

## Optimal duration of exclusive breastfeeding: Evidence and implications for public health

### Review on which this evidence summary is based:

Kramer, M.S., & Kakuma, R. (2002). **Optimal duration of exclusive breastfeeding**. *Cochrane Database of Systematic Reviews*, 2002 (Issue 1), Art. No. CD003517. DOI: 10.1002/14651858.CD003517.

*Note: The Cochrane review that this evidence summary is based on has been updated. This evidence summary summarizes the above-cited version of this review, not the updated version. An updated evidence summary will be provided as soon as possible.*

### Review Focus

- P** Lactating mothers and their healthy, term, singleton infants
- I** Exclusive breastfeeding (EBF). EBF included provision of water, teas, juices, or small amounts of infant formula.
- C** Mixed breastfeeding (MBF) MBF included juices, formula, other milks, other liquids, or solid foods.
- O** **Infant outcomes:** growth (weight, length, and head circumference and z-scores for weight-for-age, length-for-age, and weight-for-length), infections, morbidity, mortality, micronutrient status, neuromotor and cognitive development, asthma, atopic eczema, other allergic diseases, type 1 diabetes, blood pressure, and subsequent adult chronic diseases such as coronary heart disease, hypertension, type 2 diabetes, and inflammatory and autoimmune diseases.

**Review Quality Rating:** 9 (strong) *Details on the methodological quality are available [here](#).*

### Considerations for Public Health Practice

Conclusions from Health Evidence	General Implications
<ul style="list-style-type: none"> <li>The evidence included in this well-done review is of weak and moderate methodological quality. Findings are reported for developed and developing countries. <b>The conclusions focus on developed countries only.</b> Findings for <b>developing countries</b> are, however, included in the evidence table below.</li> <li><u>EBF infants compared to MBF infants were more likely to:</u> <ul style="list-style-type: none"> <li>have increased head circumference at 12 months</li> <li>have higher hemoglobin concentration at 12 months</li> <li>have lower risk of gastrointestinal (GI) infection</li> <li>have lower risk of otitis media</li> <li>be crawling one month earlier</li> </ul> </li> <li><u>MBF infants compared to EBF infants had higher:</u> <ul style="list-style-type: none"> <li>weight gain at 3-8 months</li> <li>weight for age at 6, 9 and 12 months</li> </ul> </li> <li>There were no differences between EBF infants and MBF infants on all other outcomes.</li> </ul>	<p>In developed countries, public health messages and programs should promote awareness of:</p> <ul style="list-style-type: none"> <li>the advantages of EBF compared to MBF such as lower risk of GI infection and otitis media, and higher hemoglobin concentrations; but also that</li> <li>MBF results in greater weight gain than EBF infants at 3-8 months, and slightly higher weight at 6, 9, and 12 months; and that</li> <li>the absence of significant differences between EBF and MBF on all other infant outcomes.</li> </ul> <p>Public health decision makers should prioritize efforts to ensure high risk populations are aware of the advantages of EBF as stated above.</p>

### Evidence and Implications

What's the evidence?	Implications for practice and policy
<p><b>1. Growth among EBF infants for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months (13 studies).</b></p> <p><u>Developed countries</u> <u>Weight Gain</u></p>	<p><b>1. Growth among infants EBF for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months</b></p> <p><u>Developed countries</u></p> <ul style="list-style-type: none"> <li>Public health activities should acknowledge evidence</li> </ul>

<ul style="list-style-type: none"> <li>Weight gain (4 studies) at 3-8 months was significantly higher in MBF compared to EBF infants (WMD – 12.45, 95% CI -23.46 to -1.44 g/mo).</li> </ul> <p><u>Weight for age</u> (2 studies)</p> <ul style="list-style-type: none"> <li>EBF infants had significantly lower scores for weight for age at six months (WMD -0.09, 95% CI -0.16 to -0.02), nine months (WMD -0.10, 95% CI -0.18 to -0.02), and 12 months (WMD -0.09, 95% CI -0.17 to -0.01) compared to MBF infants.</li> </ul> <p><u>Head circumference</u> (1 study)</p> <ul style="list-style-type: none"> <li>EBF infants had a significantly larger head circumference at 12 months compared to MBF (WMD 1.9, 95% CI 0.6 to 3.2mm).</li> </ul> <p><u>No impact</u> for EBF vs. MBF infants on weight gain at any other time point, length gain, length for age, weight for age, and head circumference at 6 or 9 months.</p> <p><u>Developing countries</u></p> <ul style="list-style-type: none"> <li>No impact on weight gain at any other time point, length gain, weight for age, length for age, or weight for length, or mid-upper arm circumference at 6-7 and 9-10 months</li> </ul>	<p>indicating that MBF infants gain slightly more weight than EBF infants at 3-12 months, although there are no differences in weight gain at any other time points.</p> <ul style="list-style-type: none"> <li>Public health decision makers can consider there is a slightly larger head circumference at 12 months among EBF infants compared to MBF infants, but no difference at 6 or 9 months.</li> </ul> <p><u>Developing countries</u>,</p> <ul style="list-style-type: none"> <li>Public health can advocate for both EBF or MBF during the 3-8 month time frame as there was no significant difference in weight gain between them, but it <u>should not</u> suggest differential growth (weight, length, upper arm circumference) expectations as a result of infant feeding method beyond 6 months of age.</li> </ul>
<p><b>2. Hematologic outcomes among EBF infants for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months (4 studies)</b></p> <p><u>Developed countries</u></p> <p><u>Hemoglobin concentration</u> (1 study)</p> <ul style="list-style-type: none"> <li>significantly higher hemoglobin concentration at 12 months (117 versus 109 g/L (WMD 8.0, 95% CI 4.03 to 11.97 g/L) among EBF infants compared to MBF infants.</li> </ul> <p><u>No impact</u> for EBF vs. MBF infants on all remaining hematologic outcomes</p> <p><u>Developing countries</u></p> <p><u>Ferritin</u> (2 studies)</p> <ul style="list-style-type: none"> <li>EBF infants were almost 3 times more likely to have low ferritin plasma concentration compared to MBF infants (RR 2.93, 95% CI 1.13 to 7.56).</li> </ul>	<p><b>2. Hematologic outcomes among infants EBF for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months</b></p> <p><u>Developed countries</u></p> <ul style="list-style-type: none"> <li>Public health should recognize that EBF infants have higher hemoglobin levels in cases where that is clinically important in the context of other health outcomes;</li> <li>But programs should not suggest improvements in ferritin or lipid concentrations, very low or low density lipoprotein, high density lipoprotein-2 or -3, high density apoprotein B, high density total triglycerides, or decreased risk of anemia as a result of infant feeding method.</li> </ul> <p><u>Developing countries</u></p> <ul style="list-style-type: none"> <li>Public health programs should monitor EBF infants for low ferritin,</li> <li>But should not expect improved zinc concentrations as a result of infant feeding method.</li> </ul>
<p><b>3. Morbidity and mortality among EBF infants for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months (7 studies)</b></p> <p><u>Developed countries</u></p> <p><u>Gastrointestinal infections</u> (1 study)</p> <ul style="list-style-type: none"> <li>EBF infants were 33% less likely to have GI infection in the first 12 months compared to MBF infants (RR 0.67, 95% CI 0.46 to 0.97).</li> <li>There was no reduction in risk of hospitalization.</li> </ul> <p><u>Acute otitis media (ear infections)</u> (2 studies)</p> <ul style="list-style-type: none"> <li>MBF infants were 28% more likely to have one or more episodes of otitis media compared to EBF infants (RR 1.28, 95% CI 1.04 to 1.57).</li> </ul> <p><u>No impact</u> for EBF vs. MBF infants on: risk of respiratory infections, atopic eczema at 1 or 5 years, food allergy, risk for pollen allergy at 5 years, allergy to animal dander at 5 years, predisposition toward allergic hypersensitivity reaction, risk of asthma at 5-6 years, two or more episodes</p>	<p><b>3. Morbidity and mortality among infants EBF for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months</b></p> <p><u>Developed countries</u></p> <ul style="list-style-type: none"> <li>Public health messages and programs should indicate that infants who are EBF are less likely to have gastrointestinal infections and otitis media compared to MBF infants;</li> <li>But should not suggest differential respiratory infection, eczema, allergy, asthma, hospitalization or mortality as a result of method of infant feeding.</li> </ul> <p><u>Developing countries</u></p> <ul style="list-style-type: none"> <li>Public health messages and programs should indicate that EBF infants are less likely to have gastrointestinal infections compared to MBF infants;</li> <li>But should not suggest differential respiratory infection, fever, cough, nasal congestion, or diarrhea</li> </ul>

<p>of wheezing, or risk of death.</p> <p><u>Developing countries</u>  <u>Gastrointestinal infections</u> (1 study)</p> <ul style="list-style-type: none"> <li>EBF vs. MBF infants were 59% less likely to have a GI infection (RR 0.41, 95% CI 0.21 to 0.78).</li> </ul> <p>No impact for EBF vs. MBF on risk of respiratory infections, percentage of days with fever, cough, nasal congestion, nasal discharge, hoarseness, or diarrhea.</p>	<p>as a result of method of infant feeding.</p>
<p><b>4. Development among EBF infants for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months (2 studies)</b></p> <p><u>Developed countries</u>  No impact for EBF vs. MBF infants on sleeping time.</p> <p><u>Developing countries</u>  <u>Crawling</u> (2 studies)</p> <ul style="list-style-type: none"> <li>mothers reported EBF infants crawled, on average, 0.80 months sooner (95% CI 0.34 to 1.26) than MBF.</li> </ul> <p>No impact for EBF vs. MBF infants on mean age at which infants sat from a lying position or walked by 12 months.</p>	<p><b>4. Development among infants EBF for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months</b></p> <p><u>Developed countries</u></p> <ul style="list-style-type: none"> <li>Public health messages and programs should not suggest differential developmental expectations, specifically sleeping time, as a result of method of infant feeding.</li> </ul> <p><u>Developing countries</u></p> <ul style="list-style-type: none"> <li>Public health messages may indicate that EBF infants may crawl sooner than MBF infants.</li> </ul>
<p><b>5. Nutrition among EBF infants for 6 months compared to EBF for 3-4 months and MBF thereafter through 6 months (1 study)</b></p> <p><u>Developed countries</u>  No impact on amino acid or essential amino acid concentrations.</p> <p><u>Developing countries</u>  There were no studies that explored macronutrient status.</p>	<p><b>5. Nutrition among infants EBF for 6 months compared to EBF 3-4 months and MBF through 6 months</b></p> <p><u>Developed countries</u></p> <ul style="list-style-type: none"> <li>Public health messages and programs should not suggest differential amino acid or essential amino acid concentrations as a result of method of infant feeding.</li> </ul> <p><u>Developing countries</u></p> <ul style="list-style-type: none"> <li>There is insufficient evidence at this time to comment on potential change in differential macronutrient status as a result of method of infant feeding.</li> </ul>
<p><b>Legend:</b> P – Population; I – Intervention; C – Comparison group; O – Outcomes; CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk; WMD – weighted mean difference; **For definitions see the <a href="http://www.healthevidence.org">healthevidence.org</a> Glossary <a href="http://www.healthevidence.org/glossary.aspx">http://www.healthevidence.org/glossary.aspx</a></p>	

### Why this issue is of interest to public health in Canada

The Public Health Agency of Canada promotes and supports breastfeeding since it provides optimal nutritional, immunological and nurturing of infants.<sup>1</sup> Health Canada and the World Health Organization recommend exclusive breastfeeding for the first six months of life, after which mothers should continue to breastfeed with the gradual introduction of complementary foods.<sup>1,2,3</sup> However, in Canada, only 14.4% of infants breastfed under 6 months of age are exclusively breastfed.<sup>4</sup> Breastfeeding is particularly encouraged since breast milk contains the appropriate amount of protein, carbohydrates, fat, vitamins, minerals, antibodies, and infection and disease fighting benefits which infants require.<sup>1</sup>

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Other quality reviews on this topic are available on [www.healthevidence.org](http://www.healthevidence.org)

### Suggested citation

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*This evidence summary was written to condense the work of the authors of the review referenced on page one. The intent of this summary is to provide an overview of the findings and implications of the full review. For more information on individual studies included in the review, please see the review itself.*

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