Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect

Summary of research

What we know: The decision not to breastfeed a child impacts on the health, nutrition and development of a child and on women’s health.

What this article adds: A systematic review and meta-analyses investigated breastfeeding patterns and associated outcomes in 129 low and middle-income countries (LMICs) and 36 high-income countries (HICS). Exclusive breastfeeding rate was low (37% in LMICs and 20% in HICS). Prevalence of most infant and young child feeding (IYCF) indicators decreased with increasing national wealth. Poorer people breastfeed for longer in LMICS; the converse is true in HICS. Where infectious diseases are a common cause of death, breastfeeding provides major protection against death, especially in infants under six months (12% of risk in sub-analysis); diarrhoea (reduces by 50%); and respiratory infection (one-third reduction). In HICS, significant protection is provided against sudden infant death syndrome (36% reduction) and necrotising enterocolitis (premature infants) (58%). Breastfeeding is also associated with 68% reduction in malocclusions and in high-income settings, protection against otitis media in children under two. Near-universal scale-up of breastfeeding could prevent 823,000 annual deaths (13.8%) in under twos in high-mortality LMICs. Maternal benefits include significant protection against breast cancer (4.3% incidence reduction per 12 months of breastfeeding) and ovarian cancer (16% reduction). A further 22,216 lives per year (in addition to 19,464 deaths currently averted) would be saved by increasing breastfeeding duration. Progress on breastfeeding is critical to achieving six of the SDG goals and to reach the WHA 2030 50% exclusive breastfeeding target.

The importance of breastfeeding in low and middle-income countries (LMICS) is well recognised, but less consensus exists regarding high-income countries (HICS). Twenty-eight systematic reviews and meta-analyses
(22 specially commissioned) were used to investigate breastfeeding patterns and associated outcomes as part of the *Lancet* breastfeeding series (Paper 1).

**Breastfeeding indicators and data source**

The review involved systematic searches of published literature and, where possible, meta-analyses for outcomes postulated to be associated with breastfeeding. Standard WHO infant and young child feeding (IYCF) indicators were used from LMICs, with reanalysis of national survey data such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS). Systematic reviews of published data, grey literature and public health contacts were used in HICS. National data on breastfeeding in the latter was lacking; thus, additional indicators (ever breastfed, breastfeeding at six months, breastfeeding at 12 months) were calculated to allow for global comparisons. Complete information was sourced from approximately 127 of 139 LMICs. For HICS, data were obtained for 37 out of 75 countries; for several countries, only a subset of the breastfeeding indicators were available (results should therefore be interpreted with caution). In all analyses, country data was weighted by populations of children under two years of age.

The relative risks for protection against all infectious disease causes of death in children under two years of age and against the 15% of deaths caused by prematurity complications were applied. The Lives Saved Tool was used to predict number of deaths of children under five which would be prevented if breastfeeding patterns of 2013 were scaled up to the 75 countries that are part of the Countdown to 2015 effort, and to estimate impact of global breastfeeding patterns on breast cancer and ovarian cancer rates.

**Limitations**

Findings are limited by the observational nature of most of the available data for breastfeeding, the limitations of meta-analyses, the scarcity of experimental data, and confounding factors (the reviews included sub-analyses of studies with tight control for confounders). Wherever possible, separate analyses for LMICs was done. Interpretation of associations is affected by the fact that non-breastfed infants receive different diets in different countries; e.g. association between breastfeeding and overweight is likely affected by the diet of non-breastfed infants. Most HICS are unable to report on standardised, reliable indicators, contrasting with the consistent DHS/MICS data available from LMICs.

**Results**

Globally, the prevalence of breastfeeding at 12 months is highest in sub-Saharan Africa, south Asia and parts of Latin America (>80% in low-income and lower-middle income countries). In most HICS, the prevalence is lower than 20%. In LMICs, only 37% of infants <6m are exclusively breastfed (data are not available for HICS); in children aged 6–23 months, 37% were not breastfed. Most mothers in all country groups started breastfeeding (only France, Spain and USA had rates below 80% for ever breastfed).

A strong inverse correlation (p<0.0001) between breastfeeding at six months and log gross domestic product (GDP) per person was seen; for each doubling in the GDP per head, breastfeeding prevalence at 12 months decreased by 10 percentage points. Except for early initiation, prevalence of all indicators decreased with increasing national wealth.

Poorer mothers tend to breastfeed for longer than their richer counterparts in all country groupings but especially in middle-income countries; the converse is true in HICS. Trend analysis in LMICs suggests modest gains in exclusive breastfeeding since 2013 have largely taken place amongst the richest 20% of families.

**Mortality and infectious disease**
Most data came from LMICs. In three studies that examined breastfeeding in infants <6m and mortality, exclusively breastfed infants had 12% of the risk of death compared to non-breastfed. In another three studies, infants < 6m had 3.5 times (boys) and 4.1 times (girls) increase in mortality. In studies in children aged 6-23m, any breastfeeding was associated with a 50% reduction in deaths.

In HICS, meta-analyses of six high-quality studies showed ever breastfeeding was associated with a 36% (CI 19-49) reduction in sudden infant deaths. Another meta-analysis (four randomised controlled trials) showed a 58% decrease in necrotising enterocolitis (a risk for premature infants with high fatality).

In terms of child morbidity, data largely from LMICs shows that about half of all diarrhoea episodes (72% of hospital admissions for diarrhoea) and a third of respiratory infections (57% of admissions) would be avoided by breastfeeding. Breastfeeding was also associated with 68% reduction in malocclusions. In high-income settings, important protection was identified from otitis media in children under two years of age.

The authors did not find significant associations with asthma (5% reduction based on subset of tightly controlled trials), allergic disorders, or blood pressure or cholesterol, although an increase in tooth decay with longer breastfeeding over 12 months of age (likely due to inadequate oral hygiene) was noted.

Non-communicable diseases

Most studies came from high-income settings. Based on 113 studies, longer periods of breastfeeding were associated with a 26% reduction (95% CI 22-30) in the odds of overweight or obesity, an effect consistent across income classifications. Based on a sub-set of 23 high quality studies, a pooled reduction of 13% (95% CI 6-19) in the prevalence of overweight or obesity was found. Restricting meta-analyses to three high-quality studies indicated a reduction of 24% (95% CI 60% reduction to 47% increase) in type 2 diabetes. Breastfeeding was consistently associated with higher performance in intelligence tests in children and adolescents. Pooled estimate for a sub-set of nine studies that adjusted for maternal intelligence with other confounding factors showed a pooled effect of 2.6 points (1.3-4.0).

Effects on the mother

The review confirms that increased breastfeeding, especially exclusive and predominant, were associated with longer periods of amenorrhoea (improving birth spacing). There is a robust inverse association between breastfeeding and breast cancer; the largest individual level analysis (50,000 patients from 47 studies) found each 12-month increase in lifetime breastfeeding was associated with a reduction of 4.3% (95% CI 2.9-6.8) in the incidence of invasive breast cancer. The reduction, comparing longer versus shorter durations of breastfeeding based on a restricted sub-analysis of studies that controlled for parity, was 7%. Similarly, an analysis of a sub-set of studies that controlled for parity found a reduction of 18% in ovarian cancer associated with longer periods of breastfeeding. Clear associations between breastfeeding and reduced maternal depression were seen, but it is more likely that depression affects breastfeeding than the opposite.

Estimating lives saved

Using the Lives Saved Tool, the authors estimate that the scaling-up of breastfeeding to a near-universal level could prevent 823,000 annual deaths (13.8%) in children under two years of age (in 75 high mortality LMICs). The majority (87%) of preventable deaths would have occurred in infants under six months.

The authors also estimate that existing global rates of breastfeeding avert 19,464 annual breast cancer deaths. Over half of deaths averted (58%) are in low-income regions with long breastfeeding durations (Africa and south Asia), although these regions accounted for just 35% of the global population included in the analysis. It is estimated a further 22,216 lives per year would be saved by increasing breastfeeding duration from present levels to 12 months per child in HICS and two years per child in LMICs. Latin America, central and eastern Europe,
the Commonwealth of Independent States and HICS would benefit most (higher incidence of breast cancer and shorter durations of breastfeeding).

Conclusions

The findings reflect that the decision not to breastfeed a child has major, long-term effects on the health, nutrition and development of the child and on maternal health; it is likely that no other health behaviour (which is effectively a personalised medicine) can affect such varied outcomes in the two individuals involved. Where infectious diseases are a common cause of death, breastfeeding provides major protection. In HICS, significant mortality protection is provided against sudden infant death syndrome and necrotising enterocolitis. Maternal benefits include significant protection against breast cancer and ovarian cancer. Associated longer-term child benefits are increased intelligence, lower overweight/obesity, and lower type 2 diabetes.

More than 80% of newborns receive breastmilk in nearly all countries, but early initiation rate (within one hour of birth) is low. In most countries, exclusive breastfeeding rates are well below 50% (the WHA 2025 minimum target); the current rate of increase (0.5% per year in LMICs since 2013) would need to be doubled to achieve this. There is no WHA target for continued breastfeeding.

In LMICs, time-trend analysis suggests that rich mothers are adopting exclusive breastfeeding at a much faster rate than poor mothers. Protecting breastfeeding in the poorest populations is the priority. In the poorest countries, late initiation and low rates of exclusive breastfeeding are the main challenges; in middle and high-income countries, short overall duration of breastfeeding is an additional one. The paper calls for the need to tailor breastfeeding support strategies to specific patterns recorded in each country.

The authors conclude that the findings reflect how essential the protection, promotion and support of breastfeeding is for the achievement of Sustainable Development Goals 1,2,3,4,8 and 10 by 2030.

References


Taken from Field Exchange 52

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