) | | |
| Control | 560 (47) | 641 (53) | | |
| Rural residence | 630 (44) | 812 (56) | | |
| Intervention | 317 (43) | 417 (57) | 0.83 (0.36-1.92) | 0.85 (0.42-1.71) |
| Control | 313 (44) | 395 (56) | 1 | 1 |
| Urban residence | 696 (67) | 347 (33) | | |
| Intervention | 449 (82) | 101 (18) | 4.45 (1.36–14.51)**** | 5.73 (1.51–21.81)**** |
| Control | 247 (50) | 246 (50) | 1 | 1 |

CI, confidence interval; OR, odds ratio.

*Missing cases 65, intervention and control group.

**Adjusted for within-cluster effect and intervention interaction with residence status.

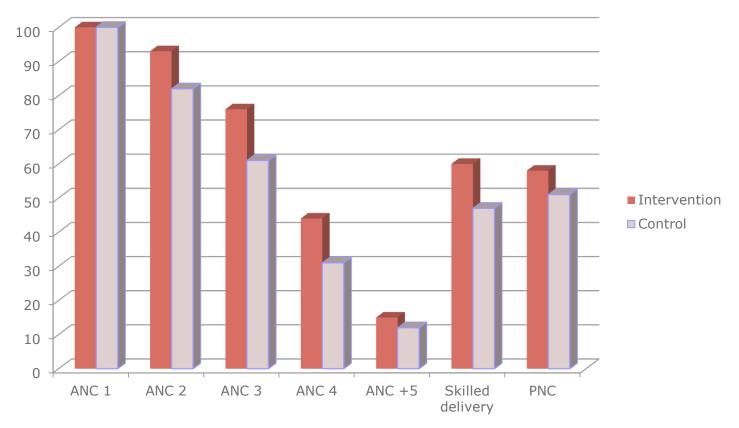
***Adjusted for significant variables associated with skilled delivery attendance, within-cluster effect and intervention interaction with residence status.

****P < 0.01.

Source: Lund S et al Mobile phones as a health communication tool to improve skilled attendance at delivery in Zanzibar: a cluster-randomised controlled trial. BJOG 2012; DOI: 10.1111/j.1471-0528.2012.03413.x.



CONTINUITY OF CARE



ANTENATAL CARE

Table 3. Association between mobile phone intervention and primary and secondary outcomes

| Variable | Intervention | Control | Unadjusted* | Adjusted OR** |
|---|--------------|----------|------------------|------------------|
| | No (%) | No (%) | OR (95% CI) | OR (95% CI) |
| Primary outcome Four or more antenatal care visits | 574 (44) | 385 (31) | 1.54 (0.80-2.96) | 2.39 (1.03-5.55) |



ANTENATAL CARE

Table 3. Association between mobile phone intervention and primary and secondary outcomes

| Variable | Intervention No (%) | Control No (%) | Unadjusted* OR (95% CI) | Adjusted OR** OR (95% CI) |
|---|------------------------|-----------------------|--------------------------------------|--------------------------------------|
| Secondary outcomes | | | | |
| Tetatnus toxoid vaccination of primigravida | | | | \frown |
| TT1 | 223/232 (96) | 195/208 (94) | 1.38 (0.39-4.87) | 1.58 (0.41-6.01) |
| TT2 ² | 155/215 (72) | 112/201 (56) | 1.67 (0.84-3.33) | 1.62 (0.81-3.26) |
| Intermittent Preventive Treatment in pregnancy IPTp1 IPTp2 | 1191 (91) 846 (65) | 1060 (86) 640 (52) | 1.78 (0.49-6.52) 1.69 (0.82-3.48) | 1.10 (0.35-3.43) 1.97 (0.98-3.94) |
| Gestational age 36 or more at last ANC visit | 366 (28) | 248 (20) | 1.45 (0.88-2.37) | 1.48 (0.89-2.45) |
| Antepartum referral | 127 (10) | 57 (5) | 1.58 (0.61-4.09) | 1.66 (0.68-4.06) |

¹Missing cases 5, 52 not eligible, ²missing cases 13, 68 not eligible, ³missing cases 13. All missing cases intervention and control group

'Adjusted for within cluster effect

"Adjusted for significant variables associated with antenatal care attendance and within cluster effect



VOICE CALLS

39% called their midwife

- Bleedings before and after delivery
- Eclampsia
- Obstructed labor

- Abdominal pain
- In labour
- Medicines
- PV discharge

• Abortion

3% emergency referrals



STILLBIRTHS

Table. Association between mobile phone intervention and delivery outcome

| Variable | Intervention No (%) | Control No (%) | Unadjusted* OR (95% CI) | Adjusted OR** OR (95% CI) |
|-------------|------------------------|-------------------|----------------------------|------------------------------|
| Born alive | 1277 (98%) | 1197 (97%) | | |
| Abortion | 14 (1%) | 11 (1%) | | |
| Stillbirths | 16 (1%) | 29 (2%) | 0.52 (0.29-0.94) | 0.48 (0.27-0.88) |

1 Missing cases 6. All missing cases intervention and control group

Adjusted for within cluster effect

"Adjusted for significant variables associated with antenatal care attendance and within cluster effect

Source: Lund S et al. Preliminary analyses.



MORTALITY

| | Study | Tanzania | Africa |
|-------------------------|-------|----------|--------|
| Stillbirth rate | 18 | 17* | 28** |
| Neonatal Mortality rate | 15 | 24*** | 28*** |

*TDHS 2010

**Coucens et al. National, regional, and worldwide estimates of stillbirth rates in 2009 with trends since 1995: a systematic analysis. Lancet 2011

*** Lozano et al. Progress towards Millennium Development Goals 4 and 5 on maternal and child mortality: an updated systematic analysis. Lancet 2011



Source: Lund S et al. Preliminary analyses.

CONCLUSIONS

Urban women more than 5 times likely to delivery with SBA in intervention group

Increased antenatal care attendance and adherence to procedures

Reduction in stillbirths

Intervention widely accepted amongst health workers and women



POLICY IMPLICATIONS

Mobile phone solutions may contribute to saving women's and newborn lives and towards achievement of MDG 4 and 5

mHealth solutions should be considered by maternal health policy makers in developing countries



THANK YOU





