Health Innovation West of England

Gloucestershire Local Maternity and Neonatal System

Report on the real-world evaluation of the Anya app

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Assurance rating

*This report can be used for context and background information	
**This report can help inform decision making, when considered with other information	x
***This report is the best available evidence to date	

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Report on the real-world evaluation of the Anya app

1. Introduction

The benefits of breastfeeding infants are well documented. For the child, breastmilk promotes neural development and guards against malnutrition, disease, and death, whilst for the woman, breastfeeding facilitates birth spacing and protects from chronic diseases[1]. The latest breastfeeding rates at 6-8 weeks in England show an aggregate rate of 52.7% for the period 2023-2024[2]. This is an increase on the previous year when it was 49.2% for the period 2022-2023[3], but still well short of the 70% target set by the World Health Assembly[1,4].

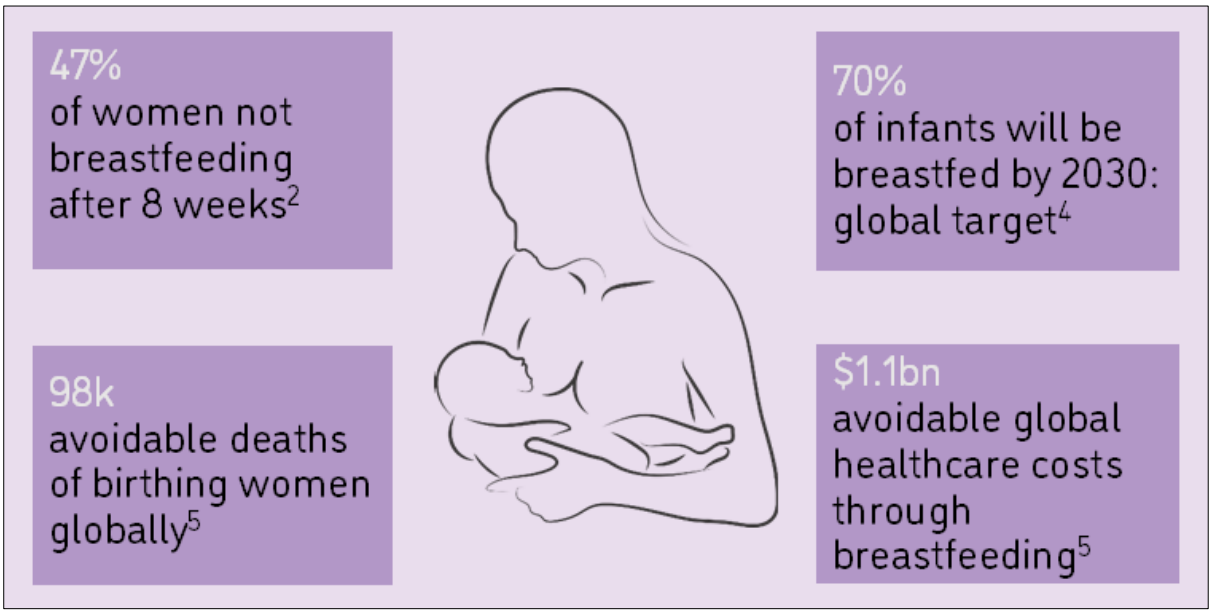

Figure 1. Infographic showing key breastfeeding statistics.

Background

Gloucestershire is a county in the West of England and is covered by one of three Integrated Care Boards supported by Health Innovation West of England. The prevalence of breastfeeding[a] in Gloucestershire (2023-2024) at 6-8 weeks was 57.6% which is 4.9% higher than the average in England. At the 6-8 week time point in 2023-2024, 40.3% of birthing people totally breastfed their babies; 17.3% of birthing people partially breastfed their babies and 41.5% babies were not breastfed at all.[b]

To increase breastfeeding rates, researchers and clinicians have turned to e-health technology, including smartphone apps, to provide alternative forms of breastfeeding support[6,7].

[a] Prevalence combines total and partial breastfeeding.
[b] Local data drawn from data tables available here.

In Gloucestershire, the Local Maternity & Neonatal System (LMNS) purchased 500 premium licences of a breastfeeding support app to use in more disadvantaged county districts, specifically Gloucester and the Forest of Dean[c].

The Forest of Dean is a district to the far west of the county, incorporating towns such as Newent, Cinderford and Lydney. The city of Gloucester and the surrounding parts of this district are located centre-west of the county. See Figure 2 for a map of the county. Health Innovation West of England agreed to conduct a real-world evaluation as part of their commission from the Office for Life Sciences.

Figure 2. Map of Gloucestershire county.
Credit: OpenStreet Map made available under the Open Database Licence.

The intervention

The LMNS purchased 500 licences for Anya. The app is created by LatchAid Ltd. and this provides scalable education, support, and communities, on a 24/7 basis. The app content covers topics antenatally and postnatally, across the critical 1,001 days to support babies and families, whilst tailoring content to support tackling health inequalities.

[c] Of the six districts in Gloucestershire, Gloucester (138) and Forest of Dean (143) rank the most deprived and Stroud (279) the least deprived on the rank of average rank for IMD. See File 10.

The premium version of the app provides the following features to users:

- 3D interactive technology to help mothers learn breastfeeding skills.
- AI-powered virtual companion, leveraging AI and one-to-one healthcare specialist support, to provide personalised expertise and companionship 24/7.
- Tailored antenatal and postnatal contents (articles, videos, expert webinars), digital programmes, and virtual specialist drop-ins.
- Virtual peer-support communities.

A free version of the app is available to download from app stores. This version has limited content and services:

- Only one 3D animation is available.
- AI interactions limited to five per day.
- One-to-one specialist support is not available.
- Digital programmes and app content is limited.

A non-standard implementation approach was adopted for this evaluation, as explained in the implementation section below. With a standard implementation, the app is available to all parents across a care delivery system. This uses a population-based (as opposed to licence-based) implementation model, allowing a straightforward approach which is easy for HCPs to adopt. Through this approach, HCPs are not required to assess each parent's need; rather they are encouraged to signpost every parent, reducing the burden and time taken for decision making. Anya provides flyers, stickers, and digital signposting materials to help conversations with parents. With a standard implementation, refresher training sessions are offered on a regular basis to ensure staff are aware of the latest features and content, ensuring maximum engagement in the app.

Terminology

In this report, we avoid using the terms "mothers" or "patients" as these terms can convey a multitude of meanings for people. For the sake of clarity and consistency we will use terms such as "women" or "birthing people" to refer to those who have had babies and are the target audience of the Anya app.

Evaluation aims

This evaluation observed the implementation of Anya in two social-economically deprived areas of Gloucestershire, specifically, the Forest of Dean and Gloucester City.

The evaluation aimed to understand the impact of the implementation on breastfeeding outcomes, NHS staff and health resource use. The evaluation sought insights into the experiences of healthcare professionals involved in implementing the delivery of Anya with recent birthing people.

Evaluation objectives

The evaluation aims were broken into four objectives, framed as questions:

1. What can we learn from healthcare staff about breastfeeding support and technology that can be applied to support the implementation of Anya?[d]
2. Does the introduction of Anya to women who have recently given birth in socio-economic deprived areas support them to achieve better breastfeeding outcomes and experiences?
3. What is the impact of implementing Anya on Health Visitors, Midwives and service utilisation?
4. Is Anya considered an acceptable breastfeeding support tool by women who have recently given birth, Health Visitors and Midwives?

2. Methods

Overall design

This was a mixed methods evaluation, which included quantitative analysis of routine health and survey data, plus qualitative analysis of staff interviews and surveys.

The observational design included descriptive and inferential statistics. To assess the impact of Anya on breastfeeding outcomes we compared outcomes for birthing people and babies in the intervention period (1st October 2023 to 31st July 2024[e]) with outcomes for birthing people and babies from the same postcode areas in the previous year (1st October 2022 to 31st July 2023).

Data collection

We used five sources of data in this evaluation:

[d] This first objective was achieved and published as a report in January 2024. No further reference will be made to this objective in the present report.

[e] Staff were asked to stop referring into the evaluation from 5th August 2024. However, to facilitate data analysis, we used data from 1st October 2023 to 31st July 2024 and describe this as the intervention period.

1. Survey data from (potential) Anya users, to measure self-reported impacts of Anya on breastfeeding.
2. NHS data from business intelligence to measure the uptake of Anya, the impact on feeding status of the women offered Anya compared to women in the previous year and their location.
3. User data from Anya to measure use and engagement with the app.
4. Survey data from NHS staff to measure staff experience and opinion of the app.
5. Interview data from NHS staff to understand the staff experience and process of implementation in more detail.

A data protection impact assessment was completed and where appropriate, data sharing agreements were set up to facilitate sharing of information. We registered the evaluation with the Research & Development departments at both Gloucestershire Health & Care NHS Foundation Trust (GHC) and Gloucestershire Hospitals NHS Foundation Trust (GHT).

As this was an evaluation, no research ethics approval was required. However, we followed ethical principles throughout the evaluation including receiving informed consent via a secure online form from participating Anya users and NHS staff.

Implementation of Anya

Prior to the app's implementation, the project team delivered a series of training events to Community Midwives and Health Visitors in the Forest of Dean and Gloucester City teams. The training sought to make staff aware of the Anya app, the planned implementation and how Community Midwives should record introduction of the app on the electronic notes platform, BadgerNet.

The Health Visiting team delivered a text message to all pregnant women in the intervention areas at antenatal week 26. The Community Midwives were asked to use their antenatal appointments at week 28 to introduce Anya and signpost to it using promotional material. The appointment at week 28 was chosen because this was typically used to discuss feeding options for the baby. Women were made aware by staff that they could have free access to the premium version of Anya by registering with their postcode. Postcodes in the Forest of Dean and Gloucester City areas were linked to an automatic upgrade to the premium version[f].

[f] The following postcode sectors were eligible for a free premium upgrade: GL1 1, GL1 2, GL1 3, GL1 4, GL1 5, GL1 9, GL14 1, GL14 2, GL14 3, GL14 9, GL15 4, GL15 5, GL15 6, GL15 9, GL16 7, GL16 8, GL16 9, GL17 0, GL17 1, GL17 9, GL18 1, GL18 2, GL19 3, GL19 4, GL2 0, GL2 2, GL2 3, GL2 4, GL2 5, GL2 6, GL2 7, GL2 8, GL2 9, GL3 1, GL3 2, GL3 3, GL3 4, GL4 0, GL4 3, GL4 4, GL4 5, GL4 6, GL4 7, GL4 8, GL4 9, HR8 1, HR8 2, HR9 7, NP16 7, NP25 4, NP5 4, NP6 6, NP6 7, WR13 6.

Midwives started promoting the Anya app to women on 1st October 2023. We asked Midwives to stop promoting Anya to new women from 5th August 2024, after determining that we were approaching full utilization of the 500 licenses.

Survey data from (potential) Anya users

At antenatal week 28, Community Midwives informed pregnant women about the Anya app. They also introduced the evaluation survey to women. They recorded on BadgerNet[g] whether women consented to being contacted by the evaluation team. The women's data was sent securely to the evaluation team by business intelligence on a regular basis.

The evaluation team contacted women and introduced themselves. We sent women an information sheet and screened women according to the evaluation inclusion and exclusion criteria (see Table 1, Appendix 1). Women gave their written informed consent to participate, primarily electronically.

A week before the woman's due date we contacted them to identify if they had delivered their baby. We continued this weekly until the woman confirmed their baby had arrived. At postnatal Week 1, birthing people were asked to complete a survey, either over the phone or on a secure web portal. We collected demographics, delivery method and breastfeeding data, how birthing people heard about Anya, their use and intention to use Anya, and the Breastfeeding Self-Efficacy Scale Short-Form[8]. If the participant did not complete the week 1 survey, we still attempted to collect data from the week 6-8 survey.

Between postnatal weeks 6-8, we contacted participants and completed a further survey. This established current breastfeeding status, use and intention to use Anya, the Breastfeeding Self-Efficacy Scale Short Form, and two questions rating the extent that Anya improved their confidence to breastfeed, and parent, based on a four-point Likert scale (from 'no difference' to 'major difference'). We asked birthing people open-ended questions, depending on whether they used Anya. This included their use of healthcare services (see Table 2, Appendix 1).

As we were contacting women at a potentially vulnerable time, we had in place a safeguarding protocol. Additionally, we followed a process of contacting the health visiting service to identify if there were any concerns we needed to be aware of, prior to contacting birthing people for follow-up surveys.

[g] The implementation of Anya was recorded in a specific area of BadgerNet. Familiarisation and information sheets were provided to staff to support them to navigate this.

NHS data from business intelligence

Care for birthing women in Gloucestershire is provided across two NHS Trusts. GHT provides maternity care including antenatal and postnatal appointments with a Community Midwife. GHC provides the universal health visiting service undertaken by a Health Visitor through antenatal and postnatal appointments. We worked with both NHS Trusts to obtain anonymised data which we were able to match using a scrambled NHS number. The evaluation team did not have access to the two unique codes that scrambled the women and babies' NHS numbers, thus ensuring anonymity. Those who had signed up to the National Data Opt-Out were not included in the data we received.

Data from GHT focused on the implementation of Anya, specifically whether:

- the Midwife told the woman about Anya;
- the woman agreed to sign up for Anya.

Data from GHC provided breastfeeding outcome data alongside the location (as measured by the LSOA[h]) associated with each baby. Specifically, we were provided with data on:

- How the baby was fed at 2 weeks and 6-8 weeks
- The LSOA associated with each baby.

Using data from the Ministry for Housing, Communities and Local Government and the Welsh Government's Stats Wales, we mapped the LSOA against the index for multiple deprivation. This enabled us to identify the deprivation decile for each baby.

For both GHC and GHT, the focus of the data search was on those women and babies living in postcode sectors outlined earlier in the report where Anya was available. The data periods we extracted covered three time periods, shown in Figure 3:

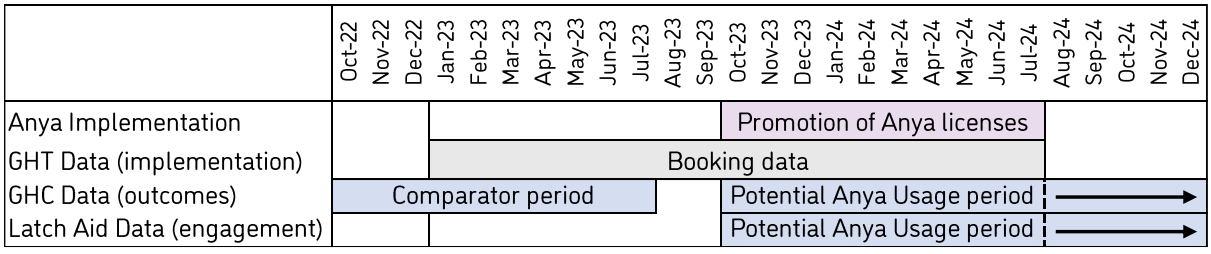

Figure 3: Data periods for the three routine data sources used.

[h] LSOA is an abbreviation of Lower Layer Super Output Area. According to the Office for National Statistics, each LSOA contains between 1,000-3,000 people.

For GHT, we were interested in understanding the sign-up rate to Anya between the period 1st October 2023 to 31st July 2024. This is the period when Anya was offered to women. The end point was chosen as July 2024 as the last whole month of the intervention period before Midwives stopped offering women the Anya app.

Given that some women would have been told about Anya at a time point beyond 28 weeks pregnancy, we obtained data from GHT for the period 1st January 2023 to 31st July 2024. This allowed a nine-month period between January and the start of the implementation in October.

For GHC, to measure breastfeeding outcomes, we collected data over a slightly longer period (referred to in Figure 3 as "Potential Anya usage period"), split into two data sets:

- 1st October 2023 to 31st July 2024 (same as intervention period).
- 1st August 2024 to 22nd December 2024 (five months[i] after the intervention period).

We also chose a comparator[j] period (n=2343) a year prior to the intervention period: 1st October 2022 to 31st July 2023. To avoid any cross-over with the intervention period, we did not extend to the date 22nd December 2023.

User data from LatchAid Limited

We requested app data from LatchAid Ltd. on how the app was used in Gloucestershire. As shown in Figure 3 we collected this for the 'potential Anya usage period'. This data was broken down into the two periods described above, namely 1st October 2023 to 31st July 2024; and 1st August 2024 to 22nd December 2024.

We sought the following data points:

- Quick Response (QR) clicks broken down by time/date.
- Sign-ups broken down by month and council area.
- Age grouping of Anya user.
- Deprivation decile.
- District the user resides in.
- Number of times Anya is used vs. pregnancy week.
- Number of times Anya is used vs. postnatal week.

[i] The additional five months reflects the time-lag in capturing breastfeeding outcomes following the period when Anya is introduced at Week 28 (in the period Oct 2023-July 2024), through to birth and up to 8 weeks of feeding postnatally.

[j] In this comparison period, the intervention was not used. This can then be contrasted with the intervention period to estimate the effect of the intervention.

- Number of times Anya is used vs. hour of day.
- Average session length vs. postnatal week.

It is important to note that the user data from Anya did not have a user identifier. Consequently, we were unable to calculate individual user statistics (such as time or sessions per user); we were limited to calculating engagement figures on the cohort of users as a whole, disaggregated by age, deprivation, month and area.[k]

We also sought usage data for the users of Anya who had consented to the evaluation. With their explicit consent, we passed on limited personal data to Anya so that we could identify their usage data on the following data points:

- Number of times Anya is used vs. pregnancy week.
- Number of times Anya is used vs. postnatal week.
- Number of times Anya is used vs. hour of day.
- Average session length vs. postnatal week.

Survey data from NHS staff

We surveyed maternity and health visiting staff from GHT and GHC, with a focus on Community Midwives, Community Feeding Support staff and Health Visitors. The survey was distributed to staff via LMNS clinical leads. The survey was available from 9th September 2024. It was originally intended to run for four weeks. However, due to low response rates, it was extended and finally closed on 6th November 2024; a total of 59 days. Staff could complete the survey anonymously but had the option to leave their details if they wanted to participate in an interview. The survey covered the following datapoints:

- Demographics.
- Anya training.
- Number of women that staff discussed the app with.
- Factors involved in discussing the app.
- Factors involved in not recording the introduction of the app.
- Estimated ease of introducing Anya.
- Estimated confidence supporting women to use Anya.
- Challenges introducing the app.
- Common patterns identified in those using the app.
- The impact of the app, along with specific factors.

[k] Fifteen out of the 1037 data points of Anya use had exactly the same duration for the same user. (e.g. one user's average session use was 19.77 seconds on two occasions). We have presumed that this is co-incidence rather than duplicate data and retained these in the analysis. In any case, this did not materially impact the overall findings.

- Assessment of benefits and harm of the app.
- Impact of the app on staff workload.
- Impact of Anya on help-seeking.

Interview data from NHS staff

We recruited a small number of NHS staff to participate in interviews with members of the evaluation team. In particular, we focused on recruiting Community Midwives and Health Visitors as these were the key staff involved in the implementation of Anya. Introductions between participants and the evaluation team were facilitated by NHS stakeholders from the Anya evaluation. Recruitment began in October 2024 and was due to close in December 2024. However, it was extended into January 2025 due to low recruitment figures.

Participants were given an information sheet and consented prior to interview. Evaluation staff followed a semi-structured interview schedule based on the evaluation objectives. Interviews were conducted using Microsoft Teams and were recorded and transcribed by this software. Evaluation staff ensured the data was quality checked and de-identified prior to analysis.

Data analysis

Quantitative data was analysed using Excel and SPSS version 30. Where inferential statistics were undertaken, the underpinning assumptions of these tests were followed. The provisional findings went through an internal quality assurance check. We carried out the following data analysis:

Qualitative data

Qualitative data from survey open-ended questions was analysed using a thematic-based approach where data was compared and contrasted in order to identify similarities and differences. Frequently, there was limited open-ended data thus a formal process of analysis could not be followed. The data was grouped into similar categories to generate insights. A formal process was followed in the analysis of staff interviews. Evaluation staff used Braun & Clarke's[9] thematic analysis approach and followed an agreed analysis plan.

Breakdown of births vs. deprivation data

To help us understand deprivation, we set out the normative population parameters for the Forest of Dean and Gloucester. Using data from the Office for National Statistics[10,11] we calculated the average number of births over a three-year period. We used the mid-year data for three years (1st July 2019 – 30th June 2022) and calculated average births per decile based on the 2019 Index of Multiple Deprivation data.

How Anya was used

We analysed hospital data to identify up-take rates of Anya among eligible women. There was a total of 3267 women in the hospital data between January 2023 and July 2024. To assess the number of eligible women (who gave birth between 1st October 2023 to 22nd December 2024), we cross-referenced the hospital data with data from GHC. This revealed that there were 2614 women linked to births in the period 1st October 2023 to 22nd December 2024.

We linked this to location data to establish the area's deprivation where individual women lived. We analysed user data from Anya to assess engagement and use. This included the number of sessions, session duration and time of access. We analysed referrals into the evaluation. We undertook a value for money analysis drawing on licensing costs from Anya. All statistics were descriptive.

Breastfeeding outcomes (objective 2)

We analysed system data from GHC and GHT for this objective. We looked at the outcomes of whether babies were breastfed at 2 and 6-8 weeks. We compared these outcomes in the intervention period (when women had access to Anya) with the comparator period from one year before.

We carried out a Chi-squared test to assess for differences in breastfeeding rates between the two periods. We also carried out a sub-group analysis by IMD to see if there was differential variation at different levels of deprivation. To explore the relationship between breastfeeding confidence and how long Anya was used, we undertook a Spearman's Rho correlation.

Survey data was analysed using descriptive statistics.

Impact on staff (objective 3) and acceptability (objective 4)

We used the staff survey, staff interviews and the survey of (potential) Anya users to answer these objectives. The analysis was descriptive. Qualitative data was analysed using the approach described above.

3. Results

Results are reported in this section by evaluation objective. Figure 4 offers a summary of the number of participants / data points that we analysed under each data source. Table 3 (Appendix 1) offers the key demographics for those in the (potential) Anya user survey and the staff survey. Demographics from the interview of staff are contained in the report available in the appendix.

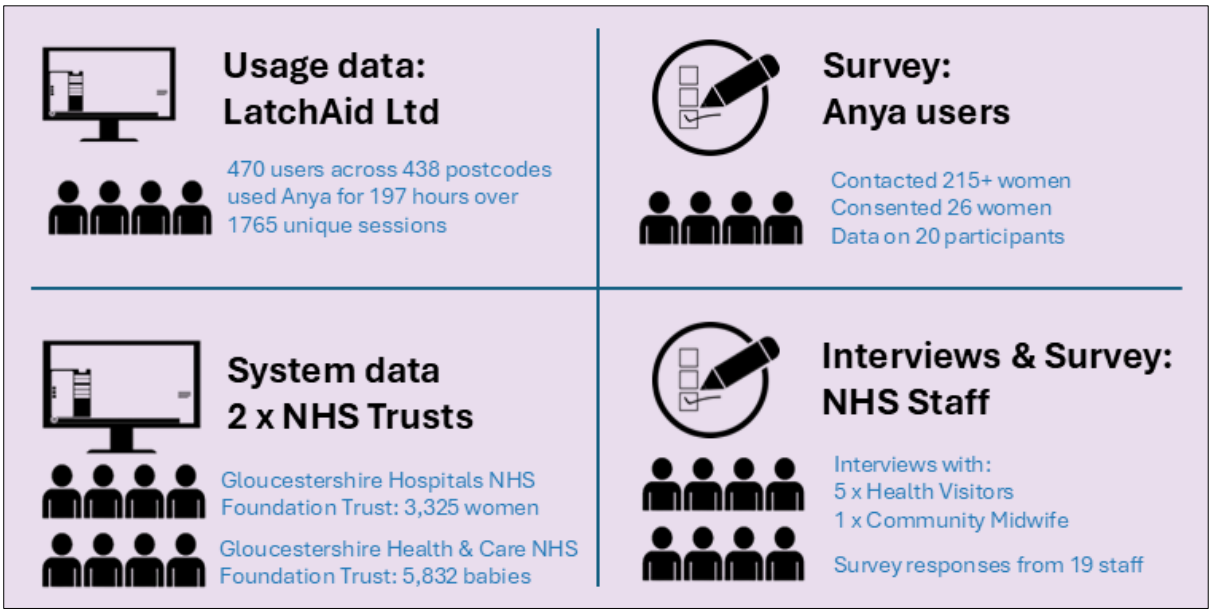

Figure 4. Infographic showing data sources.

Breakdown of births vs. deprivation data

Using the mid-year data for three years (1st July 2019 – 30th June 2022) Figure 5 shows how average births vary across IMDs between the two districts. The Forest of Dean had few, if any births in the two most and two least deprived deciles. Most of the birthing population in this district clusters around the middle 3 deciles. Gloucester district, in contrast, had a relatively large number of births in the two most deprived deciles. Table 4 shows the percentage of births over the three-year period broken down into amalgamated IMD groups.

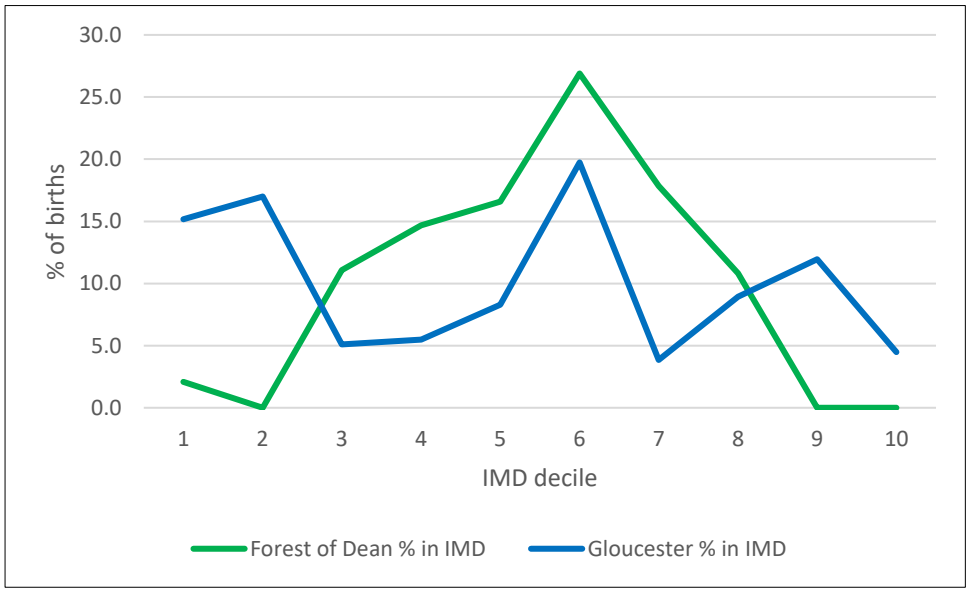

Figure 5. Average percentage of births per IMD in Forest of Dean & Gloucester (2019-2022)

IMD	% of births in IMD groups	
	Forest of Dean	Gloucester
1-3	13.2	37.3
4-7	76.0	37.4
8-10	10.8	25.4

Table 4. Percentage of births in IMD groups per district.

How was Anya used?

Overall take-up

Anya was first offered to Gloucestershire women in October 2023. Figure 6 shows the cumulative number of sign-ups to Anya along with individual months. Between October 2023 and July 2024, the total number of sign-ups was 472 and the mean number of monthly sign-ups was 47. By July 2024, the 500 purchased licenses were nearly used up and we therefore stopped recruiting women into the evaluation.[l] Usage data between 1st October 2023 and 22nd December 2024 is based on a total of 470 users with 438 unique postcodes in the dataset.

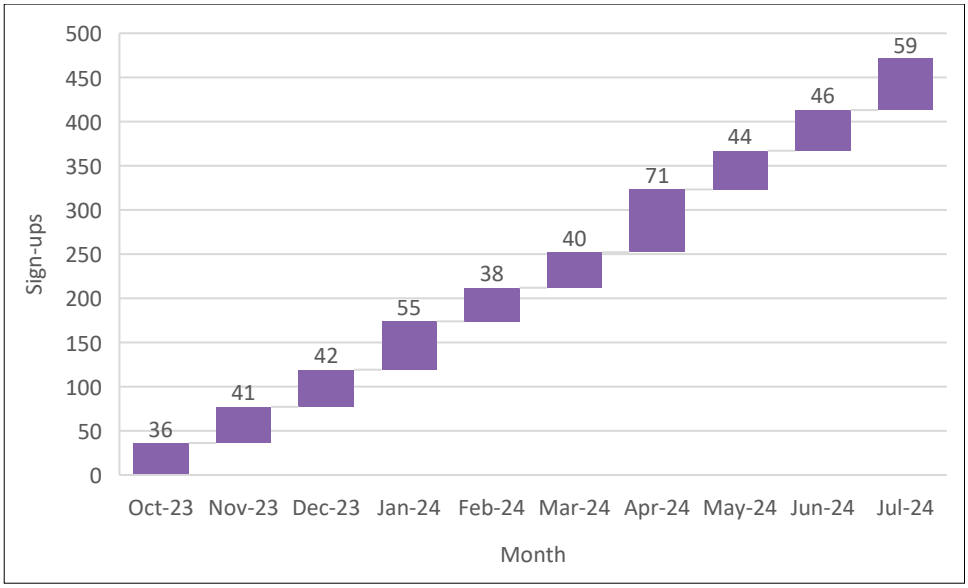

Figure 6. Chart showing the cumulative number of sign-ups to Anya.

Hospital data shows that between October 2023 and July 2024, Midwives recorded telling 20.8% (n=545) of women about Anya. Of those that were told about Anya, 92.5% (n=504) were recorded as having agreed to sign up to Anya.

[l] Further arrangements were made to purchase an additional 500 licenses for a total of £9,960. By December 2024, 671 people had signed up to use the app.

The evaluation team received the names of 222 women who had accepted Anya and had agreed to find out more about the evaluation. The team were also sent the names of the referring Midwives. Although this data is not strictly implementation data, it acts as a proxy to inform how many Midwives were engaged in the implementation of Anya. Figure 7 shows most referrals came from Gloucester-based teams (n=210).

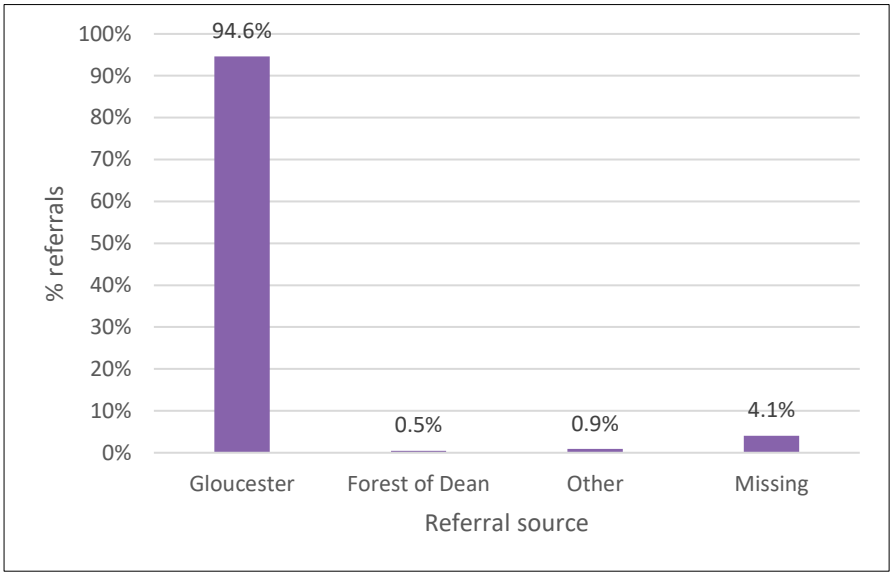

Figure 7. Referral source for women agreeing to be referred to the evaluation.

A total of 24 Community Midwives made referrals to the evaluation team. Of these 24 Midwives, the number of referrals ranged from 1 to 36, with the mean number of referrals, 9.25. This represents a high proportion of the total Midwives; see Table 5.

Month	Forest of Dean	Gloucester City	Total
October 2023	12	19	31
July 2024	13	22	35

Table 5. Number of Community Midwives per district at start and end of Anya's implementation.

Using the linked data, we established location data for 479 of the 504 women who agreed to sign up. This showed the mean IMD decile was 6.0 among those accepting Anya. Of particular interest is those who were unsure about accepting Anya: their mean IMD was 4.6, which can be contrasted to those who declined Anya whose mean IMD was 5.9. Based on the patient record, no-one from the Forest of Dean declined Anya. Most of the women were from Gloucester City (77.9%, n=373). See Figure 8 for more details.

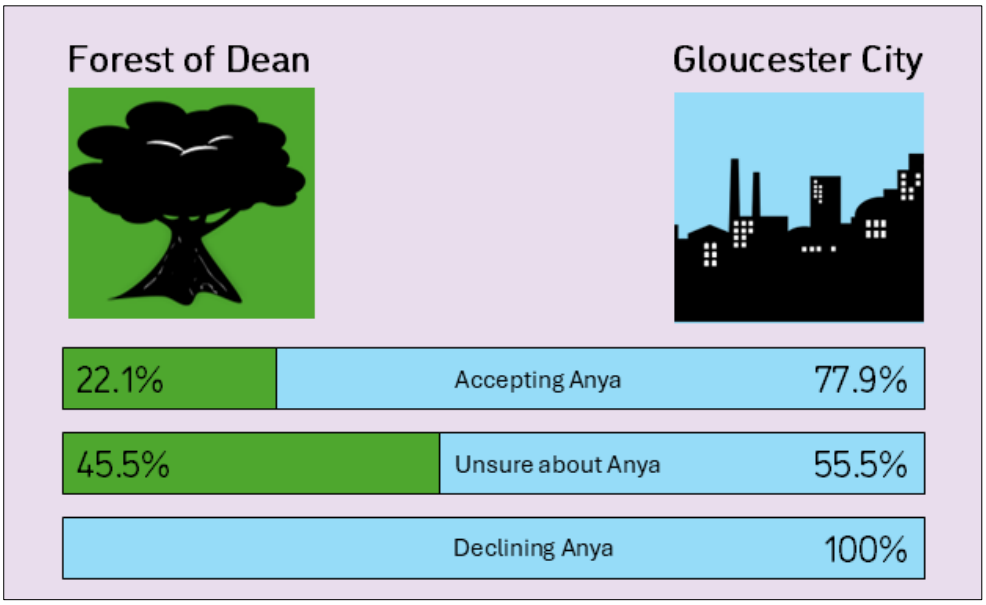

Figure 8. Infographic showing proportion of women accepting Anya per district.

Use by deprivation

Table 6 (Appendix 1) shows the number of women who accepted Anya, broken down by the IMD decile. The data pattern appears to broadly reflect the demographic birthing profile of the areas. This is illustrated in Figures 9 and 10.

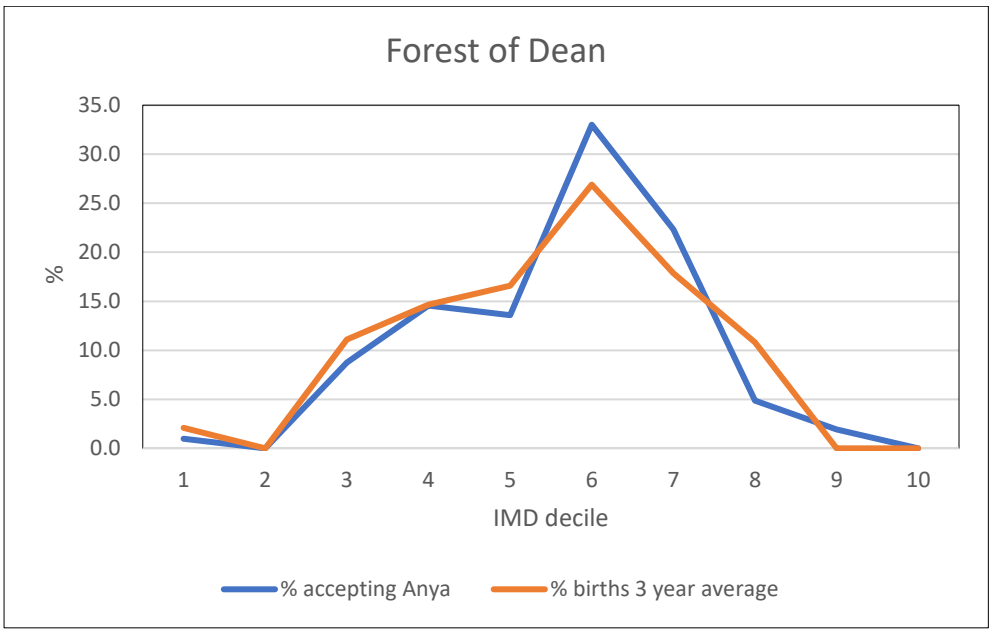

Figure 9. Percentage of women accepting Anya per IMD in the Forest of Dean (including cross-borders[m]) compared with the 3-year average of births in Forest of Dean (excluding cross-borders).

[m] Some birthing people in eligible postcodes live across the English-Welsh border or the Gloucestershire-Herefordshire border but are served by staff from the Forest of Dean teams. We refer to these areas as "cross-borders" areas.

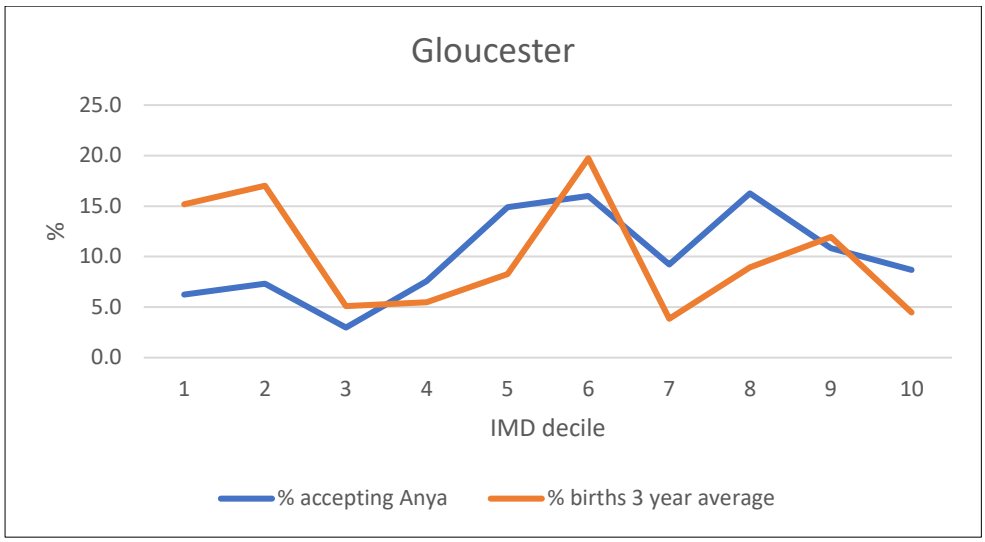

Figure 10. Percentage of women accepting Anya per IMD in Gloucester compared with the 3-year average of births in Gloucester.

Figure 9 shows that the uptake of Anya by IMD in the Forest of Dean broadly follows the expected uptake given the birthing population. In Gloucester, Figure 10 shows there was less take-up than expected in the two lower deciles (more deprived) and higher take-up than expected in the higher deciles 7, 8 and 10 (less deprived).

Engagement with Anya

Anya was used for a total of 197.5 hours across 1,765 unique sessions. The average session duration was 6 minutes 43 seconds. For antenatal use, there were 992 unique sessions for a total of 111.0 hours. For postnatal use, there were 773 unique sessions for a total of 86.4 hours. The most frequent users of Anya were aged 26 to 35 years. See Tables 7 & 8 for more detail.

Age	Forest of Dean (including cross-border)		Gloucester	
	Total time (mins)	Percentage	Total time (mins)	Percentage
18-25 years	372.9	**12.6%**	1285.3	**14.5%**
26-30 years	1137.4	**38.5%**	3545.2	**39.9%**
31-35 years	876.1	**29.7%**	3230.9	**36.3%**
36-40 years	403.2	**13.7%**	702.4	**7.9%**
41-45 years	134.9	**4.6%**	132.4	**1.5%**
46 years plus	26.7	**0.9%**	0	**0%**
Total	2951.1	**100.0%**	8896.1	**100.0%**

Table 7. Total time of sessions and percentage of time used, broken down by age groups within district.

IMD	Forest of Dean (including cross-borders)				Gloucester			
	Antenatal		Postnatal		Antenatal		Postnatal	
	Total time (mins)	%	Total time (mins)	%	Total time (mins)	%	Total time (mins)	%
1-3	97.7	6.2%	44.3	3.2%	1185.9	23.3%	311.1	8.2
4-7	998.5	63.5%	1159.7	84.1%	1993.2	39.2%	1824.9	48.0
8-10	475.6	30.3%	175.4	12.7%	1911.3	37.6%	1669.7	43.9
Total	1571.9	100.0%	1379.3	100.0%	5090.4	100.0%	3805.7	100.0%

Table 8. Percentage of session duration within IMD grouping across district.

Figures 11 and 12 shows how long Anya was used across all users. There was an initial burst of use at Week 28 (when Anya was introduced); from Week 36 to Week 39 there is a steady increase in use. Finally, the peak use comes at Week 0, when the baby is born.

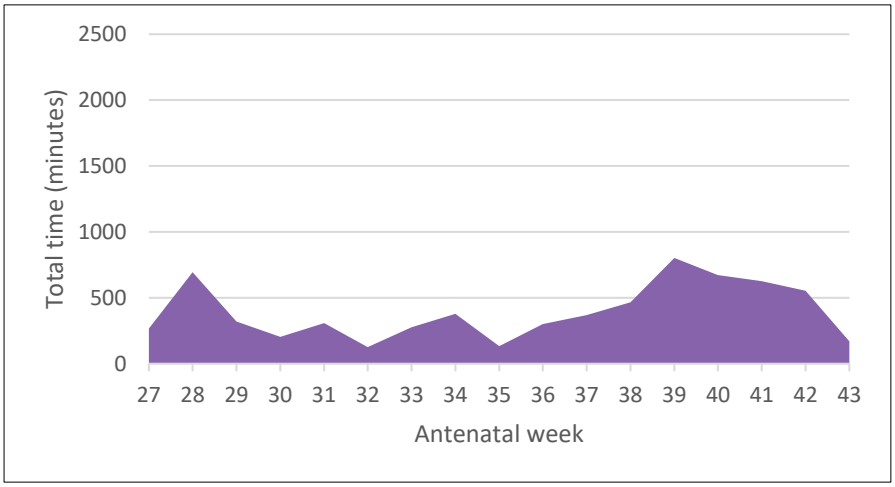

Figure 11. Graph showing how long Anya was used (minutes) per antenatal week.

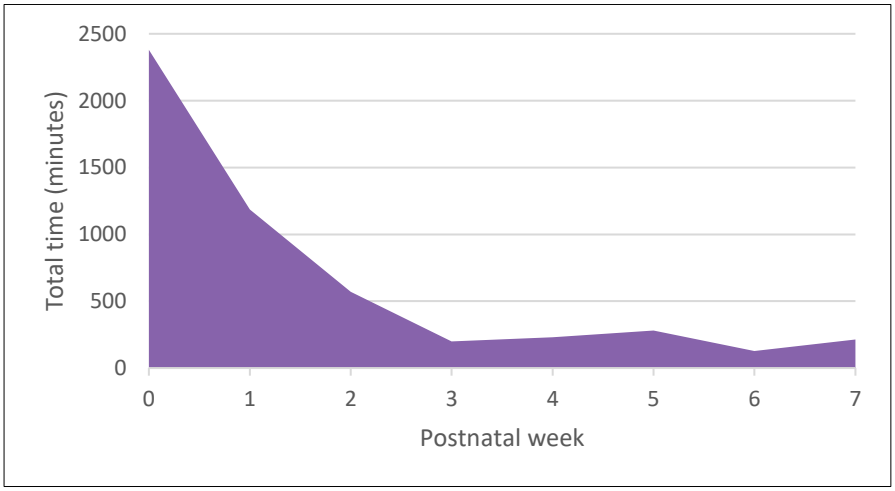

Figure 12. Graph showing how long Anya was used (minutes) per postnatal week.

Time of day Anya was used

With respect to the time of day that Anya was used postnatally, Figure 13 shows that the most frequent time period was in the afternoon between 12:00 and 17:59. The least frequent time period was in the early hours of the morning (00:00-05:59).

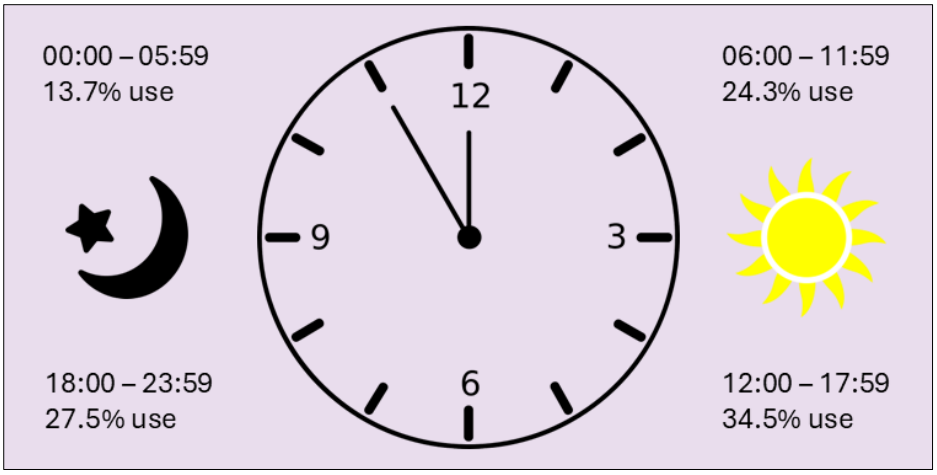

Figure 13. Infographic showing when Anya was used postnatally.

We wanted to understand whether Anya is a resource that women can access outside of core office hours. As Table 9 shows, Anya was used out of office hours 57% of the time. This supports the availability of Anya as a resource that women can access when staff are not available.

Time	09.00-16.59	17.00-08.59
Hours	358	476
Percentage	42.9%	57.1%

Table 9. Table showing postnatal use of Anya broken down into office hours.

Value for money of Anya based on usage

Whilst this evaluation did not set out to offer a health economics analysis, the engagement statistics enable a simple analysis of value for money based on the cost per session used[n] and per hour used[o]. There was a total of 1,765 unique sessions over a total of 197.5 hours. The first 500 licenses cost £10,000 with a subsequent 500 licences purchased for £9,960. As there were 671 sign-ups, the total cost for these licences was £13,406.32. This equates to a cost of £7.60 per session or £67.90 per hour of support used.[p]

[n] We do not have access to individual user engagement, so this is based on aggregated data.
[o] Since this procurement, Anya has changed their licensing model to a population-based approach.
[p] Given many instances of Anya use were under one minute, we checked that short instances did not distort the data in the cost analysis. Excluding use under 60 seconds resulted in a cost of £8.45 per session or £68.45 per hour of support used; similar to the data above.

This data is intended to be indicative rather than offering a conclusive analysis of the cost of Anya in relation to its actual use in Gloucestershire.

Survey participants

With respect to the 20 survey participants, data from LatchAid Ltd. showed:

- Nine of the 20 participants used the app antenatally; the mean duration was 25.3 minutes.
- Twelve participants used it postnatally for a mean duration of 35.0 minutes.
- Five participants used it both antenatally and postnatally, whilst four participants did not use the app at all.
- In total, 16 participants used the app during 90 unique sessions for a mean number of 5.6 sessions and a total mean time of 40.5 minutes.

Objective 2: Does the introduction of Anya to women who have recently given birth in socio-economic deprived areas support them to achieve better breastfeeding outcomes and experiences?

Breastfeeding rates

A total of 3,489 babies were born between 01/10/2023 and 22/12/2024 in the intervention areas. Of these, 70.3% were from Gloucester (n=2,453) and 28.0% were from Forest of Dean (n=976). The remaining babies were born in a different Gloucestershire district (0.6%), out of county (0.1%) or location data was missing (1.1%).

Table 10 shows the feeding outcomes for babies in Forest of Dean and Gloucester. This shows that babies in the Forest of Dean had a slightly higher rate of exclusive breastfeeding at both 2 weeks and 6-8 weeks.

To facilitate analysis, we combined the categories of feeding to:

- Bottle fed / parenteral nutrition (no breastfeeding)
- Breastfed / breastfed with supplemental feed (any breastfeeding).

We compared data from the first intervention period (1/10/23-31/7/24) with a comparator period (1/10/22-31/7/23) and looked at differences in feeding rates: see Figure 14.

Feeding status	Forest of Dean (and cross-borders) % (n)	Gloucester % (n)
Bottle fed: 2 weeks	33.5% (314)	32.3% (773)
Bottle fed: 6-8 weeks	45.0% (392)	44.5% (984)
Breast & Supplement fed: 2 weeks	20.7% (194)	23.3% (558)
Breast & Supplement fed: 6-8 weeks	17.8% (155)	19.0% (421)
Breastfed: 2 weeks	45.1% (423)	43.7% (1,045)
Breastfed: 6-8 weeks	36.6% (319)	36.1% (798)
Parenteral nutrition: 2 weeks[q]	0.6% (6)	0.6% (14)
Parenteral nutrition: 6-8 weeks	0.6% (5)	0.3% (7)

Table 10. Feeding data for period 01/10/23 to 22/12/24.

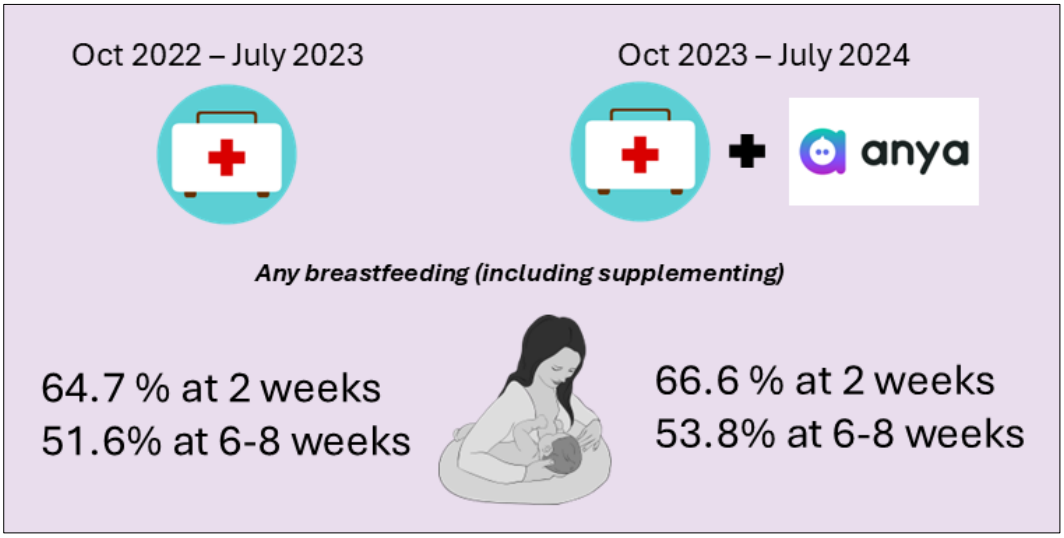

Figure 14. Infographic showing changes in feeding across time periods.

We found the number of birthing people feeding their baby any breastmilk in the intervention period was 1.9% higher at 2 weeks and 2.2% higher at 6-8 weeks. This was not statistically significant at either 2 weeks ($p>0.05$) or 6-8 weeks ($p>0.05$). The statistics test undertaken was Chi-squared.

We took a granular approach to the data analysis, breaking down the data by IMD deciles, 1-3 (most deprived), 4-7 (middle), 8-10 (least deprived). We found that in deciles 4-7, there was minimal difference (-0.2% at 2 weeks, -0.1% at 6-8 weeks) between the comparator and intervention period. In deciles 8-10, there were 2.7% difference in any breastfeeding rates at

[q] Parenteral nutrition refers to feeds that bypass the digestive system and are delivered into the blood stream (Great Ormand Street Hospital).

2 weeks (66.8% vs. 69.5%), but this was not statistically significant (p=0.33). Neither was the 2.8% difference at 6-8 weeks significant (p=0.33).

However, in the most deprived areas, deciles 1-3, more women gave their baby any breastmilk compared to the comparator group. At 2 weeks, this was 5.9% higher than the comparator period. Although this was not significant, it approached statistical significance (p=0.06). At 6-8 weeks, this difference was 6.8% higher in the intervention period and this was statistically significant (p=0.037).

Breastfeeding rates at weeks 6-8 in the most deprived areas of Gloucester were significantly higher after the introduction of Anya than before. See Table 11 (Appendix 1) for full details.

Given there are low numbers of women in IMD 1-3 in the Forest of Dean (see Figures 9 & 10), it is likely this effect was largely due to women in Gloucester. A chi-squared test was undertaken comparing any breastfeeding vs. no breastfeeding rates between the comparator and the intervention periods. This showed:

- No significant difference in the Forest of Dean at 2 weeks (p>0.05).
- No significant difference in the Forest of Dean at 6-8 weeks (p>0.05).
- No significant difference in Gloucester at 2 weeks (p>0.05).
- A significant difference in Gloucester at 6-8 weeks (p=0.029). Breastfeeding rates increased in deciles 1-3 from 49.1% (n=182) to 56.8% (n=237).

Breastfeeding confidence and Anya usage

Using the survey of Anya users and LatchAid Ltd. data, we explored the relationship between how long women used Anya and their confidence in breastfeeding, using the Breastfeeding Self-Efficacy Scale (BSES). Participants' confidence in breastfeeding increased over time as one might expect with practice; one week after birth, the mean score was 46.7 (n=17), whilst at weeks 6-8 the mean score was 50.7 (n=20).

To understand if participants' use of Anya contributed to increasing breastfeeding confidence, we undertook a Spearman's Rho correlation. This assessed the relationship between how long women used Anya and the difference in breastfeeding scores; the hypothesis was that women who used Anya for longer would have greater increases in breastfeeding self-efficacy scores.

There was no statistically significant relationship and the strength of the relationship was moderate (r=0.50, p=0.68). This remained the case once a single outlier was excluded (r=0.49, p=0.09). However, this was a small sample of self-selecting women. Therefore, the analysis is limited in its ability to speak to the contribution of Anya to breastfeeding confidence.

The women who we surveyed reported that Anya affected their confidence to breastfeed and parent. Six out of twelve respondents said Anya had made a minor difference to their confidence to breastfeed and parent. Meanwhile, five out of twelve respondents said Anya had made a significant difference to both breastfeeding and parenting. See Figures 15 & 16.

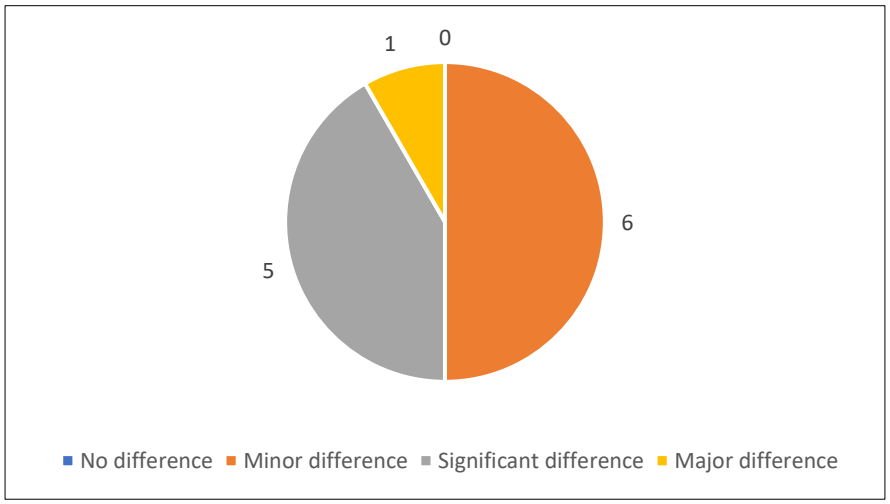

Figure 15. Confidence to breastfeed after using Anya.

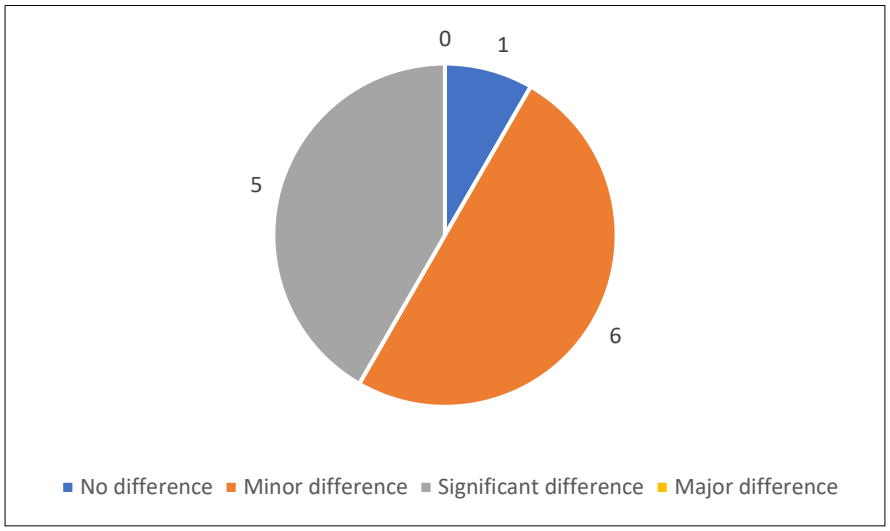

Figure 16. Confidence to parent after using Anya.

Following the intervention, we undertook a staff survey. We asked staff to consider the impact they had observed of Anya on women. The most frequent statements selected were that Anya has helped have (women's) breastfeeding questions answered (n=6), to know how to support their baby to latch (n=5) and worrying less about breastfeeding (n=4). See Table 12.

Thinking about the positive impact, have you observed the app has helped women:	n
worry less about breastfeeding?	4
know how to support their baby to latch?	5
feel more confident to breastfeed?	3
breastfeed their baby longer?	1
to avoid formula feeding?	1
have their questions about breastfeeding answered?	6
engage more with healthcare professionals?	0
or something else?	0

Table 12. Statements selected by staff about the positive impact of Anya.

When asked about the negative impact of Anya, two staff stated the following:

- "Feeling unsupported by face to face healthcare support and being app reliant."
- "Not that keen on the site and did not tell me anything new."

Staff were asked to rate how beneficial Anya has been to women and babies they work with. See Figure 17. Of the 11 who responded, the more frequent score was "beneficial".

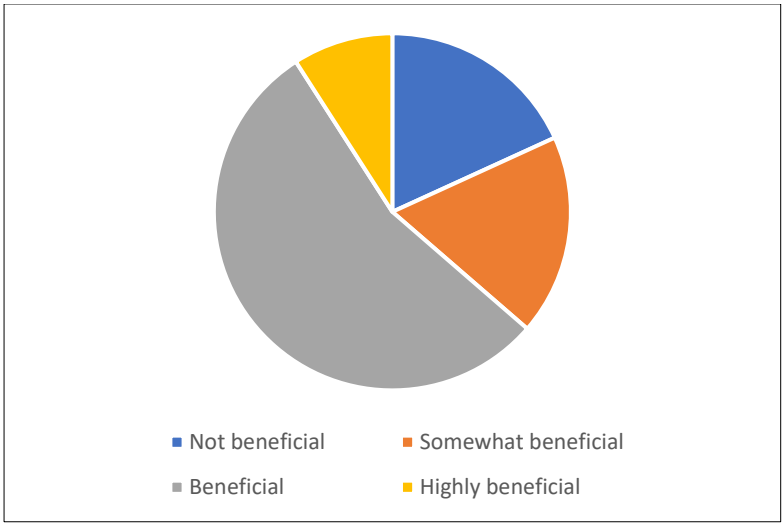

Figure 17. Pie chart showing how staff rated the app's benefit to women and babies.

Qualitative data showed some mixed views regarding the most significant outcome for women and babies that the Anya app had achieved. Of the six staff who responded, two stated they had not observed any benefits, with one of these stating patients preferred face-to-face support. Three staff noted the availability of the resource outside of staff working hours was a benefit.

Summary of data for objective 2

- This objective investigated whether the introduction of Anya to women who have recently given birth in socio-economic deprived areas supported them to achieve better breastfeeding outcomes and experiences.
- Those who accepted Anya and whose baby received any breastmilk were more likely to come from less deprived areas.
- There were higher breastfeeding rates at 2 weeks and 6-8 weeks but these were not significant. The biggest increase in breastfeeding rates were in the lower IMD deciles and this was statistically significant.
- There was no statistically significant relationship between time using Anya and breastfeeding confidence.
- However, women who used Anya reported Anya had improved their confidence to breastfeed and parent.
- Staff believed Anya helped address women's breastfeeding questions, supported their baby to latch and helped women worry less about breastfeeding.
- Staff largely viewed the app as beneficial.

Objective 3: What is the impact of implementing Anya on Health Visitors, Midwives and service utilisation?

We gathered data regarding the impact of Anya on staff workload using the staff survey, staff interviews (n=6) and the survey of (potential) Anya users. Completion rates of both surveys were low (staff survey n=19 and user survey n=20). The strength of the evidence to support any conclusions around this objective is limited by these small sample sizes. With this caveat in mind, we present the findings.

Impact on workload

We specifically asked about the impact of implementing Anya on staff workload. Fourteen staff responded, with two saying they did not know. See Figure 18. Most staff (n=9) said Anya made no difference to their workload. When asked whether using Anya led to any

disruption or harm, seven responded, with two saying 'no', two saying they were not aware and two stating there was an impact on time:

- "It added to my time with parents".
- "No, just time consuming".

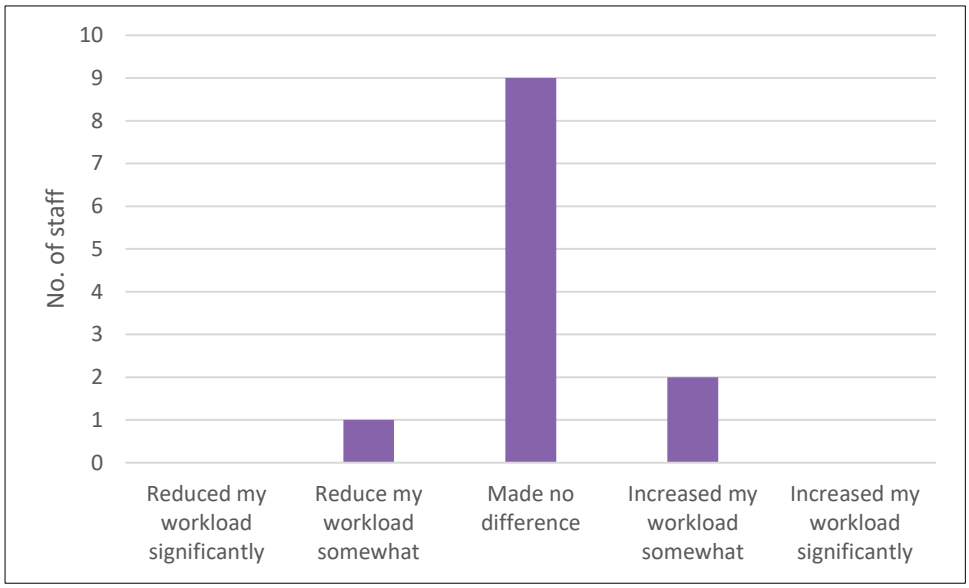

Figure 18. Number of staff members and their views on how Anya impacted their workload.

Data from the staff interviews highlight the large amount of mandatory information staff must provide women with. This can impact the capacity of staff to introduce Anya to every woman and reduces the time staff have to independently learn how to use the app.

- [Health Visitors have] "a hell of a lot to cover".

Interview data indicated staff were selective with the women they introduced Anya to. Participants described the multiple pressures on Community Midwives, including staff shortages, a regulatory inspection at the time of Anya's implementation and a new electronic patient record system (BadgerNet). Some participants did not believe Anya made a positive difference to their workload, with one NHS leader believing that the implementation of Anya added to the workload of operational staff.

Overall, one might conclude that the implementation of Anya came at a pressured time for NHS staff and whilst many respondents did not believe it impacted their workload, there was a time cost for some staff in this implementation.

Impact on service users

We asked staff whether the app had led to an observable impact on the women they work with. Of the 17 respondents, 10 staff had not observed any impact, with five staff reporting a positive impact. See Figure 19.

When asked about the most significant outcome that Anya had achieved, two staff responded saying they had not observed any benefit; one staff member said patients preferred face-to-face support. Meanwhile three staff noted the availability of the app outside of staff working hours was a benefit.

- "It's an additional available resource, but there are many others available too."
- "Out of hours breastfeeding advice."

Interview participants spoke about the specific benefits of Anya. These included the accessibility of Anya due to its visual nature, which may benefit individuals with lower literacy levels. Participants were positive about the choice Anya gives, recognising parents have different priorities and preferences. As a mobile app, Anya was seen as being convenient. Three staff felt Anya had helped them in their work. Two participants believed Anya supported women's breastfeeding confidence.

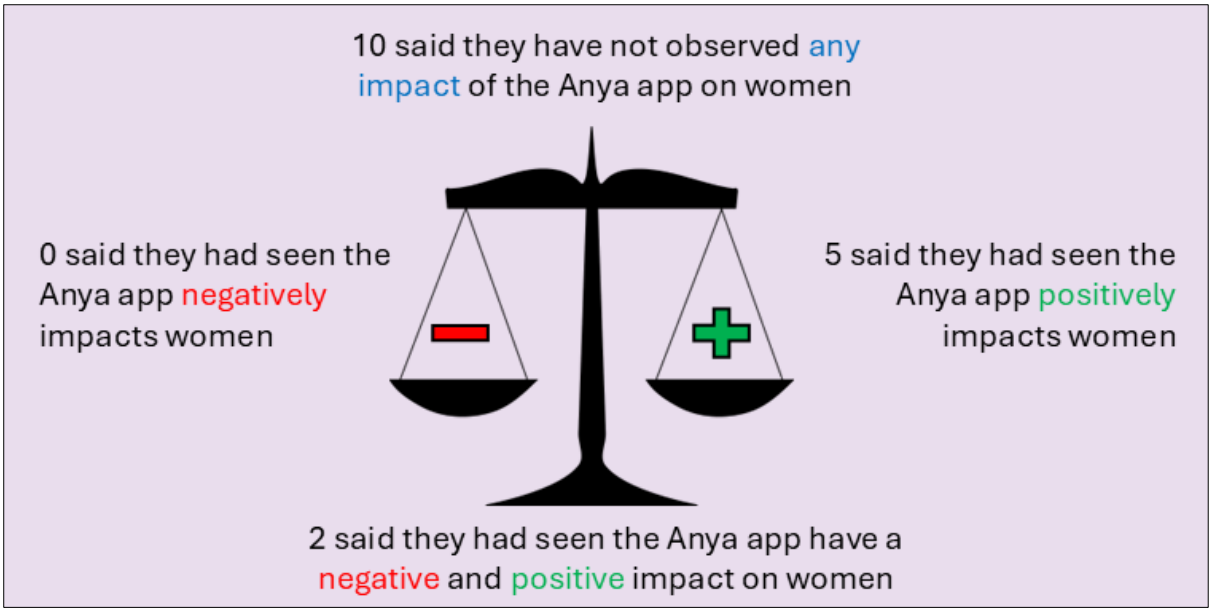

Figure 19. Infographic showing the perceived impact of Anya on women.

On the other hand, participants from staff interviews described the limited benefit of Anya; participants were not sure that Anya reduced patient contacts with staff, affected how women sought support or changed the delivery of postnatal care. This aligns with the survey

data which found that half of fourteen respondents (n=7) did not believe the app made a difference to how staff deliver postnatal care to birthing people. Only one staff interviewee reported negative feedback from a parent who had "given up".

Use of services

Although we collected data on the number of times (potential) Anya users accessed or would have accessed health services, the way this was collected inadvertently allowed participants to write in comments, which resulted in poor data quality. We have therefore not included this data in the present report.

Staff were asked whether following Anya's implementation, women had changed how they sought professional help. Eight out of the 14 respondents agreed there was no difference in how women seek help. One respondent believed women sought help somewhat more, another believed they sought help somewhat less. This is further supported in a separate question that looked at the number of contacts staff had with women. After adjusting for three staff members who did not know, 100% (n=11) said the number of contacts they had with women stayed the same.

Within Gloucestershire, this evaluation was not able to evidence any meaningful reduction in service demand for breastfeeding support through the Anya intervention. Given Anya was implemented without significant pathway changes, there is evidence that Anya's implementation has caused either no change or a minor increase in staff workload.

Summary of data for objective 3

- This objective investigated the impact of implementing Anya on Health Visitors, Midwives and service utilisation.
- Overall, there are limitations in the strength of the evidence to support firm conclusions for this objective.
- Anya appeared to be easy to introduce with staff members usually confident.
- Staff were selective in who to share Anya with.
- There was a system context of low capacity and although most staff in the survey said Anya did not make a difference to their workload, other data sources suggest the implementation of Anya added to staff workload.
- Most staff did not observe Anya having any impact on women, though some staff did note a positive impact of the app.
- It is very unlikely the app led to any patient harm.
- From staff perspectives, it is unlikely Anya reduced service demand.

Objective 4: Is Anya considered an acceptable breastfeeding support tool by women who have recently given birth, Health Visitors and Midwives?

Experiences of (potential) Anya users

Would you use Anya again?

When asked at Week 1, whether they intended to use Anya again, 14 out of 19 women who responded said they would; four out of 19 women said they were unsure (and one declined to answer). At Week 6, this figure halved to seven out of 20 women saying they intended to use Anya. Three out of 20 women said they would not and 10 out of 20 women said they were unsure. This suggests that women saw value in Anya when their baby was born but were more unsure of the app's value several weeks later.

Likes & Dislikes

We asked those who had reported using Anya, what they enjoyed (n=11) and disliked (n=10) about the app; see Figure 20 for a summary. Women reported the app or its features were easy to use (n=5); the app was accessible (n=4), for instance it was reassuring to know it was there; people valued the information available on the app (n=4), including the articles.

> "Handy to have on your phone for help and filled me with confidence."

Six women said there was nothing they disliked about the app. Some women (n=2) reported difficulties using the app, for instance, finding what they wanted. Another woman reported the app's language around there being "simple techniques" to improve her baby's latch, made her feel like a failure. However, when women were asked about whether there were negative consequences of using the app, all (n=8) reported there were none: including the woman who felt a failure given the wording around latching.

> "Quick response from live chat regarding a question I had about expressing."

We also asked women what they found useful (n=12 responded). Five women commented on the support around latching and breastfeeding positions. They liked the interactive nature of the videos. One woman found the personalisation of breast size helpful. Two women specifically commented that they liked the breastfeeding articles. Three women appreciated the availability of the app, with one woman appreciating the fast response from the live chat. Two women liked the ease of use of the app; one liked the AI function; another appreciated the availability of parenting information.

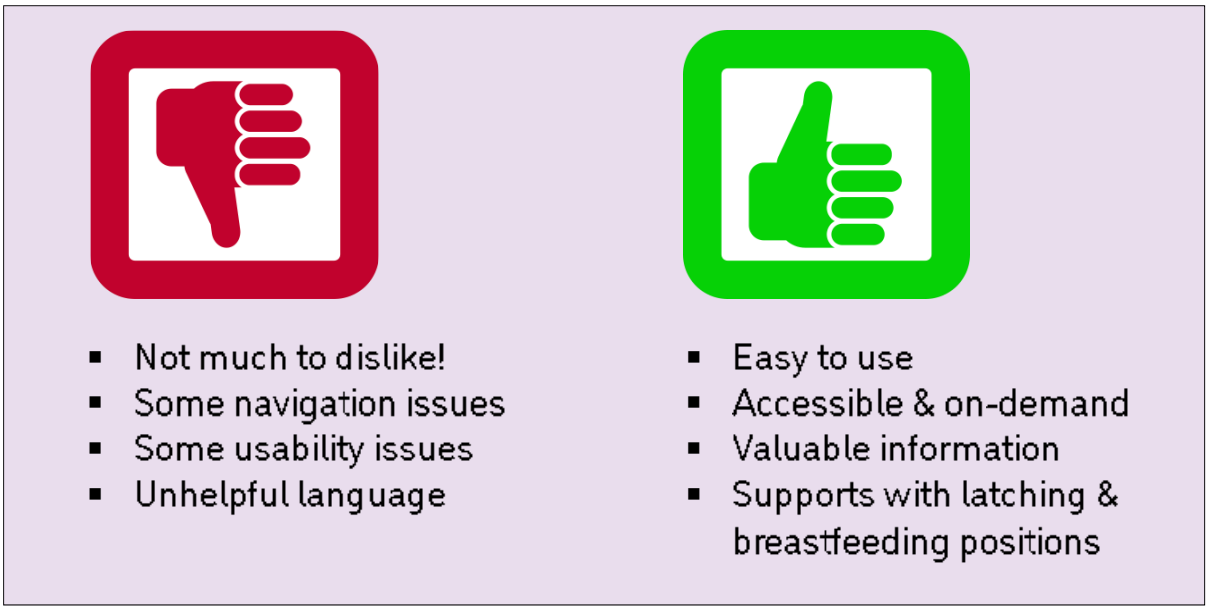

Figure 20. Infographic summarising user feedback.

What put you off using Anya?

We asked participants who stated they had not used Anya, what deterred them from using the app (n=7 responded). Two women preferred to seek help from a human, with a third seeking help from their Midwife because they forgot about the app. One person was put off by the app's questions. Another did not know how to access the app. Finally, one woman lacked the time to use the app given family responsibilities.

> "I wanted to speak to people...when I was struggling rather than an app."

Challenges using Anya

We asked those stating they had used Anya, about the challenges of using the app (n=12 responded). Five did not report experiencing any challenges. Four found navigating the app difficult. For example, the Android version closed the page when swiping instead of navigating back. Another participant found not everything could be accessed, for instance the breastfeeding position videos. Finally, one participant identified they could not skip forwards or backwards in the videos.

There were three other issues highlighted. One was around difficulties receiving notifications, another around accessing the premium version without paying and finally, one woman felt information was missing around how to store breastmilk in the community. These views represent participants' experiences at the time of survey and it is possible that Anya has since updated the app to address these issues.

> “Can be difficult to find exactly what you’re looking for.”

Adverse events

During the recruitment and data collection period, we did not identify any safeguarding concerns. We identified one experience that could be described as an adverse event, relating to baby weight loss. This was judged as unrelated to the participant's use of the Anya app given they had not used the app much.

Staff training experiences[r]

We obtained limited data from the staff survey. Only seven staff responded to the question “did you attend a briefing/training session about Anya”, with five indicating they attended and two stating they did not attend. However, of the five who attended, four of them agreed the training made them “somewhat prepared”, with one agreeing the training made them “fully prepared” to use Anya with women.

Data from interviews indicated that two of the six interviewed did not recall the training. One participant spoke positively about the training, though they reflected it was focused more on the app than using it in practice. Two participants felt disappointed with the training and believed it did not help prepare them to use Anya in practice.

Some staff fed back in the interviews that they needed more time to learn to use the Anya app so they could instil confidence in parents they signposted to Anya. Many interview participants described familiarising themselves with Anya independently, suggesting the training did not directly support this.

Implementing Anya

Hospital data suggests that Anya was not introduced to the majority of women by their Community Midwife and one might therefore question the level of staff engagement in promoting Anya. However, evaluation data of those who accepted Anya, shows that 24 Midwives made referrals, suggesting reasonable levels of staff engagement considering the total number of Midwives across Gloucester and Forest of Dean districts was 31 in October 2023 and 35 in July 2024 (see Table 5).

In the staff survey, four out of five staff responded saying it was easy or very easy to introduce Anya. The remaining staff member who responded said it was somewhat easy. Similarly, three out of five staff were confident or very confident supporting women to use

[r] The training was provided by staff from Health Innovation West of England and LatchAid Ltd.

the Anya app. One staff member was unconfident, another was somewhat confident. This can be compared to interview data where the app was described as easy to use for staff and parents, but also as "clunky" and a "step too far" for tired new parents.

There was evidence from staff interviews that due to work pressures, staff were professionally selective as to who to show Anya to. Staff might prioritise women using criteria such as their feeding difficulties or their interest. Two of the staff that were interviewed described how they could "mop up" postnatal women who had not heard about Anya, suggesting that raising awareness was something they considered within their remit.

Would staff recommend Anya?

Finally, we asked staff whether they would recommend Anya to fellow colleagues and to women they support. See Figure 21.

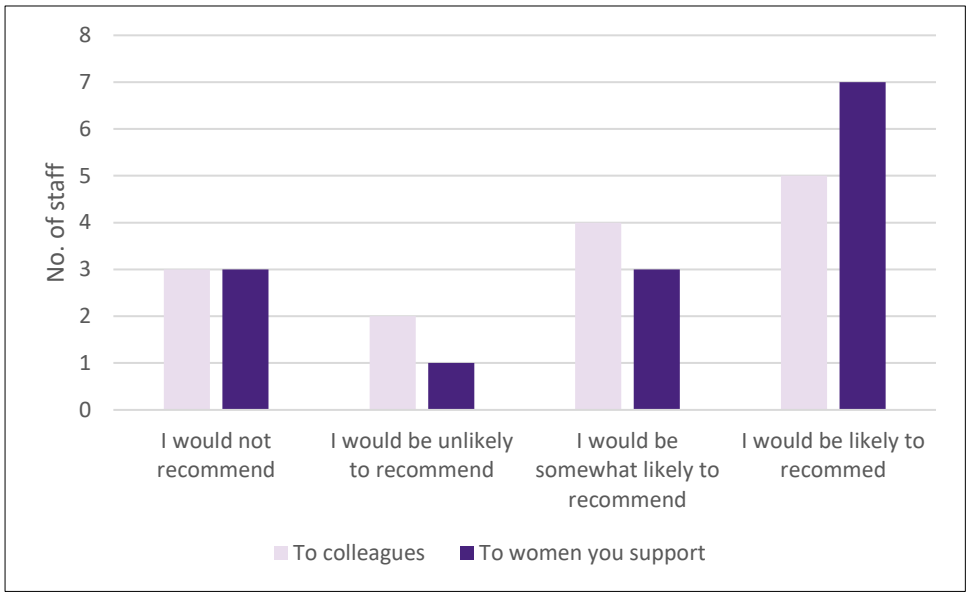

Figure 21. Bar chart showing number of participants who would recommend Anya.

Staff were more likely to recommend Anya to colleagues and women they support than not to recommend it. There were almost equal numbers of respondents who said they were *somewhat likely* or *likely* to recommend it to colleagues (n=9) compared to women they support (n=10).

Interview data shows that Anya was acceptable to staff and five staff participants stated they would recommend Anya to colleagues. Anya was seen as a complementary adjunct to practice, with three participants asserting that elements of postnatal care need to be delivered face-to-face and could not be replaced by an app.

However, interview participants appreciated that Anya could supplement the support they provide to new parents, for instance as an extra resource to support with feeding difficulties, alongside being an out of hours support or a transition tool when service support concluded.

Summary of data for objective 4

- This objective investigated whether Anya is an acceptable breastfeeding support tool by women who have recently given birth, Health Visitors and Midwives.
- More women intended to use the app again when asked at Week 1 compared to Weeks 6-8. Women found the app easy to use and appreciated its accessibility. There were issues with navigation, usability and language, but these did not predominate feedback. Some women preferred human support over the app. This evaluation identified evidence that the app was acceptable to end users who found value from using it.
- There was mixed feedback from staff about the training, with some disappointed by it and others finding it helped to prepare them for the app's implementation.
- There was reasonable staff engagement in the promotion of Anya. However, for most pregnant women, staff did not record that they offered the Anya app. It is possible that the stretched nature of the system hindered the capacity of staff to fully engage.
- Staff were more likely than not to recommend Anya.

4. Discussion

In this discussion, we start by reviewing the findings under each evaluation objective and seek to arrive at a balanced viewpoint based on the data. We then review the strengths and limitations of this evaluation before offering a conclusion.

Did Anya lead to better breastfeeding outcomes & experiences?

The system data shows that the Anya app was shared by Community Midwives with 1 in 5 women. Most women who were told about the app, agreed to sign up to it. This group of women were from less deprived areas than those who were unsure about signing up. It is possible that there was a tendency for staff to focus on telling women from less deprived backgrounds about the app. It is also possible that staff shared the app with more women than our data suggests, but did not record this discussion on BadgerNet.

There were higher breastfeeding rates in the intervention period compared to the comparison group, though these comparisons were not significant. Care must be taken in

assigning significance to the Anya app in leading to these increases. There has been a national increase in breastfeeding rates across England and this may act to confound any improvements in breastfeeding attributable to Anya. Moreover, given that for 4 in 5 women there was no evidence they were told about Anya by their Midwife, a large proportion of women were potentially not exposed to the intervention.

There was evidence that professionals were selective in who they told Anya about. Whilst we did not collect data on this, if it was the case that women who struggled with breastfeeding were more likely to be told about Anya, this could confound the rates of breastfeeding identified, effectively reducing the significance of the findings.

Notwithstanding, the analysis of women in IMDs 1-3 showed a significant increase in breastfeeding rates which was associated with the deployment of Anya, specifically in the Gloucester district only. This finding appears intuitive given that there was a stronger roll-out of Anya in the district of Gloucester. However, this needs to be balanced against the low level of Anya usage in IMDs 1-3 compared with other IMDs.

The lack of statistically significant findings overall is in line with other studies. Two randomised controlled trials (RCTs) did not find any significant difference in breastfeeding rates[12] or breastfeeding abandonment[13]. Meanwhile a recently published systematic review of mobile apps[14] found that whilst breastfeeding support apps increased the odds ratio of breastfeeding early in the postnatal period, this was not statistically significant either.

It is evident that staff and birthing people in the survey found Anya beneficial and helped to improve their confidence. The data shows with respect to breastfeeding confidence, there is no "dose-response" relationship between using Anya and improving breastfeeding confidence, though again, caution must be exercised given the risk of bias from a small self-selecting sample.

However, there is likely a benefit to be found in empowering women with the app to give them the perception of increased confidence. These findings can be contrasted with other research[15] that found statistically significant differences in breastfeeding confidence among those randomised to a breastfeeding support app. The sample size in this study[15] was substantially larger (n=335) than the present survey. Of note, this study did not find a statistically significant difference in higher breastfeeding rates.

With respect to the evaluation objective, a fair assessment would suggest there is mixed evidence that the deployment of Anya is associated with improved breastfeeding outcomes

and experiences. A significant limitation of the survey of potential Anya users was that it attracted women from less deprived areas (the mean IMD decile was 7.1; only 25% of participants lived in deciles 1-5). Therefore, the assessment of women's confidence to breastfeed was biased towards women in less deprived areas. However, there is a significant improvement in breastfeeding among the lowest IMD deciles in the Gloucester district and it is possible Anya played a role in this.

What is the impact of implementing Anya on staff & service use?

This is a real-world evaluation observing an intervention implemented in a system that experienced pressures in the delivery of services. We did not measure quantifiable metrics to assess the impact on the service; we relied on self-report. This carries an inherent risk of reporting bias or error.

Positively, Anya appeared to be an intervention that staff felt at ease with introducing to women they support. There was no objective evidence of the intervention leading to patient harm. Conversely, there was limited evidence to suggest Anya was seen by staff to be beneficial to patients. The self-reporting nature of the survey creates inherent bias risks as staff in favour of the app may be more likely to perceive benefits and those against the app less likely to see benefits. However, the fact that 10 staff perceived the app had neither a positive nor a negative impact, supports the notion that any impact the app had was probably limited.

There were significant capacity issues during the implementation of Anya. This understandably affected how staff implemented the app. Our pre-implementation survey identified that 23% of staff believed they lacked the time to introduce the app and 43% were concerned they would forget to introduce it. In the context of pressured services, it is unsurprising that staff were selective in who they shared Anya with. Moreover, it could be argued that in evaluating Anya, we inadvertently placed additional recording demands on clinical staff. This may have subsequently reduced the potential benefits of Anya for staff in reducing their workload. Implementing a new intervention takes time and resources and this should not be underestimated.

Finally, this evaluation did not identify any significant evidence that using Anya reduced the demand on services; the majority of staff reported the number of contacts with women remained the same. In addition, there are significant time and resource costs of introducing and implementing an intervention such as Anya. These would need to be outweighed by a reduction in service demands if the intervention is said to be effective.

Is Anya an acceptable breastfeeding support tool?

For Anya users in our evaluation, there was evidence it was liked and that it provided support to assist with breastfeeding. Whilst several women found it easy to use, there were others who found it difficult to navigate and who experienced accessibility issues. A couple of women preferred face-to-face support. There were no adverse events reported that could be directly linked to the app, suggesting Anya is a safe app to use. Data on participants' intention to use Anya indicates participants view the app as having limited relevance once breastfeeding is established. By and large, the evidence supports the view that Anya was viewed as an acceptable resource for women.

Most women receiving maternity care in the Forest of Dean and Gloucester districts did not have Anya introduced to them. This suggests the implementation was limited in its success. There was evidence of systemic pressures that affected staff's capacity to engage in the implementation of this intervention. Nonetheless, more staff were likely to recommend Anya to others than not to, suggesting the app was acceptable to those who responded to the survey. Given that a proportion of staff did not appear to be engaged or have the capacity to support Anya's rollout, those involved in the delivery of future innovations need to consider staff capacity and wider system pressures.

Strengths & limitations

This evaluation observed the impact of introducing a breastfeeding support app in a live healthcare setting. We drew on several sources of data that enabled us to apply some degree of corroboration across the data sets. In particular, the system data provided us with bespoke and up-to-date impact data, which is a key strength of this evaluation. We had hoped to make greater use of the linked system data sets. However, the very limited recording or introduction of Anya to end users significantly impacted our ability to undertake more definitive analysis.

We spent significant time trying to contact women who had agreed to hear more about the evaluation. It was disappointing to only consent 26 participants and this calls into question the effectiveness of an outside evaluation team recruiting service users. However, we were able to give voice to the women who participated and this has provided helpful insights into the use of Anya.

Further recruitment problems were encountered with the staff survey and we had hoped to recruit more than the 19 staff who took part. Had we achieved a greater number of participants, we would have a stronger sense of the impact of Anya and the views of staff on how acceptable a resource it was.

Given that the data from LatchAid Ltd. did not have a unique user identifier, we were unable to calculate any per-user statistics (such as time or sessions per user). This meant we could only calculate engagement figures on the cohort of users as a whole.

Finally, we want to note that no corrections were made for multiple testing, which does increase the risk of false positives. However, given we only undertook a handful of unplanned inferential statistics, and given tests such as the Bonferroni tend to be conservative[16], we did not wish to discount real effects.

Reflections on implementing Anya

Over the course of his involvement in the evaluation, the lead evaluator (BN) made brief notes on key issues affecting the implementation. Some key challenges are listed below:

- The implementation of Anya was delayed in August 2023 due to the implementation of BadgerNet electronic patient records. Local intelligence suggested that implementing BadgerNet was creating a high workload for staff. Anya was therefore not implemented until October 2023.
- There were further delays to the start of the evaluation of Anya given delays in approving data sharing with the Trusts. This meant that the training and familiarisation that had already been done with teams needed to be done again to ensure staff had a recent refresher.
- There were five different types of promotional material handed to staff. This was in addition to guidance on how to record Anya on BadgerNet. There was concern this could create confusion for staff implementing Anya.
- We were informed that in February 2024, some of the voluntary breastfeeding groups in the Forest of Dean closed. We were also informed that in the Forest of Dean there were low staffing numbers which impacted the rollout of Anya.
- There was an unannounced CQC inspection of maternity services in March & April 2024.

The COM-B model[17] offers a helpful framework for understanding key factors that facilitate changes in staff behaviour. According to this model, to implement Anya, staff would need to be capable (C), have the opportunity (O) and the motivation (M) to do so.

It is plausible that the issues described above impacted the capability, opportunity and motivation of staff to implement Anya. For instance, the low rate of women who were told about Anya by Midwives could have been an artefact of low recording on BadgerNet as staff had to learn how to use this new system. This would be a capability issue. The unannounced

CQC inspection and the low staffing in the Forest of Dean may have affected the opportunities for staff to implement Anya given other clinical priorities may have been attended to first. This would be an opportunity issue. Finally, the delay in starting Anya alongside offering training refreshers may have acted to diminish the initial enthusiasm of staff. This would be a motivation issue.

How could future digital technology be implemented successfully? There will always be external factors that hinder the implementation of interventions: nothing other than delaying the launch of Anya, could have mitigated the challenge of implementing BadgerNet. However, steps can be taken to strengthen the success of implementation. Zielasek et al.[18] offer several recommendations for implementing apps in mental healthcare, some of which are applicable in midwifery and health visiting contexts. For instance:

- Dealing with language and cultural barriers.
- Deploying staff as part of an implementation team.
- Integrating digital apps into existing clinical workflows and ensuring the systems are interoperable.
- Ensuring implementation success is monitored.
- Finding staff who are motivated and engaging with them as this can multiply use.

Given that there were some staff members who made over 30 referrals to the evaluation team, it would have made sense to work with them specifically to champion Anya. Similarly, had the evaluation team been more integrated into the midwifery service, it may have increased the recruitment rate of participants.

Considerations for commissioners

We reported that with respect to deprivation, the demographic profile for the Forest of Dean and Gloucester were quite different. However, this was not reflected in a strategy for implementation. Future work across multiple districts should consider the unique characteristics of deprivation so that a bespoke and targeted strategy for implementation can be developed.

There was a low rate of recorded implementation of Anya, with only a fifth of women recorded as having been informed about Anya. Digital health interventions take time to be implemented and staff need time out of their clinical work for training[19]. Choosing the right

time to implement interventions alongside ensuring a successful staff engagement strategy is vital to success.

The cost per hour of using Anya was substantially higher than the hourly cost of a Band 6 Midwife. However, it is likely that Anya was under-utilised by individuals. One should also consider the cost of setting up a feeding helpline with the same 24/7 availability, staffed by Band 6 Midwives would exceed £200,000. Broader consideration should be given to the potential benefits and offer of breastfeeding apps, this includes a further cost-benefit analysis, in light of the change to a new population-based licencing model.

There is a small possibility that Anya supported an increased rate of breastfeeding in the Gloucester areas of highest deprivation. The low levels of Anya use postnatally (8.2%) in Gloucester IMD areas 1-3 suggest other factors are more likely such as the recent increase in national breastfeeding rates. Moreover, the lack of evidence for improved outcomes from breastfeeding apps should be considered. Caution should be exercised in commissioning breastfeeding support apps on the sole basis that they may increase breastfeeding rates.

5. Conclusion

The evaluation of the Anya app in Gloucestershire is a real-world, observational study. We collected and analysed data from several sources to address three key questions:

1. Did Anya lead to better breastfeeding outcomes & experiences?
2. What is the impact of implementing Anya on staff & service use?
3. Is Anya an acceptable breastfeeding support tool?

We framed two of these questions in a yes/no manner, suggesting we could arrive at a simplistic conclusion. However, the data we found supports a more nuanced conclusion.

Across Gloucestershire, there were higher breastfeeding rates compared to a similar period when Anya was not in place. However, these were not statistically significant increases. The only significant increase was in the most deprived areas at the 6-8 week time point, but we did not carry out a causal analysis to compare this to other areas.

There is the small possibility that the implementation of Anya increased breastfeeding rates, but this possibility needs to be considered with the recent national trend of increased breastfeeding rates. There was no association between survey participants who used Anya and their scores on the Breastfeeding Self-Efficacy Scale. However, it is evident that both users and staff report benefits from Anya, including a perceived increase in confidence to

breastfeed. One might conclude there is an association between the use of Anya and an increase in breastfeeding rates in more deprived areas but there is uncertainty as to the role Anya played in this.

Most staff responding to the survey reported Anya made no difference to their workload. However, there were significant capacity pressures within the system and this probably had the effect of hindering the rollout of Anya. Indeed, data from the interviews suggests staff were selective in who they spoke to about Anya. We did not find strong evidence that Anya led to a reduction in service use, and given the time and effort required of staff to implement Anya, we conclude that it is probable the deployment of Anya did not reduce service use.

Finally, we consider whether Anya was an acceptable breastfeeding support tool. Anya was liked by users and there was no evidence of harm. There were minor challenges experienced by users. It is likely that Anya is an acceptable tool for the end user. Regarding acceptability to staff, a significant proportion of staff were involved in referring patients to Anya. Staff survey respondents were more likely than not to recommend it. However, a proportion of staff appeared not to be engaged in its implementation or evaluation. We therefore conclude the app is probably acceptable to staff, though external constraints such as system pressure may have reduced its appeal.

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6. References

1. Pérez-Escamilla R, Tomori C, Hernández-Cordero S, Baker P, Barros AJD, Bégin F, et al. Breastfeeding: crucially important, but increasingly challenged in a market-driven world. The Lancet. 2023 Feb;401(10375):472–85.
https://doi.org/10.1016/S0140-6736(22)01932-8

2. Office for Health Improvement and Disparities. Breastfeeding at 6 to 8 weeks, 2023 to 2024 statistical commentary. 2024 Nov 5.
https://www.gov.uk/government/statistics/breastfeeding-at-6-to-8-weeks-after-birth-annual-data-april-2023-to-march-2024/breastfeeding-at-6-to-8-weeks-2023-to-2024-statistical-commentary

3. Office for Health Improvement and Disparities. Breastfeeding at 6 to 8 weeks after birth: annual data April 2022 to March 2023. 2023 Nov 7.
https://www.gov.uk/government/statistics/breastfeeding-at-6-to-8-weeks-after-birth-annual-data-april-2022-to-march-2023

4. UNICEF. WHO/UNICEF discussion paper: The extension of the 2025 maternal, infant and young child nutrition targets to 2030. 2019 Jun 13.
https://data.unicef.org/resources/who-unicef-discussion-paper-nutrition-targets/

5. Walters DD, Phan LTH, Mathisen R. The cost of not breastfeeding: global results from a new tool. Health Policy Plan. 2019;34(6):407-17.
https://doi.org/10.1093/heapol/czz050

6. Lewkowitz AK, López JD, Werner EF, Ranney ML, Macones GA, Rouse DJ, et al. Effect of a novel smartphone application on breastfeeding rates among low-income, first-time mothers intending to exclusively breastfeed: Secondary analysis of a randomized controlled trial. Breastfeed Med. 2021 Jan;16(1):59–67.
https://doi.org/10.1089/bfm.2020.0240

7. Bunik M, Jimenez-Zambrano A, Solano M, Beaty BL, Juarez-Colunga E, Zhang X, et al. Mother's Milk MessagingTM: Trial evaluation of app and texting for breastfeeding support. BMC Pregnancy Childbirth. 2022 Aug 24;22:660.
https://doi.org/10.1186/s12884-022-04976-6

8. Dennis, C.-L. The breastfeeding self-efficacy scale: Psychometric assessment of the short form. Journal of Obstetric, Gynecologic, and Neonatal Nursing: JOGNN, 2003 32(6):734–744.
https://doi.org/10.1177/0884217503258459

9. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006 Jan;3(2):77–101.
https://doi.org/10.1191/1478088706qp063oa

10. Office for National Statistics. Births by Lower Layer Super Output Area (LSOA), England and Wales: mid-year periods (1 July to 30 June) 2000 to 2021. 2022 Dec 19.
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/adhocs/15357birthsbylowerlayersuperoutputarealsoaenglandandwalesmidyearperiods1julyto30june2000to2021

11. Office for National Statistics. Births by Lower Layer Super Output area LSOA in England and Wales, mid-year 2021 to 2022. 2024 April 30.
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/adhocs/2006birthsbylowerlayersuperoutputarealsoainenglandandwalesmidyear2021to2022

12. Lewkowitz AK, López JD, Carter EB, Duckham H, Strickland T, Macones GA, Cahill AG. Impact of a novel smartphone application on low-income, first-time mothers' breastfeeding rates: a randomized controlled trial. Am J Obstet Gynecol MFM. 2020 Aug;2(3):100143.
https://doi.org/10.1016/j.ajogmf.2020.100143

13. Vila-Candel R, Mena-Tudela D, Franco-Antonio C, Quesada JA, Soriano-Vidal FJ. Effects of a mobile application on breastfeeding maintenance in the first 6 months after birth: Randomised controlled trial (COMLACT study). Midwifery. 2024 Jan;128:103874.
https://doi.org/10.1016/j.midw.2023.103874

14. Ziebart M, Kammermeier M, Koletzko B, Patro-Golab B. Mobile applications for promoting and supporting breastfeeding: Systematic review and meta-analysis. Matern Child Nutr. 2025 Jan;21(1):e13733.
https://doi.org/10.1111/mcn.13733

15. Bunik, M., Jimenez-Zambrano, A., Solano, M. et al. Mother's Milk Messaging™: trial evaluation of app and texting for breastfeeding support. BMC Pregnancy Childbirth 22, 660 (2022).
https://doi.org/10.1186/s12884-022-04976-6

16. Armstrong RA. When to use the Bonferroni correction. Ophthalmic Physiol Opt. 2014 Sep;34(5):502-8.
https://doi.org/10.1111/opo.12131

17. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. 2011 Apr 23;6:42.
https://doi.org/10.1186/1748-5908-6-42

18. Zielasek J, Reinhardt I, Schmidt L, Gouzoulis-Mayfrank E. Adapting and implementing apps for mental healthcare. Curr Psychiatry Rep. 2022 Sep;24(9):407-417.
https://doi.org/10.1007/s11920-022-01350-3

19. Turnbull SL, Dack C, Lei J, et al. Barriers and facilitators to use of digital health tools by healthcare practitioners and their patients, before and during the COVID-19 pandemic: A multimethods study. BMJ Open 2024 Mar; 14:e080055.
https://doi.org/10.1136/bmjopen-2023-080055

7. Appendices

Appendix 1 - Tables

Inclusion criteria	Exclusion criteria
Lives in the Forest of Dean or Gloucester City area.	Under 18 years old (to avoid complications of consenting individuals legally considered children).
Pregnant or has a baby no older than 8 weeks old.	Has a baby on the Neonatal Intensive Care Unit (NICU) (given that experiences of breastfeeding premature babies will complicate the evaluation data).
	Does not speak English or have access to someone who speaks English (given the app was only available in English.
	Their baby is older than 8 weeks old (as this is outside of the survey timeframe).

Table 1. List of inclusion and exclusion criteria applied to evaluation survey.

Questions for non-Anya users
1. Thinking about how you are feeding your baby (breastfeeding, bottle feeding, combination feeding), can you tell us how you ended up feeding your baby this way? 2. What other help have you had with feeding your baby? 3. How do you think Anya helps with breastfeeding? 4. What put you off using Anya? 5. What needs to change to make Anya appeal to mothers in your situation? 6. In the last 6 weeks, how many times have you have sought help from the following services for feeding your baby: Your GP; Your Health Visitors; Local Maternity Unit; Your Midwife; 111; A&E. 7. Is there anything else you would like to tell us?
Questions for Anya users
1. What did you find useful about Anya? 2. What challenges did you experience using Anya? 3. How did Anya support you to breastfeed? 4. What did you enjoy about Anya? 5. And what did you dislike about Anya? 6. Were there any negative consequences of using Anya? 7. If you had not used Anya in the last 6 weeks, how many times would you have sought help from the following services for feeding your baby: Your GP; Your Health Visitors; Local Maternity Unit; Your Midwife; 111; A&E. 8. Is there anything else you want to tell us about your experience with Anya?

Table 2. List of open-ended questions asked of (potential) Anya users.

Data source	Demographics		
Survey data from potential Anya users	Age	Mean Minimum Maximum	32.2 years 25 years 39 years
	Ethnicity	White British White Other Black or Black British – African	85% (n=17) 10% (n=2) 5% (n=1)
	Education (highest level)	GCSEs A-Levels / College / Work Apprentice Undergraduate Degree Postgraduate Degree	10% (n=2) 25% (n=5) 45% (n=9) 20% (n=4)
	Index of Multiple Deprivation	Mean Minimum Maximum	7.1 2 10
	Birth Method	Vaginal Birth Assisted Vaginal Birth Caesarean Section Missing Data	30% (n=6) 20% (n=4) 45% (n=9) 5% (n=1)
	Breastfeeding	Week 1 Feeding any breastmilk ongoing Missing Data	 95% (n=19) 5% (n=1)
		Week 6-8 Feeding any breastmilk ongoing Feeding no breastmilk ongoing	 90% (n=18) 10% (n=2)
Staff survey	Age	25-29 years 30-39 years 40-49 years 50-59 years 60+ years Prefer not to answer	5.3% (n=1) 10.5% (n=2) 31.6% (n=6) 31.6% (n=6) 10.5% (n=2) 10.5% (n=2)
	Gender	Female Prefer not to answer	94.7% (n=18) 5.3% (n=1)
	Employer	Gloucestershire Health & Care NHS Foundation Trust Gloucestershire Hospitals NHS Foundation Trust	63.2% (n=12) 36.8% (n=7)
	Field of Work	Management Nursing/Midwifery Prefer not to say	5.3% (n=1) 78.9% (n=15) 15.8% (n=3)
	Years Worked in Maternity or Health Visting Services	Less than 1 year Between 1 to 3 years Between 4 to 5 years Between 6 to 9 years 10 years or more	0.0% (n=0) 15.8% (n=3) 0.0% (n=0) 10.5% (n=2) 73.7% (n=14)

Table 3. Demographics covering survey of (potential) Anya participants and staff survey.

IMD decile	All areas		Forest of Dean & cross-borders		Gloucester	
	(n)	(%)	(n)	(%)	(n)	(%)
1	24.0	5.1	1.0	1.0	23.0	6.2
2	27.0	5.7	0.0	0.0	27.0	7.3
3	20.0	4.2	9.0	8.7	11.0	3.0
4	43.0	9.1	15.0	14.6	28.0	7.6
5	69.0	14.6	14.0	13.6	55.0	14.9
6	93.0	19.7	34.0	33.0	59.0	16.0
7	57.0	12.1	23.0	22.3	34.0	9.2
8	65.0	13.8	5.0	4.9	60.0	16.3
9	42.0	8.9	2.0	1.9	40.0	10.8
10	32.0	6.8	0.0	0.0	32.0	8.7
Total	472	100	103	100	369	100

Table 6. Number of women who accepted Anya broken down by IMD.

				Comparator Period	Intervention Period	Total	Significance
IMD 1-3	2 weeks	Bottle / Parenteral	n	175	168	343	No p=0.060
			%	39.0%	33.1%	35.9%	
		Breastfed / Breastfeed & Supplemental	n	274	339	613	
			%	61.0%	66.9%	64.1%	
	6-8 weeks	Bottle / Parenteral	n	240	234	474	Yes p=0.037
			%	53.0%	46.2%	49.4%	
		Breastfed / Breastfeed & Supplemental	n	213	272	485	
			%	47.0%	53.8%	50.6%	
IMD 4 - 7	2 weeks	Bottle / Parenteral	n	374	410	784	No p=0.900
			%	34.8%	35.0%	34.9%	
		Breastfed / Breastfeed & Supplemental	n	701	760	1,461	
			%	65.2%	65.0%	65.1%	
	6-8 weeks	Bottle / Parenteral	n	517	561	1078	No p=0.947
			%	48.0%	47.9%	48.0%	
		Breastfed / Breastfeed & Supplemental	n	559	610	1,169	
			%	52.0%	52.1%	52.0%	
IMD 8 - 10	2 weeks	Bottle / Parenteral	n	203	179	382	No p=0.330
			%	33.2%	30.5%	31.9%	
		Breastfed / Breastfeed & Supplemental	n	409	407	816	
			%	66.8%	69.5%	68.1%	
	6-8 weeks	Bottle / Parenteral	n	281	251	532	No p=0.332
			%	45.7%	42.9%	44.3%	
		Breastfed / Breastfeed & Supplemental	n	334	334	668	
			%	54.3%	57.1%	55.7%	

Table 11. Comparisons between the comparator and intervention one periods broken down by IMD deciles.

8. Supplemental Files

File 1
Anya Staff Interview Report (version 2.1)

File 2
Protocol for Real-World Evaluation of Anya (version 2.4)

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