A realist synthesis to develop an explanatory model of how policy instruments impact child and maternal health outcomes

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ABSTRACT

Background: Child and maternal health, a key marker of overall health system performance, is a policy priority area by the World Health Organization and the United Nations, including the Sustainable Development Goals. Previous realist work has linked child and maternal health outcomes to globalization, political tradition, and the welfare state. It is important to explore the role of other key policy-related factors. This paper presents a realist synthesis, categorising policy instruments according to the established NATO model, to develop an explanatory model of how policy instruments impact child and maternal health outcomes.
Methods: A systematic literature search was conducted to identify studies assessing the relationships between policy instruments and child and maternal health outcomes. Data were analysed using a realist framework. The first stage of the realist analysis process was to generate micro-theoretical initial programme theories for use in the theory adjudication process. Proposed theories were then adjudicated iteratively to produce a set of final programme theories.
Findings: From a total of 43,415 unique records, 632 records proceeded to full-text screening and 138 papers were included in the review. Evidence from 132 studies was available to address this research question. Studies were published from 1995 to 2021; 76% assessed a single country, and 81% analysed data at the ecological level. Eighty-eight initial candidate programme theories were generated. Following theory adjudication, five final programme theories were supported. According to the NATO model, these were related to treasure, organisation, authority-treasure, and treasure-organisation instrument types.
Conclusions: This paper presents a realist synthesis to develop an explanatory model of how policy instruments impact child and maternal health outcomes from a large, systematically identified international body of evidence. Five final programme theories were supported, showing how policy instruments play an important yet context-dependent role in influencing child and maternal health outcomes.

1. Introduction

1.1. Linking political factors to child and maternal health

Politics has been defined as 'the practice of the art and science of administering states' (McLean and McMillan, 2003). Longstanding conceptual and theoretical links between politics and population health exists. The notion that 'medicine is a social science, and politics nothing but medicine at a larger scale' (Virchow, cited by Mackenbach, 2009) has been described as 'public health's biggest idea' (Mackenbach, 2009). Despite the emergence in recent decades of formal evidence-based

pathways for policymaking in the context of pharmaceuticals and other health technologies (Banta, 2003; Sorenson and Chalkidou, 2012), especially in developed countries, politics continues to exert a strong influence on many aspects of broader health-related policymaking (Reijneveld, 2017), leading to evidence-policy gaps (Ferrie, 2015). Therefore, understanding the mechanisms by which these effects operate is important for understanding the determinants of population health.

Child and maternal health are key outcome domains within population health. Child and maternal health outcomes have been shown to directly reflect a country's overall health system performance, hence

acting as an effective marker of the health of a country's health system (Pinzon-Florez et al., 2015). Moreover, reducing maternal mortality by 75% and achieving universal access to reproductive health were key elements of Millennium Development Goal 5, which were not met in 2015 despite considerable progress (World Bank,). This relates to the United Nations' Sustainable Development Goal 3 *Good health and well-being,* in particular, Target 3.1, which aims to reduce the global maternal mortality ratio to less than 70 per 100,000 live births and Target 3.2, which aims to end all preventable deaths under five years of age and keep neonatal mortality in all countries to below 12 per 1000 live births and under-5 mortality to below 25 per 1000 live births, intended to be achieved by 2030 (United Nations General Assembly, 2017). Meanwhile, the American Public Health Association has identified the importance of sociological factors in determining child health outcomes and addressing this as important to achieve health equity (American Public Health Association.).

A previous realist review (Barnish et al., 2021) considered four political exposures – democracy, welfare state provision, political tradition and globalisation – in relation to child and maternal health outcomes. Especially in more developed countries, left-of-centre political tradition generated a greater focus on welfare state measures contributing to reduced child mortality and low birth weight, while a more generous welfare state improved social conditions, contributing to reductions in infant and maternal mortality. In lower-and-middle income countries (LMICs), increased globalisation led to increased international trade dependency and increased influence of multinational corporations and international trade organisations, contributing to increased child and infant mortality and youth smoking rates. This provided greater insight into understanding the extent to which different political exposures could affect child and maternal health outcomes. In this paper, we address a gap identified in this work to examine the roles and interactions of policy instruments on child and maternal health. This advances the understanding of how a broader range of policy-level exposures relate to these outcomes and what mechanisms may operate.

1.2. Relevant theoretical perspectives

Realist synthesis (Pawson et al., 2005) is an approach to evidence synthesis that facilitates moving beyond descriptive analysis to offer a theoretically informed explanatory insight into how the effects identified in a body of evidence may operate. The theoretical insights garnered through realist synthesis are conceptualised in terms of programme theories, which are composed of context-mechanism-outcome configurations (CMOs). The theoretical lens of realist synthesis is based on the epistemological foundations of critical realism (Bhaskar, 1975). A realist synthesis culminates in a context-specific and temporally sensitive middle-range theory, enabling the understanding of a wide range of intermingling relations between contexts and mechanisms that lead to favourable or unfavourable population health outcomes.

A number of macro-theoretical perspectives may inform considerations around the relationship between politics and population health. Key relevant political theories include neoliberalism (Mirowski and Plehwe, 2009), dependency theory (James, 1997), and socialist and social democratic theories (Bailey, 2009; Lamb and Docherty, 2006). In the context of democracy, political tradition, welfare state provision and globalisation in relation to child and maternal health, it was found that the realist programme theories supported by the evidence base aligned most closely with macro-theoretical perspectives within the broadly socialist sphere (Barnish et al., 2021).

In addition to the above political exposures, there are further theoretical perspectives relevant to population health which are specifically appertaining to policy instruments. Vedung (1998b) defines policy instruments as a "set of techniques by which governmental authorities wield their power in attempting to ensure support and effect or prevent social change." Hood (1986) developed a framework of four types of resources (nodality, authority, treasure, and organization, or NATO in

Hood's terminology), that can be used by governments to address policy problems (see also the table below). In this study, the NATO model is used to analyse the targets of interventional tools and the relation between tools and goals of the interventions. Nodality refers to information advantage through the centrality of the government in various networks; authority refers to the legal power of the government to command, regulate, or delegate to achieve goals; treasure refers to a wide variety of financial incentives and mechanisms such as the ability to demand taxes or fund initiatives; and organizational instruments involve the deployment of resources to form organisations and markets and provide goods and services such as through the deployment of personnel to improve operational performance or structure (see Table 2). While there are a variety of instrument classifications available (Pal, 2014), such as the approaches taken by Linder and Peters (1989), Salamon (2002), Stewart (2009) and Vedung (1998), the NATO framework (Hood, 1986) offers the advantages of being a widely used, long-established approach using four broad analytical categories.

1.3. Aims of the current work

Much about what has been written on the programmatic innovation and health system strengthening efforts to improve maternal and child health outcomes understand these efforts as either top-down reform or bottom-up strategy involving a limited number of actors and institutions. These innovations and efforts often comprise a spectrum of strategies that involve the deployment of a single instrument or multiple instruments packaged together in a single reform initiative. In addition, the implementation mechanisms of these initiatives can be far more intricate, involving multiple actors and institutions working either uniformly, synergistically, or antagonistically. The understanding of tools and implementation mechanisms in these reform initiatives that strengthen child and maternal health has not been studied extensively, to the best of our knowledge. Moreover, existing policy evaluations in this area have tended to be successionist and descriptive, while the field would benefit from a shift to a generative, realist approach that provides an explanatory account. Thus, the current work synthesises evidence linking policy instruments, analysed using the NATO model (Hood, 1986), to child and maternal health outcomes.

2. Methods

This was a systematic review using realist methodology. Relevant RAMESES reporting guidelines (Wong et al., 2013) were followed.

2.1. Identification of evidence

Included studies met the following criteria: Quantitative, qualitative or mixed methods original primary research studies; involving analysis at either the individual or ecological level; involving measurement at more than one-time point; published in English as full-text peer-reviewed journal articles; conducted in human populations; conducted in a single country or multiple countries; assessing policy capacity or

Table 1
Candidate CMO domains.

Single-instrument	Multiple-instrument
Treasure[a]	Authority-treasure
Organisation[b]	Treasure-organisation

[a] with a focus on expenditure on health and/or social services (both improvements in outcomes associated with increased investment and deterioration in outcomes associated with austerity measures) and cash transfer programmes.

[b] with a focus on overall health-system improvements, integration and strengthening, and focused health interventions for child and maternal health, including in the community.

Table 2
Example of policy instruments by principal governing resources.

Nodality	Authority	Treasure	Organisation
Information collection and release	Command and control regulation	Grants and loans	Direct provision of goods and services and public enterprises
Advice and exhortation	Self-regulation	User charges	Use of family, community and voluntary organisations
Advertising	Standard setting and delegated regulation	Taxes and tax expenditure	Market creation
Commissions and inquiries	Advisory committees and consultations	Interest group creation and funding	Government reorganisation

Source: Howlett et al. (1995), based on Hood (1986).

policy instruments; assessing child and/or maternal health outcomes, but not fertility (given interpretation of fertility outcomes as 'success' or 'failure' depends on baseline rate).

The following bibliographic databases were searched in March 2021 to identify studies.

- MEDLINE ALL (Ovid)
- APA PsycInfo (Ovid)
- Health Management Information Consortium (Ovid)
- Global Health (Ovid)
- Social Policy and Practice (Ovid)
- Web of Science (Clarivate Analytics)
- International Bibliography of the Social Sciences (ProQuest)

The search strategies were developed by an information specialist following a discussion with the project lead. The information specialist conducted all searches, starting with database searches followed by supplementary searches and citation chasing.

Database searches comprised terms for women and children, terms for different policy/political exposures (both general terms and terms related to policy instruments to ensure coverage), and terms for health services and disparities. No study type filters or date limits were used, but results were limited to the English language. To increase specificity, a search for expected outcomes was also added, using likely outcomes as identified in a prior realist review on political factors in relation to child and maternal health (Barnish et al., 2021). The full search strategy can be found in Appendix A.

The search process was iterative. Relevant references from the initial realist review were used as a test set to ensure they were captured in the final search results. Different subject headings and keywords were tested systematically to identify which of these captured the full test set and which excluded some papers to achieve an optimum balance of sensitivity and specificity.

The search results were exported to Endnote X9 (Thomson Reuters, NY, USA) and de-duplicated using automatic checking. Items included after full-text screening were forward and backward citation chased using Scopus (Elsevier) and Web of Science (Clarivate) to identify additional relevant studies.

First and last author searches were conducted on a pilot selection of 10 key papers in Scopus. Since in all cases the corresponding author was either the first or last author, separate corresponding author searches were not required. Searches of included studies and key identified reviews were also conducted.

Title and abstract screening were initially conducted by one reviewer, and a 10% independent screening check was performed by a second reviewer. Any discrepancies were resolved by discussion between the initial two reviewers, involving two further senior team members as required. Potentially relevant records proceeded to full-text review, which was initially conducted by one reviewer with a 50% independent screening check by a second reviewer. Any discrepancies were resolved by discussion involving two further senior team members as required.

Data extraction was conducted by one reviewer, and a 50% independent check was conducted by a second reviewer. Any disagreements were resolved by discussion involving two further senior team members as appropriate. Data were extracted onto a standardised form, designed to capture the following information: Bibliographic details; country/countries of study; methodology; Ssmple size; sampling frame; years of study; exposure measure; outcome measure; results; information to help develop programme theories. When deciding which results to extract, all key study findings relevant to the review question were extracted, with a focus on narrative results that could enrich theory development and adjudication rather than quantitative effect sizes and p-values as used to inform meta-analyses.

Level of development was categorised into a binary classification of developed countries vs LMICs, whereby countries on the World Bank high-income list (World Bank, undated a) were classified as developed, and countries on the World Bank low-income (World Bank, undated b) and middle income (World Bank, undated c) lists were classified as LMICs. Since this study used realist methods, no formal assessment of the risk of bias was undertaken.

2.2. Realist analysis

The first stage of the realist analysis process was to generate micro-theoretical initial programme theories for use in the theory adjudication process. Realist initial programme theory development is typically an iterative process informed by a defined set of sources of knowledge, which can include textual sources, discussions, broader epistemological and theoretical perspectives applicable to the broad field of study, and the authors' subject knowledge. To ensure a broad range of perspectives were taken into account, included studies were each randomly assigned to one of four reviewers with different disciplinary backgrounds. Through engagement with the assigned study, as well as broader information from the body of studies as a whole and relevant theoretical perspectives, the four reviewers formed initial programme theories via a process of open coding.

These initial programme theories were first dimensionalised (i.e., related to each other across studies to understand similarities and differences) by two reviewers in the context of policy instruments applying the NATO model (Hood, 1986). They were then iteratively discussed and adjudicated in a series of team meetings.

Theory adjudication, i.e. "which theories around the intervention seem to fit best" (Rycroft-Malone et al., 2012), was performed separately for each programme theory. Coding was conducted manually. For this process, studies were divided in a 2:1 ratio between two reviewers, and the results of this adjudication were verified and refined through iterative rounds of discussion at meetings attended by all four reviewers. The process involved an overall assessment of the consistency of findings (i. e., assessment of demi-regularities in outcome patterns by context-mechanism combinations) in the direction that would support the programme theory. Consistency and strength of evidence were assessed by discussion among the team, taking into account how many studies were available, how many of the studies had broadly comparable findings and the geographical profile of the findings. Then, a more detailed assessment of studies for which the findings were in the direction that would support the programme theory was conducted. This enabled the precise context mechanism and outcome configuration to be tested and refined. The concept of mechanism was defined as per Falleti and Lynch (2009): "portable concepts that explain how and why a hypothesized cause, in a given context, contributes to a particular outcome". Since many studies incorporated countries at different levels of development, it was not feasible to stratify the analysis by level of development.

3. Results

3.1. Identification of evidence

Database searches yielded a total of 39,743 records (see Appendix A for breakdown by each database), of which 33,774 remained following de-duplication. This was supplemented by 7361 additional unique records from citation chasing and 2280 from author searches, for an overall total of 43,415 unique records. Following title and abstract screening, 632 records proceeded to full-text screening. A total of 138 publications proceeded to inclusion, representing a total of 132 unique studies. Concordance between the two reviewers was 99% at title and abstract screening and 90% at full-text screening, which the review team considered to be appropriately high. A list of articles screened at the full-text stage, indicating which were included and which were excluded

(with reasons), is provided in Appendix B. The PRISMA flow chart is provided as Fig. 1.

3.2. Study profile

The study profile and analysis are presented at the level of studies rather than individual publications, and as noted above, some studies comprised more than one publication. Twenty-five studies (19%) conducted measurement at the individual level (Andersen et al., 2015; Barber and Gertler, 2008; Blake-Lamb et al., 2020; Choudhury and Polachek, 2021; Cluver et al., 2013; Drewry et al., 2015; Findley et al., 2016; Findley et al., 2013; Gabbe et al., 2017; Ghosh and Kochar, 2018; Hajizadeh et al., 2015; Irish et al., 2021; Jahagirdar et al., 2017; Jo et al., 2018; Labrecque et al., 2018; Lessaris et al., 2002; Lopez-Arana et al., 2016; Meda et al., 2018; Meghea et al., 2013; Memon et al., 2015; Norr
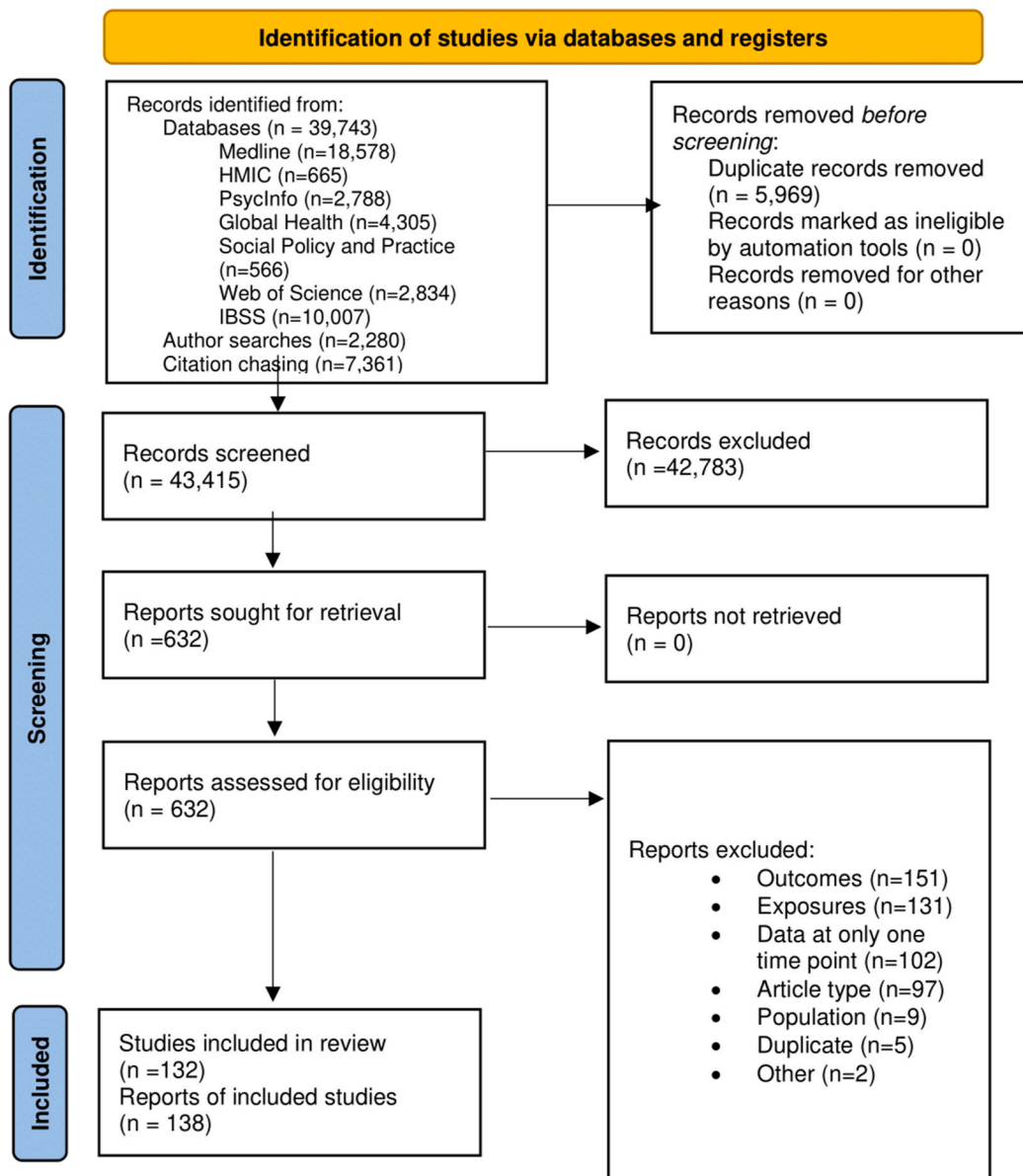
Fig. 1. PRISMA flow diagram.

et al., 2003; Okafor et al., 2011; Patel et al., 2001; Paxson and Schady, 2010; Perin et al., 2020; Sanchez et al., 2020), 16 studies (11%) used clustered, household- or area-based designs (Abdulahi et al., 2021; Adubra et al., 2019; Alexiou et al., 2021; Arifeen et al., 2009; Bang et al., 2005; Barham, 2011; Crea et al., 2015; Fernald et al., 2008; Fernald et al., 2009; Garchitorena et al., 2018; Garchitorena et al., 2020; Gram et al., 2019; Grellety et al., 2017; Houngbe et al., 2017; Huang et al., 2017; Johnson et al., 2013; Kusuma et al., 2017; Kusuma et al., 2016; Robertson et al., 2013; Saville et al., 2018), while the remainder used other ecological approaches such as country case studies, panel designs and serial cross-sectional studies. Three studies (2%) used qualitative designs (Brault et al., 2017; Katahoire et al., 2015; Vos et al., 2016), six studies (5%) used mixed methods designs (Brault et al., 2018; Gram et al., 2019; Huicho et al., 2016; Lindsay, 2002; Margolis et al., 1995; Saville et al., 2018), and the remainder used quantitative designs.

Studies were published from 1995 to 2021, and the collective period of data collection was from 1960 to 2019. The duration of data collection ranged across studies from less than one year to 41 years. The start or end year of data was not available for 14 studies (11%). Thirty-three studies (25%) were conducted exclusively in developed countries, 84 studies (64%) were conducted exclusively in LMICs, and 14 studies (11%) included both developed countries and LMICs. One study on 'EU developing countries' (Onofrei et al., 2021) included both developed countries and LMICs according to World Bank criteria. Full Information about the level of development was not available for four studies (4%). Across the 132 included studies, 100 (76%) included data from a single country, while 32 (24%) included data from multiple countries, and seven (5%) included data from a panel of at least 100 countries (Bishai et al., 2016; Factor and Kang, 2015; Farag et al., 2013; Hall et al., 2021; Kamiya, 2011; Maruthappu et al., 2015; Wise and Darmstadt, 2015).

A summary of the study characteristics is provided in Appendix C, while a summary of narrative study results is provided in Appendix D.

3.3. Initial programme theories

Separate lists of initial programme theories were generated by each of the four reviewers based on their respective allocated studies. Following de-duplication and initial dimensionalisation, 88 candidate programme theories were produced and analysed according to the NATO model (Hood, 1986). This list is provided in Appendix E.

3.4. Theory adjudication

After further iteration and integration of candidate programme theories as part of the theory adjudication process, four candidate CMO domains were considered to be well supported by the evidence base. Two of these were single-instrument candidate CMOs domains: treasure and organisation, while two were multi-instrument configurations: authority-treasure and treasure-organisation. Treasure appeared overall to be the most frequently supported domain at this stage in the analysis. Within the single-instrument treasure domain, support was greatest with regard to expenditure on health and/or social services (both improvements in outcomes associated with increased investment and deterioration in outcomes associated with austerity measures) and cash transfer programmes. Within the single-instrument organisation domain, support was greatest for overall health-system improvements, integration and strengthening, and focused health interventions for child and maternal health, including in the community. Nodality-based approaches were not among the best supported.

After the best-supported candidate CMO domains were identified within the evidence base (Table 1), further iterative team discussion elucidated more specific final programme theories, i.e. CMO configurations, within these domains (Table 3). A full list of included studies to support the analysis is provided in Appendix F. In order to provide richer insight into the results underpinning these final programme theories, a more detailed table of results presenting the outcomes underpinning the

Table 3
Final programme theories.

#	Final programme theory	Domain	Key studies
1	Increased public expenditure especially in LMICs with sufficient governance to facilitate administrative capacity led to lower infant and under-5 mortality through improved government effectiveness in expanding health facilities and access	Treasure; authority-treasure	Ashiabi et al. (2016) Behera and Dash (2020) Bishai et al. (2016) Bradley et al. (2011) Goldstein et al. (2020) Factor and Kang (2015) Farag et al. (2013) Hall et al. (2021) Kim and Lane (2013) Langnel and Buracom (2020) Nyamuranga and Shin (2019)
2	Austerity measures especially in LICs and areas of greater socioeconomic deprivation led to worse perinatal outcomes, life expectancy at birth and child mortality through weakened social protection	Treasure	Alexiou et al. (2021) Maruthappu et al. (2015) Rajmil et al. (2018)
3	Conditional cash transfer programmes especially with adequate community participation and a strong nutritional component in LMICs led to improved child growth and anthropometric outcomes and reduced infant mortality through strengthened household financial security and empowerment to access health services	Treasure; treasure-organisation	Barber and Gertler (2008) Cluver et al. (2013) De Andrade et al. (2018) Gram et al. (2019) Grellety et al. (2017) Labrecque et al. (2018) Randive et al. (2014) Lopez-Arana et al. (2016) Mascie-Taylor et al. (2010) Perez-Lu et al. (2017) Rasella et al. (2013) Sanchez et al. (2020) Shaefer et al. (2020)
4	Health system strengthening including achieving greater integration of maternal and child health programmes into the national health agenda in LMICs led to reduced under-5 and maternal mortality through country-level including economic growth and improved infrastructure, health-system factors including increased investment in midwifery training, increased funding for salaries and resources, increased facility births and increased skilled birth attendance, and a high level of acceptance by providers and patients	Organisation; treasure-organisation	Fernandes et al. (2014) Kayode et al. (2016) Khan et al. (2012) Liljestrand and Sambath (2012)
5	Focused maternal and child health interventions led to reduced maternal, perinatal, infant and under-5 mortality in LMICs through a demographically responsive health system and improved sickness management	Organisation	Abdulahi et al. (2021) Acuin et al. (2011) Adubra et al. (2019) Aquino et al. (2009) Armstrong-Schellenberg et al. (2004) Bang et al. (2005) Bitler and Currie (2005) Findley et al. (2016) Findley et al. (2013) Meghea et al. (2013) Narwal and Gram (2013) Okafor et al. (2011) Perks et al. (2006)

final programme theories, categorised by instrument type and level of development, is provided in Appendix G.

3.4.1. Final programme theory 1

Increased public expenditure, especially in LMICs with sufficient governance to facilitate administrative capacity, led to lower infant and under-5 mortality through improved government effectiveness in expanding health facilities and access (NATO policy instrument domain treasure; authority-treasure).

Ashiabi et al. (2016), Bishai et al. (2016), and Langnel and Buracom (2020) found that in an LMIC context, increased public expenditure on health led to lower child mortality rates through an improvement in health service provision and access, but this effect depended on countries having sufficient governance to facilitate administrative capacity. On a related theme, Behera and Dash (2020) found that in Southeast Asian countries, increased public health expenditure showed positive effects on the reduction of infant mortality achieved through the mechanism of improved government effectiveness to expand healthcare facilities. Furthermore, Farag et al. (2013) found that governmental effectiveness – with a level of good governance as a proxy– acted as a mechanism for the significant effect of governmental spending on health on the reduction of infant and child mortality in a panel of 133 LMICs from 1995 to 2006. Factor and Kang (2015) did not find a direct relationship between health expenditure and health outcomes once other factors such as level of economic development, regime autocracy and corruption had been considered, suggesting these may be important determinants of child and maternal health outcomes.

Taking a different perspective, Nyamuranga and Shin (2019) identified immunization, female literacy, improved water sources and reduced HIV prevalence as mechanisms for the impact of increased health expenditure on the reduction of infant and under-5 mortality in LMICs. Considering 17 countries from 1973 to 2000, Kim and Lane (2013) found further evidence supporting the beneficial impact of increased health expenditures on infant mortality and life expectancy at birth. While many studies focused on health expenditures, Bradley et al. (2011) found that in OECD countries, an increased ratio of social relative to health expenditures was predictive of better outcomes in infant mortality, life expectancy, and increased potential life years lost after adjusting for the level of health expenditures and GDP. Goldstein et al. (2020) found that increased spending on environmental, educational, and infant mortality all reduced infant mortality, the impact being greatest with lower maternal age. Hall et al. (2021) identified that, especially in lower-income contexts, increased financial investment is linked with rapid impacts on under-five and maternal mortality through improvements in government spending on health and infrastructure and improved household spending, while conversely, government debt refinancing or tax incentives may lead to short-term worsening in health due to a reduced ability to spend at both household and government levels. Focusing on more specific types of increased investment, Hajizadeh et al. (2015) demonstrated the benefit of paid maternity leave on childhood vaccination uptake in a sample of 20 LMICs. Also, in a lower-income context, in Burkina Faso, Meda et al. (2018) did not find evidence for the influence of a fee subsidy policy for deliveries and emergency obstetric and neonatal care on neonatal mortality rates, although institutional deliveries themselves were increased. In a high-income context, Susan Marquis and Long, 2002 found that expanding public insurance led to better health outcomes for women through improved access to maternal care services, while a maternal and child health services block grant facilitated reduced infant mortality (Margolis et al., 1995).

Considering the authority-treasure domain further, certain studies offered insight into favourable treasury policies that lack enforcement. In a Kenyan context, Gitobu et al. (2017) stated that governmental policy to waive delivery charges in public health facilities did not improve maternal survival or influence the causes of maternal mortality. Also, in a Kenyan context, Gitobu et al. (2018) found that a delivery charge waiver policy in public health facilities statistically significantly increased the number of facility-based deliveries, but this did not convert into a significant reduction in maternal or neonatal mortality. After adjusting for patient characteristics, Taylor et al. (2020) in a Medicaid non-expansion state in the US did not find an association between Medicaid status at delivery and adverse pregnancy outcomes. Urquieta-Salomon et al. (2020) identified increased utilisation of health services and increase in health equity as potential mechanisms for the beneficial impact of universal health insurance legislation on maternal and child health.

Furthermore, certain studies showed how authority mechanisms bolstered the deployment of treasury tools. Irish et al. (2021) found that changes to the treasure-related instrument of parental leave implemented based on authority mechanisms in a high-income context are associated with diffuse maternal and child health outcomes. Improvements in income and family bonding were identified as mechanisms, but outcomes also depended on the context of family resilience and economic status. Ahammer et al. (2020) found that reform of Austrian maternity leave legislation in 1974 to extend compulsory prenatal leave did not improve children's health at birth or long-term health. Tanaka (2005) identified adequate payment and job protection as key determinants of the success of parental leave policies on child health outcomes in a panel of 18 OECD countries from 1969 to 2000, as they facilitate parental leave-taking behaviour. Turning to a low- and middle-income context, Jahagirdar et al. (2017) also found little evidence that changes in legislated paid maternity leave were sufficient to affect child height-for-age. It was considered that the relatively short duration of legislated leave, potential low coverage and increases in child growth in this particular setting may explain these findings.

3.4.2. Final programme theory 2

Austerity measures especially in LICs and areas of greater socioeconomic deprivation led to worse perinatal outcomes, life expectancy at birth and child mortality through weakened social protection (NATO policy instrument domain treasure).

Three studies examined the impact of austerity programmes. In a high-income context, Rajmil et al. (2018) found that large budget cuts in education, health and other public services resulted in adverse trends in perinatal outcomes (low birth weight and infant mortality) and the social determinants of health (child poverty rates and severe material deprivation in families with primary age children), potentially due to weakened social protection, while Alexiou et al. (2021) showed the disproportionate impact of funding cuts on life expectancy at birth in more socially deprived areas of England. Considering a sample of 176 countries at different levels of economic development, Maruthappu et al. (2015) showed that reductions in government healthcare spending led to increased child mortality, with the impact being greater in low-income countries.

This provides a consistent finding across Alexiou et al. (2021) and Maruthappu et al. (2015) that the adverse impact of austerity programmes is greater in the context of greater socio-economic deprivation. From a related perspective, Kayode et al. (2016) found that irregular and insufficient funding and lack of sufficient monitoring and evaluation were some of the biggest implementation challenges for policies to strengthen maternal care.

3.4.3. Final programme theory 3

Conditional cash transfer programmes, especially with adequate community participation and a strong nutritional component in LMICs, led to improved child growth and anthropometric outcomes and reduced infant mortality through strengthened household financial security and empowerment to access health services (NATO policy instrument domains treasure and treasure-organisation).

It was noted that cash transfer programmes were primarily studied in an LMIC context, as would be expected given their particular relevance in this economic context. Empowering people to access health services,

especially where the cash transfer programme has a strong nutritional component, was identified by studies focusing on CCTs as a mechanism for the positive impact of cash transfer programme participation on child growth and anthropometric outcomes as well as infant mortality reduction. This potential mechanism was reinforced by Rasella et al. (2013), which showed that an increased income as a result of a CCT programme can improve access to food and health-related services, facilitating a reduction in under-5 mortality. Sanchez et al. (2020) further reinforces the value of CCTs for improving nutritional status, while Grellety et al. (2017) emphasise strengthened financial security for vulnerable households as a mechanism by which these gains may be achieved. Behaviour change may be another mechanism by which cash transfer programmes achieve their benefit. This is related to strengthened financial security since this security may, in turn, enable people to change their health-related behaviours. De Andrade et al. (2018) found that CCTs led to decreased leprosy incidence in individuals under 15 years old potentially through enhancing early detection and prompt treatment of cases, reducing transmission, occurrence of disabilities and negative social consequences due to leprosy, while Cluver et al. (2013) found that cash transfers can reduce HIV adolescence among adolescent girls through reducing risk behaviours. The importance of ensuring adequate participation in cash transfer programmes was shown by a study from Brazil (Labrecque et al., 2018), which showed a negative association between conditional cash transfer (CCT) programme participation and child length- and weight-for-age in the context of low participation rates in the CCT. However, it is important to note inconsistent evidence for the benefit of CCT programmes, with Lopez-Arana et al. (2016) showing a positive impact on thinness but not the more prevalent outcome of stunting in Colombia. Mascie-Taylor et al. (2010) showed that a cash-for-work programme in Bangladesh improved childhood nutritional status and associated anthropometric status through facilitating greater household expenditure on food and consequent consumption of more protein-rich food. Shaefer et al. (2020) considered the opposite direction of effect, assessing the negative impact of the decline of cash assistance in a US context in a state-level analysis from 2001 to 2015. It was found that the decline of cash assistance increased household food insecurity and child homelessness among those in state education, with the reduction in financial means, especially for women with greater social deprivation and stagnation in maternal employment, identified as a potential mechanism.

Gram et al. (2019) conducted a process evaluation of a combined participatory women's group and unconditional cash transfer programme to improve low birth weight in rural Nepal and found that the benefit was limited by women not spending the money in the intended manner. Randive et al. (2014) showed that the impact of a cash incentive programme in India was differential according to the level of area deprivation, leading to increased inequality despite improved maternal health outcomes, emphasising the need for more targeted interventions. Barber and Gertler (2008) and Perez-Lu et al. (2017) both emphasised the importance of system co-ordination for successful CCTs, noting that both treasure and organisation elements have an important role to play.

3.4.4. Final programme theory 4

Health system strengthening, including achieving greater integration of maternal and child health programmes into the national health agenda in LMICs, led to reduced under-5 and maternal mortality through country-level including economic growth and improved infrastructure, health-system factors, including increased investment in midwifery training, increased funding for salaries and resources, increased facility births and increased skilled birth attendance, and a high level of acceptance by providers and patients (NATO policy instrument domain organisation; treasure-organisation).

Kayode et al. (2016), in a Ghanian context, found that the benefit of increasing and strengthening cost-effective and neonatal-specific interventions such as the Safe Motherhood Program (SMP) and Community-Based Health Planning and Services (CHPS) Program on

under-5 mortality in line with MDG4 was achieved through high levels of acceptance of the policies and interventions among health providers and patients, which improved utilisation rates. Furthermore, in Pakistan, Khan et al. (2012) found that integrating newborn care in national health policies and programmes facilitated reduced neonatal mortality and identified the catalysation of newborn services at both facility and community levels through the National Maternal, Newborn and Child Health Programme as a mechanism. In turn, this strengthening of the integration of neonatal care into the national health agenda has been facilitated by civil society and academic advocacy and advisory links with the government. In a Cambodian context, Liljestrand and Sambath (2012) found that another health system-strengthening initiative, the Safe Motherhood Programme, increasing the incorporation of maternal health into the national health agenda, facilitated a reduction in maternal mortality. Country-level factors, such as peace and stability, economic growth, improved transport and communication infrastructure and improved female education, as well as health-system factors, such as increased facility-based births, increased investment in midwifery training, and increased skilled birth attendance, were identified as potential mechanisms.

In the context of health system capacity strengthening, Fernandes et al. (2014) found a decrease in child mortality in Mozambique and identified a combination of financial and structural institutional mechanisms: increased health workforce density, increased institutional birth coverage and increased governmental budgetary resources to support salaries and other health-facility running costs. This shows how treasury tools can augment positive child and maternal outcomes when operating in the context of community participation and system-wide reforms.

3.4.5. Final programme theory 5

Focused maternal and child health interventions led to reduced maternal, perinatal, infant and under-5 mortality in LMICs through a demographically responsive health system and improved sickness management (NATO policy instrument domain organisation).

Bang et al. (2005) and Okafor et al. (2011), in an LMIC context, found that focused maternal and neonatal care programmes led to reduced perinatal and maternal mortality through improved sickness management. Meanwhile, Acuin et al. (2011) found that favourable health system development related to obstetric care and interventions directed towards infectious diseases predicted a rapid decline in maternal, infant and under-5 mortality in an Asian context with modest levels of economic growth. The key mechanism of this effect was identified as having a demographically responsive health system. Comprehensive district-level health programmes in Laos, including strengthening of district health management and improving access to health facilities led to increased healthcare utilisation at a population level, in turn facilitating a reduction in child and infant mortality rates (Perks et al., 2006). Aquino et al. (2009), in a Brazilian context, corroborated the view that reorganisation of primary health care can reduce infant mortality, also noting a reduction of health inequalities through a greater reduction in areas with higher baseline infant mortality. In a Tanzanian context, Armstrong-Schellenberg et al. (2004) also found that a strategy to integrate the management of childhood illness reduced under-5 mortality and identified facilitating access to health facilities and consequent high utilisation as potential mechanisms. In a Nigerian context, Findley et al. (2013) identified that participatory and community-based interventions in the context of an integrated maternal, newborn and child health program increased skilled birth attendance and follow-up and infant vaccination rates as well as reduced infant mortality rates. Findley et al. (2016) specifically identified a benefit from increasing participation. However, Narwal and Gram (2013), in an Indian context, found no evidence for the benefit of the National Rural Health Mission on infant mortality, suggesting a need for more robust monitoring and evaluation processes.

Specifically, in the context of a conditional cash transfer programme intervention incorporating a lipid-based nutrient supplement, Adubra

et al. (2019) identified weakness in intervention design and suboptimal implementation (short duration and poor coverage) as reasons for negative effects on stunting. Turning in particular to the role of community health workers, Meghea et al. (2013), specifically in a US context, found no overall benefit on child health of the introduction of community health workers, whereas contrastingly Abdulahi et al. (2021) found the introduction of community health workers to be an important component of how the health system is organised for the benefit of child health. While it is not possible to know for certain, this discrepancy in outcomes may relate to differences in health systems context. Considering another nutrition-based intervention, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), Bitler and Currie (2005) in the United States found that the intervention was associated with improved birth outcomes with the effect being greater among more disadvantaged women.

4. Discussion

4.1. Summary

This article presents a realist review focusing on child and maternal health incomes in relation to policy instruments. It identifies several theories relating to public expenditure, austerity, conditional cash transfer programmes, health system strengthening and focused maternal and child health interventions. Treasure and organisation were the most consistently effective single policy instruments using the NATO model. Considering multiple instruments, the combination of authority-treasure and treasure-organisation was shown to be particularly synergistic. The effectiveness of particular instruments was shown to be context-dependent rather than context-independent. It was noted that nodality did not feature among the best-supported policy instruments in this review. It is not possible to determine whether this reflects a relative ineffectiveness of nodality for child and maternal health, a preference on the part of governments to deploy other strategies, and/or a preference by researchers and funders to study other policy instrument types.

4.2. Contextualisation

This work builds on a prior realist review by Barnish et al. (2021), which also considered child and maternal health outcomes in the context of a different but related set of political exposures – democracy, political tradition, the welfare state, and globalisation. As such, the specific programme theories are different but share some thematic commonalities. The current work excluded fertility outcomes to improve the specificity of the results. This is because the directionality of the effect of fertility data depends on the baseline population density of the study, which will differ between countries included within a single study as well as across studies. Furthermore, the present review also includes studies that presented data from only one sovereign country, whereas the prior review only considered internationally comparative studies. Thirty-eight of the included studies in the current work were internationally comparative. The addition of studies assessing a single country offers a valuable perspective, given the selection of policy instruments can be influenced by a range of country-specific factors. The policy instrument theoretical lens helps public health scholars to examine the broader institutional apparatuses matter in affecting governance and capacity in implementing mega health programmes and interventions aiming to improve maternal and child health and how these forces result in programmes and interventions being enforced or veered away from the intended outcomes.

The present review targets the final of the five key steps identified by Berry and Saloner (2021) for the use of policy to generate substantial population health benefits: that is to say, evaluating the effects of policies. Work by Gelius et al. (2022) found that the selection of harder or softer policy instruments depends on the outcomes sought. The present work found that harder policy instruments, such as treasure-based

instruments, were generally preferred in the context of child and maternal health outcomes, with softer instruments, in particular nodality-based instruments, not featuring among the most effective strategies. Policy instruments deployed for child and maternal health had more in common with those deployed for tobacco and alcohol policy rather than those for encouraging good nutrition and physical activity in the general population (Gelius et al., 2022).

The realist perspective generated micro-theoretical initial programme theories, which were iterated through multiple rounds of discussion to adjudicate the proposed theories and to situate them in the context of macro-theoretical perspectives from the wider literature. For instance, the cross-fertilisation of public policy theories and public health literature means that we could apply a policy instrument theoretical lens from public policy to dissect public health interventions for maternal and child health to achieve a system-level understanding of their implementation mechanisms, as well as dissecting the explicit and hidden factors within the entire health system governance structure that affect the success and failure of these programmes, interventions and reforms.

The present work shows different approaches that governments and health system organisations have deployed as they seek to address the international health priorities (World Bank.; United Nations General Assembly, 2017) of child and maternal health in the context of 'the practice of the art and science of administering states' that constitutes politics (McLean and McMillan, 2003). Analysis was undertaken using the NATO model for policy instruments (Hood, 1986). Results may differ if an alternative classification scheme were to be used, but there are broad commonalities. Vedung (1998) and Pal (2014), for example, speak to the degree of use of state mechanisms and authority in deploying policy instruments. Pal (2014) notes that the choice of instrument may depend on the extent of state coercion that will be accepted as legitimate for this particular purpose, which speaks to purpose-specific differences in policy instrument selection, as noted by Gelius et al. (2022). The use of a more focused instrument such as NATO affords an advantage to the present work in drawing commonalities and distinguishing context-specific differences in instrument deployment compared to an approach such as Kirschen (1964), which offers greater granularity. However, with 62 different types of policy instruments identified, it is less amenable to comparative analysis across contexts. Greater use of treasure and authority-related instruments may be generally more aligned with social democratic and/or socialist macro-theoretical perspectives (Bailey, 2009; Lamb and Docherty, 2006). However, this will depend on specific local cultural and political contexts, as well as factors related to health system organisation. Furthermore, an international context introduces systematic and idiosyncratic complexities in the mapping between political characteristics and specific political parties (Barnish et al., 2018).

4.3. Strengths and limitations

This work benefits from the use of realist methodology, drawing on the theoretical lens of critical realism, to offer an explanatory perspective to inform considerations around the relationships between policy instruments and child and maternal health. The use of systematic searching of seven major scholarly databases plus relevant supplementary searches and independent dual review minimised the risk of non-retrieval and reviewer bias (Uman, 2011). Most studies were ecological, which permitted studies to access larger, more representative datasets across longer time spans than would be typically untenable with individual-based methods such as cohort studies and randomised controlled trials. However, the risk of ecological fallacy in extrapolating group-level effects to constituent individuals should be considered. Most studies were observational, which poses challenges for drawing causal inferences, although a critical realist theoretical lens can help mitigate this. Only English-language articles were able to be considered.

4.4. Future directions

The study and practice of public health shall benefit from further theoretically informed analyses that explicitly acknowledge the political nature of health (Bambra et al., 2005). Realist reviews benefit from being informed by the critical realist perspective and, as such, stand to be especially useful for understanding and advancing the social epidemiology of health (Muntaner, 2013). A greater understanding of how governance, policy capacity and policy instruments exert influence on child and maternal health outcomes could enable the furtherance of policy analysis of public health initiatives and lead to greater opportunities for synergy between academic research and practical action for the improvement of population health (Capewell et al., 2018; Smith and Stewart, 2017).

Further research could also consider additional political exposures that could be relevant to child and maternal health, including governance, policy capacity, political culture, policy processes, as well as other pertinent systems factors such as levels of productivity, innovation, and inequity (Taeihagh, 2017). A valuable focus for further research could be examining how the choice of type of policy instrument (hard vs soft and single vs multiple) differs as a function of time and level of development, when a given policy instrument is most likely to be effective, and what relationship exists between policy instrument choice and mode of governance. Within the study of policy design in public health, there is also room to incorporate more granularity when interrogating the data, especially in examining instrument calibrations and in teasing out the differences between substantive and procedural policy instruments and tools (Howlett et al., 1995) in advancing various public health agendas.

5. Conclusions

This paper presents a theoretically informed realist synthesis of a large systematically identified international body of evidence on the relationships between policy instruments and child and maternal health outcomes. Five final programme theories were supported, showing how policy instruments play an important yet context-dependent role in influencing child and maternal health outcomes. Firstly, increased public expenditure, especially in LMICs with sufficient governance to facilitate administrative capacity, led to lower infant and under-5 mortality through improved government effectiveness in expanding health facilities. Secondly, austerity measures, especially in LICs and areas of greater socioeconomic deprivation, led to worse perinatal outcomes, life expectancy at birth and child mortality through weakened social protection. Thirdly, conditional cash transfer programmes, especially with adequate community participation and a strong nutritional component in LMICs, led to improved child growth and anthropometric outcomes and reduced infant mortality through strengthened household financial security and empowerment to access health services. Fourthly, health system strengthening, including achieving greater integration of maternal and child health programmes into the national health agenda in LMICs, led to reduced under-5 and maternal mortality. This is typically achieved through country-level factors, including economic growth and improved infrastructure; health-system factors, including increased investment in midwifery training, increased facility births and skilled birth attendance, and a high level of acceptance by providers and patients. Fifthly, focused maternal and child health interventions led to reduced maternal, perinatal, infant and under-5 mortality in LMICs through a demographically responsive health system and improved sickness management.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.socscimed.2023.116402.

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