The costs, benefits, and cost-effectiveness of interventions to reduce maternal morbidity and mortality in Mexico

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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
The study examined the cost-effectiveness of different strategies to reduce maternal mortality and mortality in Mexico, in accordance with international recommendations. The authors concluded that increasing the provision of family planning and assuring access to safe abortion are cost-effective strategies that reduce maternal mortality and morbidity and costs in the context of the Mexican health care system. The quality of the study methodology appears satisfactory, although more information was presented in an online appendix. Overall, the authors' conclusions are likely to be robust.

Type of economic evaluation
Cost-effectiveness analysis, cost-utility analysis

Study objective
The objective of the study was to undertake a comprehensive economic evaluation of different strategies for reducing maternal morbidity and mortality in Mexico in a hypothetical cohort of 15-year-old women followed over their lifetime. The strategies under examination comprised the current standard of maternal care in the authors' setting and several selected upgraded strategies that reflected the coverage levels recommended in the World Health Organization (WHO) Mother Baby Package (MBP).

Interventions
The interventions under examination were assessed in two separate analyses. First, the natural history was compared against the current practice in Mexico and the WHO MBP standard of care. Second, the current practice was compared with the following upgraded strategies: current practice plus increased family planning (FP) and safe abortion; current practice plus increased FP, safe abortion, and enhanced intrapartum care (IpC) and emergency obstetric care (EmOC); current practice plus increased FP and enhanced IpC/EmOC; current practice plus increased FP; current practice plus safe abortion and enhanced IpC/EmOC; and current practice plus enhanced IpC/EmOC.

Location/setting
Mexico/secondary care.

Methods
Analytical approach:
A decision analytic model was developed to simulate the natural history of pregnancy (both planned and unintended) and pregnancy-related complications under different scenarios that represented the alternative strategies under examination. A lifetime horizon was considered. The perspective adopted in the study was not explicitly stated.

Effectiveness data:
The clinical data used in the decision model were derived from a selection of known relevant studies. Some model inputs (e.g. percentage of women using methods of birth control) were taken from Mexican sources, but most were obtained from other countries given the scarcity of Mexican estimates. Epidemiological evidence came mostly from regional estimates for Latin America and the Caribbean region from the Global Burden of Disease Study. Data on the effectiveness of the interventions were obtained from published randomised clinical trials whenever possible, followed by prospective cohort studies, then expert opinion. In the case of a lack of evidence, conservative assumptions were made. Mexican data were available for coverage rates for prenatal care, deliveries assisted by skilled attendants and
facility-based deliveries.

Monetary benefit and utility valuations:
Disability weights were used in the analysis, but the calculation of them was not described.

Measure of benefit:
The summary benefit measures were the life-years (LYs) and disability-adjusted life-years (DALYs). These were estimated using the decision model. The benefits were discounted but the discount rate was not reported.

Cost data:
The analysis of the costs included the health services associated with personnel, services, drugs, and both inpatient and outpatient care at three levels of care (rural health centre, urban health centre and hospital). These costs and resources were derived from a comprehensive study assessing the costs of interventions included in the WHO MBP in Morelos State, Mexico. Other costs associated with the treatment of selected long-term complications (e.g. infertility, neurologic sequelae) were estimated using published studies conducted in other countries. The impact of including the costs of productivity losses associated with premature death was considered only in a sensitivity analysis. The price year was 2001 and the costs were in US dollars ($). Future costs were discounted but the discount rate was not reported.

Analysis of uncertainty:
A deterministic sensitivity analysis was undertaken to assess the robustness of the model outputs to variations in the clinical and economic inputs. The sources of ranges of values used were not stated, but were presumably reported in the appendix.

Results
In the first analysis, the expected lifetime costs per individual were $237.16 with natural history, $502.87 with current practice and $371.82 with MPB care. The corresponding life expectancies were 28.4010 with natural history, 28.6321 with current practice and 28.6464 with MPB care. Thus, the incremental analysis showed that the current pattern of care was dominated (i.e. less effective and more expensive) by the MBP, which in comparison with the natural history scenario had an incremental cost of $550 per LY gained and $390 per DALY averted.

In the second analysis, all upgraded strategies were less expensive and more effective in comparison with current practice. Among these strategies, the most cost-effective strategy was current practice plus increased FP, safe abortion and enhanced IpC/EmOC, which had an incremental cost of $300 per DALY averted in comparison with the next best strategy (current practice plus increased FP and safe abortion). All the remaining strategies were dominated.

The sensitivity analysis showed that the model results were sensitive to variations in the cost of increasing coverage of the interventions above and beyond the current practice in Mexico. Globally, even assuming high costs, the incremental cost per DALY averted was below the Mexico-specific Gross Domestic Product per capita, which is often considered as a threshold for cost-effectiveness. In general, the results of the base-case were stable.

Authors' conclusions
The authors concluded that increasing the provision of FP, assuring access to safe abortion, enhanced IpC and EmOC are feasible and cost-effective strategies in the context of the Mexican health care system. All strategies were cost-saving in comparison with the current pattern of care and were effective in reducing maternal deaths and disability.

CRD commentary
Interventions:
The selection of the comparators was appropriate in that the current pattern of care in the authors’ setting was compared with alternative strategies, which reflected possible scenarios to be implemented. Given the variety of interventions under examination, these comparators are also likely to be relevant in other contexts.

Effectiveness/benefits:
The authors selected the sources of clinical data, but details of any review of the literature were not reported. Some information on these sources was provided. Interestingly, the authors provided a quality score for the evidence used in
the model. This approach highlighted the weakest sources, which were then investigated in depth in the sensitivity analysis. The benefit measure was appropriate for the context of the intervention. However, the expected DALYs were not reported, nor were details of their calculation. It may be possible to find more information in the online appendix.

Costs:
The perspective adopted in the cost analysis was not explicitly stated. Although only direct medical costs were included in the primary analysis, productivity losses were considered in the sensitivity analysis, which suggests the use of a societal perspective. Little information on the sources used and the categories of costs included in the analysis was provided. As on the clinical side of the analysis, more information can probably be found in the online appendix. Discounting was relevant given the long-term horizon applied, but details of the rate used were not given.

Analysis and results:
The synthesis of the costs and benefits was appropriately carried out. The authors reported the results of the base-case analysis extensively and discussed the key findings of the sensitivity analysis. The issue of uncertainty was addressed, especially with regard to the key clinical and economic estimates used in the model. A schematic of the decision model was presented and epidemiological patterns were described.

Concluding remarks:
The study appears to have been carried out satisfactorily, with good selection of sources of clinical evidence, that selection being justified. Limited reporting around some aspects of the analysis was due to the extensive presentation of data in an online appendix. The sensitivity analysis addressed key areas of uncertainty, and the authors' conclusions appear valid.

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Other publications of related interest


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