

The effectiveness of home visiting as a delivery strategy for public health nursing interventions to clients in the prenatal and postnatal period: a systematic review

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The purpose of this systematic overview was to assess the evidence for the effectiveness of public health nursing interventions when carried out by the strategy of home visiting of clients in the pre- and postnatal period. This is an update of a larger overview first collecting literature to 1993, then updated to the end of 1995, and now updated to 1998. The search of published and unpublished literature related to home visiting resulted in retrieval of a total of 211 articles, including 149 articles relevant to all age groups and including all interventions implemented by various professional and nonprofessional groups, where the intervention was considered to be within the scope of practice of public health nursing in Ontario. When the relevance was limited to interventions where the intervenor was known to be a nurse, and the clients were in the pre- or postnatal period, there were 20 articles with quality ratings of 'strong' or 'moderate' included in this update for the systematic review, and 8 additional articles in this update. There were no reported negative effects of home visiting in the 12 strong articles. Positive outcomes included improvement in children's mental development, mental health and physical growth, reduction in the mother's depression, improvement in maternal employment, education, nutrition and other health habits, and government cost saving. There is no proven impact on low birth weight, gestational age or neonatal morbidity or mortality, although the studies had inadequate sample sizes to demonstrate a difference in such relatively rare occurrences. As a delivery strategy, nurses visiting pre- and postnatal clients in the home can produce significant benefit, particularly with interventions of high intensity and with clients who are considered to be 'at risk' due to factors such as low income and low educational achievement.

Key words: effectiveness; home visiting; newborn; nursing; postnatal; prenatal; public health; review

Introduction

Historically, in North America, programmes for prenatal and postnatal women, newborn and early

childhood care have been delivered by the strategy of public health nurses visiting the family in the home. Increasing fiscal restraint in the past 10 years led some health departments to abandon home visiting as it was considered to be too expensive. While multiple other delivery strategies have been developed, including peer and lay support workers, telephone information and support lines, and clinics, there is usually a certain pro-

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portion of the population that does not access these alternative services. Thus home visiting remains one of a number of programme delivery strategies.

By reviewing and summarizing the findings of research studies, it is hoped that the most effective and efficient use of public health resources can be promoted by abandoning interventions for which there is evidence of no benefit, or evidence of harm, and by implementing interventions for which there is evidence of benefit. There are inherent difficulties in conducting research in community health (Hayward *et al.*, 1996), including problems achieving large enough sample sizes for adequate power, conducting a randomized trial within a community, controlling for contamination and confounders, blinding outcome assessment, and finding reliable and valid outcome measurement tools. However, this review did find studies of high quality which will be presented here. This study is an update of a larger overview first collecting literature up to 1993 (Ciliska *et al.*, 1996), and then updated to the end of 1998. It is acknowledged that a home visit may include many different types of intervention and, where possible, some detail is given in this paper about the content of the home visit.

The following question was asked for this systematic review. *What is the effectiveness of public health nursing interventions for prenatal and postnatal clients offered through the strategy of home visiting?*

Comparisons of interest relate to the risk level of clients and to the timing and intensity of the interventions.

Methods

Search strategy

- 1) For the overall project, an online search of MEDLINE and CINAHL was conducted for the years 1979 to 1998. Key words used were 'PHN' or 'CHN', and 'effectiveness' or 'comparative' or 'control' or 'evaluative' study. A focused search using the keyword 'home visiting' was made back to 1985.
- 2) Prominent authors in the field were searched online for the years 1986 to 1998.
- 3) Key public health journals were hand-searched from 1990 to 1998. These journals included

the *Canadian Journal of Public Health*, the *Canadian Journal of Nursing Research*, the *American Journal of Public Health*, *Nursing Research*, *Image*, *School Health*, *Journal of Advanced Nursing*, *Journal of Community Health Nursing*, *Public Health Nursing*, and the *American Journal of Health Promotion*.

- 4) Published bibliographies, reports from several health research programmes and several government documents were hand-searched for relevant articles. The abstracts of workshops and papers presented at recent Canadian Public Health Association, Ontario Public Health Association and American Public Health Association conferences and the International Conference on Community Health Nursing were reviewed. Key informants were contacted in Public Health Research Education and Development Programs in Ontario, University Schools of Nursing in Canada and through a directory of Canadian Nurse Researchers, for both published and unpublished papers.
- 5) The content lists of 107 related journals were also reviewed monthly from September 1992 to December 1998.
- 6) Relevant references (from 1980 to the end of 1998) from each article were identified, retrieved and reviewed.

An article was retrieved as being of potential relevance if its title or abstract indicated that it was an evaluative study of an intervention, within the scope of public health nursing, conducted in the home with clients of any age group. For online searches, two reviewers independently assessed the bibliographic listings. For all other sources of retrieval, one reviewer assessed material for its potential relevance.

Review procedures

The relevance criteria determined whether the study evaluated an intervention or programme, described an intervention within the scope of public health nursing (PHN) practice in Canada (Canadian Public Health Association, 1990), provided information on client-focused outcomes and/or cost, described a prospective study and had a control or comparison group (which could have been before and/or after the study). To be included, an article had to meet all five inclusion criteria. In the initial overview and update, articles were

considered relevant regardless of the discipline or preparation of the intervenor, if the intervention was within the scope of PHN practice in Ontario. For this update, the relevance criteria included only those studies in which the intervenor was identified as a nurse. An additional limiting relevance criterion was that the target group had to consist of prenatal and/or postnatal clients. These criteria were agreed upon by the authors after extensive consultation with practitioners and policy-level personnel within Public Health Departments and the consultant within the Ministry of Health of Ontario. They were considered to be criteria which would result in a review with greatest applicability to decisions regarding resource allocation practice patterns. The educational preparation of the 'nurse' was often not made explicit in the studies.

The next phase involved rating the relevant articles for validity. A validity tool was developed using the Cochrane tool (Oxman, 1992) as a starting point, and it was then pre-tested and modified. It included the following criteria: method of allocation to the study groups; level of agreement to participate in the study; control for confounders; method of data collection (pre-testing of data collection tools, blinding of data collectors to group allocation of study participants); quantitative measure of effect; cost analysis; and percentage of participant follow-up. Studies were rated as 'pass', 'moderate' or 'fail' on each criterion. If an article stated that the sample was 'randomized' without providing any information about how that was achieved, it was considered to be quasi-randomized, which satisfied the 'moderate' rating. The tool was tested for inter-rater reliability and it achieved a kappa score of at least 0.80 with three sets of two readers independently rating articles.

In order for an article to be assessed as 'strong', a minimum of four of six criteria had to be rated as 'pass' with no 'fail'. For the 'moderate' category, no criterion could be a 'fail' and three or more criteria had to be 'moderate'. A 'weak' rating meant that at least one criterion was a 'fail'. For this update, all of the articles were read and rated independently by two reviewers, each of whom was blind to the rating of the other person, both for relevance and for validity. Any discrepancies were discussed until a consensus was reached. The primary reader did the data abstraction.

The most frequent weaknesses were that the method of allocation to study groups was not

random, that the method of randomization was not described, that there was inadequate control for potential confounders, and that less than 80% of potential participants actually participated.

The purpose and content of the interventions in these studies were highly diverse. There were various different populations, different outcomes, and different ways of measuring the same outcomes. For these reasons, the authors decided that a meta-analysis would not be meaningful.

Results

The total search of published and unpublished literature related to home visiting resulted in retrieval of 211 articles, of which 149 articles were relevant to all age groups, and including all interventions done by various professional and non-professional groups, where the intervention was considered to be within the scope of practice of public health nursing in Ontario. When the relevance was limited to interventions where the intervenor was known to be a nurse, and the clients were in the pre- or postnatal period, there were 15 articles (rated as strong and moderate) from the previous update included in this review. A total of 10 additional articles from this update were relevant to the narrower question, and five were rated as weak on quality. Therefore there were 20 articles for this systematic review, and 8 articles added since the last review.

Table 1 summarizes the 20 articles (12 strong and 11 moderate) related to 12 studies, including the design, intervention and results. It is important to note that there are two studies with more than one article, which are different reports concerning different follow-up times or different outcomes for the same study. These include the initial study by Rauch *et al.* (1988) of low-birth-weight babies and the two longer follow-ups at 7 years (Achenbach *et al.*, 1990) and 9 years (Achenbach *et al.*, 1993), as well as the seven total reports of the Elmira study of Olds and colleagues beginning with the two initial reports (Olds *et al.*, 1986a; 1986b), followed by the 2-year follow-up (Olds *et al.*, 1988; Olds, 1993), 4-year follow-up (Olds *et al.*, 1994) and 15-year follow-up (Olds *et al.*, 1997; 1998).

The studies are grouped according to interventions in the prenatal period and the postnatal period and interventions that took place in both

Table 1 Included studies: summary of 'strong' and 'moderate' articles

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Prenatal interventions					
Villar <i>et al.</i> (1992) South America	RCT Strong	Women considered at high risk during pregnancy for delivery of LBW infant Randomized • 1115 clinic care plus home visit • 1120 prenatal clinic care	Social support Health and nutrition information	Non-significant: • LBW • preterm delivery • IUGR • neonatal and maternal morbidity, mortality	<ul style="list-style-type: none"> • For eligibility – had to seek prenatal care before 22 weeks and have attended at least 1 prenatal visit • May have excluded women in greatest need, for whom it would have had greatest effect
York <i>et al.</i> (1997) USA	RCT Strong	Women with diabetes or hypertension during pregnancy who were hospitalized during the pregnancy Randomized • 44 early discharge, plus follow-up • 52 control discharged routinely from hospital plus follow-up	Discharge planning and home follow-up by perinatal nurse specialist 5 home visits (day of discharge and 2 visits each in next 2 days) Follow-up telephone or clinic contact	Significant: • fewer rehospitalizations during pregnancy Non-significant • birth weight • gestational age	<ul style="list-style-type: none"> • Reduced cost of care for intervention group (\$772 vs. \$13327 US)
Postnatal interventions					
Holden <i>et al.</i> (1989) UK	RCT Strong	Depressed postpartum women Randomized • 26 counselling • 24 control	8 weekly counselling sessions	Significant: • reduction in depression (Goldberg and Edinburgh Postnatal Depression Scale)	

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Brooten <i>et al.</i> (1986) USA	CCT Moderate	72 VLBW infants discharged early from hospital Randomized • 36 early discharge with home support • 36 control (usual hospital discharge and clinic follow-up)	Visits at 1 week and 1, 9, 12 and 18 months Weekly telephone contact Education support with regard to physical care, developmental screen, parents' coping, infant stimulation	Significant: • decrease in number of rehospitalizations • decrease in acute care visits • decrease in incidence of failure to thrive • decrease in child abuse and foster placement	• Costs of intervention 26.4% less than cost for control group
Wasik <i>et al.</i> (1990) USA	CCT Moderate	65 families • children at risk for cognitive difficulties at birth Randomized Group 1: education and day care Group 2: • 25 education only Group 3: • 23 control	• Day care: child development centre – 5 days/week (addressed both cognitive and social domains) • Education through home visits (weekly for 3 years, then less frequently for years 4 and 5) • Home visits provided support, information, advocacy, referral, promoted coping, modelled positive parent and child interactions, taught problem solving and developmentally appropriate activities All three groups had available monthly parent support group plus social worker available for crisis counselling	Significant: • Group 1 increased in mental development at 12 and 18 months (Bayley) and at 24 and 36 months (Stanford-Binet) • Group 1 increased over Group 3 in mental development at 30, 42 and 54 months (McCarthy) Non-significant: • home environment (HOME) • child-rearing attitudes (child-rearing and education research instrument) up to 36 months after birth	• Family education alone did not differ significantly from the control group

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Casiro <i>et al.</i> (1993) Canada	RCT Strong	100 LBW infants and families Randomized: • 50 early discharge • 50 usual care control	Home visits by PHN started day after discharge for up to 8 weeks PHN provided • assessment and teaching • support • referral • liaison Content of teaching: infant feeding, sleeping, elimination, growth, development, immunization, safety, parental concerns, family structure, roles, relationships, lifestyle, health status, economic adequacy, physical environment Homemaker service for 8 weeks	Significant: • increase in avoidance of restriction and punishment (HOME) • increase in provision of play materials (HOME) • higher total score (HOME) Non-significant: • rates of rehospitalization • use of ambulatory services • mental or psychomotor development (Bayley) • infant growth	Attending physicians were notified if infants were randomized to intervention, which may have introduced a bias Outcomes were measured at 12 months of age Intervention group: • mean home visits = 3.8/family • mean telephone calls = 8.4/family • cost savings \$5289/family
Rauch <i>et al.</i> (1988) USA	RCT Moderate	LBW infants Randomized • 24 intervention • 32 control • Added another comparison group of 37 normal-weight infants	7 hospital sessions (week before discharge) 4 home sessions (3, 14, 30 and 90 days after discharge) Mother-Infant Transaction Program: 1) enabled mother to appreciate specific behavioural and temperamental characteristics 2) sensitized her to the baby's cues 3) taught the mother appropriate response to cues	4-year follow-up Significant: • mothers in intervention group had greater self-confidence and satisfaction, and lower perception of infant difficulty at 6 months • Intervention group scored higher than LBW group on mental ability at 36 and 48 months on McCarthy Scale Non-significant: • maternal anxiety • child's mental development before 36 months (Bayley Scale) • intervention group did not differ from normal-weight control group after 36 months	Intervention group increased scores on mental ability to level of normal-weight controls • Intervention prevented cognitive lags normally present in LBW children

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Achenbach <i>et al.</i> (1990) (7-year follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> intervention group scored higher than LBW control on Kauffman mental processing scales: composite, sequential simultaneous <p>Non-significant:</p> <ul style="list-style-type: none"> intervention group did not differ from normal-weight control group 	<ul style="list-style-type: none"> Intervention group maintained gains in mental ability equal to normal-weight control group
Achenbach <i>et al.</i> (1993) (9-year follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> intervention group scored higher on Kauffman mental processing scales: composite, sequential, simultaneous, achievement <p>Non-significant:</p> <ul style="list-style-type: none"> intervention group did not differ from normal-weight control group 	<ul style="list-style-type: none"> Intervention group maintained gains up to level of normal-weight control group LBW controls still lagged behind intervention group in cognitive functioning
Robinson <i>et al.</i> (1998) UK	RCT Moderate	<p>Infants born at ≤ 32 weeks' gestation</p> <p>Randomized</p> <ul style="list-style-type: none"> 116 developmental education programme 106 non-directional counselling 106 control 	<p>Discharge from hospital to age 2 years</p> <ul style="list-style-type: none"> Intervention (Portage): education programme introduces parents to aspects of child development Attention control: non-directional support, based on parent-advisor model Control: usual care to appropriate primary care and community support groups 	<p>Non-significant:</p> <ul style="list-style-type: none"> no differences in scores at 2 years of age on Griffiths Mental Development Scale 	<ul style="list-style-type: none"> Mean number of visits on each intervention group was 42; length 45 minutes Social variables may have confounded the results Social variables were all independently associated with scores
Avon Premature Infant Project					

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Pre- and postnatal interventions					
Olds <i>et al.</i> (1986a) <i>Elmira</i> study USA	RCT Strong	400 pregnant women Randomized: • Group 1: control (usual care) • Group 2: free transportation for prenatal care and well-child care • Group 3: intervention 2 plus home visits during pregnancy • Group 4: intervention 3 plus home visits continued to 24 months of age	Minimum visits: • prenatal – home visit every 2 weeks • postpartum – weekly visits to 6 weeks • every 2 weeks to 14 months, every 6 weeks to 24 months Content: • emphasis on family strengths • education about fetal and infant development • involvement of family and friends in child care and support of mother • use of other health and social services	Significant: • improved mother's report of baby's mood • lower level of concern about infant behaviour • lower level of restricting children (Caldwell) • decrease in visits to emergency department • decrease in records of accidents and poisoning Non-significant: • verified cases of child abuse	• Groups 1 + 2 and Groups 3 + 4 combined for analysis
Olds <i>et al.</i> (1986b)				Significant: • increase in awareness of community services • increase in attendance at childbirth education classes • increase in numbers who talked about stresses of parenting • decrease in kidney infections • improvement in nutrition • decrease in number of cigarettes smoked/day Non-significant: • infant birth weight • length of gestation	

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Olds <i>et al.</i> (1988) (follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> early increase in educational attainment by mothers (no longer different at 2 years) increase in employment among unmarried women decrease in subsequent pregnancies 	
Olds <i>et al.</i> (1993) (follow-up)				<ul style="list-style-type: none"> net costs 2 years after programme = programme costs minus savings (social assistance, Medicaid, food stamps) = \$1582 (US) for intervention group as a whole \$180 (US) for low-income families 	Cost-effective for low-income families
Olds <i>et al.</i> (1994) (follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> lower level of hazardous exposure in the home higher scores (HOME) for poor unmarried teenagers higher level of functional punishment 30% fewer visits to emergency departments 40% fewer injuries and ingestions 45% fewer behavioural parent coping problems <p>Non-significant:</p> <ul style="list-style-type: none"> new cases of child abuse or neglect children's intellectual functioning (Stanford-Binet) mother's warmth, control 	<ul style="list-style-type: none"> Outcomes measured at 25–48 months of age
Olds <i>et al.</i> (1997) (15-year follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> women in nurse-visited group less often identified as perpetrators of child abuse and neglect unmarried, low-income mothers in intervention group had fewer subsequent births, longer time interval between births of first and second children, less time on family aid, less alcohol and drug use, fewer arrests by self-report and fewer state records of arrest, fewer days consuming alcohol in past 6 months 	<ul style="list-style-type: none"> Programme had long-term effect on social outcomes of mothers in high-risk group Programme had significant impact on children of mothers in high-risk group

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Olds <i>et al.</i> (1998) (15-year follow-up)				<p>Significant:</p> <ul style="list-style-type: none"> • children of unmarried low-income nurse-visited mothers had fewer reported instances of running away, arrests, convictions, life-time sexual partners 	
Kitzman <i>et al.</i> (1997) USA	RCT Strong	<ul style="list-style-type: none"> • 1290 women < 29 weeks' pregnant recruited from medical centre <p>Randomized:</p> <ul style="list-style-type: none"> • Group 1: control (usual care) • Group 2: free transportation to clinic • Group 3: intervention 2 plus more visits during pregnancy plus 2 postpartum visits • Group 4: intervention 3 plus postpartum visits by nurse until child was 2 years old 	<p>Prenatal:</p> <ul style="list-style-type: none"> • assessment and support with regard to healthy diets, substance use • education about pregnancy complications <p>Postpartum:</p> <ul style="list-style-type: none"> • education about care of child, signs of illness • promotion of parent-child interaction, play environment, safety and stimulation • problem-solving with regard to education, work and family planning 	<p>Significant:</p> <ul style="list-style-type: none"> • lower rate of pregnancy-induced hypertension • fewer injuries or ingestions in children • fewer second pregnancies <p>Non-significant:</p> <ul style="list-style-type: none"> • LBW • preterm delivery • children's immunization, mental development or behavioural problem • mother's educational achievement 	<p>Nurse-visited group had mean of 7 prenatal visits and 26 postpartum visits</p> <ul style="list-style-type: none"> • This study is a replication of Old's study with a different population (inner-city African-Americans vs. rural Caucasians)

Table 1 Continued

Study	Design/quality	Participants	Intervention	Outcomes*	Results/comments
Seitz <i>et al.</i> (1985) USA	Cohort analytic Moderate	Pregnant, inner-city low-income families who had no complications in delivery <ul style="list-style-type: none"> • 18 families in intervention group • 17 families in comparison group 	Home visiting over 30 months: <ul style="list-style-type: none"> • support and problem solving about housing, food, safe environment, education, marital and career issues • liaison with other service providers • comprehensive programme of home visits, day care and paediatric care 	10-year follow-up Significant: <ul style="list-style-type: none"> • increase in maternal education • increase in maternal involvement in child's schooling • increase in school attendance Non-significant: <ul style="list-style-type: none"> • maternal employment • socioeconomic status • parenting style • academic achievement of children 	<ul style="list-style-type: none"> • Families received an average of 28 visits over 30 months
Black <i>et al.</i> (1994) USA	CCT Moderate	60 prenatal women identified as drug abusers Randomized: <ul style="list-style-type: none"> • 31 in intervention group • 29 in comparison group 	Biweekly home visits before delivery to 18 months after: <ul style="list-style-type: none"> • promote maternal support, parenting, child development, utilization of resources, advocacy 	Significant: <ul style="list-style-type: none"> • more emotionally responsive (HOME) • provided more stimulation (HOME) Non-significant: <ul style="list-style-type: none"> • gestational age • 1-minute APGAR • hospital stay • maternal abstinence • cognitive scores 	<ul style="list-style-type: none"> • Nurses were provided with a uniformed escort for safety • Study participants were single, multiparous non-high-school graduates, low family income, 40% HIV-positive, 62% history of incarceration, all used cocaine and/or heroin

*All outcomes reported achieved $P < 0.05$.
RCT, randomized controlled trial.

pre- and postnatal period with the same client. For narrative detail about the studies included, see Ciliska *et al.* (1999).

Discussion

The additional eight studies in this update, added to the original 12 studies, continue to confirm the earlier review findings. In summarizing the literature, there are no negative effects of home visiting – that is, home visits have not been shown to do any harm. There were no outcomes reported where the non-home-visited group were worse off with regard to the intervention than the control group. Moreover, the studies have demonstrated a positive impact of nurses intervening through the delivery strategy of home visiting on physical health, mental health and development, social health, health habits, and knowledge and service utilization of mothers and babies. Home visiting can have a positive impact on the quality of the home environment, a finding that was also confirmed in the recent review by Kendrick *et al.* (2000a). Home visiting can increase the effectiveness of other medical, social and educational services. Some of the articles report no effect or else selective effects, but the effects seem to be mediated by the intensity of the intervention and the pre-existing level of health and social status of the client. Larger treatment differences were associated with higher intensity of the intervention. Effectiveness can be impaired by inadequate intensity or poor timing of home visits. Interventions generally had more impact on clients at higher risk (e.g., unmarried clients, those on low income, teenage mothers) than on those at moderate or low risk. The exception to the findings in high-risk groups is the study of young pregnant women who were multiple drug users (Black *et al.*, 1994).

Home visiting has shown no impact on some outcomes. For example, there is no evidence that home visiting increases the uptake of immunization (Kendrick *et al.*, 2000b). There is also no evidence of an effect of prenatal programmes delivered by nurses through home visiting on low birth weight or gestational age, neonatal morbidity or mortality. Fortunately, most of these outcomes are quite rare, and the sample sizes have not yielded sufficient power to detect small differences between groups. Many studies lack a strong theor-

etical framework linking the intervention to the expected outcome. The weakness of the theoretical causal link between social support and low birth weight may account for this limited impact. Similar theoretical weaknesses were found in many of the studies included here, as well as in the review by Kendrick *et al.* (2000a).

One criticism of this body of literature is the difficulty in separating out the effects of home visiting in multipronged approaches. However, the Elmira study shows significant additive effects of home visiting. The Olds study is often criticized for the intensity of the intervention, yet some of the other studies of lesser intensity have not demonstrated a measurable effect.

Two further problems with this literature are the lack of description of the level of preparation of the ‘nurses’ who made the intervention, and the lack of description of what happens during the home visit. This makes any comparison of outcomes by nurse preparation or by type of intervention impossible. Robinson (1999) concurs with these limitations in her review of domiciliary home visiting.

Conclusions

Despite variations in the quality of research on home visiting, the positive direction of effect found through high-quality trials is generally supported by the results of weaker evaluations. Although there are limitations inherent in public health research, adequate evidence exists to enable conclusions to be drawn that home visiting by nurses has important impacts on many otherwise intransigent health problems.

There are many implications for practice and research arising from this review. In practice settings, home visiting interventions have not been effective in altering rates of low birth weight. However, adequate home visiting interventions (in intensity, duration and content) for pre- and postnatal women with risk factors are effective in improving a variety of physical, mental, social and developmental health outcomes, and in some cases have been shown to be cost-effective compared to control groups who are receiving normal care services. Home visiting allows for a programme delivery strategy for high-risk clients who may not access other means of care delivery.

In relation to research implications, public health policy-makers, managers and clinicians want to know how intense an intervention needs to be in order to make a significant impact. Does it need to have the intensity and duration of the Elmira intervention? Can a paraprofessional be as effective as a baccalaureate-educated PHN? These are the questions that are of primary importance in the next generation of research related to home visiting as a strategy for delivering interventions by public health nurses. As a result of this review, several suggestions arise for researchers to consider when reporting their studies. One is to make very explicit how randomization was achieved. Another is to develop tracking strategies or other ways to achieve follow-up of at least 80% of the individuals who enter a study. Collecting information about possible confounders and controlling for these at the stage of data analysis would also improve the validity of the findings. These were the major weaknesses of this literature as a whole. Increased funding of public health nursing research will be necessary to enable the design and implementation of high-quality studies in which adequate sample sizes and follow-up are achieved. There is also a need for studies of outcomes which clients consider are important, rather than those solely predefined by the researcher. Finally, there is a tremendous need for cost analysis of public health interventions.

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