ASIAN JOURNAL OF PUBLIC HEALTH AND NURSING

SUPPLEMENTARY APPENDIX

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Hasan et al., Exploring Which Public Health Interventions Are More Effective to Reduce Maternal and Child Health Inequalities in South Asia: A Systematic Literature Review" (2024) ***Asian Journal of Public Health and Nursing*****, 1(3). doi:10.62377/xx2std63**

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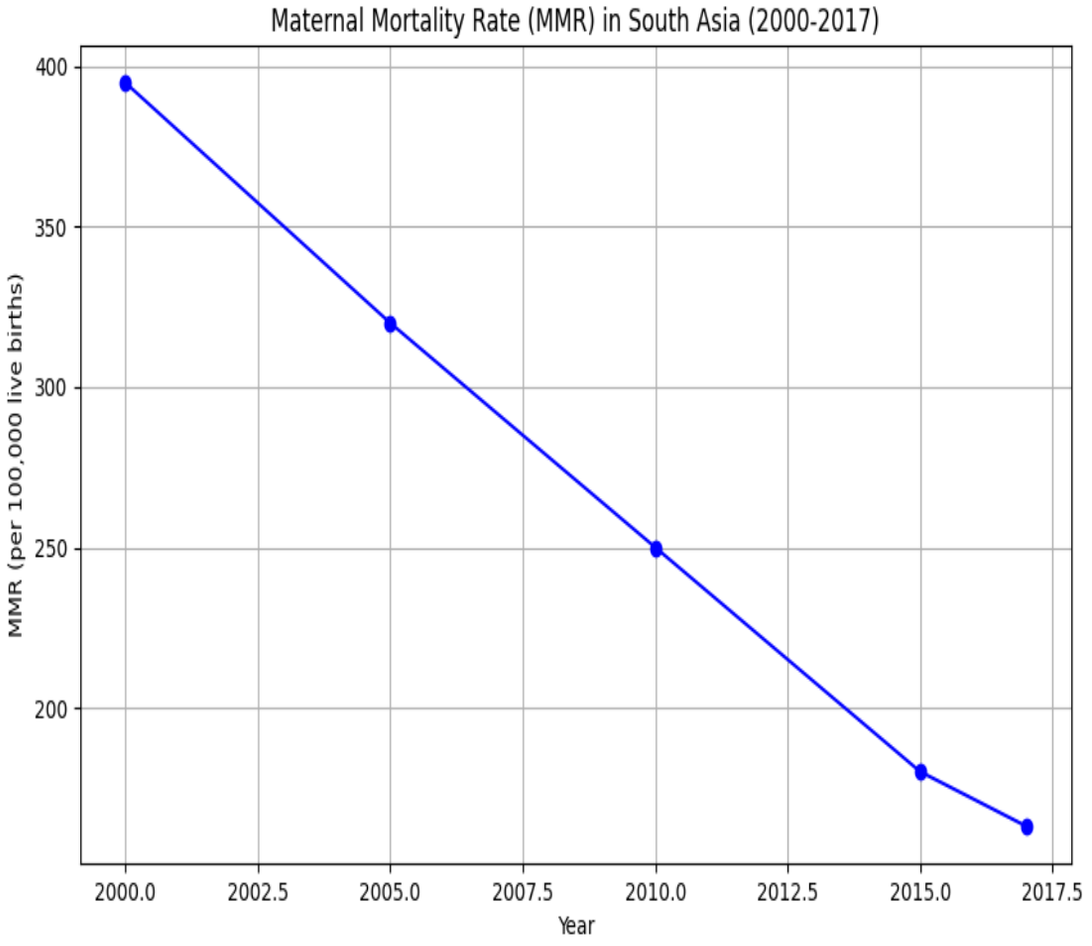
Appendixes: Tables and Figures

Graph 1: Maternal Mortality Rate (MMR) in South Asia (2000-2017)

This graph shows the trend of Maternal Mortality Rate (MMR) in South Asia from the year 2000 to 2017.



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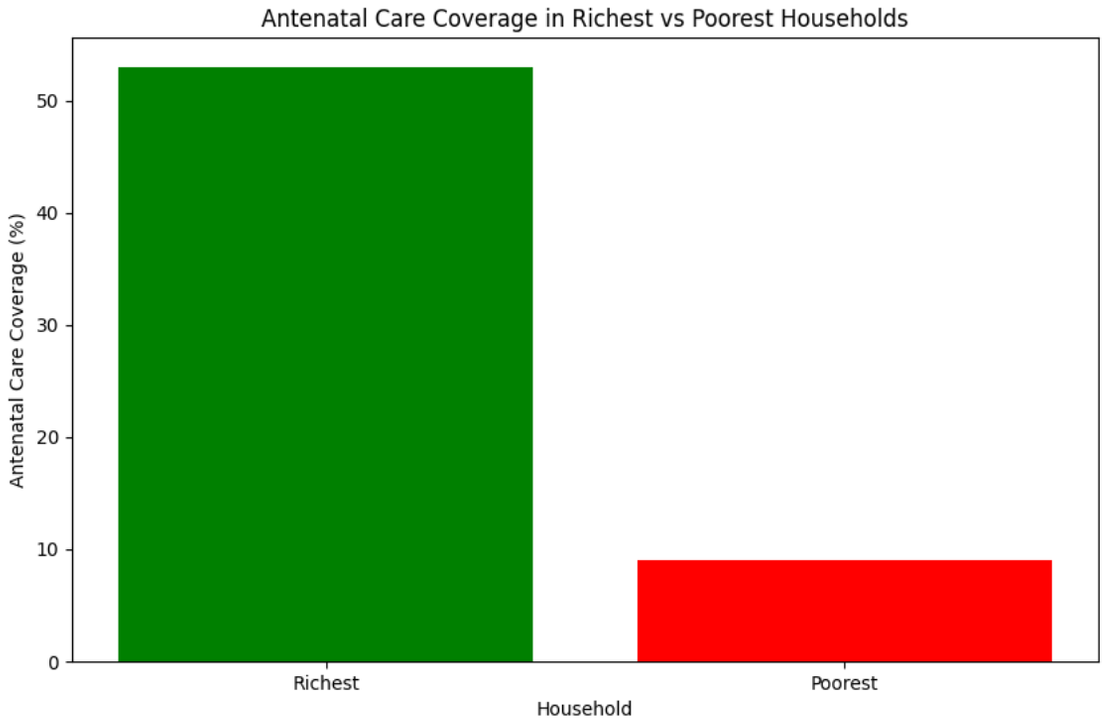
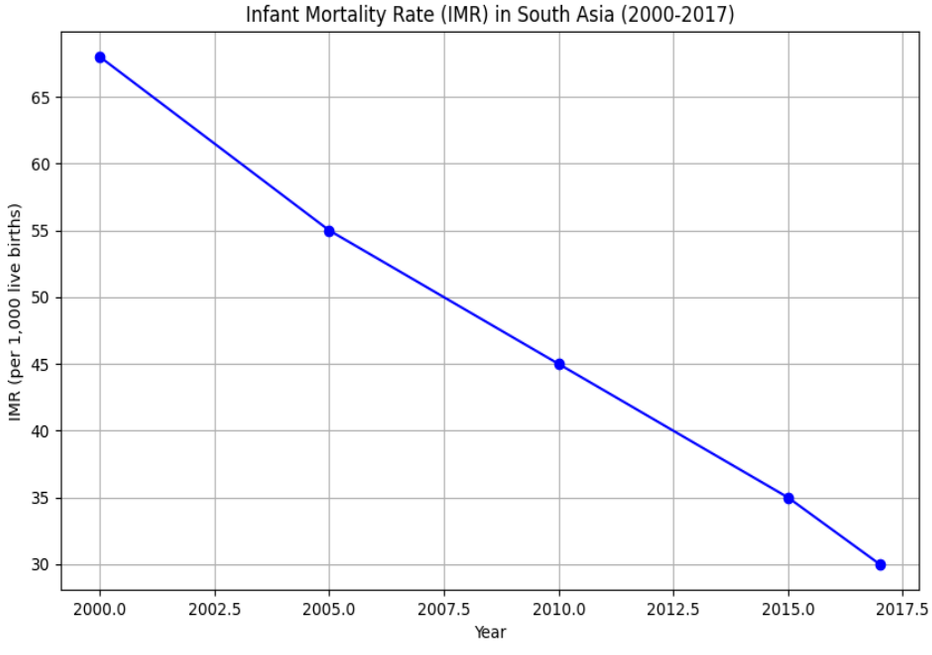
Graph-2: Antenatal Care Coverage in Richest vs Poorest Households

This graph compares the antenatal care coverage between the richest and poorest households.



Graph-3: Infant Mortality Rate (IMR) in South Asia (2000-2017)

This graph shows the trend of Infant Mortality Rate (IMR) in South Asia from the year 2000 to 2017



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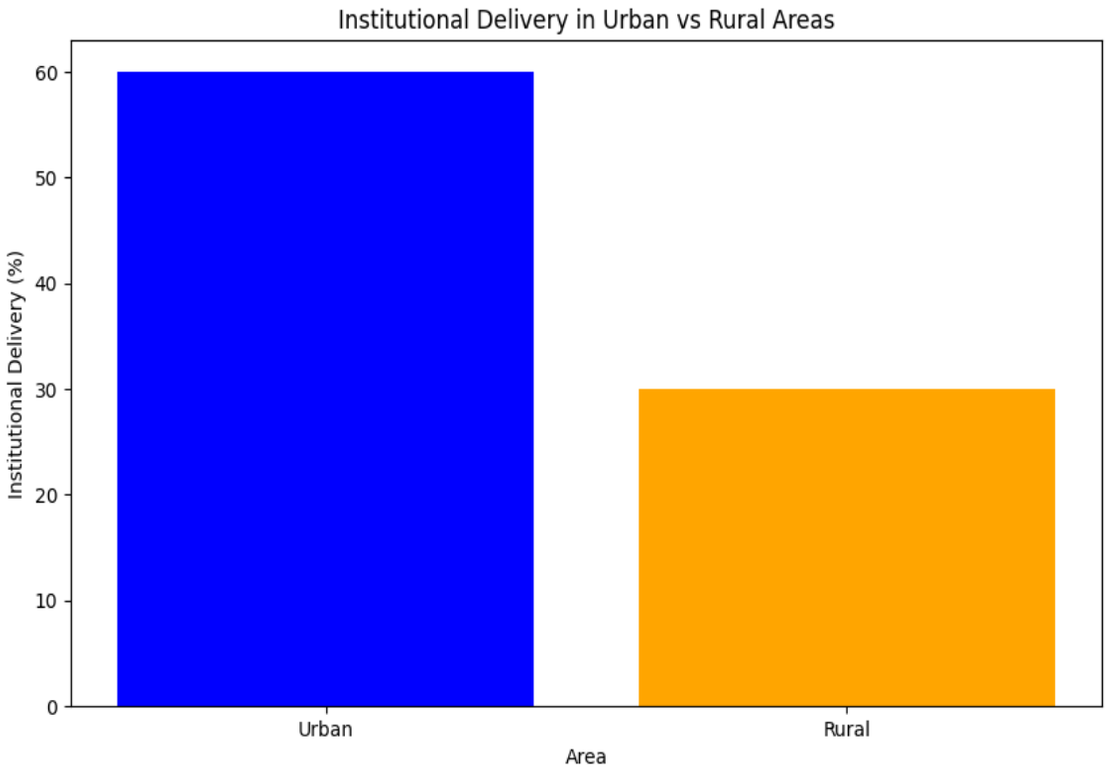
Graph-4: Institutional Delivery in Urban vs Rural Areas

This graph compares the percentage of institutional deliveries between urban and rural areas.



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Tables

Table-1: Outcomes measuring indicators

Goal 4: Reduce child mortality	Target 4A: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate Indicator 4.1 Under-five mortality rate Indicator 4.2 infant mortality rate Indicator 4.3 Proportion of 1-year-old children immunized against measles
Goal 5: Improved maternal health by 2015	Target 5A: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio Indicator 5.1 Maternal mortality ratio. Indicator 5.2 Proportion of births attended by skilled health personnel. Indicator 5.3 Contraceptive prevalence rate. Indicator 5.4 Adolescent birth rate. Indicator 5.5 Antenatal care coverage (at least one visit and at least four visits)
SDG 3: Ensure healthy lives and promote well-being for all at all ages	3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100 000 live births. 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births.
SDG 5: Achieve gender equality and empower all women and girls	5.3.1 Proportion of women aged 20-24 years who were married or in a union before age 15 and before age 18

Source: UNDP, 2000 and United Nations, 2015

Table-2: A summary table for the inclusion and exclusion criteria

List of Criteria	**Inclusion Criteria**	**Exclusion Criteria**
Study Design	Randomized Controlled Trials (RCTs), Quasi-experimental studies, Cohort studies, Case-control studies, Systematic reviews, Meta-analyses, Time-series studies, Controlled before-after studies	Case reports, Opinion pieces, Letters to the editor, Reviews without meta-analysis
Population	Pregnant women and children under 5 in South Asia (Bangladesh, India, Pakistan)	Studies that were not specific to South Asia, Studies focusing on specific subpopulations (e.g., only urban or rural)
Intervention	Public health interventions to improve maternal and child health, including universal and targeted interventions	Interventions not directly related to maternal and child health, Interventions focusing solely on individual-level behaviours

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Outcome Measures	MDG 4 and 5, SDG 3 and 5 indicators (e.g., maternal mortality, infant mortality, child malnutrition, immunization coverage)	Outcomes not directly related to maternal and child health, non-quantitative or non-measurable outcomes
Geographic Location	Low- and middle-income countries in South Asia (Bangladesh, India, Pakistan)	Other regions apart from the regions listed in the inclusion criteria

Table-3: PRISMA Chart

Phase	Description	Count
Identification	Records identified through database searching	237
	Additional records identified through other sources	18
	Duplicate records removed	36
Screening	Records screened (post-duplicates)	219
	Records excluded for irrelevance	118
Eligibility	Full-text articles assessed for eligibility	101
	Full-text articles excluded (with reasons)	82
Included	Studies included in qualitative synthesis	19

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Table-4: Critical Appraisal using CASP Tool:

Sl No	Reference	Were Aims/Objectives of The Study Clear?	Was The Study Design Appropriate for The Stated Aim (S)?	Was The Sample Size Justified?	Was The Target/Reference Population Clearly Defined?	Was The Sample Frame Taken from An Appropriate Population Base So That It Closely Represented the Target/ Reference Population Under Investigation?	Was The Selection Process Likely to Select Subjects/ Participants That Were Representative the Target/ Reference Population Under Investigation?	Were Measures Undertaken to Address and Categorisation Responders?	Were The Risk Factor and Outcome Variables Measured Appropriate to The Aims of The Study	Were The Risk Factor and Outcome Variables Measured Correctly Using Instruments /Measurements That Had Been Trialled, Piloted or Published Previously	Is It Clear What Was Used To Determine Statistical Significance And/ or Precision Estimates? (E.G., *P* Values, Confidence Intervals)	Were The Methods (Including Statistical Methods) Sufficiently Described to Enable Them to Be Repeated?	Were The Basic Data Adequately Described	Does The Response Rate Raise Concerns About Non-Response Bias	Were The Results Intentionally Consistent?	Were The Results Presented for The Analyses Described in The Methods?	Were The Authors Discussions and The Conclusions Justified by The Results	Were The Limitations of The Study Discussed	Was Ethical Approval or Consent of Participants Attained
1	Mehra et al., (2018)	+	+	+	+	+	+	+	+	+	+	+	+	—	+	+	+	+	+
2	Willis et al., (2012)	+	+	+	+	+	+	+	+	—	+	+/—	+	NS	+	+	+	+	+
3	Haider et al., (2017)	+	+	+/—	+	+	+	+	+	+	+	+	+	—	+	+	+	+	+
4	Bhuiya et al., (2002)	+	+	+	+	+	+	+	+	+	+	+	+	—	+	+	+/—	+	+
5	Bhutta et al., (2011)	+	+	+	+/—	+	+	+	+	—	+	+	+	—	+	+	+	+	+
6	Kumar et al., (2008)	+	+	+	+	+	+	+	+	—	+	+	+	NS	+	+	+	+	+
7	Baqui et al., (2008A)	+	+	+/—	+	+	+	NA	+	—	+	+	+	NS	+	+/—	+	+	+
8	Abir et al., (2017)	+	+	+	+	+	+	—	+	+	+	+	+	—	+	+	+	+	+
9	Baqui et al., (2008)	+	+	+	+	+	+	+	+	+	+	+/—	+/—	NA		+	+	+	+
10	Koeing et al., (2001)	+	+	+	+/—	+	+	NS	+	—	+	+	+	NA		+	+	+	+

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11	Bishai et al., (2003)	+	+	+	+	+	+	NA	+	—	+	+	+	—		+	+	+	+
12	Bishai et al., (2002)	+	+	—	+	+	+	+	+	+	+	+	+	NS		+	+/—	+	+
13	Honweling et al., (2013)	+	+	+	+	+	+	+	+	+	+	+	+	NS		+	+	+	+
14	Hotchkis et al., (2011)	+	+	+	+	+	+	+	+	—	+	+	+	—		+		+	+
15	Nasreen et al., (2003)	+	+	+	+	+	+	+	+	—	+	+	+	NA		+	+	+	+
16	Kamiya et al., (2013)	+	+	+	+	+	+	NS	+	+	+	—	+	—		+	+/—	+	+
17	Quayyum et al., (2013)	+	+	+	+/—	+	+	+	+	+	+	+	+	—		+	+	+	+
18	Amudhan et al., (2013)	+	+	+	+	+	+	+	+	+	+	+	+	NS		+	+	+	+
19	Bishai, Kumar et al., (2005)	+	+	+	+	+	+	+/-	+	+	—	+	+/-	—	+	+	+	+	+

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Table-5: The PRISMA Statement

Section	Checklist Item	Details
Title	**Identify as systematic review**	*Systematic Review on Public Health Interventions to Reduce Maternal and Child Health Inequalities in South Asia*
Abstract	**Structured summary**	Includes objectives, methods, results, and conclusions following PRISMA for Abstracts
Introduction	**Rationale**	Explains disparities in maternal and child health in South Asia and the need for effective interventions
	Objectives	Objective to identify and assess effective interventions for reducing health inequalities
Methods	**Eligibility Criteria**	Studies on maternal/child health interventions in Bangladesh, India, Pakistan; 2000–2019; focused on reducing disparities
	Information Sources	Databases: PubMed, Medline, Journal of Health Population and Nutrition, etc.; last search September 2019
	Search Strategy	Terms included "health inequality," "maternal and child health," "mortality," with region-specific keywords
	Selection Process	Two reviewers screened titles/abstracts, full texts; discrepancies resolved by a third reviewer
	Data Collection Process	Data extracted on study design, intervention, outcomes, using a standardized Excel template
	Risk of Bias Assessment	CASP tool for study quality, six-item checklist for public health; rated Strong, Moderate, or Weak
	Effect Measures	Outcomes analyzed with risk ratios and narrative synthesis due to study heterogeneity
	Synthesis Methods	Grouped by intervention type; synthesized results on inequalities across socio-economic and geographic groups
Results	**Study Selection**	255 records identified, 219 screened post-duplicates, 19 included; flow diagram provided
	Study Characteristics	Various public health interventions targeting maternal/child health; RCTs, observational, quasi-experimental
	Results of Individual Studies	Community education, financial support, and healthcare improvements effectively reduced health disparities
	Risk of Bias in Studies	11 Strong, 7 Moderate, and 1 Weak, based on CASP and six-item checklist ratings
Discussion	**Summary of Evidence**	Effective community and targeted interventions were highlighted as most impactful
	Limitations of Evidence	Heterogeneity and limited data on specific intervention processes constrained synthesis
	Limitations of Review Processes	Single-reviewer data extraction; short time frame for review may impact thoroughness
	Implications for Practice and Policy	Recommends community-based and tailored health interventions to address socio-economic barriers
Funding and Registration	**Funding**	Funding sources acknowledged in each study included
	Registration	The Review and ethical approval registered with Middlesex University, school of public health, United Kingdom

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Table-6: Extracted information of the selected studies including the overall quality assessment

Included studies, Locations and Samples	Interventions	MDGs and SDGs outcome (refer to the table 1 for details)	Study design and the quality Quality	Inequality aspect	Inequality measurement and outcomes of the study
1. Mehra., 2018 **India** **Sample:** Male and female (10-24 years)	Community-based intervention through education from youth information centres and access to mass media to delay early marriage, early pregnancy and improve school retention among adolescents	MDG 5 (5.4) Adolescent birth rate SDG 5(5.3) Early marriage	Cross sectional (post study) with mixed method approach strong	Socioeconomic and Education	The difference in early marriage and early pregnancy in pre and post-intervention and stratified for socioeconomic status: a significant decrease in the number of early marriages and early pregnancies in similar socioeconomic and cultural settings in the rural areas.
2. Willis, 2012 **India** **Sample:** Pregnant women	Community-based behaviour-change management intervention of essential new-born care services from birth preparedness to postnatal care	MDG 4 (4.2) Infant mortality rate SDG 3 (3.2) Preventable death of newborns	cluster-randomized controlled trial Strong	Socioeconomic status and Caste	Neonatal mortality and morbidity rate were significantly lower in the intervention cluster in comparison with the control group
3.MR Haider,2017 **Bangladesh** **Sample:** Women giving birth in the preceding year	Intervention to improve maternal and neonatal health through increasing the maternal health care utilization and providing human resource and institutional support	MDG 4 (4.2), 5 (5.1,5.2,5.5,5.6) SDG 3 (3.2,3.2)	Cross-sectional surveys, before and after study Strong	Socioeconomic and Geographical region	Utilization of maternal health care services increased in the deprived and poorer community which resulting increase antenatal care coverage (at least four visits), ANC from a trained provider, institutional delivery and delivery by skilled personnel. Intervention districts have had better improvement, but not in comparison districts
4. Bhuiya, Abbas et al.,1998 **Bangladesh**	Women-focused development programme through training on skill development,	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality	Prospective study: pre and post intervention	Wealth	Significant reduction of death of infant and children aged 1 to 4 years old of participant mothers compared to non-participant mothers from similar socioeconomic background

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Sample: Women from rural area	functional literacy, and financial loan arrangement	SDG 3 (3.2) Preventable death of newborns	Strong		
5. Bhutta, 2011 **Pakistan** **Sample:** Women from targeted community	Community-based intervention to reduce infant mortality through antenatal and postnatal health care services	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality SDG 3 (3.2) Preventable death of newborns	cluster randomised trial weak	Sociodemographic aspects	The neonatal mortality rate was reduced compared to the control group from different socio-demographic dimensions.
6.Vishwajeet, 2008 **India** **Sample:** Pregnant women	Community-based behaviours-change management intervention to reduce neonatal mortality through provision of essential new-born care from birth preparedness to postnatal care	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality SDG 3 (3.2) Preventable death of newborns	cluster-randomised controlled Strong	Sociodemographic aspects	In different villages, neonatal mortality was lessened among those mothers who received the postnatal care in the intervention cluster compared to the control group
7.Baqui A, Ahmed et al.,2008 **India** **Sample:** Mothers who had given birth in the 2 years preceding the survey	An integrated nutrition and health programme through newborn care package to increase the frequency of behaviours during the antenatal, delivery and postnatal periods	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality SDG 3 (3.2) Preventable death of newborns	Quasi-experimental design moderate	Sociodemographic aspects	Significant increase in health worker services during the antenatal and postnatal period which resulting in reduce neonatal mortality in the intervention districts compared to non-intervention districts
8.Abir, 2017 **Bangladesh** **Sample:** Pregnant mothers	A universal Intervention to reduce child mortality through antenatal care, iron-folic acid (IFA) supplementation and tetanus toxoid	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality SDG 3 (3.2) Preventable death of newborns	Cross-sectional study Strong	socioeconomic status, Education, Race, Age and Employment	FA supplementation and ANC TT vaccination together were implemented to child mortality in Bangladesh compared to the non-intervention population. With similar socio-demographic and economic status, infant and children mortality rate was lower in the targeted population

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	vaccination during pregnancy				
9.Baqui., 2008 **India** **Sample:** Pregnant Mother and women	A community based Maternal child health (MCH) program to improve the maternal and child health care services through provision with the collaboration of government and non-government sector	MDG 4 (4.1, 4.2) Reduce infant and under-five Mortality SDG 3 (3.2) Preventable death of newborns	A quasi-experimental study design: Controlled before and after study strong	Asset/wealth	The change of concentration indices (CI) between baseline and endline in study locations (districts) showed substantial improvement compared to the comparison districts. Each outcome had been considered to calculate the CI for comparison and intervention districts
10.MA Koeing, 2001 **Bangladesh** **Sample:** Children	Child survival intervention through immunization campaign for measles vaccination	MDG 4 (4.1 & 4.2) Infant and under-five mortality rate	Cohort study strong	Size of the residential house	The measles vaccination significantly reduced the child mortality in population from the smaller living area size compared to those from the larger residential house.
11.Bishai 2003 **Bangladesh** **Sample:** Children	Measles vaccination	MDG 4 (4.1 & 4.2) Infant and under-five mortality rate	Cohort study based on quasi experimental design Strong	Socioeconomic dimension	In terms of lowest and highest socioeconomic status, the mortality rate in the unvaccinated children from poorer families was higher than those from rich families.
12.Bishai, 2002 **Bangladesh** **Sample:** Children	Immunization campaign with the help of the community health worker	MDG 4 (4.3) Measles vaccination	Cohort study Strong	Education and the size of the living area (house)	Parents' education and the size of the living room influence increasing the measles vaccination within the intervention area
13.Houweling, 2013 **India** **Sample:** Women from the rural area	Participatory intervention with women's groups through education about maternal and newborn problem	MDG 4 (4.1 & 4.2) Infant and under-five mortality	Secondary analysis of a cluster-randomised trial: Controlled before and after study Strong	Socioeconomic status, Race, Caste, Education and deprivation	Neonatal and child mortality rate declined substantially through community-based participatory intervention for those who came from the lower caste, deprived rural areas and illiterate community

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14.Hotchkis 2011 **Bangladesh**	Improvement of the provision of maternal and child health care services through expanding the private sector for contraceptive facilitation.	MDG 5 (5.3) Modern contraceptive prevalence Rate	Repeated cross-sectional study Moderate	Asset/Wealth	Fluctuation in inequity was noticed through increasing the role of the private sector for supplying the modern contraceptive use to the deprived population group in the study area.
15. Nasreen 2003 **Bangladesh**	Interventions implemented by BRAC to improve the facility of maternal and childcare services through delivering education and primary care services	MDG 4 (4.1 and 4.2); SDG 3 (3.2) Infant and under-five mortality rate	Case control study Moderate	Age, Education, Employment and Economic status	Age and wage were the determinants of the death rate of the children. The rate was higher among those mothers (less age) and fathers with no wages in the intervention sample. However, no meaningful association was found with the economic status and parents' education level
16. Kamiya 2013 **Bangladesh**	Mixed interventions where Safe Motherhood Promotion through participatory approaches interlinked to the intervention for improving the primary and secondary care level to accelerate safe motherhood practices at the district level	MDG 5 (5.2 & 5.5) Skilled birth attended and antenatal care coverage	Controlled before and after study Strong	Income	Subgroup analysis by income on antenatal care: the substantial increase was noticed among the lower economic group compared to the highest income group in the comparison site.
17.Quayyum 2013 **Bangladesh**	Intervention to advances the facilities of maternal and child health care services designed by BRAC: a community-level intervention	MDG 5 (5.2 & 5.5) Skilled birth attended and antenatal care coverage	Controlled before and after study Strong	Asset or wealth	Health care services utilization increased among disadvantaged people. A noteworthy growth in the utilization of trained attendants for home delivery was noticed in the intervention area compared to the other areas
18. Bishai, 2005 **Nepal**	Nutrition supplements: Vitamin A	MDG 4: Infant and under-five mortality	Controlled Trial Strong	Gender, caste and asset	The disparity in mortality rates between boys and girls was smaller in the Vitamin A group compared to the placebo group. This indicates that Vitamin A supplementation reduced the gender gap in mortality more effectively than the placebo.

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19.Amudhan 2013 **India**	Demand-supply side strategies and intervention to improve the primary health centre (PHC) network through financial help under conditions and strengthening the PHC network	MDG 5 (5.2) Birth attended by skilled personnel	Controlled before and after study Moderate	Socioeconomic dimension, Caste and Education	Stratified by socioeconomic status, rate of institutional delivery increased among the disadvantaged group compared to groups

Table-7: Effects of the analysed interventions on inequality reductions

Indicators	Expanding Immunization campaign	Community education and access to mass media	Interventions to improve health care provision and services	Institutional support through demand side intervention	Mixed interventions	Nutritional supplementatio
Contraceptive prevalence rate			Wealth↓(+)			
Antenatal care visit			Wealth↓(++)	Residential place↓(+) Asset/wealth↓(+) employment↑(+)	Income↓(++)	Income ↓(++)
Adoloscent birthrate and childhood marriage		Socioeconomic status ↓(++) Education ↓(++)				
Skilled births attendance			Wealth↓(++, -)		Socioeconomic status↓(++) Education ↓(++)	Income ? (++) Socioeconomic status↓(+)
Infant mortality rate			Socioeconomic status ↓(+,-) employment↑(++); Age↑(++) Financial situation ? (++) Education ? (++)	Socioeconomic status↓(++)	Socioeconomic status↓(++)	Wealth↓(++) Income↓(++)
Measles immunization rate	Income ? (+) Education↓(++)		Socioeconomic status ↓(+)			

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	Living area ↓(++) Race ? (-)					
Under-five children mortality rate	Living area ↓ (+); Socioeconomic status↓ (++) Education ? (+)		Socioeconomic status↓(-); Occupation Age		Socioeconomic status ↓(+,-)	

'↓'; '↑'; '?' indicated reduction, increase and no change, respectively.

'++'; '+'; '-' indicated Strong, Moderate and Weak methodology quality, respectively.

6.C. PubMed Search Strategy

("mothers"[MeSH Terms] OR "mothers"[All Fields] OR "maternal"[All Fields]) AND ("child health"[MeSH Terms] OR ("child"[All Fields] AND "health"[All Fields]) OR "child health"[All Fields]) AND ("socioeconomic factors"[MeSH Terms] OR ("socioeconomic"[All Fields] AND "factors"[All Fields]) OR "socioeconomic factors"[All Fields] OR "inequality"[All Fields]) Under-five[All Fields] AND ("mortality"[MeSH Terms] OR "mortality"[All Fields] OR ("mortality"[All Fields] AND "rate"[All Fields]) OR "mortality rate" ("health"[MeSH Terms] OR "health"[All Fields]) AND ("socioeconomic factors"[MeSH Terms] OR ("socioeconomic"[All
("infant mortality"[MeSH Terms] OR ("infant"[All Fields] AND "mortality"[All Fields]) OR "infant mortality"[All Fields]) AND ("J Rehabil Assist Technol Eng"[Journal] OR "rate"[All Fields]) proportion[All Fields] AND 1[All Fields] AND year[All Fields] AND old[All Fields] AND ("child"[MeSH Terms] OR "child"[All Fields] OR "children"[All Fields]) AND immunized[All Fields] AND against[All Fields] AND ("measles"[MeSH Terms] OR "measles"[All Fields]) ("maternal mortality"[MeSH Terms] OR ("maternal"[All Fields] AND "mortality"[All Fields]) OR "maternal mortality"[All Fields]) AND ("Ratio (Oxf)"[Journal] OR "ratio"[All Fields])