

**ISPOR issue panel: Capturing family spillover effects**

# **Incorporating Family Spillover Effects in Economic Evaluation of Child Health Interventions**

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**May 8, 2024**

# Outline

- Introduction & definitions of spillover effects
- Current health technology assessment guidelines
- Current methods and practices in considering family spillover effects
  - Pediatric cost-utility analyses
  - Maternal-perinatal cost-utility analyses
- Conclusions

# Introduction

## Spillover Effects

# spillover



What is **spillover effects**?

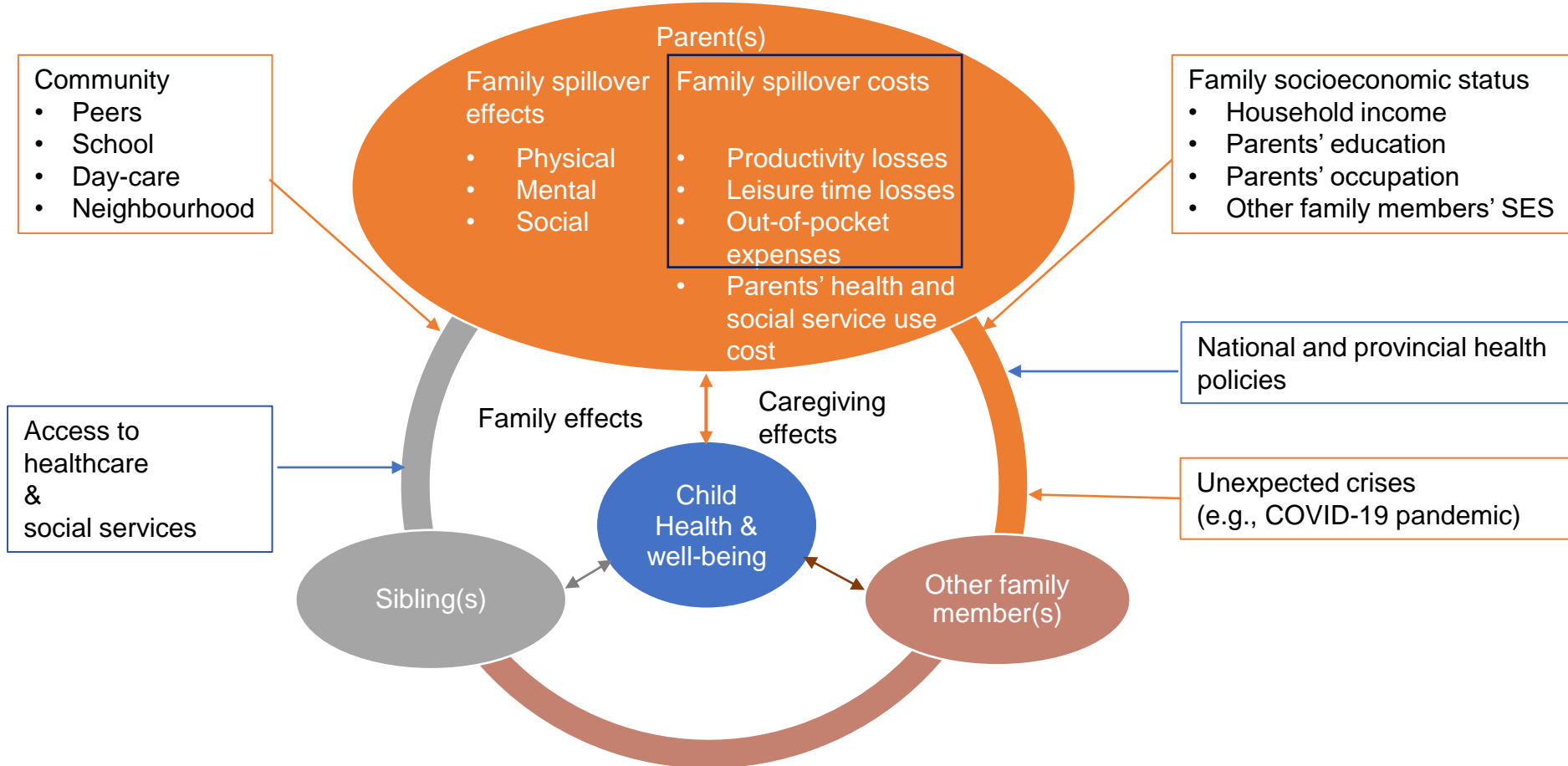
- Health and economic and/or well-being effects of a child's health condition on family members.
- Stems from caregiving effects and family effects.

**Types of spillover effects**

1. Family spillover costs
2. Family spillover effects

(Source: Brouwer et al., 2009; Botanic et al., 2010; Brouwer et al., 2018; Lamsal et al., 2024)

# A Conceptual Framework for Spillover Effects



# Four steps in incorporating family spillover effects

1. Identifying and deciding which family member should be included
2. Measuring and estimating family spillover effects
3. Integrating family spillover effects
4. Reporting family spillover effects

# Guidelines on conducting cost-effectiveness analysis (CEA)

## Canada





“Any associated spillover beyond the targeted population(s), in terms of either costs or effects, [should be addressed in a non-reference case analysis](#).” (page 27, CADTH, 2017)

## United Kingdom

“For the reference case, the perspective on outcomes should be all direct health effects, whether for patients or other people” (page 32) and in the summary of the reference case, this expanded as “[whether for the patient or, when relevant, carers](#).” (page 32, NICE, 2013)



# A Systematic Review of Methods Used by Pediatric Cost-Utility Analyses to Include Family Spillover Effects

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Accepted: 25 October 2023 / Published online: 9 November 2023  
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## A Systematic Review of Methods and Practice for Integrating Maternal, Fetal and Child Health Outcomes, and Family Spillover Effects in Cost-Utility Analyses

Ramesh Lamsal, E. Ann Yeh, Eleanor Pullenayegum, Wendy J. Ungar

Current status: under review **Pharmacoeconomics**

# Methods

- **Systemic review of literature: PRISMA statement**
- **Six Databases:** MEDLINE, Embase, EconLit, Cochrane collection, CINAHL, and INAHTA (from inception to 2020)
- **Pediatric Economic Database Evaluation (PEDE):** update the search through December 2021-Pediatric CUAs and December 2022- Maternal-perinatal CUAs
- **Analytic Considerations**

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## Pediatric CUAs

Family members included

Approaches used to measure and estimate family spillover effects

Approaches used to integrate family spillover effects

Methods use to report family spillover effects

## Maternal-perinatal CUAs

Approaches used to measure the fetal outcomes

Approaches used to measure the impact of the fetal loss in parents' health-related quality of life  
*'bereavement effects'*



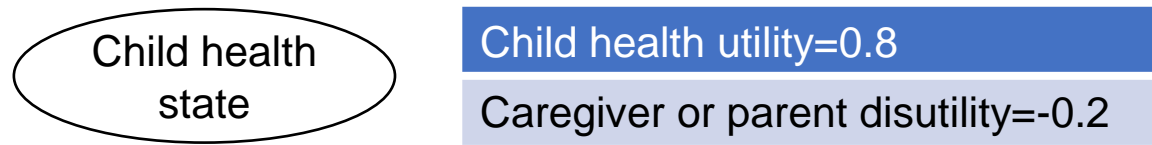
# Paediatric CUAs: Key Findings

- **Out of 878 pediatric CUAs, 35 (4%) included family spillover effects**
- **Family members included**
  - One parent or caregiver
  - Two caregivers or parents
  - Three caregivers
  - Family network members
- **Approaches used to measure family spillover effects**
  - Isolated approach**
    - Quality-adjusted life-years (QALYs) losses of family members and/or caregivers due to a child's illness or disability
    - Disutility of a child's illness or disability on the caregiver(s) or parent(s)
    - QALY losses of family network members
    - QALY losses of the caregiver-child dyad
  - Inherent approach**
    - Health utility of the caregiver or parent → QALYs
    - Health utility of the caregiver-child dyad → QALYs

# Paediatric CUAs: Key Findings

## ○ Approaches used to integrate family spillover effects

- Disutility or utility decrements of a child's illness or disability on the caregiver or parent applied to the child's utility



- Summation of QALYs of children and parents or caregivers within the group

Caregiver or parent health utility → Caregiver QALYs  
Child health utility → Child QALYs

} Combined QALYs of children and parents or caregivers

## ○ Approaches used to report family spillover effects

- QALYs and incremental QALYs reported for children
- QALYs and incremental QALYs for caregivers and children reported separately
- Combined QALYs and incremental QALYs for caregivers and children reported at family level

# Maternal-perinatal CUAs

- Maternal-perinatal interventions are delivered during pregnancy or childbirth
- Maternal-perinatal health involves two distinct yet intricately related individuals– **a mother and a fetus** – whose health and well-being are inherently interconnected
- Unique challenges in conducting CUAs of maternal-perineal interventions
  - Measuring fetal outcome, particularly measuring and valuing fetal losses in terms of QALYs or DALYs
  - Measuring the impact of fetal losses on mothers' HRQoL-bereavement effects

# Maternal-perinatal CUA : Key Findings

- **Out of 174 maternal-perinatal CUAs, 62 (36%) considered the health outcomes of pregnant women and fetuses and/or children**
- **Fetal health outcomes**
  - Out of 62 included maternal-perinatal CUAs, **21 (34%) included fetal health outcomes**
  - '0' health utility-fetal loss
  - QALYs lost, for instance, QALYs lost associated with a stillbirth was estimated at 25 QALYs
- **When to begin 'counting' human life in the cost-utility analyses**
  - Miscarriage (the loss of pregnancy before the 20<sup>th</sup> week of gestation)
  - Stillbirths (pregnancy loss after the 20<sup>th</sup> week of gestation)

# Maternal-perinatal CUA : Key Findings

- **Impact of the fetal loss on mothers' HRQoL – *bereavement effects***
  - Out of 62 included maternal-perinatal CUAs, **17 (27%) included the effect of fetal loss on mother's HRQoL**
  - Healthy utility of (0.92 or 0.76) for mothers who experience a fetal loss
  - Disutility on mother's HRQoL due to fetal loss
  - Duration of **the effects of fetal loss on mother' HRQoL**
    - Ranging from **one year to the remainder of life or until menopause**
    - Varied based on **the gestation age at which the fetal death occurred,**
    - For example, termination of pregnancy = two years and stillbirths = rest of the life of mothers

# Conclusions

- **Various approaches were used to measure, incorporate and report the family spillover effects in pediatric cost-utility analyses**
- **Various approaches were used to measure fetal outcomes and the impact of fetal loss on the mother's HRQoL in maternal-perinatal CUAs**
- Observed variance indicates **a lack of consensus among researchers regarding** how family spillover effects should be measured, incorporated and reported, and how fetal loss and its impact on mothers should be measured
- Might have introduced **biases in cost-effectiveness estimates**
- Need for **guidelines on incorporating and reporting family spillover effects**
- Need for **specific guidelines for maternal-perinatal intervention**

# Moving forward

Methodological issues	Future research and possible solutions
Changes in family members' HRQoL over time after a patient dies	Extend the time horizon beyond the patient's life expectancy to include bereavement effects on family members.
Shifts in family spillover effects	Add a spouse, older sibling, or other family members as a caregiver(s) as patient ages.
Identifying causal effects of the child's health on family member's health	Collect HRQoL data on caregivers or family members alongside randomized clinical trial measures. Use a matched-comparison group, such as family members of healthy children or general population norms. Consider family-level or parent-child dyad health utilities, including reciprocal HRQoL effects.
Same magnitude of health spillovers on all family members, including the primary caregiver	Measure the impacts of a child's illness or disability on HRQoL of various family members.
Delay in observing the changes in family members' HRQoL due to the child's health intervention	Extend the time horizon to capture these effects.

*HRQoL* Health-related quality of life, *QALY* Quality-adjusted life year

Lamsal, R., Yeh, E. A., Pullenayegum, E., & Ungar, W. J. (2024). A Systematic Review of Methods Used by Pediatric Cost-Utility Analyses to Include Family Spillover Effects. *PharmacoEconomics*, 42(2), 199-217.

# Acknowledgement

## **PhD thesis supervisor and committee members**

- Dr. Wendy Ungar
- Dr. Eleanor Pullenayegum
- Dr. Eluen Ann Yeh

## **Funding source**

- Restracom PhD Scholarship - Hospital for Sick Children (SickKids)
- Institute of Health Policy, Management, and Evaluation (IHPME), University of Toronto



**THANK YOU!**



Institute of Health Policy, Management and Evaluation  
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**TASK** Technology Assessment at  
**SickKids**