

## Evidence Summary Title:

# The effectiveness of public health strategies to reduce or prevent the incidence of low birth weight in infants born to adolescents: Evidence and implications for public health

Review Quality Rating: **9 (strong)**

## Review on which this evidence summary is based:

Brunton, G., & Thomas, H. (2001). **The effectiveness of public health strategies to reduce or prevent the incidence of low birth weight in infants born to adolescents: A systematic review.** *Effective Public Health Practice Project*, 1-49.

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*This is an evidence summary written to condense the work of the authors of this systematic review, referenced above. 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.*

## Review content summary

This systematic review of 16 published reports of 15 research studies aimed to determine the effectiveness of public health, health promotion and primary care interventions to reduce or prevent low birth weight (LBW) in infants born to adolescents. LBW was defined as a weight less than 2500 g at birth, as a result of prematurity or intrauterine growth restriction. Participants studied were between 13 and 22 years of age, of mixed ethnicity, and from both rural and urban settings (where specified). To be included, studies had to be of prospective design, and use a control group. Interventions described in this review included: health information and strategies such as peer support. Outcomes measured included: rates of low birth weight (7 studies); mean birth weight (5 studies); and rate of pre-term delivery (5 studies). Authors report that five of the 13 studies showed a significant improvement in birth weight, or a decrease in the incidence of preterm delivery or intrauterine growth restriction; the other eight studies showed a positive effect which was not statistically significant. Rigorous studies indicated that a combination of home visiting and clinic services were effective. Interventions employing multiple strategies were also effective (e.g. transportation to appointments, health teaching, social support). Moreover, evidence suggests interventions initiated early in pregnancy show a significant improvement in LBW rates. Review authors identified that future research initiatives should take the form of well-designed, adequately sampled RCTs situated in home and clinic settings that develop and implement interventions with the participants' involvement.

## Comments on this review's methodology

This is a methodologically strong systematic review. A focused clinical question was clearly identified. Appropriate inclusion criteria were used to guide the search. A comprehensive search was employed using health, social, psychological, and educational databases; reviewing reference lists of primary studies; handsearching key relevant journals; reviewing grey literature sources that include (list); contacting key informants. The search was limited by language (English and French). Primary studies were assessed for methodological quality using the following quality criteria: selection bias, study design, control of confounders, blinding, data collection methods, and description of withdrawals and dropout. The methods were described in sufficient detail so as to allow replication and two reviewers were involved in quality appraisal. Any discrepancies in appraisal results were rectified by discussion. The results of this review were not transparent. Results were clearly presented in graphical form so as to allow for comparisons across studies. Heterogeneity was not assessed. Appropriate analytical methods (fixed effects, random effects) were not employed to enable the synthesis of study results. Strong and moderate quality studies received data extraction, as presented in table format and analysed narratively. Neither an assessment of heterogeneity nor a statistical synthesis of outcomes was undertaken.

## Why this issue is of interest to public health

Ontario public health practitioners are responsible for identifying and providing prenatal education and support to pregnant adolescents. In addition, the Ontario Ministry of Health and Long Term Care set a mandate for its public health units to reduce low birth weight rates to 4% by the year 2010. Evidence suggests, however, that interventions to prevent low birth weight in infants are not effective across all maternal age groups. This is an important consideration as maternal age less than 20 years increases the risk of having a LBW infant.<sup>1,2</sup> Canada's low birth weight rate has been consistently higher than Norway's rate and consistently lower than the rate in the United Kingdom and the United States.<sup>3</sup> Overall, the rate of low birth weight has been quite stable over time. Also encouraging is the fact that pregnancy among Canadian adolescents has been decreasing in recent decades, with an overall rate in 2003 of 27.1 per 1000 population, compared to 48.8 per 1000 in 1994<sup>3</sup>. In Canada, approximately 6% of all births meet LBW criteria.<sup>2</sup> Of these, about 70% of all LBW infants are born preterm. While a seemingly small proportion, the long-term implications of LBW for families and society at-large are clear. Infants who are born LBW

and/or preterm are at increased risk of learning difficulties, vision difficulties, chronic respiratory problems like asthma and cerebral palsy. As such, the costs to care for the immediate needs of these infants, along with the potential need for ongoing care places a significant burden on the healthcare system.<sup>2</sup> In addition, literature suggests a correlation between young women who are substance users and smokers with those who become pregnant; both of which increase the risk of having a LBW infant. Young women from low income families are getting pregnant at a higher rate than those from middle and upper income families. This is important to note as poverty rates among youth living in large urban centres rose substantially between 1990 and 1995.<sup>4</sup> It is evident that this multi-faceted issue requires a multi-faceted approach.

## Evidence and implications

Evidence points are not in order of the strength of evidence

What's the evidence?	Implications for practice and policy:
<p><b>1. Low birth weight (LBW) (7 studies)</b></p> <p>1.1. Results are mixed regarding the effectiveness of interventions to reduce or prevent the incidence of low birth weight in infants born to adolescents. However, the methodologically strongest studies reported no treatment effect.</p> <p>1.1.1. In three studies, participants in the intervention group had fewer infants with LBW than those in control groups (one moderate RCT; two moderate cohort; one moderate matched case control)</p> <p>1.1.2. In the other studies, participants in the treatment group had as many infants with LBW as those in the control group (one strong RCT; 3 matched cohort – one strong, 2 moderate)</p>	<p><b>1. Low birth weight</b></p> <p>1.1. Given that the stronger studies found no treatment effect including these interventions in public health programs are not likely to be effective in preventing LBW among infants born to adolescent mothers.</p> <p>1.2. Public health organizations that do proceed with programs to prevent LBW among infants of adolescent mothers should ensure that these programs undergo rigorous program evaluations. These organizations should ensure that data on other important outcomes are tracked and evaluated over time.</p> <p>1.3. In addition, to add to the limited number of studies and conflicting results, high quality research is needed in order to add to the body of knowledge related to the prevention of LBW</p>
<p><b>2. Mean birth weight (5 studies)</b></p> <p>2.1. Results are mixed regarding the effectiveness of interventions to improve mean birth weight in infants born to adolescent mothers</p> <p>2.1.1. In two studies, mean birth weight was significantly higher in the treatment group than in the control group (one strong RCT; one moderate analytic cohort)</p> <p>2.1.2. In the other studies, there was no difference in mean birth weight among adolescent mothers in the treatment and control groups (one strong RCT; two matched cohorts – one strong, one moderate; one moderate cohort)</p>	<p><b>2. Mean birth weight</b></p> <p>2.1. It is unclear whether or not these interventions are effective in improving mean birth weight among infants of adolescent mothers. Public health organizations should consider this lack of certainty when making program decisions related to this outcome.</p>
<p><b>3. Preterm delivery (5 studies)</b></p> <p>3.1. Results suggest that these interventions are not effective in preventing preterm delivery among adolescent mothers</p> <p>3.1.1. In one moderate cohort study, participants in the treatment group gave birth to fewer preterm infants than did those adolescents in the control group. In this study, the impact is significant for the general group of adolescents (<math>p &lt; 0.05</math>)</p> <p>3.1.2. In the other 4 studies, participants in the treatment group were no more or less likely to give birth to a preterm infant than those in the control group (two RCTs - one strong, one moderate); one moderate matched cohort; one moderate cohort)</p>	<p><b>3. Preterm delivery</b></p> <p>3.1. The evidence does not support the use of these interventions if the primary outcome is to prevent preterm births among adolescents.</p>
<p><b>4. Interuterine growth retardation (IUGR) (3 studies)</b></p> <p>4.1. Results are mixed regarding the effectiveness of interventions to improve mean birth weight in infants born to adolescent mothers. However, the one strong RCT found no treatment effect.</p> <p>4.1.1. In two studies, participants in the treatment group were significantly less likely to give birth to an infant with IUGR than those in the control group (one moderate matched case control; one moderate cohort)</p> <p>4.1.2. In one strong RCT, participants in the treatment group were no more or less likely to give birth to an infant with</p>	<p><b>4. Interuterine growth retardation (IUGR)</b></p> <p>4.1. Given that the evidence is unclear regarding the effectiveness of interventions to prevent IUGR, public health programs are not advised to include these interventions in their maternal child programs aimed at adolescents if the primary outcome is to prevent IUGR.</p>

IUGR than those in control group	
<b>5. Methodological Issues with the Primary Studies in the Review</b> (15 studies – 4 strong, 9 moderate, 2 weak; Data extraction conducted on 13 studies) 5.1. Failure to minimise selection bias (10 studies) 5.2. Failure to control for confounding variables 5.3. Small sample sizes 5.4. Use of poor inclusion criteria	<b>5. Implications for Future Research</b> 5.1. Given the lack of research in this area, public health organizations that provide programs aimed at the prevention of preterm births should ensure that rigorous program evaluations are conducted and high quality research studies be conducted to evaluate the effectiveness of interventions aimed at the improvement of birth outcomes for the infants of adolescent mothers.
<b>6. Cost Benefit or Cost-effectiveness Information</b> 6.1. No cost related information was included in the review	<b>6. Cost Benefit or Cost-effectiveness Information</b> 6.1. Future research should assess cost benefit or cost-effectiveness of the interventions
<b>General Implications</b> <ul style="list-style-type: none"> <li>• The evidence on the effectiveness of interventions aimed at the improvement of birth outcomes for infants of adolescent mothers, generally suggests that these interventions are not effective in improving birth outcomes.</li> <li>• Any public health program aimed at improving these health outcomes should undergo rigorous program evaluation.</li> <li>• Additional high quality research should be conducted to determine effective strategies to improve birth outcomes for infants of adolescent mothers.</li> </ul>	
<b>Legend:</b> CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk **For definitions see the <i>healthevidence.org</i> glossary <a href="http://www.healthevidence.org/glossary.aspx">http://www.healthevidence.org/glossary.aspx</a>	

## References used to outline issue

1. Canadian Institute for Child Health. The health of Canada's children : A CICH profile, low birth weight <http://www.cich.ca/PDFFiles/ProfileFactSheets/English/LBWEng.pdf>
2. The Ottawa Coalition for the Prevention of Low Birth Weight: <http://www.successby6ottawa.ca/lbwfpn/english/>
3. Canadian Paediatric Society. (2006). Position statement: Adolescent pregnancy <http://www.cps.ca/english/statements/AM/ah06-02.htm>
4. Public Health Agency of Canada. (2000). A Framework for Action to Reduce the Rate of Teen Pregnancy in Canada [http://www.phac-aspc.gc.ca/dca-dea/publications/reduce\\_teen\\_pregnancy\\_section\\_1\\_e.html](http://www.phac-aspc.gc.ca/dca-dea/publications/reduce_teen_pregnancy_section_1_e.html)

## Other quality reviews on this topic

- Boyd CA, Quigley MA, Brocklehurst P. (2006). Donor breast milk versus infant formula for preterm infants: Systematic review and meta-analysis. *Archives of Disease in Childhood Fetal and Neonatal Edition*, 92, F169-F175.
- Hodnett ED, Frederiks S. (2003). Support during pregnancy for women at increased risk of low birthweight infants. *Cochrane Database of Systematic Reviews*, Issue 3. Art. No.: CD000198. DOI: 10.1002/14651858.CD000198.
- Lumley J, Chamberlain C, Dowswell T, Oliver S, Oakley L, Watson L. (2009). Interventions for promoting smoking cessation during pregnancy. *Cochrane Database of Systematic Reviews*, Issue 3. Art. No.: CD001055. DOI: 10.1002/14651858.CD001055.pub3.
- Mahomed K, Buttha Z, Middleton P. (2007). Zinc supplementation for improving pregnancy and infant outcome. *Cochrane Database of Systematic Reviews*, Issue 2. Art. No.: CD000230. DOI: 10.1002/14651858.CD000230.pub3.

## Related links

- Health Canada: Infant Development and Care <http://www.hc-sc.gc.ca/hl-vs/infants-bebes/develop/index-eng.php>
- McKay, A. (2006). Trends in teen pregnancy in Canada with comparisons to U.S.A. and England/Wales. *The Canadian Journal of Human Sexuality*, 15(3-4), 157- 161. [http://www.beststart.org/events/detail/bsannualconf08/presentations/PC1\\_mckay.pdf](http://www.beststart.org/events/detail/bsannualconf08/presentations/PC1_mckay.pdf)
- Ontario Ministry of Children and Youth Services, Ontario Early Years Centres: <http://www.gov.on.ca/children/oeyc/en/index.html>
- Public Health Agency of Canada: The Family-Centred Maternity and Newborn Care: National Guidelines [http://www.phac-aspc.gc.ca/dca-dea/prenatal/fcmc1\\_e.html](http://www.phac-aspc.gc.ca/dca-dea/prenatal/fcmc1_e.html)
- Public Health Agency of Canada, Childhood and Adolescence, Prenatal – 6 Years: <http://www.phac-aspc.gc.ca/dca-dea/prenatal/index-eng.php>
- The Young/Single Parent Support Network of Ottawa: <http://www.ottawayoungparents.com/yspsn.htm>

## Suggested citation

Robeson, P., McRae, L., Dobbins, M. (2008). The effectiveness of public health strategies to reduce or prevent the incidence of low birth weight in infants born to adolescents: Evidence and implications for public health. Hamilton, ON: McMaster University. Retrieved July 27, 2009, from *healthevidence.org*: [http://www.healthevidence.org/documents/16136/byid/Brunton2001\\_EvidenceSummary\\_EN.pdf](http://www.healthevidence.org/documents/16136/byid/Brunton2001_EvidenceSummary_EN.pdf)

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