Alternative strategies to reduce maternal mortality in India: a cost-effectiveness analysis

Goldie SJ, Sweet S, Carvalho N, Natchu UC, Hu D

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

CRD summary
This study examined the cost-effectiveness of a wide range of strategies, individually or packaged into integrated services, to improve the safety of pregnancy and childbirth. The authors concluded that improving family planning and fertility choices, as well as providing safe abortion and maternal health services, were cost-effective strategies to prevent pregnancy- and delivery-related maternal deaths. A valid cost-effectiveness framework was used and extensive information on the data sources was presented in an appendix. The authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of a wide range of strategies, either individually or packaged into integrated services, to improve the safety of pregnancy and childbirth, in India.

Interventions
The interventions included family planning, safe abortion, antenatal care, treatment of anaemia, post-partum care, interventions to reduce the incidence of a complication, such as misoprostol to prevent post-partum haemorrhage and clean delivery to prevent sepsis, and appropriate management in a referral facility to reduce the death rate. Phased introduction, with scaling-up access to services over time, was considered.

Location/setting
India/primary and secondary care and hospital.

Methods
Analytical approach:
The analysis was based on a decision-analytic model, namely the computer-based Global Maternal Health Policy Model. Separate models were adapted for urban and rural settings, and a lifetime horizon was considered. The authors did not explicitly state the perspective adopted.

Effectiveness data:
The clinical evidence was from the literature and the designs and other characteristics of these sources were provided in an online appendix. Most of the data were official statistics or data from the World Health Organization (WHO). Indian data were used, where available. The reduction in maternal mortality due to the interventions was a key input for the model.

Monetary benefit and utility valuations:
Not considered.

Measure of benefit:
Life-years were the summary benefit measure.

Cost data:
The economic analysis included the costs of a normal pregnancy, induced abortion, treatment of abortion- and pregnancy-related complications, salaries of health care providers, prenatal care, and providing safe abortion or family planning options. The non-health care costs (transport and patient time to seek or receive care) were considered. The
costs were estimated from official sources that were country-specific or international organisations. Published sources were searched to assess the patterns of resource consumption. All costs were in US dollars ($) and the price year was 2006. A 3% annual discount rate was used.

Analysis of uncertainty:
Several one-way sensitivity analyses were carried out to assess the uncertainty, varying almost all the model parameters and considering alternative scenarios. The ranges of values were published estimates or some were assumed by the authors.

Results
Over the lifetime analysis, all preventive interventions reduced the number deaths per 100,000 women compared with the usual care. Most of the interventions were cost saving.

For example, in rural India, the number of deaths per 100,000 women was 1,543 with usual care and increasing the safe abortion rate to 50% reduced the deaths to 1,517, increasing the rate to 75% reduced deaths to 1,473, and increasing it to 95% reduced deaths to 1,433. The lifetime cost savings for a cohort of all 15-year-old women amounted to $48,080,115 when increasing the rate to 50%, $130,739,115 when increasing it to 75%, and $214,460,115 when increasing it to 95%. More favourable estimates were observed with other interventions, while the magnitude of savings was smaller in urban India.

With phased improvements in the components of the integrated package (intrapartum care, family planning, and safe abortion) and comparing each upgrade with the next most efficient strategy, the incremental cost per life-year gained ranged from $150 to $300 in rural India and from $150 and $350 in urban Indian. Even under unfavourable conditions, the incremental cost per life-year gained was always well below the per capita gross domestic product of $1,068, which is often considered as the cost-effectiveness threshold. The results were generally stable in the sensitivity analyses.

Authors' conclusions
The authors concluded that improving family planning, safe abortion, and maternal health services were cost-effective strategies to prevent pregnancy- and delivery-related maternal deaths.

CRD commentary
Interventions:
A wide range of appropriate interventions was selected to represent the available preventive strategies in the authors’ setting.

Effectiveness/benefits:
No systematic review was reported to identify the relevant sources of data, the details of which were provided in the appendix. Appropriate sources appear to have been used for the key inputs and the authors generally justified their selection of studies. Valid country-specific sources were used and appropriate ranges of values were considered in the sensitivity analysis. The authors stated that the best available data were used. Life-years were an appropriate benefit measure given the impact of the disease on expected survival.

Costs:
A broad perspective appears to have been considered, but this was not explicitly stated. A breakdown of cost items, with the unit costs, data sources, and resource quantities, was extensively presented in the online appendix. This increases the transparency of the analysis and allows the replication of the study for other settings. All costs were varied in the sensitivity analysis. Other details, such as the price year and discount rate, were provided.

Analysis and results:
The results were extensively presented, except for the projected life-years, which were not reported. Incremental cost-effectiveness ratios were appropriately calculated to synthesise the costs and benefits of the alternative strategies. The uncertainty was investigated by considering alternative scenarios for several inputs. An extensive description of the model was given and the model outcomes were validated using real-world data. These results might be transferable to similar settings.
Concluding remarks:
A valid cost-effectiveness framework was used and extensive information on the data sources was presented in the appendix. The authors’ conclusions appear to be robust.

Funding
Funding received from the John D. and Catherine T. MacArthur Foundation.

Bibliographic details

PubMedID
20421922

DOI
10.1371/journal.pmed.1000264

Original Paper URL
http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1000264

Indexing Status
Subject indexing assigned by NLM

MeSH
Cost-Benefit Analysis /methods; Family Planning Services; Female; Humans; India; Maternal Health Services; Maternal Mortality; Pregnancy

AccessionNumber
22010000992

Date bibliographic record published
10/11/2010

Date abstract record published
11/05/2011