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## Methodological Article

# Setting the Boundaries for Economic Evaluation: Investigating Time Horizon and Family Effects in the Case of Postnatal Depression

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### ABSTRACT

**Objectives:** This study investigates the impact of varying the boundaries of economic evaluation: time horizon and inclusion of family effects. The context is postnatal mental health, where although advocates for investment often include longer-term and family problems in describing the burden of postnatal depression, economic evaluations are usually limited to mothers' effects with a relatively short time horizon. This discrepancy may lead to suboptimal allocation of healthcare resources. **Methods:** The question of whether such boundary extensions could make a difference to decision-making is explored using decision analytic models, populated with data from the literature, to estimate the cost-effectiveness of a hypothetical preventive intervention under alternate boundary-setting approaches. **Results:** The results suggest that broader boundaries, particularly extension of the time horizon, could make substantial differences to estimated cost-effectiveness. Inclusion of family effects without extension of the time horizon had little impact, but where a longer

time horizon was used, family effects could make a significant difference to the conclusions drawn from cost-effectiveness analysis.

**Conclusions:** Considerations in applying broader boundaries include the substantial resource requirements for evaluation, potential equity implications, relevance to decision-makers, methods for inclusion, and the interpretation and use of such results in decision-making. However, this context underscores the importance of considering not only caregiving but also family health effects, and illustrates the need for consistency between the arguments presented to decision-makers and the analytical approach taken in economic evaluation.

**Keywords:** boundary setting, decision analytic modeling, economic evaluation, family effects, mental health, postnatal depression.

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## Introduction

Although theory recommends that the boundaries of an economic evaluation should incorporate all important differences between the comparators [1], it may not always be obvious where to draw the boundaries, that is, which costs and outcomes to incorporate into a particular evaluation. In a discussion of decision analytic modeling for economic evaluation, Drummond et al. suggest that boundary setting "should mainly be driven by the extent to which extending the boundaries...is considered likely to impact on the cost-effectiveness of the options being compared" [1, p290]. Similarly, Gold et al. [2] state that effects that have little impact on the results can safely be excluded from the analysis.

This article addresses two issues of boundary setting in the context of postnatal depression (PND): length of time horizon and the inclusion of family effects (quality of life and/or costs of relatives or significant others). Family effects encompass a third boundary: whether a health sector or wider perspective is taken. I

outline why these issues are relevant in postnatal mental health, examine the impact of varying each boundary, and explore broader implications.

Maternal PND is a common cause of postnatal morbidity [3,4], producing a range of distressing and debilitating symptoms [5]. Relevant to the choice of time horizon, approximately 30% are still depressed 1 to 2 years later [6], and PND is associated with later depression [7]. Family effects are pertinent because children whose mothers had PND have higher rates of behavioral, emotional, and cognitive problems [8,9]. Although factors such as family environment, social support, biology, or adverse life events may explain these associations [10], a causal link is plausible. Children's development during the postnatal period may be influenced by maternal stress, learned cognitions or behaviors, attachment problems, and neurobiological processes [11]. A series of reviews found that after accounting for factors including later maternal depression, the association between maternal PND and behavioral or emotional problems is

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ambiguous, but more reliable between PND and cognitive problems [8,9,12]. These postulated family effects of PND could have significant economic implications. Children's health costs during the postnatal period are higher when mothers have PND [13]. Children with cognitive, behavioral, and emotional problems have lower quality of life and higher costs, affecting health, education, social services, and justice sectors [14,15].

Advocates for investment in PND often describe the burden of PND as incorporating mothers' longer-term depression and children's problems [16–19], thereby implicitly assuming that intervening in PND could change factors beyond mothers' postnatal mental health. These broader costs and outcomes would be relevant to economic evaluation if their inclusion would vary the relative cost-effectiveness of comparators. In contrast, economic evaluations of PND interventions are usually limited to mothers' costs and outcomes with a time horizon of 6 to 18 months. This discrepancy may lead to an allocation of health care resources that fails to maximize health. Women may be missing out on interventions that would be considered cost-effective if the appropriate boundaries were used, but conversely, if advocates influence decision making using these arguments in the absence of economic evidence, overinvestment in PND interventions may result, with associated opportunity cost.

### Boundary Setting for Economic Evaluation in PND

Following economic theory and the “burden of PND” argument would alter the boundaries of evaluation in three dimensions from the status quo. First, and least controversially, it would entail use of a longer time horizon. Studies show that treatment for depression can improve the risk of recurrence [20] and that preventive approaches can be effective for at least up to 2 or 3 years [21].

The second boundary variation would be to include family effects, assuming that some of an intervention's value lies beyond the patient [22]. Although there is not yet consensus on how and when to include family effects in economic evaluations, key decision makers, including those in the United Kingdom and the United States, have taken the position that relevant family effects should be included [23,24]. They have been considered only in limited contexts, including prevention of HIV

transmission, using a net monetary benefit approach [25]; chronic heart failure, by summation of patient and carer quality-adjusted life-years (QALYs) [26]; children's vaccinations, taking carer QALYs and productivity losses into account [27–29]; and dementia, with patients and carers analyzed separately [30]. The inclusion of family effects might also affect the appropriate time horizon because the impact of children's problems could extend into the child's adulthood [31].

The third boundary variation, arising from the scope of associated children's problems, shifts perspective from the health sector to the public sector. Family effects relating to caregiving or altruism may be relevant only from a societal perspective [32], but family health effects may be relevant within a health sector perspective, particularly to a nation-wide health care payer (such as UK's National Health Service). Although some children's problems affect the health sector, some involve other public sectors, such as education or social services.

If all important differences between comparators should be captured, family effects could be relevant whenever the intervention affects family members' costs or outcomes [23,32]. PND interventions could modify children's risks through several pathways. Some could change children's outcomes even if the association between the outcome and PND is noncausal, such as by targeting family relationships [33] or parenting [34], or through spillover of the intervention by a mother learning and passing on skills to her child. To date, measures of family effects have largely been missing from studies of PND interventions, but the limited evidence suggests that treating PND leads to only a slight improvement in child development, if any, even when the mother-child relationship improves [35,36].

One concern over the inclusion of family effects in economic evaluations is the potential for double counting of health-related quality of life (HRQOL) because the target individual could incorporate the effects on family members' well-being into their own [32]. However, family health effects, such as the posited effects of PND on children, are less likely than caregiving effects [37] to result in double counting [32].

Although we lack full data to inform the choice of boundaries for economic evaluation in PND, decisions on funding interventions must still be made. Decision analytic modeling allows synthesis of

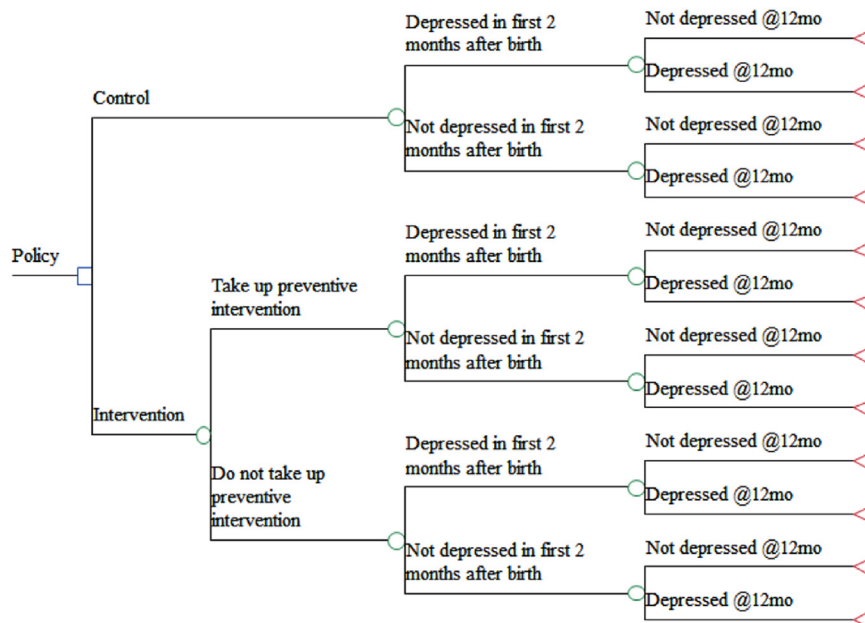


Fig. 1 – Format of the base model.

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