

Letter to the Editor



Determining Optimal Strategies to Reduce Maternal and Child Mortality in Rural Areas in Western China: an Assessment Using the Lives Saved Tool*

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China, as a whole, is about to meet the Millennium Development Goals for reducing the maternal mortality ratio (MMR) and infant mortality rate (IMR), but the disparities between rural area and urban area still exists. This study estimated the potential effectiveness of expanding coverage with high impact interventions using the Lives Saved Tool (LiST). It was found that gestational hypertension, antepartum and postpartum hemorrhage, preterm birth, neonatal asphyxia, and neonatal childhood pneumonia and diarrhea are still the major killers of mothers and children in rural area in China. It was estimated that 30% of deaths among 0-59 month old children and 25% of maternal deaths in 2008 could be prevented in 2015 if primary health care intervention coverage expanded to a feasible level. The LiST death cause framework, compared to data from the Maternal and Child Mortality Surveillance System, represents 60%-80% of neonatal deaths, 40%-50% of deaths in 1-59 month old children and 40%-60% of maternal deaths in rural areas of western China.

It is well documented that China has made impressive progress towards achieving the Millennium Development Goals (MDGs), especially the MDG 4 & 5. The maternal mortality ratio (MMR) was reduced from 94.7/100,000 in 1990 to 24.5/100,000 in 2012. The infant mortality rate (IMR) and under-five mortality rate (U5MR) were reduced from 50.2 per thousand live births and 61 per thousand live births in 1990 to 10.3 per thousand live births and 13.2 per thousand live births in 2012, respectively^[1-2]. The newborn mortality rate was reduced from 22.8 per thousand live births in 2000 to 6.9 per thousand live births in 2012. In 2007, China has already achieved the MDG 4 of reducing

U5MR by two-thirds between 1990 and 2015^[1,3]. However, great disparities in maternal and child mortality rates still exist among different areas in China. The ratio of U5MR in urban areas to that in rural areas reached 2.75 in 2012, which was considerably higher than the average level of 1.4 in 80 developing countries in 2011^[2,4].

International organizations, pay much attention to the development of evidence-based strategies for the selection of cost-effective maternal and child health (MCH) intervention in disadvantaged regions. In December 2011, the World Health Organization (WHO) published 'Essential Interventions, Commodities and Guidelines for Reproductive, Maternal, Newborn and Child Health', which identified 60 cost-effective interventions^[5]. With the WHO's framework as guidance, each developing country still needs to determine the priority interventions by taking the local context into account. The Lives Saved Tool (LiST) is used for policy modeling based on *The Lancet's* Series on Child Survival, Neonatal Survival, and Maternal and Child Under-Five. It is designed to encourage a strategic approach to a select priority intervention package and provide a unified framework in integrated MCH planning in low-middle income regions; it has been applied widely in these regions in recent years^[6-7].

The aim of this study was to explore optimal strategies in reducing maternal and child mortality in rural areas in western China by using LiST. In selecting the survey areas, we found that Tibet, Xinjiang, Qinghai, Yunnan ranked as the top four provinces in China regarding level of MMR, IMR, U5MR. However, the geography and ethnic structure of these provinces are quite different from the other provinces in China, and a broader selection that

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would better represent the country was sought. Expert consultation recommended Guizhou province in southwest China to be included in the survey area due to its high IMR, MMR, and U5MR (all ranking within the top ten in China) and its lower economic level. Shaanxi province in northwest China was selected to represent the relatively developed region in western China.

Based on the provincial surveillance data, the causes of maternal and child deaths were classified by using LiST : 1) causes of neonate death: diarrhea, sepsis, pneumonia, tetanus, asphyxia, premature birth complication, congenital anomaly; 2) causes of death for children aged 1-59 months: diarrhea, pneumonia, meningitis, measles, malaria, pertussis, AIDS, injury; 3) causes of maternal death: prenatal bleeding, postpartum hemorrhage, gestational hypertension, puerperal infection, abortion, childbirth, ectopic pregnancy and other causes of death.

Asphyxia, preterm birth and pneumonia were

found to be the leading causes of neonatal death while pneumonia and diarrhea were identified as leading causes of death for children aged 1-59 months in the rural areas of Guizhou and Shaanxi. It is important to note that more than 60% of all death in this age group in the two provinces belonged to the 'other' category in LiST. Postpartum hemorrhage, antepartum hemorrhage, and gestational hypertension were the leading causes of maternal death, while other death causes increased.

By using LiST, 21 key intervention measures, which will improve the survival of women and children in surveyed areas, were developed and listed in Table 1. The coverage levels used in the analysis represents the feasible and universal scale-up scenarios. In Table 1, the feasible coverage rates were set according to central government policy targets and, in the absence of these, expert consultation, while the universal coverage rates reflects the ideal intervention level.

Table 1. Modeled Target Intervention Coverage Rates in Two Scale-up Plans for Two Provinces Surveyed

Intervention	Current Coverage Rate	Feasible Coverage	Universal Coverage
Folic acid supplementation/fortification	41.2%-49.1% ^a	90% ^c	99.9%
Systematic management in pregnancy (ANC visit >4)	69.4%-89.6% ^a	85% ^d	99.9%
Multiple micro-nutrient supplementation	7.7%-12.9% ^a	90% ^e	99.9%
Hospital delivery	96.6%-99.7% ^a	96% ^d	99.9%
National plan vaccination	77.4%-99.3% ^a	95% ^d	99.9%
Hib	3.0%-8.9% ^a	90% ^e	99.9%
Pneumococcal	0-23.4% ^a	90% ^e	99.9%
Rotavirus	0.7%-9.7% ^a	90% ^e	99.9%
Exclusive breastfeeding 0-6 months	14.7%-32.6% ^a	50% ^c	90.0%
Thermal care	89.4%-98.7% ^a	90% ^e	99.9%
Clean postnatal practice	89.4%-98.7% ^a	90% ^e	99.9%
Appropriate complementary feeding	87.9%-93.7% ^a	90% ^e	99.9%
Vitamin A supplementation	27.9%-62.6% ^a	90% ^e	99.9%
Zinc supplementation	24%-52.2% ^a	90% ^e	99.9%
Improved water source	20.2%-79.1% ^a	90% ^e	99.9%
Water connection in the home	54.8%-68.0% ^a	90% ^e	99.9%
Utilization of latrines or toilets	23.9%-58.0% ^a	90% ^e	99.9%
Hand washing with soap	19.9%-37.9% ^a	90% ^e	99.9%
Hygienic disposal of children's stools	78.7%-94.9% ^a	90% ^e	99.9%
ORS-oral rehydration solution	11.7%-40% ^a	90% ^e	99.9%
Zinc-for treatment of diarrhea	25%-50% ^b	90% ^e	99.9%

Note. ^a indicator calculated based on the household survey in investigated counties; ^b indicator estimated from local expert consultation; ^c represents the goal of Ministry of Health. *The Mechanism and Management for Folic Acid Supplementation in Preventing Neural Tube Defects (2010. <http://www.moh.gov.cn>)*; ^d refers to the goal of National Maternal and Child compendium(2011-2020); ^e refers to presents intervention, which have no quantitative goal in government planning, feasible coverage goals were developed according to experts consultation based on the current level and resource accessibility. For specific intervention in investigated province which has already obtained the feasible coverage, we assumed that the achieved coverage was maintained.

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