

The Fiscal Case for Preventive Maternal and Child Health Investment in India

Evidence from a Scenario-Based Economic Analysis in Madhya Pradesh

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2026

Case study data provided in collaboration with the Antara Foundation, Madhya Pradesh

Word count: approximately 10,200

Research question: Under plausible and conservative assumptions, do preventive maternal and child health system-strengthening interventions in a high-burden Indian state generate economic returns that exceed their cost?

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Abstract

Existing economic evaluations of preventive health investment typically frame returns as aggregate social benefits or cost-effectiveness ratios. This paper takes a different approach: it asks whether preventive maternal and child health (MCH) investment generates fiscal returns specifically to the public payer that finances it. That framing matters for budget planning in fiscally constrained settings, where the relevant question is not whether prevention is socially beneficial in general, but whether it reduces the expenditure obligations of the same government that funds it. The paper develops this analysis for a high-burden Indian state, using Madhya Pradesh as a case study and drawing on published cost benchmarks and program expenditure data.

The analysis combines program-level cost data with secondary epidemiological and treatment-cost estimates from published Indian sources. Rather than estimating causal program impact, it uses a scenario-based framework to test fiscal plausibility: whether conservative proportional reductions in severe maternal and neonatal complications — under three scenarios ranging from 1% to 5% — would generate avoided public inpatient expenditure that offsets the cost of prevention. Parameters are grounded in published benchmarks from Prinja et al. (2013, 2016, 2017) and the structural precedent for this approach draws on Alderman and Behrman (2006, 2017).

The results indicate that the fiscal case for prevention rests on a structural cost asymmetry. At USD 1.41 per beneficiary in preventive system-strengthening costs, the break-even threshold — the number of severe cases that must be averted to offset total preventive expenditure — is fewer than 10% of baseline severe events in a representative cohort. Even at the low scenario (1% reduction), avoided inpatient expenditure is economically meaningful relative to program cost. Because the analysis captures only immediate avoided inpatient spending, longer-term human capital returns would strengthen these results further.

The paper contributes to the literature on sustainable development by treating preventive MCH investment as a fiscal risk management strategy, not only a health or welfare intervention. In high-burden settings where the public sector bears the cost of obstetric and neonatal emergencies, modest investments in system strengthening can plausibly reduce downstream expenditure obligations while simultaneously building the early-life human capital that underpins long-term economic development. The findings have direct implications for state-level health budget planning in India, particularly in states where baseline mortality remains well above national and SDG targets.

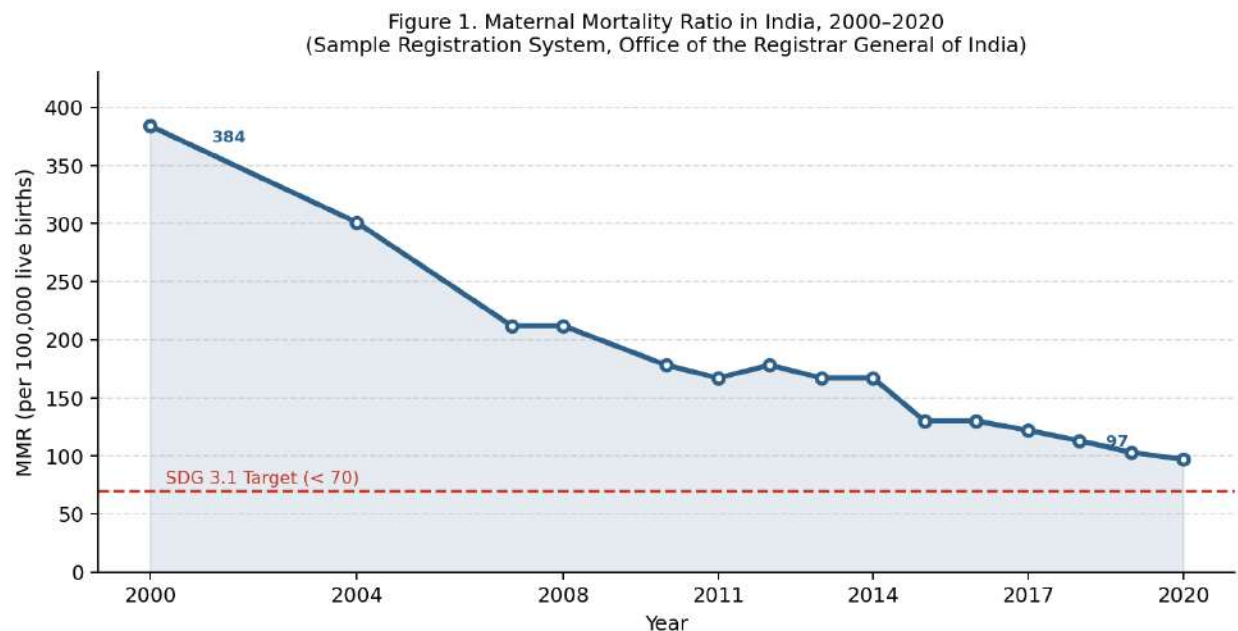
1. Introduction

Sustainable development, at its core, is the gradual distribution of finite resources in a way that improves present well-being without unduly burdening future generations financially, socially, or economically. While environmental sustainability is often associated with the concept, its economic basis is in intergenerational investment decisions, particularly those that impact institutional capacity, human capital, and long-term productivity (Sachs, 2015). This idea holds that the health of the population, and especially early-life health, is an essential component of sustainable development rather than a secondary social issue.

In development economics, maternal and child health (MCH) outcomes have a particularly important place. Pregnancy, delivery, and early childhood health circumstances have been demonstrated to have long-term consequences on survival, cognitive development, educational attainment, and adult productivity (Almond & Currie, 2011; Heckman, 2006). These early life circumstances have an impact on public finance dynamics and overall economic performance over decades, in addition to individual life paths. Therefore, it is appropriate to think of investments in

mother and child health as long-term development projects that have intergenerational benefits rather than as temporary welfare expenditures.

India has achieved significant yet insufficient strides in the field of maternal and child health over the last 20 years. According to the Sample Registration System, India's maternal mortality ratio dropped from 384 deaths per 100,000 live births in 2000, to 97 in 2018–20 due to increases in service coverage and institutional deliveries (Office of the Registrar General of India, 2022). Despite these improvements, India continues to account for a significant share of global maternal and newborn fatalities, with the majority of these deaths occurring during childbirth and the early neonatal period. Neonatal mortality, which accounts for around two-thirds of all under-five deaths in the nation, is most perilous during the first week of life and the day of birth (UNICEF, 2023).



This concentration of mortality risk has important economic implications. Adverse pregnancy and delivery outcomes are not only among the most expensive to treat in public health systems, but they also have the potential to be fatal. Emergency obstetric treatments, newborn intensive care, and prolonged hospital stays are considerably more costly than routine preventative services like prenatal care, early risk screening, nutrition assistance, and quality assurance in delivery settings (Prinja et al., 2017; Prinja et al., 2013). Financially speaking, ineffective prevention measures lead to expensive downstream costs that continuously pressure state health budgets.

However, public spending trends frequently reflect the opposite logic. Like many low and middle-income countries, India spends a disproportionate amount of money on emergency and tertiary care, while investment for preventative therapies is still insufficient given their potential economic advantages (World Bank, 2021). This pattern is more likely to be caused by institutional incentives, the political visibility of hospital infrastructure, and the delayed nature of the benefits from preventive investment than by evidence-based prioritization. As a result, rather than making

regular investments to reduce the risk of crises, health systems often deal with them after they occur.

The global economy provides evidence that this approach is not working. Research from high-income settings has repeatedly demonstrated that the benefits of preventive public health initiatives can exceed their initial expenses. Small investments in prevention eventually yield significant savings on healthcare costs and lost productivity, as shown by economic analyses of US tobacco cessation programs, childhood vaccination schedules, and public health system spending (Zhou et al., 2005; Richard et al., 2012; Brown, 2016). These findings support a broader economic theory: spending on preventative health care often exhibits non-linear returns, whereby small upfront inputs avert outcomes that would require costly treatment in the future.

Despite the relevance of this research, economic evaluations of preventive MCH investment in India have a specific limitation: they rarely frame returns in terms of fiscal savings to the public payer. Existing Indian studies document health outcomes, service delivery gaps, and household financial hardship extensively. Cost benchmarks for maternal complications and neonatal intensive care in public facilities are available (Prinja et al., 2017; Prinja et al., 2013), as are estimates of preventive service delivery costs (Prinja et al., 2016). What is missing is an integrated framework that explicitly compares prevention costs to the avoided public expenditure those investments generate — a distinction that matters for government budget decisions, where the question is not whether prevention is economically valuable in the abstract, but whether it reduces the state's own spending obligations.

This discrepancy has an impact on sustainable development policy. If economic evaluations that translate health improvements into monetary and societal benefits are unavailable, preventive therapies may be undervalued in budgetary decision-making. As decisions about marginal spending have long-term impacts on the sustainability of public finances and the development of human capital, this is particularly problematic in contexts with limited resources.

This paper, hence, attempts to bridge this gap by estimating the financial value of investments in preventative maternal and child health in the Indian context. The analysis applies established economic assessment logic to a case study of preventive interventions implemented in Madhya Pradesh to ascertain if small investments in early-life health can avert deaths and reduce downstream public healthcare expenditures. The focus is deliberately on economic efficiency and sustainability, rather than on program attribution or impact evaluation.

The study's approach uses an economic calculation technique based on recognized links between healthcare spending, mortality reduction, and preventative treatment, as well as conservative assumptions. Secondary data from government publications, peer-reviewed literature, and national surveys is integrated with program-level cost data. Instead of claiming causal attribution, the study poses a more focused yet policy-relevant question: do preventive maternal and child health expenditures seem economically successful when compared to the costs they are intended to avert, under reasonable assumptions?

By situating mother and child health within a paradigm of sustainable development, this study contributes to the growing body of research that views health systems as long-term economic infrastructure. By doing this, it seeks to add to policy debates about how preventative investment strategies could advance human welfare and budgetary sustainability in India and other contexts.

2. Theoretical Framework: Preventive Health, Human Capital, and Public Finance

This essay is based on three interrelated areas of economic theory: market failure in the provision of preventative healthcare, human capital accumulation, and intertemporal public finance. When considered collectively, these stands explain why investments in mother and child health prevention can generate disproportionately large economic returns and why these investments are frequently underfunded in the absence of deliberate public action.

2.1 Health as Human Capital and the Timing of Investment

In economic theory, health is widely recognized as a basic component of human capital. In his early writings, Becker defined human capital as an accumulative investment process in which investments in skills, education, and health at one stage of life have an effect on productivity and profits at later stages (Becker, 1964). Instead of being seen as consumption, this method views health spending as an investment that boosts future economic capacity.

Subsequent research has highlighted the need of making timely investments in human capital. Heckman and colleagues demonstrate that investments made early in life yield greater returns than those made later due to the dynamic complementarities between early health, later learning, and skill acquisition (Heckman, 2006; Heckman & Masterov, 2007). Improvements in early life health boost the effectiveness of later educational and social investments, while impairments acquired during pregnancy or early infancy are costly and often impossible to fully cure.

Empirical research supports this theoretical prediction. Unfavorable health circumstances during pregnancy and early childhood have been shown to have long-term effects on adult incomes, educational attainment, survival, and cognitive development (Almond & Currie, 2011). Thus, from the perspective of human capital, investments in mother and child health are distinguished by their dynamic economic returns that accumulate over an individual's lifetime in addition to their social relevance.

2.2 Intertemporal Public Finance and Fiscal Sustainability

While human capital theory explains returns at the individual level, sustainable development requires a public finance perspective that considers government budget constraints over time. Intertemporal trade-offs must be made by governments, as choices about current expenditures affect future financial commitments. Investments that reduce future spending can improve long-term fiscal sustainability even if they increase short-term costs.

Investments in preventive mother and child health operate precisely through this mechanism. By lowering the risk of expensive bad outcomes such as obstetric emergencies, neonatal intensive care admissions, and long-term disability, preventive investment saves future public healthcare expenses. These avoided costs often show up years after the initial investment, usually after the political or financial window in which the expenditure decision was made.

Economic theory states that if future gains are greatly discounted or do not fit within current accounting systems, governments may underinvest in prevention even when such investments are financially favorable over the long run (Sachs, 2015). This intertemporal misalignment exacerbates the systemic bias toward tertiary and emergency care, which is immediately needed, politically visible, but sometimes far more expensive than prevention measures.

Thus, from the perspective of public finance, funding preventative maternal and child health can be seen as a form of fiscal risk reduction. Modest current spending improves the sustainability of health system financing by lowering the possibility of large, uncertain future spending.

2.3 Market Failures in Preventive Maternal and Child Health

Standard economic theory also explains why private markets are unlikely to offer socially optimal levels of investment in mother and child health prevention. A few market failures in this area are particularly noteworthy.

First, preventative health care creates positive externalities. Improved mother and child health benefits not only individuals and households but also society as a whole through reduced disease burden, increased future production, and lower public spending. Because private decision-makers do not fully recognize the social benefits of prevention, private investment falls short of the social optimum (Arrow, 1963).

Secondly, information asymmetries are prevalent. Pregnant women and families may not have access to trustworthy information regarding health risks, service quality, or the long-term consequences of poor treatment. Preventive behaviors are continuously under-adopted in settings with limited access to reliable information, notwithstanding their economic significance (Arrow, 1963; Cutler & Lleras-Muney, 2010).

Thirdly, households' ability to pay for preventive care is limited by credit restrictions and income changes, even when the long-term benefits are acknowledged. Particularly in low-income and rural locations, opportunity costs like lost job or travel time may discourage people from receiving care on time.

Lastly, time irregularity has a big role. The costs of investing in preventative mother and child health are immediate, but the benefits accrue over time. Because they heavily discount future earnings, governments and families may habitually underinvest, even in situations where returns are high.

These market failures present a strong economic argument for both government involvement and system-level measures to enhance the provision of preventative care.

2.4 Non-Linear Returns and the Economics of Prevention

The key takeaway from the aforementioned frameworks is that non-linear returns are often obtained from investments in preventive health. Rather than increasing proportionately with cost, benefits may rise sharply once certain coverage, quality, or coordination criteria are reached.

The high concentration of severe adverse outcomes around certain risk periods—labor, delivery, and the early postnatal period—causes this non-linearity in mother and child health. It is possible to avoid results that are extremely costly to manage, both financially and emotionally, by avoiding even one problem during this time. As a result, very small preventative investments may yield large avoided costs, creating the appearance of unnecessarily large returns.

This economic rationale supports empirical evaluations of preventive interventions in other domains, such as childhood vaccination and tobacco cessation, where a little per-capita investment has been shown to avert costly downstream consequences (Zhou et al., 2005; Richard et al., 2012). Preventing maternal and child health is no different, particularly in settings with high baseline risk and constrained health system capacity.

2.5 Implications for Sustainable Development Analysis

The combination of market failure, intertemporal public finance, and human capital theory provides a rational economic justification for funding maternal and child health prevention as a sustainable development strategy. These investments boost long-term productivity, reduce future fiscal liabilities, and rectify systemic underinvestment brought on by short-term decision-making horizons and structural market failures.

Importantly, this idea does not imply that prevention can take the place of tertiary care. Instead, it suggests that marginal reallocations toward preventative investment can improve economic efficiency and budgetary sustainability. Therefore, rather than whether to promote prevention, the relevant policy question is whether current levels of preventive investment are proportionate with their long-term economic returns.

This theoretical framework serves as the basis for the subsequent empirical investigation. The study calculates the economic value of preventative maternal and child health investments in the Indian context to ascertain whether the efficiency gains proposed by theory are feasible under realistic assumptions.

3. Global Evidence on Returns to Preventive Health Investment

A vast corpus of empirical research from high-income nations provides compelling evidence that preventative public health investments can produce economic benefits that exceed their original costs. The fundamental economic mechanisms—avoidance of high-cost events, decreased future expenditure, and productivity gains—are generalizable even though the institutional and epidemiological foundations of these settings are different from those of low- and middle-income

countries. The worldwide data on the benefits of investing in preventive health is discussed in this section, with special focus on the methods used and the consequences for the health of mothers and children.

3.1 Economic Evaluations of Preventive Public Health in High-Income Settings

One of the most frequently studied sectors of preventive health spending is tobacco control. In their evaluation of a Medicaid-funded tobacco cessation program in Massachusetts, Richard, West, and Ku (2012) discovered that within a rather short time horizon, program expenses were offset by decreases in healthcare spending. Using administrative claims data, the study calculated that decreases in smoking-related hospitalisations led to net savings for the Medicaid program, delivering a positive return on investment even before accounting for long-term productivity increases.

In a similar vein, thorough cost-benefit analyses have been conducted on childhood immunization programs. The routine childhood immunization schedule in the United States was economically evaluated by Zhou et al. (2005), who estimated both direct healthcare expenses avoided and wider social benefits. The study indicated that every dollar spent on vaccination generated multiple dollars in savings by reducing hospitalisations, long-term impairment, and premature mortality. Importantly, these gains were driven not by high per-capita spending, but by the prevention of uncommon yet extraordinarily costly unfavourable events.

At the system level, Brown (2016) investigated public health spending across California counties and found that increased investment in public health was connected with reduced healthcare expenses in subsequent years. Using longitudinal county-level data, the study found that preventative public health expenditure lowered downstream medical spending, demonstrating that prevention acts as a cost-saving mechanism inside healthcare systems rather than an additional fiscal burden.

Together, the varying research reveal a similar empirical pattern: preventative public health investments can provide positive fiscal returns by preventing costly downstream outcomes. While the particular magnitudes vary by intervention and circumstance, the direction of effect is robust across various domains.

3.2 Methodological Approaches in ROI and Cost-Benefit Studies

The global literature on preventive health investment encompasses a range of methodological approaches, but several common components are worth underlining. First, the majority of studies do not assess economic rewards using randomized controlled trials. Instead, they combine program cost data with estimates of averted healthcare usage and productivity losses drawn from observational data and acknowledged epidemiological linkages (Zhou et al., 2005; Brown, 2016).

Second, these research frequently assume a conservative approach regarding attribution. Rather than asserting full causal impact, they estimate feasible ranges of saved costs under given

assumptions. Sensitivity analyses are frequently used to evaluate how results change when important parameters—like discount rates, cost estimates, or effect sizes—vary.

Third, economic assessments typically make a distinction between social benefits (such as increased well-being and productivity) and fiscal returns (savings to public budgets). From the perspective of government budgeting, the fiscal component alone is usually adequate to sustain preventative investment, even though many studies report both (Richard et al., 2012).

These methodological attributes are especially important in situations where large amounts of microdata are not accessible since they show that reliable economic evaluation can be achieved by using aggregated data and secondary sources.

3.3 Evidence from Low and Middle-Income Countries

The evidence that is now available is comparable, despite the fact that there are fewer economic evaluations of preventive health investment in low- and middle-income countries (LMICs) than in high-income settings. High cost-effectiveness is often observed in research analysing immunization programs in LMICs, with costs per disability-adjusted life year (DALY) averted substantially below widely accepted norms (Ozawa et al., 2012). While these studies often focus on cost-effectiveness rather than ROI, their findings reveal tremendous economic return compared to program expenses.

A closer methodological precedent comes from the LMIC nutrition literature. Alderman and Behrman (2006) estimated the economic returns to reducing low birth weight in low-income settings, combining cost benchmarks for preventive nutrition interventions with evidence on long-term productivity gains from improved early health. Structurally, their approach—apply a proportional reduction to a baseline event rate, multiply averted cases by an avoided-cost estimate, and test sensitivity across parameter ranges—closely resembles the scenario-based framework applied in this paper. Alderman, Behrman, and Puett (2017) extended this logic to undernutrition more broadly, estimating economic benefits for a range of LMIC settings using explicit conservative assumptions about effect sizes and cost figures. Both papers establish that scenario-based economic estimation, rather than full causal attribution, is an appropriate and credible methodological choice when working from secondary data in LMIC contexts. Critically, however, both papers frame returns in terms of aggregate social and economic benefit rather than savings to a single public payer. The fiscal framing adopted in this paper—identifying specifically the avoided expenditure accruing to the state health system that also finances prevention—is less common in this literature, and represents a contribution relevant to government budget planning.

However, most LMIC research falls short of translating health gains into lower budgetary expenditures. As a result, the economic case for prevention is often defined in terms of cost-effectiveness or moral urgency rather than fiscal efficiency. This restricts the usefulness of such evaluations for financial decision-making, particularly in decentralised systems where health spending competes with other development goals.

3.4 Global Evidence and the Indian Context

While caution is important in extrapolating results across contexts, several components of the worldwide research are definitely relevant to India. First, there is no context-specific mechanism by which preventive investment yields returns—avoiding unusual but very expensive adverse consequences. Even when given in public institutions, emergency obstetric care and newborn intensive care are costly in all health systems (Prinja et al., 2013).

Second, baseline dangers in India are higher than in most high-income environments. Both the frequency of avoidable comorbidities and the rates of maternal and infant deaths continue to be high. Higher baseline risk means larger potential for lives saved and costs avoided per unit of preventive spending, all else equal (Jamison et al., 2013).

Third, unit costs of preventive interventions in India are typically lower than in high-income countries, due to lower labour costs and existing public delivery platforms. This combination of high baseline risk and low prevention cost suggests that the ratio of benefits to costs may be at least as large as, and potentially larger than, those observed in high-income settings.

Fundamental differences must be acknowledged at the same time. Health system capacity limits, variation in quality of service, and fragmented data systems impede straightforward estimation of returns. These factors highlight the necessity of context-specific analysis as opposed to straightforward extrapolation.

3.5 Implications for Maternal and Child Health Investment

Three conclusions that are directly related to preventative maternal and child health investment in India are supported by the global research reviewed in this section. First, preventative health investment has consistently been proved to yield positive economic returns by averting high-cost downstream events. Second, these returns are often driven by non-linear dynamics, in which modest per-capita investment prevents occasional but catastrophic outcomes. Third, as long as assumptions are made clearly and sensitivity assessments are carried out, reliable economic estimation can be attained even in the absence of experimental evidence.

Despite these results, there is still a considerable gap in the application of ROI-style analysis for maternal and child health prevention in India. Health consequences and financial hardship are reported in existing research, but these are rarely incorporated into a fiscal framework that contrasts preventive costs with prevented public expenditure. Therefore, in policy discussions that give priority to short-term cost considerations, preventive MCH initiatives may be consistently undervalued.

The analysis that follows builds on the global data by applying its basic economic rationale to the Indian context. Rather than replicating outside estimates, the article combines program-level cost data and Indian cost benchmarks to examine whether preventive maternal and child health treatments plausibly generate the kinds of economic returns reported abroad. By doing this, it seeks

to advance a conversation on prevention as a sustainable development strategy that is better informed by financial considerations.

4. Why the Indian Context is Different for Preventive Maternal and Child Health Investment

While the economic theory supporting preventive health expenditure is broad, its implications are moulded by institutional, epidemiological, and fiscal context. India offers a unique environment where the possible financial gains from investments in preventive maternity and child health (MCH) may be different from those seen in high-income nations, both in terms of size and type. The structure of public health financing, lower unit costs of preventive interventions, higher baseline health risks, and ongoing implementation gaps in service delivery are the causes of these disparities.

4.1 Higher Baseline Risk and Concentration of Adverse Outcomes

One aspect of the Indian environment is the relatively high baseline risk associated with pregnancy, childbirth, and the neonatal period. Despite tremendous progress, India continues to account for a sizable share of global maternal and neonatal deaths. The Sample Registration System (SRS) 2019–21 reports India's national maternal mortality ratio (MMR) at 97 per 100,000 live births, against an SDG 3.1 target of below 70 (Office of the Registrar General of India, 2022). Madhya Pradesh, the case study state in this analysis, recorded an MMR of 175 per 100,000 live births—nearly double the national figure—underscoring the disproportionate burden borne by high-load states (Office of the Registrar General of India, 2022). Infant mortality is similarly skewed: Madhya Pradesh's infant mortality rate (IMR) stood at 41 per 1,000 live births against a national average of 27, and well above the SDG 3.2 target of a neonatal mortality rate below 12 per 1,000 live births (UNICEF, 2023). Maternal mortality is still unevenly distributed among states, and infant mortality makes up over two-thirds of all under-five deaths in the country (Office of the Registrar General of India, 2022; UNICEF, 2023).

Importantly, there are just a few windows of time when mortality and severe morbidity are concentrated. While a significant portion of maternal deaths occur during labour, delivery, or the initial postpartum period, the majority of neonatal deaths occur during the first week of life (Lawn et al., 2014). This emphasis implies that when preventative measures fail at specific stages, the repercussions are disproportionately harsh. According to economic theory, such concentration increases the marginal returns to measures that effectively reduce risk during these periods.

A higher baseline risk also suggests more space for improvement. When adverse outcomes are more frequent, even modest improvements in coverage or quality can have a major impact on lowering mortality and morbidity. This feature distinguishes India from many high-income settings, where lower baseline risks result in lesser marginal gains.

4.2 Lower Unit Costs of Preventive Interventions

A second feature that distinguishes the Indian environment is the relatively low unit cost of preventative health measures. Prenatal care, nutrition counselling, community-based follow-up, and frontline worker coordination are among the preventative MCH services that are mostly delivered through pre-existing public platforms. Because labour costs for frontline health workers and facility staff are lower than in high-income countries, expanding or upgrading preventive services is less expensive per capita. Prinja et al. (2016), drawing on data from public-sector primary and community health centres in North India, estimated median delivery costs for preventive and promotive services that are substantially below the inpatient costs associated with obstetric or neonatal emergencies. This provides an important empirical anchor for the claim that prevention costs less than treatment in the Indian public system (World Bank, 2021).

On the other hand, compared to investing in prevention, addressing serious issues still comes at a significant cost. Studies assessing the cost of emergency obstetric treatment and neonatal intensive care in Indian public hospitals reveal expenses that greatly exceed average per capita health spending, even after accounting for state subsidies (Prinja et al., 2017; Prinja et al., 2013). Investing in prevention can be particularly cost-effective due to the discrepancy between the high cost of treatment and the low cost of prevention.

Due to the combination of low preventative costs and high baseline risk, the benefit-cost ratio of preventive MCH investment may be very advantageous in India from an economic standpoint. This does not mean that all preventative measures are necessarily successful, but it does support the need for comprehensive economic analysis as opposed to relying on assumptions made from other situations.

4.3 Structure of Public Health Financing and Fiscal Exposure

India differs from many high-income countries in its public health funding structure. The majority of emergency and tertiary care costs are covered by state governments through publicly funded organisations and insurance plans. When preventative measures fail, the public sector is largely responsible for the cost of treating issues rather than being fully covered by private insurance or households (World Bank, 2021).

This structure increases the significance of financial return on investment. Preventive MCH treatments that avoid emergency care not only improve health outcomes but also directly reduce public spending obligations. In decentralized systems where governments are subject to stringent financial constraints, such saved expenses have economic value even if they do not immediately appear as line items in annual budgets.

However, public health funding in India frequently exhibits program and time horizon fragmentation. Preventive spending may fall under one administrative category, yet hospitalization savings accrue to another. This split lessens the incentives to invest in prevention, even when it is often cost-effective (Sachs, 2015). As a result, underinvestment may persist even in the face of preventive MCH treatments' long-term financial benefits.

4.4 Persistent Gaps in Quality and Coordination

Indicators of service coverage in India have significantly improved, but coordination and quality are still inconsistent. High rates of institutional delivery are reported by national surveys; yet, there is still significant variance in prompt referral, continuity of care, and adherence to clinical procedures (Government of India, 2021). In rural and tribal communities, where the capacity of the health system is limited, these disparities are especially noticeable.

Quality and coordination gaps are not just service deficiencies from an economic standpoint; they are inefficiencies. Value for money is compromised when preventive services are ineffective since the system must pay for both prevention and therapy. On the other hand, by increasing the effectiveness of current spending, relatively inexpensive investments that enhance frontline worker coordination or care quality during crucial times can yield significant economic returns.

This attribute is particularly pertinent to system-strengthening actions that improve the functionality of current public services without developing parallel delivery methods. In certain situations, the financial advantages of fewer problems and hospitalization may outweigh the marginal cost of improvement.

4.5 Implications for Economic Evaluation

When combined, these characteristics imply that the Indian context is a unique setting where the economics of prevention function differently rather than just being a lower-income counterpart of high-income settings. The ability to save lives is increased by higher baseline risk; cost-effectiveness is improved by lower prevention unit costs; and fiscal returns from averted treatment expenses are amplified by public funding systems.

However, careful methodological decisions are required due to data limitations and institutional complexity. Claims must be stated cautiously, and economic evaluations must rely on inference rather than direct measurement of returns. However, the lack of perfect data emphasizes the significance of open assumptions and sensitivity analysis rather than diminishing the applicability of economic reasoning.

By placing preventative maternal and child health interventions inside India's institutional framework and looking at a Madhya Pradesh case study, the ensuing sections expand on this background. By doing this, the study aims to determine if the worldwide empirical and theoretical justifications for preventative investment logically convert into economic efficiency in a system with limited resources and a high burden.

5. Institutional Context of Preventive Maternal and Child Health in India

The institutional architecture that makes it easier to provide preventative maternity and child health (MCH) services in India must be carefully considered in order to understand the economics of doing so. Preventive outcomes are not just determined by the distribution of resources;

accountability mechanisms, administrative coordination, public health facilities, and frontline healthcare providers also have an impact. Although India has a sizable publicly sponsored delivery network, persistent coordination problems and quality concerns undermine the effectiveness of preventive investment.

5.1 Structure of India's Maternal and Child Health Delivery Systems

A multi-tiered public health system comprising sub-centres, primary health centres (PHCs), community health centres (CHCs), sub-district hospitals, and district hospitals provides maternal and child health care in India. Three frontline cadres are essential at the community level: Anganwadi Workers (AWWs), Accredited Social Health Activists (ASHAs), and Auxiliary Nurse Midwives (ANMs). These professionals are in charge of early detection of high-risk pregnancies, nutrition counselling, vaccine mobilization, and prenatal care outreach (Government of India, 2021).

Over a million community health workers nationwide are now part of the ASHA program, which was started under the National Rural Health Mission and has grown quickly (Ministry of Health and Family Welfare, 2022). Similarly, early childhood services and nutrition are provided at scale through the Integrated Child Development Services (ICDS) program, which is run through Anganwadi facilities (NITI Aayog, 2020). This infrastructure theoretically offers a solid foundation for delivering preventive MCH.

Several national schemes have built on this infrastructure to extend the scope and incentive structure of MCH service delivery. The Janani Suraksha Yojana (JSY), launched in 2005 under the National Rural Health Mission, uses conditional cash transfers to encourage institutional delivery, particularly among low-income and rural households (Ministry of Health and Family Welfare, 2022). Complementing JSY, the Janani Shishu Suraksha Karyakram (JSSK) provides entitlements for free delivery, caesarean sections, drugs, diagnostics, and transport for pregnant women and sick newborns in public facilities, thereby removing out-of-pocket barriers to care-seeking. The Pradhan Mantri Matru Vandana Yojana (PMMVY) offers maternity benefits to incentivize early registration of pregnancies and appropriate health-seeking behaviour (Ministry of Women and Child Development, 2022). On the nutrition side, the POSHAN Abhiyaan (National Nutrition Mission), launched in 2018, targets reductions in stunting, undernutrition, anaemia, and low birth weight, coordinating across multiple ministries and drawing on the Anganwadi network (NITI Aayog, 2020). The Integrated Child Development Services (ICDS) program, running for decades through these same Anganwadi centres, delivers supplementary nutrition, growth monitoring, immunization support, and early childhood education at scale (NITI Aayog, 2020).

The existence of these schemes is analytically important for two reasons. First, they establish a substantial baseline of preventive MCH investment against which marginal system-strengthening expenditure—such as the USD 1.41 per beneficiary discussed in Section 8—should be understood as additional rather than substitutive. Second, they demonstrate that India's institutional architecture for preventive MCH delivery is well-established, which makes coordination and

quality improvements—rather than the construction of parallel delivery systems—the relevant margin for investment.

Infrastructure, however, does not provide efficient coordination on its own. The effectiveness of preventative initiatives may be diminished by the division of the nutrition and health systems, task overlap, and insufficient data sharing within cadres (World Bank, 2021). The prompt identification of high-risk beneficiaries and follow-up across the treatment continuum are two of the many factors that impact mother and child health outcomes.

5.2 Gaps in Quality and Continuity of Care

Even while institutional delivery rates have significantly grown, reaching over 88 percent countrywide according to NFHS-5, the quality of care during labor and the early postpartum period remains inconsistent (Government of India, 2021). Disparities in the treatment of obstetric and neonatal issues, the accessibility of required equipment, and adherence to therapeutic protocols have been documented in research (Das et al., 2016). The experience of JSY is instructive here: Kruk et al. (2018), in their Lancet Commission on High-Quality Health Systems, use JSY as a prominent example of a program that successfully expanded institutional delivery coverage but did not produce commensurate reductions in maternal and newborn mortality, precisely because coverage gains were not accompanied by equivalent improvements in care quality. This pattern underscores that in a context where institutional delivery rates are already high, the marginal return to quality improvement exceeds the marginal return to further coverage expansion.

Continuity of care is another problem that institutions face. Effective prevention requires coordination between birth facilities, postnatal care, and prenatal services. Any breakdown increases the likelihood of negative outcomes. For example, a delayed referral of high-risk pregnancies or inadequate monitoring during the early postnatal period may lead to major problems that require costly emergency care.

From an economic standpoint, such breakdowns are an indication of systemic inefficiencies. Even when money is invested in preventative services, without thorough coordination and quality control, the intended downstream cost savings are not entirely achieved.

5.3 Financial Implications of Institutional Performance

The way public health funding is organized in India exacerbates the financial effects of institutional inefficiency. Public hospitals, particularly district and sub-district facilities, bear a major portion of the expense of emergency obstetric and neonatal care. Studies show that in high-burden jurisdictions, a significant portion of public health spending is allocated to inpatient care for issues affecting mothers and newborns (Prinja et al., 2017; Prinja et al., 2013).

When preventative efforts fail to identify high-risk pregnancies or promptly manage problems, cases progress to higher-cost levels of treatment. These increases are not insignificant financially. Emergency obstetric procedures, neonatal intensive care units (NICUs), and special newborn care

units (SNCUs) all need a lot of resources, including skilled personnel, equipment, and extended hospital stays.

In this case, institutionalizing preventative methods is one way to achieve cost efficiency. By increasing frontline staff coordination, ensuring timely referral, and strengthening facility readiness during critical periods, it may be able to reduce the incidence of significant complications that require expensive tertiary intervention. As a result, the bottom line can benefit greatly from even modest improvements in institutional performance.

5.4 System Strengthening Versus Parallel Service Delivery

One notable feature of preventative MCH interventions in India is the emphasis on system building rather than simultaneous service provision. System-strengthening methods seek to improve the functioning of existing public delivery mechanisms rather than creating standalone projects. This means improving frontline staff data synchronization, bolstering facility-level policy adherence, and encouraging responsibility through regular review procedures.

System strengthening can have significant economic benefits since it makes use of buried infrastructure costs. Rather than needing large capital expenditures, these approaches usually place an emphasis on collaboration, mentoring, and incremental quality improvement. If they are successful, they increase the effectiveness of existing spending rather than developing whole new financing streams.

However, system strengthening also has measurement problems. Coordination or quality enhancements may reduce the probability of catastrophic events, although they may not produce easily observable output indications. This dynamic emphasizes the importance of economic estimation frameworks that take saved costs into consideration rather than relying solely on observable service volume indicators.

5.5 Implications for Economic Analysis

The institutional framework for maternal and child health in India states that funding preventative care aims to improve the efficiency of an already well-established, comprehensive system in addition to expanding coverage. Therefore, economic benefits are likely to depend on minor improvements in coordination and quality rather than the development of whole new services.

This implies two crucial elements for economic research. First off, the cost of preventive strengthening might be quite low when compared to the cost of expanding infrastructure. The fact that the financial benefits of avoided issues are achieved within the same public system that finances prevention lends even more credence to the legitimacy of a fiscal return-on-investment perspective.

The case study that is covered in the next part takes place against this institutional context. By focusing on interventions that improve frontline worker coordination and facility-level quality during critical risk, the analysis seeks to determine whether small-scale system performance

improvements can actually result in financial gains in accordance with theoretical and international empirical expectations.

6. Case Study Context: Preventive Maternal and Child Health in Madhya Pradesh

In order to determine if investments in preventative maternity and child health (MCH) in India could result in significant economic gains, this study uses Madhya Pradesh as a case study. The state is a relevant and analytically adequate setting because of its historical burden of maternal and newborn mortality, its preponderance of rural population, and its reliance on public health infrastructure for service delivery. These characteristics provide conditions that may lead to particularly large marginal returns on investments in prevention.

In order to execute the preventive system-strengthening interventions that are the focus of this case study, the Government of Madhya Pradesh partnered with the Antara Foundation, a non-profit organization that works to enhance the current public maternal and child health delivery systems rather than operate parallel service structures. Without evaluating organizational performance or blaming any one actor for the causal impact, the study that follows uses these activities as an illustration of developing preventive systems within a public health framework.

6.1 Epidemiological and Demographic Context

Madhya Pradesh has historically had higher rates of maternal and infant deaths than the national average, despite recent improvements. As noted in Section 4.1, the SRS 2019–21 records Madhya Pradesh's MMR at 175 per 100,000 live births, against a national figure of 97—placing the state among India's highest-burden jurisdictions (Office of the Registrar General of India, 2022). The state's IMR of 41 per 1,000 live births likewise exceeds the national average of 27 (UNICEF, 2023). These differentials mean that the case study represents a setting where baseline risk is meaningfully higher than the national norm, increasing the plausible economic return per unit of preventive investment. Neonatal mortality continues to be a major contributor to under-five mortality in the state, which is consistent with national patterns where nearly two-thirds of deaths occur during the newborn period (UNICEF, 2023).

Importantly, there are just a few windows of time when mortality and severe morbidity are concentrated. While a significant portion of maternal deaths occur during labor, delivery, or the initial postpartum period, the majority of neonatal deaths occur during the first week of life (Lawn et al., 2014). This concentration of risk implies that when preventative measures fail at specific stages, the resulting repercussions are disproportionately severe. According to economic theory, such concentration increases the marginal returns to measures that effectively reduce risk during these periods.

Due to Madhya Pradesh's large rural and tribal population, access limitations and quality inequalities are more apparent. Rural health clinics sometimes struggle with a shortage of skilled personnel, equipment restrictions, and referral delays. These institutional characteristics increase the possibility that preventable problems could get worse and result in costly negative effects.

6.2 Preventive Interventions as System Strengthening

The aforementioned programs are a component of the government health system and are intended to enhance coordination and quality rather than take the role of public service delivery. Through community-level coordination mechanisms, Anganwadi Workers (AWWs), Accredited Social Health Activists (ASHAs), and Auxiliary Nurse Midwives (ANMs) work together to detect high-risk pregnancies, synchronize beneficiary data, and ensure follow-up. Such strategies address a recognized institutional challenge in India: the fragmentation between nutrition programs, maternal health outreach, and facility-based care (World Bank, 2021).

At the facility level, mentoring programs and quality improvement initiatives are concentrated on labor rooms and newborn care units. Given that a sizable portion of maternal and newborn deaths occur during the delivery period, improving facility preparedness and strengthening adherence to clinical standards may reduce the incidence of serious complications. The Lancet Commission on High-Quality Health Systems states that improving quality, not simply coverage, is necessary to reduce mortality in low- and middle-income countries (Kruk et al., 2018). In this sense, proof of the global health system's efficacy aligns with preventive approaches that prioritize quality.

Crucially, by making use of the existing public infrastructure (district hospitals, primary health centers, community health centers, and sub-centers), these interventions seek to enhance coordination and protocol adherence. This implies that, from an economic standpoint, the possible monetary gains from avoided problems can exceed the marginal costs.

6.3 Scale and Coverage

Preventive interventions are being carried out in thousands of villages and hundreds of facilities in some parts of Madhya Pradesh. Preventive measures reach pregnant women, nursing mothers, and children under five by enhancing the standard of delivery facilities and organizing at the local level. Due to the scale of coverage, even small percentage improvements in risk identification, clinical quality, or referral compliance could have a major absolute impact on reducing adverse outcomes.

Scale is important economically since threshold effects are often seen in preventive measures. As quality procedures and coordination systems are established, their marginal cost per additional benefit falls. However, averted issues at scale can lead to overall fiscal savings that exceed program expenses when tertiary care costs are substantial relative to preventative investment (Prinja et al., 2017; Prinja et al., 2013).

6.4 Cost Structure and Fiscal Exposure

The case study's preventative system-strengthening actions were relatively inexpensive per beneficiary when compared to the cost of treating severe maternal and neonatal issues. The cost of routine preventative services may be substantially lower than the cost of inpatient care for childbirth-related complications in public institutions, according to published estimates (Prinja et al., 2017; Prinja et al., 2016). Neonatal critical care, in particular, necessitates extensive hospital stays, specialized personnel, and equipment (Prinja et al., 2013).

In a system where the public sector finances a large amount of tertiary care, reductions in severe complications directly affect state-level budgetary exposure. Therefore, preventive spending that lowers the frequency of costly incidents might have financial benefits in addition to social ones. In governments with constrained budgets and conflicting development ambitions, this fiscal channel is particularly crucial.

6.5 Justification of Case Selection

The selection of Madhya Pradesh as the case study is supported by three analytical arguments. First, its relatively high baseline mortality raises the likelihood of a measurable impact from preventative strengthening. Second, its largely rural and resource-constrained health infrastructure emphasizes the importance of coordination and quality improvements. Third, the system-strengthening features of the examined interventions allow for the evaluation of preventive investment without requiring the use of different service delivery models.

The case study is not said to be generally relevant across India. Rather, it provides a methodology for evaluating the financial case for prevention in real-world institutional and financial contexts. If investments in prevention demonstrate tenable economic efficiency in a high-burden, resource-constrained context, it strengthens the broader argument for prioritizing preventive mother and child health in sustainable development planning.

7. Data and Methodology

This section describes the data sources, assumptions, and estimation methods used to assess the financial value of the preventative maternity and child health (MCH) investment in the Madhya Pradesh case study. The objective is not to estimate the causal influence ascribed to a certain organization or activity. Rather, the study seeks to ascertain if expenditures in upgrading the preventive system, implemented under clear and prudent assumptions, are likely to yield economic benefits by preventing public spending and saving lives.

7.1 Analytical Objective and Scope

The central empirical question of this paper is:

"Under plausible and conservative assumptions, do preventive maternal and child health system-strengthening interventions in a high-burden Indian state generate economic returns that exceed their cost?"

The study employs an economic estimating approach to answer this question, which is consistent with previous ROI and cost-benefit analyses in public health (Zhou et al., 2005; Richard et al., 2012; Brown, 2016; Alderman & Behrman, 2006). This approach combines program-level cost data with secondary estimates of mortality reduction and avoided healthcare expenses.

This study does not employ regression-based identification methods or an effort to measure the causal influence attributed to a certain organization. Instead, it employs a methodical approach to economic analysis, determining if the financial justification for preventative investment is credible in light of precise and transparent assumptions.

7.2 Program-Level Inputs

The Antara Foundation and the Madhya Pradesh government collaborated to carry out the preventive system-strengthening projects that were the focus of this investigation. Antara Foundation supplied data on program cost and implementation scope for this investigation. Each mortality statistic, treatment-cost standard, and proportionate reduction scenario is separately sourced from published secondary sources.

These program-level inputs include:

- Description of preventive coordination mechanisms among frontline health workers
- Description of facility-level mentoring and quality improvement in labor and newborn care
- Geographic scale (villages and facilities covered)
- Approximate total program expenditure
- Estimated cost per beneficiary

Preventive system-strengthening initiatives are expected to cost each recipient around USD 1.41. This figure is derived by dividing total program expenditure in intervention areas by the covered beneficiary population, which includes pregnant women, lactating mothers, and children under five served through the coordination and quality-improvement mechanisms described above. The denominator thus reflects the full target population across whom preventive activities are distributed, and USD 1.41 should be understood as the additional per-capita cost of system strengthening layered on top of the baseline investment already embedded in schemes such as JSY, JSSK, and ICDS. Because beneficiary counts can be defined more or less broadly, the conservative end of plausible estimates is used for all base-case calculations; sensitivity to this parameter is examined in Section 8.

For the purposes of this analysis, the reported cost per beneficiary is considered a fixed program input. Instead of determining whether this cost structure is efficient, the study assesses if preventive investment at the reported cost level conceivably generates fiscal returns through avoided high-cost adverse occurrences.

7.3 Baseline Risk and Mortality Parameters

The baseline maternal and newborn risk characteristics are derived from the following nationally representative sources:

- Sample Registration System (SRS) reports for maternal and neonatal mortality (Office of the Registrar General of India, 2022)
- UNICEF estimates of neonatal mortality concentration (UNICEF, 2023)
- Global evidence on mortality concentration around childbirth (Lawn et al., 2014)

These sources form the epidemiological framework that preventative investments operate within. Instead of assuming uniform mortality reduction across populations, the approach examines baseline risks to determine the magnitude of severe occurrences that preventive strengthening credibly hopes to lower.

7.4 Cost of Treatment Benchmarks

The analysis computes avoided fiscal expenditure using published cost estimates for serious maternal and neonatal issues in public facilities:

- Cost of childbirth and maternal complications (Prinja et al., 2017)
- Cost of neonatal intensive care in public hospitals (Prinja, Manchanda, Mohan et al., 2013)
- Cost of delivering preventive health services at primary and community health centres (Prinja et al., 2016)

These studies estimate conservatively the costs of inpatient treatment borne by the public system. The analysis uses these figures as treatment-cost benchmarks when calculating avoided expenditure under various reduction scenarios.

7.5 Scenario-Based Estimation Strategy

Because the study does not estimate causal impact, it adopts a structured scenario framework to test fiscal plausibility, following the methodological approach used by Alderman and Behrman (2006) and Alderman, Behrman, and Puett (2017) in LMIC nutrition contexts.

Three outcome scenarios are defined:

1. Low bound scenario: Minimal proportional reduction in severe maternal or neonatal complications attributable to improved coordination and quality
2. Moderate scenario: Reduction consistent with documented quality improvement effects in LMIC health systems (Kruk et al., 2018)
3. Upper bound scenario: Reduction aligned with global preventive benchmarks, while remaining within plausible institutional constraints

For each scenario, the analysis proceeds as follows:

4. Apply proportional reduction to baseline severe-event risk

5. Estimate the number of cases potentially averted within the covered population
6. Multiply cases averted by published treatment-cost benchmarks
7. Compare aggregate avoided expenditure to total preventive program cost

The primary metric examined is the ratio of avoided public expenditure to preventive investment. This is a measure of fiscal return rather than a comprehensive social cost-benefit analysis. Examples of broader, non-monetary economic benefits include improved educational attainment, higher lifetime incomes, and intergenerational effects. As a result, expected returns should be regarded as conservative lower-bound fiscal effects.

7.6 Assumptions and Boundary Conditions

The estimation framework operates under the following boundary conditions:

- Program cost per beneficiary is treated as exogenous and fixed
- Treatment-cost benchmarks are assumed representative of public facility averages
- Reductions in severe complications are modelled proportionally rather than through structural behavioral modelling
- General equilibrium effects and long-term productivity gains are excluded

As a result, the model is partial-equilibrium in nature and restricted to the immediate financial impacts on the public health system.

7.7 Treatment of Uncertainty

All results are displayed as ranges rather than point estimates. It demonstrates that there is sensitivity to significant variables, including the treatment cost per case and the corresponding proportional decline in severe events.

No discount rate is applied to short-term prevented inpatient expenditures because they often occur during the same fiscal period as preventative measures. Longer-term benefits are described qualitatively rather than quantitatively.

7.8 Methodological Limitations

Since this method does not quantify causal attribution, it should not be interpreted as an effect evaluation. Cost standards vary across facilities and might not take into consideration all indirect costs. Additionally, proportionate reduction assumptions simplify complex clinical and institutional dynamics.

However, the goal of this study is not to accurately quantify the impact. In accordance with recognised economic theory and global empirical data, the objective is to ascertain if funding preventative mother and child health at the current cost levels rationally generates financial benefits.

8. Economic Estimation: Lives Saved and Costs Avoided

This section evaluates whether investments in improving the maternal and child health (MCH) system by preventing costly adverse occurrences are likely to yield financial benefits using the scenario-based methodology previously presented. The objective is not to assess causal influence, but to ascertain if conservative proportional reductions in severe maternal and neonatal disorders may balance out preventive investment.

8.1 Baseline Risk and Cost Asymmetry

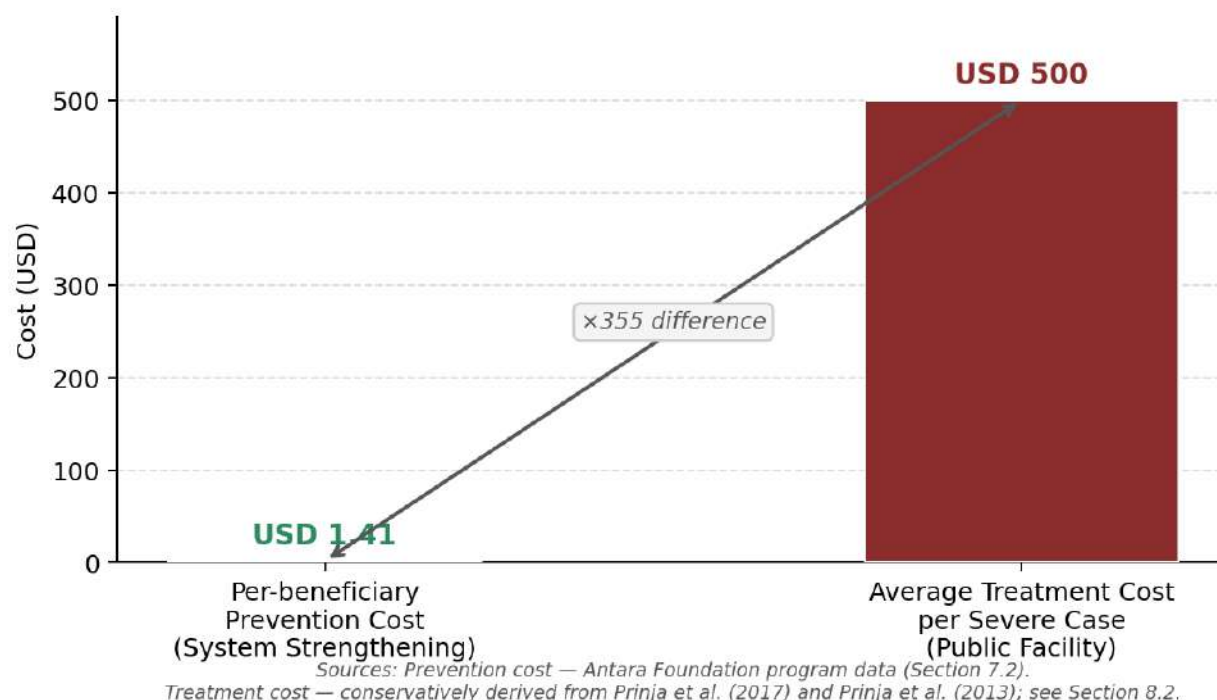
Most maternal and neonatal deaths in India happen during childbirth and the initial months following delivery. Nearly two-thirds of deaths in children under five occur during the newborn period, and a sizable percentage of maternal and neonatal deaths occur during labour or the first week of life (UNICEF, 2023; Lawn et al., 2014). Severe issues within this window often require immediate obstetric intervention or neonatal intensive care.

Regular prophylactic interventions are substantially less expensive than inpatient care for maternal issues in public facilities, per published statistics (Prinja et al., 2017; Prinja et al., 2016). Prinja et al. (2016) estimate median costs of preventive and promotive services at public primary and community health centres in India that are considerably lower than inpatient treatment costs reported for obstetric and neonatal complications. Numerous resources are required for admissions to neonatal intensive care, such as specialist personnel, equipment, and extended hospital stays (Prinja et al., 2013). Based on these published figures, the cost of treating a single serious maternal or neonatal complication in a public facility can conservatively reach several hundred US dollars, as detailed in Section 8.2 below.

In contrast, each recipient in this case would pay about USD 1.41 to upgrade the preventative system, representing marginal system-strengthening costs above the existing baseline investments embedded in JSY, JSSK, ICDS, and related schemes.

This asymmetry—the high per-case treatment cost and the low per-beneficiary prevention cost—is the foundation of the budgetary reasoning.

Figure 2. Cost Asymmetry: Prevention vs. Treatment in Maternal and Child Health (India, Public Sector)



Sources: Prevention cost — Antara Foundation program data (Section 7.2). Treatment cost — conservatively derived from Prinja et al. (2017) and Prinja et al. (2013); see Section 8.2.

8.2 Representative Cohort Illustration

The fiscal mechanism is illustrated using a representative covered cohort because precise annual birth coverage for the full intervention area was not publicly available. The reasoning behind the approach scales proportionally with actual program coverage.

Assume a representative cohort of 100,000 beneficiaries:

- Preventive cost per beneficiary = USD 1.41 (program expenditure data, Antara Foundation; see Section 7.2)
- Total preventive expenditure = USD 141,000

The baseline severe-event rate and the treatment-cost estimate require explicit derivation.

Baseline severe-event rate (3%): The 3% figure is used as a combined conservative estimate of births likely to involve a severe maternal or neonatal complication requiring high-cost inpatient care. It draws on two streams of evidence. For severe neonatal complications, SNCU admission data from public facilities in high-burden Indian states suggests admission rates of roughly 3–4% of live births (Ministry of Health and Family Welfare, 2022; Lawn et al., 2014). For severe maternal complications, obstetric emergency rates in public facilities in states with comparable MMR profiles are generally estimated in the range of 1–5% of deliveries in the literature (Prinja et al., 2017). Because this analysis examines a combined maternal and neonatal complication rate,

3% represents the lower end of the plausible range and is therefore a conservative baseline assumption. It is labeled explicitly as an assumption rather than a measured program outcome.

Average treatment cost per severe case (USD 500): This figure is derived conservatively from published cost benchmarks for Indian public facilities. Prinja et al. (2017) estimate the cost of childbirth and obstetric complications in public hospitals; vaginal delivery costs approximately ₹8,000 (~USD 95) and caesarean section approximately ₹12,900 (~USD 155) at published exchange rates. For neonatal intensive care, Prinja, Manchanda, Mohan et al. (2013) report a cost of approximately ₹4,581 per neonate admitted to an SNCU (~USD 55), with an additional bed-day cost of approximately ₹818 (~USD 10). A severe neonatal case requiring a 7–10 day SNCU stay would therefore cost roughly USD 120–155 in direct inpatient costs. When severe cases requiring operative delivery plus extended neonatal care are considered, and accounting for referral, personnel, and indirect facility costs not captured in per-procedure figures, a conservative composite estimate of USD 500 per severe maternal or neonatal case requiring high-cost intervention is plausible. This figure represents the lower end of severity-weighted composite costs rather than a best-case estimate, and is explicitly labelled as a conservative assumption supported by the literature ranges above.

Under these assumptions:

- Baseline severe cases = 3,000
- Baseline treatment expenditure = USD 1,500,000

Now consider proportional reductions in severe cases:

Low Bound Scenario (1% Reduction):

- Severe cases averted = 30
- Avoided expenditure = USD 15,000

Moderate Scenario (3% Reduction):

- Severe cases averted = 90
- Avoided expenditure = USD 45,000

Upper Bound Scenario (5% Reduction):

- Severe cases averted = 150
- Avoided expenditure = USD 75,000

Table 1 reports immediate avoided inpatient expenditure under each scenario — a partial, short-run, lower-bound component of fiscal benefit. Longer-term savings and broader human capital returns, discussed in Section 8.4, are not monetised here. The break-even analysis in Section 8.3 addresses the full fiscal plausibility question directly.

Scenario	Reduction in Severe Cases	Cases Averted	Avoided Treatment Cost
Low	1%	30	\$15,000
Moderate	3%	90	\$45,000
Upper	5%	150	\$75,000

Table 1. Estimated avoided inpatient expenditure under alternative reduction scenarios (representative cohort of 100,000 beneficiaries; USD 500 treatment cost per severe case).

The more direct test of fiscal plausibility is the break-even threshold. For any given preventive cost, the number of severe cases that must be averted to offset total expenditure is:

$$\text{Break-even cases} = \text{Total preventive cost} \div \text{Treatment cost per severe case}$$

Under the illustrative parameters: $141,000 \div 500 = 282$ severe cases. In a cohort of 100,000 with a baseline incidence of 3,000 severe events, the break-even threshold is fewer than 10% of baseline cases — well within the range of improvement associated with quality-strengthening interventions in LMIC health systems (Kruk et al., 2018). Fiscal plausibility therefore does not depend on achieving the upper-bound scenario; it holds even at reductions far below the low scenario reported in Table 1.

The structural driver is cost asymmetry: when per-case treatment costs are large relative to per-beneficiary prevention costs, even modest reductions in complication rates produce avoided expenditure that exceeds preventive investment. As coverage scales up or treatment costs rise above conservative benchmarks, the avoided expenditure in Table 1 rises proportionally.

8.3 Broader Economic Effects

The illustration captures only short-term public health expenditure. It does not monetise:

- Reduced long-term disability
- Lower future healthcare utilization
- Improved cognitive and developmental outcomes
- Increased lifetime productivity
- Intergenerational human capital effects

Early health benefits yield dynamic returns that extend beyond immediate cash savings, according to human capital theory (Heckman, 2006; Almond & Currie, 2011). Alderman and Behrman (2006) and Alderman, Behrman, and Puett (2017) demonstrate that even conservative estimates of productivity and earnings gains substantially exceed direct healthcare savings in LMIC settings. Including these broader effects would increase the anticipated economic rewards.

8.4 Interpretation

The analysis demonstrates fiscal plausibility rather than impact attribution. Assuming fair treatment-cost assumptions and small proportional reductions in severe complications, enhancing

the preventive mother and child health system could potentially result in avoided public expenditure that is economically significant in relation to program cost.

The results are consistent with theoretical predictions of non-linear returns to early-life health investment and global data from preventive health evaluations (Zhou et al., 2005; Richard et al., 2012; Brown, 2016; Alderman & Behrman, 2006).

Therefore, rather than being just considered a welfare expenditure, investing in preventative mother and child health in high-burden settings can be seen as a financially reasonable strategy that promotes sustainable development goals.

9. Policy Implications and Sustainable Development Significance

The prior analysis makes no claims on causal attribution or a thorough cost-benefit analysis of investments in preventative maternity and child health (MCH). Rather, it demonstrates budgetary plausibility: conservative assumptions imply that, when compared to the expenses of preventive interventions, moderate reductions in severe maternal and infant disorders could result in large avoided public spending. This finding has several implications for India's health policy and planning for sustainable development.

9.1 Prevention as Fiscal Risk Management

In high-burden settings, asymmetric fiscal exposure poses a challenge to public health systems. Severe maternal and neonatal issues are rare at the individual level but costly at the systemic level. When preventative strategies fail, for example, by inadequate care, missed risk identification, or delayed referrals, public hospital inpatient costs are disproportionately high.

The study's economic arguments suggest that investing in maternal and child health prevention might be viewed as a means of risk management. By lowering the likelihood of expensive side effects, small preventative investments reduce the likelihood of high, concentrated treatment costs. This is in line with broader theories of public finance, which maintain that upstream investments lower downstream budgetary volatility (Sachs, 2015).

Since health budgets compete with those for social protection, education, and infrastructure, even modest reductions in costly inpatient treatment could free up money for other development objectives in states with limited resources.

9.2 Correcting Structural Underinvestment in Prevention

Despite strong theoretical and empirical justifications, spending on preventive healthcare is frequently underprioritized when compared to tertiary care. This mismatch involves the structural components listed below:

- Political visibility of hospital infrastructure

- Short budget cycles that discount long-term benefits
- Fragmented financing streams across preventive and curative services
- Difficulty in attributing avoided outcomes to specific preventive investments

As a result, prevention may appear less significant than treatment, even in cases where it is financially advantageous. The scenario-based analysis presented here suggests that a misalignment between fiscal rationality and institutional incentives may be the cause of this underinvestment.

Improving frontline worker collaboration and facility-level quality during high-risk periods may not yield immediate benefits. Their economic value, however, is found in the dire circumstances that do not arise. By recognizing and incorporating this avoided-cost logic into planning frameworks, allocation efficiency may be improved.

9.3 Implications for State Level Health Planning

Particularly in high-burden areas like Madhya Pradesh, state governments should assess investments in preventive maternal and child health by taking into account both the budgetary consequences and coverage indicators.

Two planning implications arise:

8. Marginal reallocations toward preventive strengthening may be economically justified, even if absolute mortality reductions appear modest
9. Quality improvement and coordination mechanisms may yield higher marginal returns than further expansion of basic coverage, particularly where institutional delivery rates are already high (Government of India, 2021; Kruk et al., 2018)

This does not imply that tertiary care spending is unnecessary. Instead, it suggests analyzing both preventive and curative spending using an intertemporal fiscal framework.

9.4 Prevention and Sustainable Development

Sustainable development encompasses both short-term welfare improvements and long-term economic sustainability. Investing in early life health is a key component of this strategy.

Human capital theory states that improvements in maternal and neonatal health lead to increases in future productivity, earnings, and educational attainment (Heckman, 2006; Almond & Currie, 2011). The LMIC nutrition literature provides parallel evidence that preventive investments targeting early-life health conditions generate returns substantially exceeding their costs when long-run productivity effects are included (Alderman & Behrman, 2006; Alderman, Behrman, & Puett, 2017). Even though these long-term advantages were not monetized in the fiscal model, they provide credence to the broader economic case for prevention.

Furthermore, reducing preventable maternal and neonatal deaths directly contributes to the Sustainable Development Goals (SDGs) for health and well-being. However, the significance extends beyond health metrics. By reducing future healthcare liabilities and promoting the

development of human capital, preventive MCH investment strengthens the economic foundations of sustainable growth.

9.5 Limitations and Caution in Interpretation

Before making any policy conclusions, it is necessary to take into account the methodological limitations of the investigation. The scenario framework uses proportional reduction assumptions instead of known causal effects. Because treatment-cost benchmarks vary throughout facilities, actual program impact may deviate from modeled scenarios.

However, precise numerical approximations do not affect the main policy lesson. Its foundation is the structural discrepancy between low per-capita preventative spending and high per-case treatment expenses. When such imbalance exists, even modest increases in prevention can have major financial effects.

Understanding this discrepancy may help policymakers include preventative investment into budgetary decisions.

9.6 Concluding Implications

The results show that improving preventative maternal and child health systems in high-burden Indian states is not only a moral or humanitarian obligation. Financially speaking, it is also economically sound.

By presenting prevention as both a financial efficiency strategy and an investment in human capital, this study contributes to a broader development discussion that balances health policy with sustainable economic planning. In order to reduce long-term financial burden and strengthen the foundation for equitable growth, expenditures in preventive maternal and child health should be evaluated based on more than just service coverage.

10. Limitations and Conclusion

10.1 Limitations

The financial feasibility of interventions that strengthen the preventive maternity and child health (MCH) system is evaluated in this study using a scenario-based economic evaluation approach. Although the study relies on accessible epidemiological and cost data, it is crucial to acknowledge several limitations.

First, the paper does not estimate causal influence. The scenarios' proportional reductions in severe maternal and infant issues are illustrative and based on credible ranges drawn from quality-improvement literature rather than measured program results (Kruk et al., 2018). Therefore, the analysis demonstrates economic plausibility rather than empirical attribution.

Second, treatment-cost benchmarks are based on published facility-level studies and may vary over time and between districts (Prinja et al., 2017; Prinja et al., 2013). Actual inpatient costs are influenced by the severity of the situation, the facility's capacity, and the cost of local resources. Adopting cautious average cost estimates decreases overstatement, but it does not eliminate uncertainty entirely.

Third, the model is partial-equilibrium in nature. The public health system's short-term avoided inpatient costs are documented, but long-term productivity gains, effects on general equilibrium, and dynamic behavioral responses are not taken into account. Improvements in mother and baby health may affect intergenerational outcomes, labor engagement, fertility decisions, and educational achievement, even if none of these characteristics are monetized here.

Fourth, precise annual coverage numbers for the intervention regions were not publicly available. Therefore, fiscal illustration uses representative cohort modeling instead of program-calibrated birth cohorts. Even though the economic logic increases correspondingly, precision is limited by the lack of exact coverage data.

Fifth, the 3% baseline severe-event rate and the USD 500 treatment-cost estimate are conservative assumptions derived from published literature ranges rather than directly measured parameters. The derivation of each is made explicit in Section 8.2, but the analysis is sensitive to these inputs. Sensitivity to both parameters is addressed through the three-scenario structure, though a more comprehensive sensitivity analysis using formal parameter ranges would strengthen the results.

These limitations highlight that the findings should be seen as a methodical plausibility assessment rather than a definitive estimate of return on investment.

10.2 Conclusion

This study examined whether improving the mother and child health systems in a high-burden Indian context could potentially lead to financial benefits by preventing expensive negative outcomes. Using global data on investments in preventive health, human capital theory, and intertemporal public finance principles, the analysis evaluated the economic rationale of prevention under conservative assumptions.

The results show that when the cost of serious maternal and newborn issues greatly exceeds the per-capita preventative expenditure, even modest proportional reductions in high-cost events can lead to substantial financial savings. The fact that, under representative cohort modeling, the number of severe cases that must be averted to balance preventive investment is negligible compared to baseline incidence further supports the structural difference between prevention and treatment costs.

Crucially, the fiscal analysis presented here only includes short-term public healthcare costs. The greater advances in human capital that economic theory anticipates are not monetized, nor are intergenerational effects taken into consideration (Heckman, 2006; Almond & Currie, 2011;

Alderman & Behrman, 2006). Including these longer-term benefits would likely increase the economic case for prevention.

The primary conclusion is that funding preventative maternal and pediatric healthcare in high-burden regions may be viewed as both a humanitarian need and a financially sensible component of a sustainable development strategy. Strengthening the preventive system reduces future healthcare liabilities and improves early-life human capital building, which links short-term fiscal conservatism with long-term developmental resilience.

The goal of future studies should be to move from plausibility assessment to empirical return measurement by combining comprehensive cost estimation with program-specific outcome data. Even in the absence of causal attribution, the structural economic logic shown here urges a greater emphasis on preventative maternal and child health investment in state-level budgetary planning.

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