Evaluation of the Healthy Start voucher scheme on maternal vitamin use and child breastfeeding: a natural experiment using data linkage

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Scientific summary

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Background

Having a good start in life during pregnancy and infancy has been shown to be important for living both a healthy life and a longer life. Health and well-being during the early years (which starts pre-conception) have a crucial impact on chronic disease and inequalities across the life course and from one generation to the next. There is a willingness of governments to invest in early years, as early investment in the life course has been shown to provide the highest rate of economic return. Despite the introduction of many policies designed to improve the circumstances during pregnancy and early life, there have been few outcome evaluations of these policies. Many of the evaluations are restricted to process evaluations of how the policy is implemented, rather than an evaluation of the outcomes for the mothers and their infants.

The Healthy Start voucher (HSV) scheme was introduced in the United Kingdom (UK) in 2005/6. It is a means-tested voucher scheme for pregnant women and mothers with children under 4 years of age. If these women are in receipt of certain means-tested benefits then they are eligible for vouchers to be spent on milk, infant formula milk, fruit and vegetables. They also receive free vitamins. All mothers aged > 18 years are eligible for the scheme. Vouchers worth £3.10 per week are given to eligible women. These can be spent in neighbourhood shops and pharmacies. There are four main aims of the scheme: improve the nutrition of pregnant women, increase fruit and vegetable intake, initiate and maintain breastfeeding, and introduce foods in addition to milk as part of a progressively varied diet when infants are 6 months old.

The effectiveness and cost-effectiveness of the HSV scheme have not yet been shown. Previous evaluations of outcomes comparing the HSV scheme with the Welfare Food Scheme (WFS) found that mothers eligible for the HSV scheme had higher daily intakes of iron, calcium, folate and vitamin C than mothers eligible for WFS. A mixed-methods study of practitioners and low-income mothers found that recipients valued the vouchers but that there were substantial barriers to access, including low levels of awareness of the HSV scheme among both mothers and practitioners, and uncertainty about the eligibility criteria among health professionals. A report on the operational aspects of the HSV scheme concluded that a comparative study is needed that extends previous analyses to the examination of outcomes and assessing the cost-effectiveness of the HSV scheme.

There remains a need to determine the effectiveness on health outcomes and cost-effectiveness of the HSV scheme, using larger studies and investigating a wide range of outcomes with longer-term follow-up. Unless such schemes are rigorously evaluated there is a risk that resources will be wasted on ineffective interventions, or that opportunities to improve the design and administration of potentially valuable interventions are missed.

Objectives

The overall aim was to evaluate the HSV scheme in relation to the extent to which it improves the nutrition of pregnant women and the health outcomes of their infants.

There were five objectives to investigate:

1. the effectiveness of the HSV scheme in relation to vitamin use in pregnancy and breastfeeding initiation and duration

2. the effectiveness of the HSV scheme in relation to infant and child weight and body size, child morbidity, infant and child feeding, and maternal health
3. how findings differ between different populations (Scotland and England)
4. to establish actual voucher usage and determine the reasons for uptake and non-uptake of the HSV
5. to establish the cost-effectiveness of the HSV.

Methods

This evaluation of the HSV scheme had a focus on outcomes in pregnancy, early infancy and late infancy, with the potential to follow infants into adulthood through routinely collected data. It was a mixed-methods study, taking a natural experiment approach. It combined a quantitative evaluation with an integrated qualitative study to understand the lived experiences of low-income women. In addition to evaluating the health outcomes, we developed a framework to undertake an economic evaluation alongside a natural experiment using observational data.

Exposure, controls and comparison groups

The exposed group were those women eligible and claiming HSV, namely recipients (R). One reason the HSV scheme has not been evaluated on a large scale is the difficulty of identifying an appropriate comparison group. As the HSV is means tested it is not clear what an appropriate comparison group is; it is not appropriate to compare those who are eligible for HSV with those who do not meet the eligibility criteria as they are a very different group in terms of socioeconomic characteristics, with very different health behaviours and outcomes. We identified two comparison groups, the first being women who are eligible for HSV but do not claim the vouchers, namely eligible (E). The second comparison group was low-income women who just miss out on eligibility for HSV owing to not being eligible for the means-tested benefits owing to slightly increased income levels, namely nearly eligible (NE).

With these exposure and control groups, there are three ways to compare these groups:

1. recipients versus eligible but not claiming (group 1 vs. group 2)
2. recipients versus nearly eligible (group 1 vs. group 3)
3. all eligible versus nearly eligible (group 1 and 2 combined vs. group 3).

Design

The design used a multiple analytical approach in line with Medical Research Council guidance for the evaluation of natural experiments (NEs).

There are three parts to this evaluation:

1. secondary analysis of two existing data sets, including linking one to routinely collected health data (objectives 1, 2 and 3)
2. qualitative interview study of mothers including a descriptive analysis of voucher usage (objective 4)
3. establishing methods for cost-effectiveness analysis and conducting preliminary analysis (objective 5).

Quantitative data sources and analysis

For the quantitative analysis, we used two high-quality surveys representative of the Scottish population [Growing Up in Scotland (GUS); n = 2240] and the UK population [Infant Feeding Survey (IFS) 2010; n = 8067] to evaluate the HSV scheme. We examined potential improvement in vitamin use in pregnancy and breastfeeding initiation and duration, and other related health outcomes for low-income mothers and their children. We linked the GUS data to NHS routinely collected data to examine further health outcomes.

We used propensity score matching on key characteristics to allow for the exposed and control groups to be more balanced on covariates. This method tries to mimic the characteristics of a randomised controlled trial. The propensity score is a balancing score, which means that it is conditional on the propensity score; the distribution of observed baseline covariates will be similar between treated and untreated subjects. This matching technique minimises selection bias and is better at getting to the causal effect than simple covariate adjustment in models.

Qualitative interview study

We carried out 40 in-depth, semistructured, face-to-face interviews, spread across each of the exposed and control groups. Key foci of the analysis were the processes involved in the take-up, non-take-up or discontinuation of the HSV scheme; the experience of using HSVs and how the vouchers are used.

Framework for the cost-effectiveness analysis

We developed and proposed methods and guidance for conducting economic evaluations in population health using observation data from NEs. Such evaluations are subject to the inherent biases that affect observational data. We reviewed and adapted current economic methods guidance and incorporated evidence from economic evaluations carried out in similar early years contexts. In addition, we used methods from previous studies that incorporated economics into NEs in education and microeconomics as well as health economic evaluations using observational data.

Ethics

Ethics approval was not required for the secondary analysis of existing data as there was no primary data collection. The linkage and release of the GUS data with the routinely collected data for research purposes was approved subject to Public Benefit and Privacy Panel for Health and Social Care project number 1516-0614. The qualitative study was reviewed and fully approved by the University of Glasgow, College of Social Science Ethics Committee in October 2015. This Committee complies with the Economic and Social Research Council's research ethics framework.

Results

Impacts on child health

For nearly all the outcomes across both GUS and IFS, apart from ever breastfeeding and breastfeeding duration in IFS, the results indicated there is no effect of HSV on the outcomes. For ever breastfed and duration of breastfeeding there are differences between propensity score results from GUS and IFS, with the IFS indicating a negative effect of HSV on breastfeeding. Ever breastfed: R 49%, E 53%, $p = 0.255$; R 58%, NE 62%, $p = 0.189$; all eligible (AE) 58%, NE 62%, $p = 0.168$, in GUS; R 57%, E 69%, $p < 0.0001$; R 53%, NE 70%, $p < 0.0001$; AE 60%, NE 74%, $p < 0.0001$, in IFS. Duration of breastfeeding in months (standard deviation): R 1.32 (2.1), E 1.46 (2.2), $p = 0.374$; R 1.73 (2.3), NE 1.88 (2.3), $p = 0.315$; AE 1.84 (2.4), NE 1.88 (2.3), $p = 0.803$, in GUS; R 1.37 (2.6), E 1.94 (3.0), $p < 0.0001$; R 1.23 (2.4), NE 2.09 (3.1), $p < 0.0001$; AE 1.53 (2.7), NE 2.51 (3.3), $p < 0.0001$, in IFS.

For birthweight and low birthweight, the effect sizes and significance vary across the data sets and methods, indicating less confidence in the results of the HSV scheme on birthweight. For premature births and age at introduction of solid foods, there is more consistency across the data sets and evaluation methods, indicating some confidence in the results.

Impacts on maternal health

There was no difference in vitamin use during pregnancy for either comparison: R 82%, E 86%, $p = 0.10$; R 87%, NE 88%, $p = 0.43$; AE 87%, NE 88%, $p = 0.43$, in GUS. Proportions were similar for IFS: R 89%, E 86%, $p = 0.01$; R 89%, NE 87%, $p = 0.01$; AE 88%, NE 86%, $p = 0.43$. Although results were statistically significantly different, indicating increased vitamin use in the HSV groups, these are small effect sizes.

We were able to examine further health outcomes, health behaviours and financial difficulties of the mothers in the GUS data set. For health during pregnancy, alcohol use and household managing financially, there was no effect of the HSV scheme across all the comparison groups. There were slight differences in mother's current health as assessed by the Short Form questionnaire-12 items when the NE comparison group was used as the control. Short Form questionnaire-12 items physical health mean (standard deviation) R 52.26 (7.45), E 52.43 (6.84), $p = 0.734$; R 51.28 (8.36), NE 53.09 (6.87), $p = 0.0002$; AE 51.52 (8.13), NE 53.09 (6.87), $p = 0.001$. Short Form questionnaire-12 items mental health mean (standard deviation): R 51.11 (9.12), E 51.36 (8.74), $p = 0.693$; R 50.69 (9.23), NE 52.28 (8.36), $p = 0.0045$; AE 50.81 (9.19), NE 52.28 (8.3), $p = 0.0083$.

There were large differences in smoking when the NE comparison group was used as the control: R 43%, E 34%, $p = 0.419$; R 37%, NE 24%, $p < 0.0001$; AE 35%, NE 24%, $p < 0.0001$ for current smoking status, and R 10.6, E 11.14, $p = 0.581$; R 10.9, NE 8.6, $p = 0.00014$; AE 10.9, NE 8.6, $p = 0.0001$ for numbers of cigarettes smoked per day.

Understanding mother's experiences

The rich accounts given by the participants gave rise to four key themes: knowledge, awareness, take up and use of the HSV scheme; opinions of the HSV scheme; the effect of the HSV scheme on diet and feeding choices for their babies and children; and the broader lives of low-income women.

The HSV scheme aims were well understood and the scheme was valued by participants. They thought that the eligibility criteria should be widened as they had had positive experiences and appreciated the scheme and the impact that the vouchers had on their lives. For some mothers, it supported them to provide a healthy diet and the opportunity to give their children a range of fruit and vegetables. For many other mothers, despite appropriate nutrition for children being important to them, there was evidence that some children still had poor diets. The HSVs were not mentioned in their decision-making around breastfeeding. Women's choice to breast or formula feed was based on a range of other factors, such as support to breastfeed and assumptions and expectations of health professionals. The HSVs were incorporated into budgeting strategies and were seen as a good support in the context of the lives of low-income women.

Methods for conducting a health economic analysis alongside a natural experiment

Current guidance for economic evaluations focusses on randomised controlled trial designs and therefore does not address the specific challenges for natural experiment designs. Using such guidance can lead to suboptimal design, data collection and data analysis for NEs, leading to a bias in the estimated effectiveness and cost-effectiveness of the intervention or policy. We produced a framework to use when conducting an economic evaluation alongside a natural experiment.

Conclusions

Despite inconclusive findings of the impact of the HSV scheme on health, the HSV scheme attempts to influence health behaviour, and this evaluation can inform other policies aiming to change behaviours or use voucher incentives. There was a high use of vitamins during pregnancy in all groups, with indications of a small increase in vitamin use in the IFS group. Breastfeeding behaviour was similar in both recipients and nearly eligible groups, offering reassurance that the HSV scheme does not disincentivise breastfeeding, but results differed across GUS and IFS. The null effect of HSV on the primary outcomes may be due to the value of the vouchers being insufficient to make a large impact on the income for these women and children. There is a need to provide additional support for smoking cessation to the women eligible for HSVs.

Implications for future research

Future research should use the methods developed to undertake an economic evaluation alongside a natural experiment using existing data to explore the cost-effectiveness of the HSV scheme. We would

also recommend further work to explore and identify other data sources or control groups to improve triangulation and strengthen the causal effects of this policy evaluation.

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