

Understanding the Role of Citizen Generated Data in the Context of Public Health – A Case Study on Breastfeeding and FeedFinder

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Abstract

Exclusive breastfeeding is recommended by the World Health Organisation until an infant is 6 months old. Yet, despite this, the UK has the lowest rates of breastfeeding seen across the world with only 1% of mothers exclusively breastfeeding at 6 months. While promoting breastfeeding is considered a public health priority in the UK, budget cuts and subsequent reduction in local authority services have made it difficult to provide consistent support for women choosing to breastfeed. As such, 'Breastfeeding Welcome' campaigns that aim to provide localised support for women and organisations have either disappeared or are poorly resourced. Against this background, FeedFinder has been developed to provide a platform for women to find, rate and review places in real-time based on how breastfeeding friendly they are. The application has been used by over 14000 women, mapping over 5000 venues with reviews from across the UK, with some reviews now seen for venues in Asia, America and Australia. FeedFinder is a civic technology, that is, where citizens have the potential to contribute to the shaping of communities, environments and potential local service delivery mediated through technology.

The main aim of this research was to understand how FeedFinder and the data it provides might be used to leverage community support for women choosing to breastfeed in public. Three strands of research contribute to the process of achieving the overall aim; (1) understanding FeedFinder, its users and the data it provides, (2) investigating if FeedFinder is a useful tool to professionals and voluntary groups who promote and support breastfeeding and (3) design and evaluation of a new geo-analytics website for support of breastfeeding which includes a community breastfeeding policy to offer practical guidance to public-facing organisations seeking to improve provision and support for breastfeeding women.

The research followed a mixed methods and action research approach, being driven by the needs and values of the multiple stakeholders involved; parents, public health

improvement practitioners, infant feeding coordinators, breastfeeding peer support workers and local public-facing organisations. Following the completion of strand 2 of the research, it was clear that FeedFinder was useful for parents but the process to access the data for breastfeeding support or local public-facing organisations to use was not efficient. This led to the iterative design and development of the FeedFinder website, community breastfeeding policy, poster and video followed by an evaluation with stakeholders (strand 3).

The newly developed FeedFinder website and community breastfeeding policy have shown promising potential to provide a tool for local communities to do more to support breastfeeding. The expert evaluation revealed that breastfeeding support services welcome the website in practice, though some concerns persisted on trust and legitimacy of data therein. This thesis describes the way in which citizen-generated data can be utilised in public health provision while outlining the key limitations and concluding with recommendations for sectors with potential to impact on improving the breastfeeding rates across the UK and so meeting recommendations for optimum infant feeding.

Key findings

- FeedFinder has provided a tool for some women to find suitable places to breastfeed in public and women use the application to support their breastfeeding experience in the early months. Once women feel confident to breastfeed anywhere, they use FeedFinder less frequently.
- There are sociodemographic differences in the way people respond to a breastfeeding woman in public, e.g. older adults and adolescent males.
- FeedFinder review data provides detailed information on 'what matters' for women when breastfeeding in public, building on existing knowledge of the reports from Public Health England and Infant Feeding Survey. These findings are useful for public health practitioners and interested stakeholders in supporting breastfeeding beyond the healthcare system.
- Some reservations remain around trust and moderation of the use of citizen-generated data in public health.
- Socio-demographic inequalities exist in the participation of citizens in apps like FeedFinder, further supporting the inequalities seen across breastfeeding women.

Artefacts and Publications

Artefacts:

FeedFinder Website - <https://feed-finder.co.uk/>

Community Breastfeeding Policy, Poster and Video

<https://feed-finder.co.uk/breastfeeding-policy>

Publications:

Simpson, E., Comber, R., Garbett, A., Jenkins, E.I. and Balaam, M., 2017, May. Experiences of Delivering a Public Health Data Service. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (pp. 6171-6183). ACM

Simpson, E., Garbett, A., Comber, R. and Balaam, M., 2016. Factors important for women who breastfeed in public: a content analysis of review data from FeedFinder. BMJ Open, 6(10), p.e011762.

Toombs, A.L., Morrissey, K., **Simpson, E.**, Gray, C.M., Vines, J. and Balaam, M., 2018, April. Supporting the complex social lives of new parents. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (p. 420). ACM.

Concannon, S.J., Balaam, M., **Simpson, E.** and Comber, R., 2018, April. Applying computational analysis to textual data from the wild: A feminist perspective. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (p. 226). ACM.

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Prabhakar, A.S., Newhouse, N., **Simpson, E.**, Mburu, C.W., Ahmed, N. and Chen, Y., 2019, April. MatHealthXB: Designing Across Borders for Global Maternal Health. In Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems (p. SIG04). ACM.

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Other publications during this time:

Simpson, E., Bradley, J., Poliakov, I., Jackson, D., Olivier, P., Adamson, A. and Foster, E., 2017. Iterative development of an online dietary recall tool: INTAKE24. *Nutrients*, 9(2), p.118.

Bradley, J., **Simpson, E.**, Poliakov, I., Matthews, J., Olivier, P., Adamson, A. and Foster, E., 2016. Comparison of INTAKE24 (an online 24-h dietary recall tool) with interviewer-led 24-h recall in 11–24 year-old. *Nutrients*, 8(6), p.358.

Rowland, M., Adamson, A., Poliakov, I., Bradley, J., **Simpson, E.**, Olivier, P. and Foster, E., 2018. Field Testing of the Use of Intake24—An Online 24-Hour Dietary Recall System. *Nutrients*, 10(11), p.1690.

O'Donnell, A., McParlin, C., Robson, S.C., Beyer, F., Moloney, E., Bryant, A., Bradley, J., Muirhead, C., Nelson-Piercy, C., Newbury-Birch, D. **Simpson, E.** and Norman, J., 2016. Treatments for hyperemesis gravidarum and nausea and vomiting in pregnancy: a systematic review and economic assessment. *Health Technology Assessment*, 20(74), pp.1-268.

Table of Contents

Acknowledgements	2
Abstract	4
Key findings	6
Artefacts and Publications.....	7
List of tables	15
List of figures	16
Chapter 1 Introduction	19
1.1 Overview.....	19
1.1.1 FeedFinder	23
1.1.2 Digital Civics.....	24
1.2 Research aim, objectives and research questions.....	26
1.3 Research Context.....	27
1.4 Thesis structure	30
Chapter 2 Background and Literature Review.....	34
2.1 Introduction.....	34
2.2 Strategies to improve public health	34
2.3 Overview of technology use in public health	37
2.3.1 Citizen data in public health	41
2.3.2 Civic technologies	47
2.4 FeedFinder.....	50
2.4.1 How FeedFinder works	51
2.5 Breastfeeding	52

2.6	Supporting infant feeding practices at the local level	56
Chapter 3 Methodology		60
3.1	Introduction.....	60
3.1.1	Action Research	61
3.1.2	User-centred design	62
3.1.3	Mixed Methods.....	63
3.2	Research aims and objectives.....	64
3.3	Ethics	66
3.4	Research context	67
3.5	Research Approach.....	68
3.5.1	Epistemological perspective	69
3.5.2	Research Design.....	71
3.5.3	Research Methods.....	72
3.5.4	Strand 1: Understanding FeedFinder.....	72
3.5.5	Strand 2: Can FeedFinder be used in breastfeeding support?.....	74
3.5.6	Strand 3: Design and evaluation of the FeedFinder website	75
Chapter 4 Understanding FeedFinder		77
4.1	Introduction.....	77
4.2	Background.....	78
4.3	FeedFinder Users.....	80
4.3.1	Survey Method	80
4.3.2	Survey Results.....	82
4.4	The FeedFinder data: What information are FeedFinder users sharing with one another?	93

4.4.1	Method	93
4.4.2	Findings of the FeedFinder data analysis.....	96
4.5	Summary of findings.....	101
4.6	Discussion	102
4.6.1	Objective 1 - To gather an understanding of the type of data available within FeedFinder.....	103
4.6.2	Objective 2 - To describe the FeedFinder users and motivations of use.....	105
4.7	Study Limitations	108
4.8	Chapter summary	110
Chapter 5 How can FeedFinder support the role of breastfeeding support services?...		111
5.1	Introduction.....	111
5.1.1	Research context and collaborators	112
5.1.2	FeedFinder Promotion.....	114
5.2	Methods	115
5.2.1	Data collection and analysis	115
5.3	Findings.....	116
5.3.1	FeedFinder Data Accessibility and Unravelling the Data	118
5.3.2	Professional Support of FeedFinder	122
5.3.3	Adding to the Map and Encouraging Use	124
5.3.4	User needs generated from the findings.....	126
5.4	Discussion	130
5.5	Chapter Summary.....	132
Chapter 6 Development of FeedFinder Website and Community Breastfeeding Policy		133
6.1	Introduction.....	133

6.1.1	Citizen-led service design to support the development of the FeedFinder website	136
6.1.2	Supporting breastfeeding women in the community.....	138
6.2	Methods	138
6.2.1	Review of existing Breastfeeding Welcome schemes.....	138
6.2.2	Summary of findings from resource review	140
6.2.3	Qualitative research with breastfeeding women	145
6.2.4	Summary of findings from breastfeeding women	147
6.2.5	Public Health Improvement at a local authority.....	153
6.2.6	Involvement of Local Public Facing Organisations.....	155
6.3	The Community Breastfeeding Policy, Poster and Video	157
6.4	FeedFinder Geo-analytics Website.....	163
6.5	Chapter Summary.....	179
Chapter 7 Stakeholder Evaluation of the FeedFinder Website for Breastfeeding Support in the Community		180
7.1	Introduction.....	180
7.1.1	Background	181
7.2	Methods	182
7.3	The Evaluation Event	183
7.3.1	Recruitment for the event	184
7.3.2	Venue.....	184
7.3.3	Agenda.....	185
7.3.4	Accessing the website.....	185
7.3.5	Activity 1	186
7.3.6	Activity 2	188
		13

7.3.7	Additional feedback from breastfeeding women.....	189
7.3.8	Attendees	189
7.4	Findings.....	190
7.4.1	General feedback.....	190
7.4.2	Findings from the thematic analysis of evaluation.....	197
7.4.3	Summary of Findings	212
7.5	Discussion	213
7.6	Chapter Summary.....	218
Chapter 8 Discussion		219
8.1	Can citizen-generated data impact on service provision in public health?	221
8.1.1	To gather an understanding of the type of data available within FeedFinder.....	223
8.1.2	To describe the FeedFinder users and motivations of use.	226
8.1.3	To investigate if the data available within FeedFinder is of value in the context of breastfeeding support within public health	227
8.2	Challenges and limitations of the research	230
8.3	Strengths	231
8.4	Conclusion	233
8.5	Recommendations.....	235
8.6	Self-Reflection	237
Bibliography.....		241
Appendices		263

List of tables

Table 1 Example of cuts from three governments in England. A total of 44% of cuts across breastfeeding services, 2018.....	21
Table 2 Ethnicity of FeedFinder users who responded to the survey.	83
Table 3 Role of FeedFinder user.	84
Table 4 Most frequent self-reported occupation of survey sample	84
Table 5 Length of time using FeedFinder	86
Table 6 How often FeedFinder is used by the sample of users surveyed.....	86
Table 7 Average rating for each of the criteria; comfort, hygiene, privacy and baby facilities.	97
Table 8 Categories derived from analysis of data. Total number of codes assigned from each category and % and what proportion of the reviews were negative (Simpson et al., 2016).....	98
Table 9 Examples of text reviews obtained from FeedFinder with codes assigned and sentiment analysis.	101
Table 10 IMD ranking for the post codes provided by women in the survey.....	148
Table 11 List of venues associated with Tyne and Wear Archives and Museums.....	157
Table 12 Number of stakeholders attended.....	190
Table 13 Feedback on evaluation form.	191

List of figures

Figure 1 Data collection and contribution to the design and development of the FeedFinder website and community breastfeeding policy.	29
Figure 2 HealthMap landing page. Geolocated and presented shared illnesses present within locale (North East of England, UK)	44
Figure 3 FeedFinder location-based review application. ¹ Opening screen showing GPS located map – typically presents where the user is located, but a user is also able to search for a different location. ² Adding a review to a venue – free text entry, star rating out of 5 for each of the chosen criteria ³ John Lewis average review scores ⁴ John Lewis free text-based reviews.....	51
Figure 4 Image of Candice Swanepoel breastfeeding in the Daily Mail and some comments taken from underneath the article.....	56
Figure 5 Methods used in each strand of the research (capitalisation signifies the dominant method used).....	65
Figure 6 FeedFinder promotional material.	114
Figure 7 Data collection and contribution to the design and development of the FeedFinder website and community breastfeeding policy.	135
Figure 8 Example of search results from Lincoln on breastfeeding.....	141
Figure 9 List of breastfeeding friendly places in Cornwall.....	142
Figure 10 Community breastfeeding policy statements.....	160
Figure 11 Breastfeeding friendly poster as part of the policy resource.	161
Figure 12 Selected stills from the video.	162
Figure 13 About page on FeedFinder website.....	169
Figure 14 Landing page of the FeedFinder website.....	170
Figure 15 Map showing the density of venues via heatmap.	171
Figure 16 FeedFinder results with heatmap for population density.	172
Figure 17 FeedFinder search page with results.....	173
Figure 18 Venue landing page for John Lewis, Newcastle.....	174
Figure 19 Text reviews from John Lewis.....	175

Figure 20 Data obtained from the Office for National Statistics on venue landing page.	176
Figure 21 Data from Office for National Statistics on venue landing page.....	177
Figure 22 Take Action information on venue landing page.....	178
Figure 23 Activity 1 scenarios and worksheet where reflections posted.	187
Figure 24 Quadrant for exploring how comfortable a user would be carrying out activities using the website and resource, and how useful it would be for their role. ..	188
Figure 25 Images taken from the event, showing activity 1 and activity 2.	193

List of abbreviations

CM (Community Mosaic)

HCI (Human Computer Interaction)

IMD (Index of Multiple Deprivation)

iOS (Apple iPhone)

NHS (National Health Service)

OHC (Online Health Community)

PH (Public Health)

PHI (Public Health Improvement)

TWAM (Tyne and Wear Archive and Museums)

VGI (Volunteered Geographic Information)

WHO (World Health Organisation)

Chapter 1 Introduction

1.1 Overview

The health benefits of breastfeeding are well established across low, middle and high-income countries and exclusive breastfeeding is recommended by Global Health policy until at least 6 months (WHO, 2015). But unfortunately, in the west, breastfeeding rates remain low and despite being one of the richest countries in the world, the UK has some of the lowest breastfeeding rates worldwide. While a high proportion of women initiate breastfeeding at birth (75%), by the 6-8 week check-up, less than 1% are exclusively breastfeeding and only 36% of infants given any breastmilk at all (Public Health England, 2016). Additionally, women say that they stop breastfeeding before they want to, which has been associated with feelings of guilt, regret (Brown, 2017; Shepherd, Walbey and Lovell, 2017) and even post-natal depression (Brown, Rance and Bennett, 2016).

Breastfeeding cessation is linked to many factors including physically unpleasant and painful experiences (Smith *et al.*, 2012), concerns around lactation, nutrition and perceived lack of infant satiation (Li *et al.*, 2008), inadequate infant weight gain (Odom *et al.*, 2013), and also lack of support during and post-hospital discharge (Lewallen *et al.*, 2006; Brown, 2014), including access to peer and social support (Grant *et al.*, 2018).

Breastfeeding promotion is a top priority for Government and the UNICEF Baby Friendly Initiative has been successful in increasing breastfeeding initiation rates, but as it is focussed primarily on hospitals, this has minimal impact on breastfeeding duration. It is the public health services that play a key role in raising awareness of the benefits of breastfeeding and providing additional support in the postnatal period. This thesis is concerned predominantly with the support that is provided by public health services at the local level in relation to breastfeeding. Since 2013, the delivery of public health services has been the responsibility of local governments.

In the months leading up to the thesis submission, the Chief Medical Officer, Professor Dame Sally Davies released an independent report (2019) 'Time to Tackle Childhood Obesity' which highlights the increasing breastfeeding rates as one of the priorities in reducing childhood obesity. There are many reasons for this, but overfeeding is common with formula feeding and one in four babies gain too much weight in their first 18 months and nearly half of women who are pregnant are overweight or obese (Davies, 2019). In the report, Davies describes:

*Breastfeeding protects children and mothers from obesity, but our breastfeeding rates remain low, particularly amongst women living in deprived areas. Many **women complain of the difficulties they encounter when trying to breastfeed out of the home.** Families are still being exposed to waves of messaging and marketing for formula milks, drowning out advice from healthcare professionals. The healthcare system needs to be much more proactive. Health visitors, midwives, doctors, school nurses and community nurses should be adequately skilled and have the resources to initiate conversations, and to advise and support children and their families. (2019)*

As increasing breastfeeding rates remain a priority, it is acknowledged that more must be done collectively to support women to breastfeed until the recommended duration and to support women continuing to breastfeed beyond the healthcare system and into the community (WHO, 2015; Rollins, Bhandari and Hajeer, 2016; The Lancet, 2016; UNICEF, 2016; Brown, 2017). In a separate recent report, an alliance to fight for better support for breastfeeding listed all the cuts to breastfeeding services across the country from 2015 - 2019, where 44%, 142 out of 326 local authorities had cuts to breastfeeding support services (The Better Breastfeeding Campaign, 2018). Some examples of the detriment to services is shown in Table 1. The completion of this thesis work is a timely contribution to the landscape of breastfeeding support in public health at the local authority level.

Table 1 Example of cuts from three local governments in England. A total of 44% of cuts across breastfeeding services reported in 2018 (The Better Breastfeeding Campaign, 2018).

<i>Local Government</i>	<i>Impact of service cut</i>
<i>Blackpool</i>	Highly acclaimed breastfeeding peer support service closed and infant feeding lead post cuts. No specific breastfeeding support currently in place (2017)
<i>North Tyneside</i>	Infant feeding coordinator post cut and training for peer supporters ended.
<i>Reading and West Berkshire</i>	Funding for peer support service, including phone service, drop-in groups, home visits and hospital support, ended in Reading. Reduced service will operate in West Berkshire (2018)

Traditional public health promotion, prevention and protection initiatives have delivered campaigns to promote positive health and wellbeing. Over the years, as knowledge, culture and attitude have evolved, public health campaigns have progressed. Typically, a one-way delivery of public health information, the rise in technology usage has changed the landscape of public health and enabled a much more interactive delivery of campaigns. For example, Change4Life is a public health campaign to reduce and prevent obesity through making small lifestyle changes and the campaign recently released a series of mobile applications as part of their campaign such as the ‘Smart Swap’ application deployed in 2014 (Wrieden and Levy, 2016). Smart swap enables families to find substitutions of foods by scanning barcodes on food labels which would then display the suggested swaps to improve dietary choices through informed decision making and is promoted for use as a collective family task. This approach to developing novel digital technologies to improve public health is a positive progression to keep up with the fast-pace of evolving technologies.

In the context of pregnancy and parenthood, technologies to improve health and wellbeing are vastly available. New parents often report having both physical and mental health worries when being pregnant and becoming a parent for the first time. The early days of motherhood in particular can instil feelings of anxiety, loneliness and isolation. The use of digital media online and mobile applications provide a means of ‘taking back control’ (Lupton *et al.*, 2016) while providing support, information and social interaction at their fingertips. For example, online spaces where women and health professionals create and share experiences can be accessed in times of need in order to reduce anxiety or uncertainty. Social connectedness in particular is reported to have a significant impact on maternal wellbeing (Gibson and Hanson, 2013) and the emotional connection and support women have reported to receive online has helped maintain and establish new friendships while also feeling more connected to their children. In the UK, social mobile applications such as Peanut¹ and Mush² are promoted as apps to reduce isolation and loneliness, where mothers can connect with each other in their local area. Other technologies to improve health and wellbeing of parents include self-tracking technologies such as the Baby Buddy³ app from the NHS which can help to give women peace of mind when comparing with what is normal from a trusted source. However, there has been little research into the use of social computing technologies in a public health evaluation perspective.

The pervasive nature of social computing platforms over the last decade has markedly changed the way citizens produce and consume media, meaning it is a much more collaborative, participatory and open effort. In the context of public health, sharing public health campaigns on social media platforms and apps offers an opportunity for citizens to engage with and respond to content shared by public health authorities. The

¹ Peanut <https://www.peanut-app.io/>

² Mush <https://letsmush.com/>

³ Baby Buddy <https://www.bestbeginnings.org.uk/baby-buddy>

wealth of data, both qualitative and quantitative that can be generated through participation in such platforms could have the potential to offer rich and credible insight into the lived experiences of citizens and act as a catalyst for positive social change.

As technologies advance, 'civic technologies' have been gaining academic interest for some time, particularly in social science, politics and local democracy, though little work has explored the role of these technologies within a public health context. As part of the Digital Civics research agenda, this work opened up an opportunity to explore in-depth and gain an understanding of whether civic technologies and citizen-generated data can impact on local service provision in public health. Using breastfeeding as a public health priority, this work investigates the use of FeedFinder, a civic technology that enables women to find, rate and review places according to how breastfeeding friendly they are. This thesis provides a deeper understanding of FeedFinder and the data available within the application to support breastfeeding women, exploring whether it has the potential to be of value in breastfeeding support as part of public health services.

1.1.1 FeedFinder

FeedFinder (Balaam *et al.*, 2015), developed by a team of researchers at Open Lab, Newcastle University is a location-based review application that enables women to map venues and review those venues based on their breastfeeding experience. Described as a civic technology, all of the content provided in FeedFinder is contributed by the users and until now, there has been no investigation into the use of the application or the data available. This thesis provided a unique opportunity to explore FeedFinder as a civic technology and investigate, as part of the Digital Civics research agenda (Olivier and Wright, 2015) on how this might be used to impact on local service provision. FeedFinder is described in more detail in the following Chapter 2 along with the background and literature review.

1.1.2 Digital Civics

An emerging cross-disciplinary research initiative, Digital Civics seeks to understand the design and use of technologies for civic activities. In doing so, the technologies open up a space for dialogue and increased participation between citizens and their local civic institutions (Olivier and Wright, 2015; Vlachokyriakos, Crivellaro, Le Dantec, Gordon, Wright and Ol, 2016). This turn to participatory systems is described by McCarthy and Wright as "an open, empathic, and critical questioning relationship... [that] construct[s] new imaginaries through mutual learning" (McCarthy and Wright, 2015). Civic technologies can bring together groups or citizens with a shared interest in social issues and their resolution (either locally or geographically dispersed if a wider social issue), enabling them to engage in counter-narratives and construct their own 'shared learning and shared ownership'. Further adding to the digital civics narrative is the push for institutional or community centred transformation where the participatory systems enable a relational model of interaction between citizens and their civic institutions. Thinking about this from a design and delivery of public service point of view, what would typically be described as transactional models of service delivery (one way), has the opportunity to become more relational, reconfiguring the relationship between citizens and service providers (Olivier and Wright, 2015; Vlachokyriakos, Crivellaro, Le Dantec, Gordon, Wright and Ol, 2016; Corbett and Dantec, 2018). In a relational model of service delivery, citizens are able to have a say in the way that the services are designed, developed and deployed to suit their needs and values. In other words, technologies act as a broker of the partnership between communities and local or national governing bodies/Non-Governmental Organisations (NGO's) responsible for delivery of public services, for example.

Using FeedFinder as the primary civic technology, this research worked very closely with multiple stakeholders involved in breastfeeding support in the North East of England including breastfeeding mothers, breastfeeding peer support services, public health improvement, infant feeding coordinators and local public-facing organisations.

Drawing on key elements of action research, adopting a pragmatic, mixed methods approach, the research was driven by the needs and values of the breastfeeding stakeholder community. The participation and involvement of key stakeholders in the research are described in great detail in Chapter 3 Methodology.

The research is best described as three strands of work that overlapped and intertwined across the trajectory of the project, with the involvement of stakeholders at different stages based on the work undertaken. The work began with an investigation into FeedFinder and the data available to form a better understanding of what would be on offer to breastfeeding support. Relationships with breastfeeding support services were established and maintained throughout the research, and an investigation into the potential use of FeedFinder in their supportive role was undertaken. An outcome of the investigation led to the design and development of a new FeedFinder website which would enable increased access to the FeedFinder data, a data driven community breastfeeding policy and training video for local public-facing organisations which was then followed with an expert evaluation of the resources as part of the Fuse (Centre for Translational Research in Public Health). Figure 1 shows an overview of the work undertaken, illustrating the different strands of research and in which chapter that investigation is described. The remaining sections of this current introductory chapter outlines the aims and objectives of the research and thesis structure.

1.2 Research aim, objectives and research questions

The primary aim of this research is to understand the role of citizen-generated data in the context of public health and breastfeeding support.

The research objectives to achieve this aim are as follows:

- To gather an understanding of the type of data available within FeedFinder
- To describe the FeedFinder users and motivations of use.
- To investigate if the data available within FeedFinder is of value in the context of breastfeeding support within public health

The research questions driving the work in Chapter 4, strand 1:

- What are the demographic characteristics of the FeedFinder users and how does this compare to the demographic characteristics of breastfeeding women in the UK?
- How is FeedFinder used?
- What information are FeedFinder users sharing with one another?

The research objectives for Chapter 5, strand 2:

- To describe the use of FeedFinder within the breastfeeding peer support service.
- To explore the acceptability and feasibility of using FeedFinder and the available data in breastfeeding support within public health services.
- To define key requirements for the development and use of FeedFinder as a public health data service.

The research objectives for Chapter 6, strand 3:

- To review the available Breastfeeding Welcome schemes in England to support breastfeeding women.
- To engage with multiple stakeholders interested in breastfeeding support; parents, public health improvement, local public facing organisations.

- To develop resources for supporting breastfeeding women including a FeedFinder website and community breastfeeding policy

The research questions driving the evaluation of resources in Chapter 7 were:

- i) Can the FeedFinder website and available data provide a useful resource for breastfeeding support services?
- ii) What are the implications of sharing data from the FeedFinder website?

1.3 Research Context

This work is situated in the North East of England, primarily Newcastle, Gateshead and Northumberland. Differences in breastfeeding rates are seen across the UK (Brown *et al.*, 2010; McAndrew, Thompson and Fellows, 2012) but the North East of England has the lowest rates of exclusive breastfeeding compared to other regions at one week and 6 months, 36% and less than 1%, respectively. Society has a collective responsibility to provide a supportive and enabling environment for women who want to breastfeed (Rollins, Bhandari and Hajeerhoy, 2016). The transition of public health services from the primary care sector to local authority has already exerted considerable financial and resourceful strain on services, with an additional call to cut £78 million to Newcastle City Council services from the start of this research until the year 2019 (Newcastle City Council, 2016, 2017). Though there are cuts nationwide, it is considered that cuts to services in the North of England are higher than the south with 20% and 9%, respectively (BBC News, 2018). Local authorities in the north have reported less opportunities to raise money locally and have to make the most of available resources. Specific research into breastfeeding in the North East of England highlighted that although there is good support for breastfeeding, it is rarely seen in public, a barrier significant with the poor continuation rates beyond the first week (Pain, Bailey and Mowl, 2001). In addition, the National Childbirth Trust (National Childbirth Trust, no date) (NCT) recent survey found most women (90% of those who stop in the first 6 weeks) stop breastfeeding before they wanted to because they do not receive accurate information and sufficient support.

There are many barriers that influence why women choose not to breastfeed, including physical/practical difficulties but also social, cultural and public values, family history, class and regional influences (Pain, Bailey and Mowl, 2001). The 'breast is best' mantra highlights the nutritional and immunological benefits of breast milk for infants, but also carries moralistic ideals, adding pressure on women to be perceived as 'good mothers' (Murphy, 1999; Leung and Sauve, 2005). Women who choose not to breastfeed are often shamed into feeling inadequate, experiencing guilt, blame and feelings of failure (Thomson, Esbich-Burton and Flacking, 2014). Although it is important to acknowledge the inadequacies experienced by mothers who choose to formula feed, for the purposes of the research, the main focus is on women who breastfeed and how they experience breastfeeding in public.

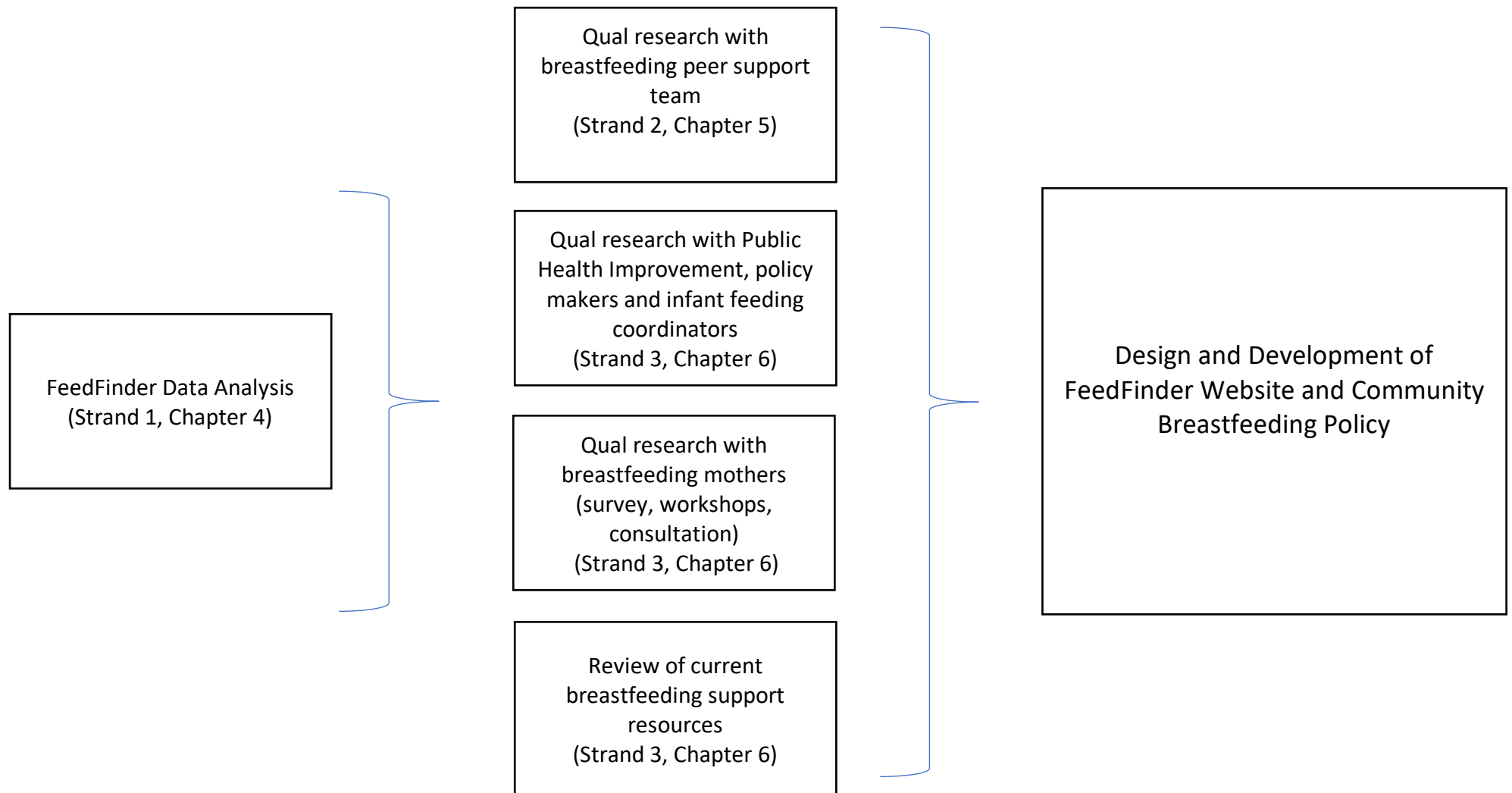


Figure 1 Data collection and contribution to the design and development of the FeedFinder website and community breastfeeding policy.

1.4 Thesis structure

This section outlines the structure of the thesis, describing each chapter in relation to the strand of work undertaken. The following Chapter 2 provides a narrative review of the background and literature relevant to the research. Chapter 3 details the research methodology, describing and providing a rationale for the research design and methods. Chapter 4 is the first data chapter, presenting the findings from the FeedFinder user analysis and available data within the application. The collaboration with breastfeeding support services is outlined in Chapter 5 and this provides an investigation into the use of FeedFinder in breastfeeding support within public health services. The work undertaken here concluded that a website would increase access to the FeedFinder data and the workshops with breastfeeding mothers highlighted that a community policy for breastfeeding in public would help them to feel supported. Chapter 6 describes the development of the website and policy, with an additional video for local public-facing organisations. What began as a collaboration with the local breastfeeding peer support team in Newcastle, the research collaborators expanded over the trajectory of the PhD with different key stakeholders being involved in different strands of research, including mothers, public health improvement practitioners at Newcastle City Council, Northumberland County Council and their commissioned infant feeding coordinators. The final strand of research in Chapter 7 described the expert evaluation event that was carried out to elicit feedback on the newly developed resources. Concluding the thesis, Chapter 8 provides a discussion of the work undertaken and succinctly details the key findings and closing with suggested future recommendations going forward.

Chapter 2 – Background and Literature Review – This Chapter provides the foundation of the thesis, drawing on the relevant literature in both Human Computer Interaction (HCI) and public health research. In particular, this chapter draws on ‘civic technology’ type research to demonstrate the value and potential of civic technologies and the citizen-generated data they can provide in public health. Despite having a long standing history within HCI research, the terminology for describing these types of technologies is

relatively new, being defined as the 'design and use of technology to support both formal and informal aspects of government and public services' (Boehner and Disalvo, 2016). The literature review then draws on multiple case studies conducted in America to demonstrate the growing interest in civic technology to bridge the gap between service providers and the communities in which they operate. There is, however, little exploration of the use of civic technologies in public health.

Further supporting the context of the research, a rich description of the current breastfeeding status of the UK is provided. This work highlights breastfeeding as a public health priority and the current provision of services by public health as part of the local authority. Challenges and opportunities are noted given the recent cuts to funding and therefore service provision. The shortfall of breastfeeding support lends itself perfectly for framing the use of FeedFinder in this space.

Chapter 3 - Methodology – Outlined here are the research design decisions and rationale for using an action research driven, mixed methods approach. Quantitative methods were used to analyse the data from FeedFinder (Chapter 4)

Qualitative methods were used to gain subjective knowledge from the multiple stakeholders involved, in Chapter 5, 6 and 7. This Chapter draws on methods from both disciplines and describes the epistemological perspective of adopting a pragmatic approach to the research that is focussed not on one type of method or theory but instead, uses the most appropriate approach at that time.

There is emphasis on the engagement of key stakeholders in the research from the outset and how this draws from the action research and participatory design literature.

Chapter 4 – Understanding the FeedFinder Data – this Chapter begins by situating the understanding of FeedFinder in relation to other civic technologies. A survey of FeedFinder users was conducted to capture demographic data, motivation and patterns of usage. The findings from the analysis provide a rich picture of the type of user FeedFinder attracts, and this information can be used to compare with the characteristics of FeedFinder users with women breastfeeding in the UK, and map

against the Index of Multiple Deprivation (IMD). Further analysis was conducted on the FeedFinder review data to demonstrate the geographic profile of the venues mapped against IMD and a content analysis provides information on the factors considered important for meeting women's breastfeeding needs when in public. This work was published in BMJ Open, (Simpson *et al.*, 2016). This Chapter concludes with a discussion on the implications for public health services and how FeedFinder can potentially be used in breastfeeding support before leading to this investigation in Chapter 5.

Chapter 5 – Can FeedFinder be used in breastfeeding support? - Introducing the first qualitative data analysis from the collaboration and investigation into the usefulness of FeedFinder in breastfeeding support. Workshops, interviews, and field notes were collected, and a thematic analysis approach was used to analyse the data. The primary line of inquiry was to determine how the support service could work with the review data and use FeedFinder as a resource in their professional capacity, given they are at the forefront of breastfeeding support in Newcastle. Accessing and unravelling the data proved much more nuanced than simply deciding whether the data would warrant any actions. Outcomes from the analysis provided design recommendations for increasing access to the FeedFinder data. The experiences derived from this investigation were published at the Conference on Human Factors in Computing Systems (Simpson *et al.*, 2017).

Chapter 6 – Development of the FeedFinder website and community breastfeeding policy – this chapter describes in depth the process of using the data collected from FeedFinder and further workshops, and an online survey with breastfeeding mothers to design a community breastfeeding support policy for local public-facing organisations. A scoping review was conducted of available guidelines and policies that are in place across the UK for supporting women when breastfeeding in public. The review included searching websites of Local Authorities and well-known parenting organisations online that would be available resources to the general public and businesses. From this, a new stakeholder involvement occurred at this stage; local public-facing organisations –

Tyne and Wear Archives and Museums (TWAM). It is important to include the viewpoint of those administering the policy, those affected by it and those who will implement and be responsible for adhering to the principles within the policy. The chapter also described the development of the new geo-analytics FeedFinder website which aimed to increase access to the FeedFinder data for breastfeeding support services. The website draws on other publicly available data to generate a rich picture of breastfeeding and health outcomes in the UK.

Chapter 7 – Stakeholder evaluation of the website and community policy - this chapter presents an expert evaluation with 31 stakeholders as part of Fuse – Centre for Translational Research in Public Health. The evaluation presented the research up until the evaluation stage and the public health improvement practitioner presented the context to why the research has been important. Two evaluation activities were included to elicit feedback from the stakeholders on the acceptability of using the website and data in breastfeeding support. The findings indicated the value and potential of the FeedFinder website and community policy for use in breastfeeding support but highlighted some persistent challenges around trust and fear of sharing the data from the website.

Chapter 8 - Discussion – This chapter provides a synthesis of the findings of each preceding chapter in relation to the aims and objectives of the research while outlining the challenges of using FeedFinder in a public health context. The key findings are presented along with the self-reflection of working with multiple stakeholders over the long term. The chapter concludes with recommendations on future directions of the work for breastfeeding support and public health policy, and researchers working in the design of civic technologies.

Chapter 2 Background and Literature Review

2.1 Introduction

Over the last two decades, digital technologies have changed how we experience life in the developed world. Personal and social relationships, education, health, economy and security have all been significantly impacted by technology devices and the expansion of Wi-Fi and, regardless of personal preference, we are increasingly becoming subjects of digital data (Lupton, 2014, 2018). This Chapter seeks to outline the ways in which technology has changed with the landscape and delivery of public health.

This chapter includes a narrative review of relevant literature which was conducted through searching of databases Web of Science, MedLine, Scopus and the ACM Digital Library using key words such as 'citizen data', 'digital civics', 'civic technologies', 'social media', 'social computing' and 'health', 'public health'. The search was conducted at multiple stages throughout the research, starting in 2015 and at 6 monthly intervals until the final search conducted in 2019.

2.2 Strategies to improve public health

Public health strategies and health improvement campaigns attempt to change or moderate people's behaviour for the better. Since 1917, mass media marketing has been used to translate Government policies and strategies into health-related messages telling people what to do, e.g. eat well, and move more, practice safe sex. Campaigns have progressed and evolved with the changes in knowledge, culture and attitudes. For example, smoking was promoted as an integral part of soldier welfare and medical treatment post war up until the 1960s when the detrimental health consequences were realised (Public Health England, 2017). Attempts to spread the health-related messages began with static one-way delivery of information through print advertising, radio broadcasting and TV advertising up to the 21st century when campaigns became multi-

faceted programmes. As the campaigns progressed, they encouraged involvement and participation from multiple organisations and the public and in some cases having a huge impact on the living environment, e.g. bringing in the smoke free legislation. Public Health England is an agency of the Department of Health responsible for improving health and wellbeing of the population (Public Health England, 2013) and since it was established in 2013, much of the public health promotion effort has focused on encouraging children and young people to 'start on the right foot' (Public Health England, 2017). Change4Life, for example, is a social marketing campaign that has developed along with society over the last ten years. A sub-campaign of Change4Life is Start4Life which includes pregnancy and birth health related content which promotes breastfeeding as the optimum for infant feeding. Using distinct brightly coloured and creative branding and material, Change4Life has progressed through static multi-media campaigns to developing a 'novel' mobile application that enables food bar code scanning and suggested swaps based on nutrition information. A recent evaluation of the short-term impact of the application found a positive effect on food choice, although the longer term impact on food choice is unknown (Wrieden and Levy, 2016). The use and understanding of technologies in public health is a key interest among public health and HCI researchers.

The use of 'novel' technologies in public health can potentially fall subject to the 'novelty effect' before any longer-term impact can be realised. Novelty effect can be described as a spike in performance or change in behaviour for the better by an introduction of a new technology (Balestrini, Rogers and Marshall, 2015). The initial interest in the technology is responsible for the positive behaviour change but once the novelty has worn off, behaviour reverts back to habitual or 'normal'. This has also been reported about campaigns more generally, where once the 'wow factor' of the campaign had subsided people will tend to revert back to their original behaviour (Xiem, 2009). Despite the novelty effect risk, the development of behaviour change apps in public health and human computer interaction continues to increase (Buhi *et al.*, 2013; de Korte *et al.*, 2018; Pinder *et al.*, 2018; Short *et al.*, 2018; McKay *et al.*, 2019). Still an

emerging field, there is no single best practice method for evaluating mobile health apps (McKay *et al.*, 2018). However, most research is concerned with the health outcomes, less often focussed on the functionality and usability of an application and very rarely considers the lived experience of using apps to improve or manage health (Nunes *et al.*, 2015). A reason for this could be because mobile apps described and evaluated in the published literature rarely progress further than the research project, and so fail to gain much traction in 'real-world' environments that are already overwhelmed with other consumer technologies (Odom *et al.*, 2016; Bindhim, McGeechan and Trevena, 2018). Other research has also shown that the effectiveness of public health media campaigns and interventions are often difficult to measure given the complexities of everyday life, health behaviours and the inability to conduct robust randomised control trials in this context. Evaluations that have been carried out typically note an increase of awareness and short-term behaviour change or impact on health, but few are able to measure impact on health outcomes over the long term.

FeedFinder is an example of a supportive health technology that focuses, not on changing behaviour as such, but rather providing an opportunity for women to make the decision to breastfeed if their social environment allows (Balaam *et al.*, 2015). What is different about FeedFinder compared with most other public health applications is the way in which women are able to see for themselves, from the experiences of other women, how their community responds to breastfeeding. Rather than focussing on individuals' change or altering the environment, FeedFinder provides a tool for women to understand and affect change themselves; advocating for better, more inclusive public breastfeeding. This can be likened to other technology applications that support health promotion through activism. Through an activist lens, Parker *et al* (2012) discuss how digital technologies can disrupt power relations and social inequalities when communities take charge of their own health and wellbeing. Community Mosaic (a social media platform with text message input to a digital screen in local YMCA, Atlanta), was designed and developed for use by communities in areas of high deprivation to connect to one another by sharing of experiences and culturally relevant ideas relating to healthy

eating on a budget (Parker *et al.*, 2012). Other examples of health activism using technology include work by Talhouk et al (2017) who examined technology for improving access to healthcare services and providing autonomy and agency to refugees by increasing control of interactions with providers of healthcare (Talhouk *et al.*, 2017, 2018). More recent work, in line with the Repeal the 8th and abortion rights campaign in Ireland, Michie (2018) highlighted the role of technology in raising awareness, encouraging dialogue and mobilising communities to take action (Michie *et al.*, 2018).

FeedFinder presents an opportunity to understand how citizen-generated data and civic technologies might implicitly be used to advocate for positive health communities through informing policy and public health practice. There is an untapped opportunity to look at localised experiences of women in different social contexts and explore how this might be used to influence public health service provision. Specially designed and developed technologies to encourage dialogue between citizens and public service providers is discussed in more detail in the section 2.3.2 Civic Technologies.

2.3 Overview of technology use in public health

In the landscape of public health, modern technology is having a profound impact on how public health professionals and researchers conduct their work, for example in crisis mapping, disease surveillance, health promotion etc. For some, technology proposes a panacea for many of the healthcare, medical and public health challenges we face (Lupton, 2018) but given the rate at which technology develops, it is difficult to keep track of all the ways in which technology has been utilised in public health.

Moving away from government strategies and campaigns, in the early days of technology usage, the development of the internet provided an opportunity for medical professionals to directly relay information to the general public. Following on from this, people living with health conditions began documenting their experiences online through blogs, creating message boards and forums where people like them could share

and connect, but most often these groups were closed off to the rest of the world (Lupton, 2018). In 2004, the term 'web 2.0' offered a new dimension of the internet, where a much more social and interactive series of web technologies were actualised including social media platforms (e.g. Facebook, Twitter), digital media (e.g. Flickr, YouTube) Wikipedia and geo-locational applications (e.g. TripAdvisor, Foursquare). Fuelled by individual's desire to connect to one another, web 2.0 has aided in a "liberation of data with crowd-sourced collective information' (Stephens, 2013) where user-generated content is created and distributed for others to consume. Such advancements are proposed to support a more participatory approach to public health and those working in this field have coined the term 'Public Health 2.0' (Hardey, 2008; Wilson and Keelan, 2009; Ritzer and Jurgenson, 2010). Not only do these platforms/technologies allow users to connect with one another, but they also provide an opportunity for 'expert' communication of health-related knowledge, for example in health promotion campaigns and interventions. Some examples include text and email services for health promotion and prevention (Buhi *et al.*, 2013; Lee *et al.*, 2014), social media websites and mobile apps used for 'nudging' health behaviour change (Chou *et al.*, 2009; Korda and Itani, 2013), social media for disease outbreak surveillance, e.g. Twitter for monitoring cancer and influenza (Signorini, Segre and Polgreen, 2011; Lee, Agrawal and Choudhary, 2013; Sinnenberg *et al.*, 2017) and advocating the use of self-tracking and sensor technologies in public health practice (Swan, 2012, 2013; Wiederhold, 2012). This can present challenges for public health institutions; putting information out there that juxtaposes expert advice against critics and conspiracy theorists alike. An example of this is anti-vaccination theorists who have used multiple social media platforms (e.g. YouTube, Facebook, and Twitter) to crusade against medical and public health professionals. Dubbed the 'anti-vaccination movement', digital media has played a crucial role in sensationalising vaccine objections where scientific debate on the potential risk of vaccines has encouraged a rhetoric of doubt (Kata, 2010, 2012). Parents go on to share their own experiences with one another and through an echo chamber effect, views become heavily polarized. A recent study quantifying the engagement of both pro-vaccinator and anti-vaccinators on Facebook demonstrated members of both

groups only consume information that aligns with their beliefs (Chiou and Tucker, 2018; Schmidt *et al.*, 2018). The evolution of anti-vaccinators over time has increased at a much faster rate than pro-vaccinators, harnessing the internet to enable any and all unfiltered and misinformed opinions to spread instantaneously (Davies, Chapman and Leask, 2002; Kata, 2012). The polarisation of opinion online presents challenges for those working in public health protection where concerted efforts to inform people who are against vaccinations, and ultimately change their perspective are usually consumed by those who are already pro-vaccines, that is, the echo-chamber effect. Targeting the lay public with misinformed health-related information, is not only detrimental to the health of the population, as seen with the recent rise in measles outbreak due to anti-vaccination increase, (UK Government, 2018) but also undermines the trust between health professionals and the public (Wilson and Keelan, 2009; Schmidt *et al.*, 2018). Other research has also indicated a lack of trust as a barrier to accepting mHealth or data based initiatives from some health professionals (Wicklund, 2016).

Online health communities (OHC's) are now an established environment online where people connect over common, shared interests and purposes relating to health. People use multiple online channels (e.g. blogs, forums, chats, social media, virtual environments) where connections can be made with others who have similar or more experience in dealing with relevant health concerns and conditions and though the use of professional websites and online discussion forums are still in their plenty, they are now heavily replaced by social media platforms. People living with, or caring for persons with a condition, whether it be a common chronic condition, or rare, genetic disorder that affects a minority, social media platforms are a way to connect with other, similar people. Some online spaces allow people to communicate anonymously and allow the sharing of information that they might feel embarrassed to discuss in person, but also enables them to reciprocate the support they receive (Hwang *et al.*, 2010; Newman *et al.*, 2011). Online groups and communities are of particular importance to those living with or caring for a person with a rare condition, where local, in person, support groups are not possible due to the geographic dispersal of people living with the condition

(MacLeod, 2016; Macleod *et al.*, 2017). PatientsLikeMe (Patients Like Me, 2019), is an example of a successful online social media platform that connects patients to one another. Since the launch, over 650,000 patients have connected worldwide with over 2900 individual conditions registered. The platform began as a bottom up movement from a family with one brother suffering from a progressive disease of the nervous system, Amyotrophic lateral sclerosis (ALS). Two brothers, when searching for information online, discovered that the one thing missing was others' experiences of dealing with the condition. PatientsLikeMe provides an opportunity to construct new knowledge about conditions based on real world experiences and outcomes shared. It fosters a democratic health system where an added rich layer of data from the lived experience from patients enables health professionals, and other patients to review information, enhance their own knowledge and support better communication with one another (Frost *et al.*, 2008; Wicks *et al.*, 2010; Madathil *et al.*, 2015; Eichler *et al.*, 2016).

Despite the growing trend in PatientsLikeMe and other platforms that aim to democratise health, some medical professionals still have reservations regarding the accuracy of the data shared. Clinicians have reported on the additional risk of engaging with inaccurate and misleading data leading to further complications or psychological stress while evidence of the medical outcomes of participating in online communities is sparse (Eysenbach *et al.*, 2004; Wicks *et al.*, 2010). In addition, people who connect through online platforms such as PatientsLikeMe and other online health community platforms might not be representative of the population living with the condition. People who are not health or digitally literate or lack the capacity/resource to access the internet through mobile or home devices regularly may be at risk of further marginalisation and increasing health inequalities. The benefits of using online health communities may only be experienced by those willing and able, and engaged online. At present, there appears to be a lack of research in this area to inform the mitigation of harm, despite its substantial growth over the last decade. Further still, there is little research looking at how data presented online is used offline, that is, how it is used by people or translated into a useful resource for patient-clinician communication, or how

it impacts on service provision or decision making in healthcare. There has been an increased interest in using moderated health related social media sites, though there is rarely any information on how the sites are moderated and who by (Eysenbach *et al.*, 2004; Eysenbach, 2008) and research investigating the use of user-generated data from online health communities to make decisions in health practice is scarce.

2.3.1 Citizen data in public health

The following sections draw on literature to explore the potential for using citizen-generated data in public health including citizen science, big (open) data, and civic technologies.

2.3.1.1 Citizen Science in public health

Citizen science is a term used to describe a range of ideas but is mostly associated with public engagement in scientific discourse, research activities, data collection and analysis to contribute scientific knowledge innovation. Citizen science as a field recognises the valuable contribution active members of the public can make to scientific discovery. Adding in opinion, experience or expertise from citizens to a project allows researchers to include multiple perspectives from a wider scope of people beyond the research project, enhancing the understanding and literacy of science while improving trust in science discovery. Furthermore, researchers are able to garner an understanding of patient and public perspectives, informing research and policy decisions (Simmons, 2018). There are different forms of collaboration that can be considered citizen science, and these might include crowdsourcing or volunteered geographic information (VGI). In crowdsourcing type projects, the 'crowd' are usually paid for completing a certain number of micro tasks, whereas in citizen science projects, the contributors are not paid but they usually have a vested interest in the topic of the project and contribute voluntarily. Though there are distinctions, the lines between them are often blurred. When considered part of the 'crowdsourcing' movement, multiple members of the public can make small contributions that can equate to a large effort overall (Strang and

Simmons, 2018). The concept of public participation in science research and citizen science is not new. In 1890, the 'Cooperative Observer Program' was launched to aid climate studies and detect meteorological changes in real time (Garbarino and Mason, 2016). Today, Zooniverse⁴ is the largest example of citizen science in action, running multiple simultaneous science projects that the public can contribute to. With a community of over a million people worldwide, projects range from identifying cyclones through to crowdsourcing cancer pathology (Candido Dos Reis *et al.*, 2015; Raddick, Prather and Wallace, 2019). Other platforms have since emerged which enable citizens to be involved in systematic reviews such as Cochrane Crowd⁵, where members of the public are asked to contribute to categorising healthcare evidence. An evaluation of the platform showed that the crowd performed accurately and had 99% agreement when compared with performance of a systematic reviewer and information specialist (Strang and Simmons, 2018).

In Volunteered Geographic Information (VGI) projects citizen contribute geographic data through digital devices. The contribution of such data has been used extensively in environmental health projects but there is an increasing interest in the use of VGI in health research/projects. OpenStreetMap⁶ is the largest VGI platform currently with almost 6,000,000 users worldwide and as there are no limitations on map attributes, contributors can assign their own or use pre-defined ontologies. Some contributors have added health information to the map, tagging locations for healthcare, doctor, pharmacist hospital, dentist, and emergency (Mooney, Corcoran and Ciepluch, no date; Kamel Boulos *et al.*, 2011).

⁴ <https://www.zooniverse.org/>

⁵ <https://crowd.cochrane.org>

⁶ <https://www.openstreetmap.org/>

2.3.1.2 Big Data in public health

There is a utopian ideal that big data can vastly improve healthcare, public health policy and practice (Lupton, 2018). The ubiquity of mobile phones and embedded sensors provides an opportunity to collect highly detailed information in real time while enabling the aggregation of data either on one person over an extended time period, join multiple data points together from different individuals, or join sets of data from many groups of people while making the data readily available for retrieval by those who are interested/require it. Healthcare providers are increasingly digital, storing demographic and health related information electronically for people accessing the services.

The general view is the bringing together of large diverse data sets helps to understand groups of the population, enhancing understanding and contributing to knowledge around health but there has been little exploration of this in practice.

Content analyses of social media interactions online have contributed an understanding of health and medical material that people share concerns or health-related behaviours about. Twitter is often favoured as a tool to mine data from as people are considered more open and candid in their tweets (Reddy, 2015), it can often involve opinion and discussion from lay people and health professionals, and it provides a higher volume of real-time data where researchers have been able to obtain extremely large datasets - even up to a million tweets (Lupton, 2018).

Research on Twitter use in health is extensive and spans different health-related topics e.g. whether the incidence of health and disease correlates with what social media users share online (Weeg *et al.*, 2015) and what type of personal health issues are shared online (Yin *et al.*, 2015). Twitter has also been used in public health for disease surveillance along with search engine queries to distinguish epidemics of disease (Salathé, 2018). HealthMap⁷, see Figure 2, is a platform that encourages people to contribute their illness, while drawing from other online informal sources, e.g. search

⁷ <https://healthmap.org/en/>

engines, blogs, social media posts as a way to monitor disease out-breaks and provide surveillance of 'real-time' public health threats. Platforms like HealthMap draw on open datasets that are considered publicly available and free for everyone to use.

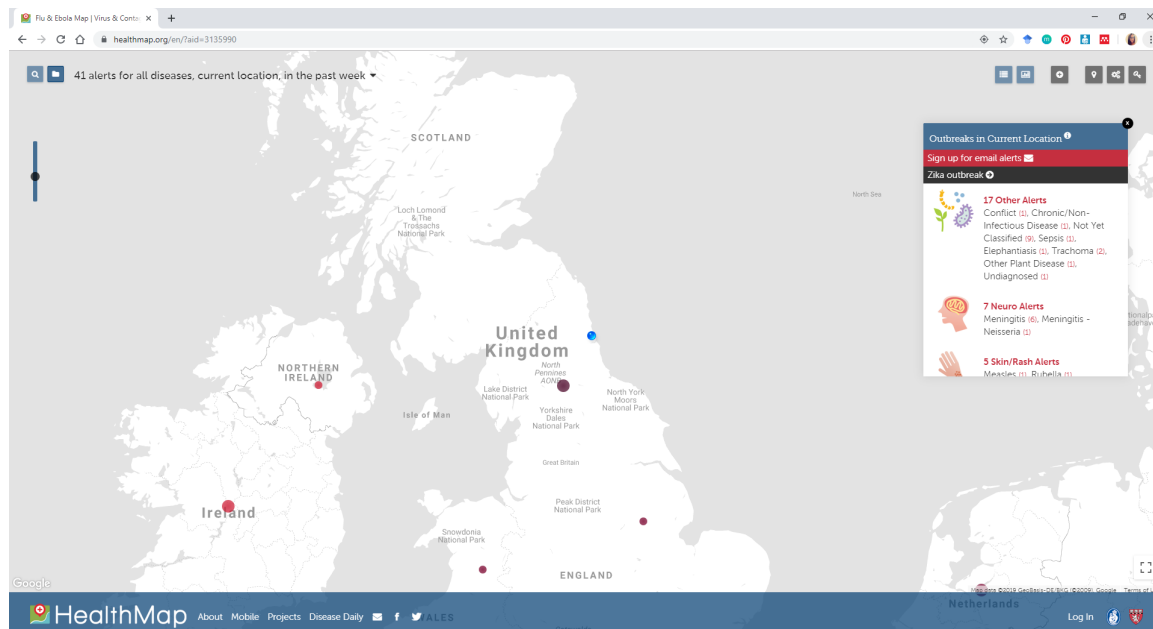


Figure 2 HealthMap landing page. Geolocated and presented shared illnesses present within locale (North East of England, UK)

2.3.1.3 Open Data

Open Data are the term used to categorise all publicly available data, where publicly available simply refers to the data being out there and free for everyone to use.

However, the term 'open data' implies that the data are not only publicly available, but it is accessible for all, which is not the case. Data may be publicly available but presents significant limitations for those who do not possess the skills required to use, analyse and understand raw data files and measuring openness by the volume of data available fails to address the realities of the data not actually being usable unless they have data processing skills (Asad and Le Dantec, 2017; Puussaar *et al.*, 2018) and relying on people with particular expertise is not always possible.

Some researchers have begun to design tools that make it easier for people to access, interpret, and make sense of data, other than the professionals who create the data or

are trained in data science or analytics (Puusaar *et al.*, 2018). Across different civic-related contexts, data driven technologies are being developed to provide platforms that foster collaboration between civic institutions and communities and as a result provide a data resource that can be used and repurposed (Boehner and Disalvo, 2016; Golsteijn *et al.*, 2016; Puusaar *et al.*, 2018). In the work that has been done thus far in data-driven technologies, communities and people are connected through place, which could be a street, neighbourhood, village, town, or city. People in communities come together to voice concerns and issues that collectively can be used to advocate for changes and improvements through the sharing of data.

Research by Hughes *et al* (2016) noted that aggregating data collected from patients supports the management of population health. The use of geospatial data with a combination of patient data from electronic health records, census data, and IMD can predict, prevent and manage resources for improving population health, especially at the local authority level. In the US, the combination of multiple data sources has been acknowledged in a way to inform the delivery of services that are stepping away from traditional health care levers by incorporating data from the neighbourhood and are referred to as 'community vital signs' (Hughes *et al.*, 2016). Hughes *et al* (2016) have called for a streamlined technological process that formats pre-existing data sets, combining geocoded neighbourhood data with electronic health record data. In doing so, the burden to service providers would potentially be reduced while optimising administrative duties and enabling comparisons across practices.

Learning health systems is a term used to describe a similar approach to managing and improving population health through data analytics (Friedman, Wong and Blumenthal, 2010; Friedman, Rubin and Sullivan, 2017; NHS Digital, 2019). Utilising multiple data sets and analysis processes, the concept of learning health systems and learning cycles describes an evolutionary process of 'infrastructure co-production' where multiple stakeholders are involved in the contribution of data that is used for reflection and learning about different health related practices at the local, regional or national levels.

Taking a person-focussed approach, the 'learning health system' would combine data from the care experience but also draw on geospatial data and data addressing the social determinants of health. These type of 'big data' systems that incorporate multiple data sources are a way to foster better relationships with stakeholders, across services and sectors, to enable a more proficient way of working together while drawing on the lived experiences of the people at the very centre of their care. The co-produced data can be used to influence policy making, generate reports, and improve the health and wellbeing of the population, while hopefully being as transparent and open as possible. This drive for using open data for the common good is still in its infancy, but certainly on the rise. Digital civics type projects in recent years have begun focussing on ways to develop open data systems that integrate multiple open data sets, while making it easier for citizens to interpret and understand (Balestrini *et al.*, 2017; Puussaar *et al.*, 2018). Recent work by Puussaar et al (2018) has focussed primarily on developing systems for place-making and community building where the benefit of using such systems in the context of public health also seems promising.

There are public health data systems out there which are useful for surveillance measures if you work in public health improvement, research or policy, e.g. Fingertips⁸ from Public Health England. However, at present there is no public health data system that incorporates citizen-generated data with open data sets from the government, or provides data that might be useful for multiple stakeholders and can be interpreted and managed easily by many, not just data analysts acting as an intermediary in health contexts. NHS Digital for example are striving for a 'learning health system' type model that brings together all health related data points to facilitate decision making in the healthcare process, though the complexities of developing such systems are noted (Friedman, Wong and Blumenthal, 2010; Friedman, Rubin and Sullivan, 2017; NHS Digital, 2019).

⁸ <https://fingertips.phe.org.uk/>

2.3.2 Civic technologies

Under the guise of ‘civic technologies’, ‘civic tech’, ‘digital civics’, and ‘citizen sensing’, digital technologies are designed to mediate participation and engagement between citizens and local government. Independently, the interest in ‘civics’ and ‘technology’ has been long standing in the field of HCI but the concept of ‘civic tech’, is relatively new (Olivier and Wright, 2015; Boehner and DiSalvo, 2016; Vlachokyriakos, Crivellaro, Le Dantec, Gordon, Wright and Olivier, 2016).

Recent technology advancements make it easier to participate in data-driven service delivery, supporting deliberative democracy and equity through the use of interactive systems and collaborative efforts with civic institutions (Vlachokyriakos, Crivellaro, Le Dantec, Gordon, Wright and Olivier, 2016). Described as part of a digital civics’ initiative, this shift in participation becomes a much more relational endeavour, providing an opportunity for citizens to be active players in the design of local services and provisions. Acting as agents of change, citizens are able to participate in the process of defining their everyday problems and negotiating localised solutions. Given the current economic climate and reduced funding for local government and their services, the potential of involving local citizens could result in the sustainability of services longer term. Within the context of HCI and civic technology research, the formation of ‘publics’ has been used several times to describe a group of people coming together to form a collective voice around a connected issue (DiSalvo, Maki and Martin, 2007; DiSalvo, 2009; Le Dantec *et al.*, 2011; Le Dantec, 2012; Le Dantec and DiSalvo, 2013; Asad and Le Dantec, 2017; Balestrini *et al.*, 2017). Drawing on Dewey’s notion of ‘publics’ from his seminal work in the early 20th century, DiSalvo describes the construction of ‘publics’ as a form of civic advocacy –

“the public is an entity brought into being through issues for the purpose of contending with these issues in their current state and in anticipation of the future consequences of

these issues...the public consists of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for” (Dewey, 1927; DiSalvo, 2009)

This theory of constructing publics has also been used in social science research whereby for example, the formation of ‘intimate mothering publics’ is used to characterise the women coming together to support one another in the transition to first time motherhood (Johnson, 2015a).

In technology design, one might consider how to design for the formation of ‘publics’ where technology provides an easy way for civic advocacy to take place through fostering citizen engagement and collective action. Much of the work that has materialised since the earlier writings of DiSalvo considered the notion of ‘publics’ in the design of civic technology, though some research has explored the use of current, publicly available platforms such as Facebook to investigate the formation of publics for addressing local concerns, and triggering social movements. Crivellaro et al (2014), conducted an empirical analysis of Facebook data where local residents had come together to contest the planning application of a derelict outdoor pool in a local seaside town, Tynemouth. The authors describe how the functionalities of Facebook were utilised to provide a tool for political discussion and action. In a health context, technologies have provided an opportunity for local communities to advocate for social change by disrupting power relations between service providers and service users.

Community Mosaic (CM) (Parker *et al.*, 2012) is another example of a technology that helped to facilitate activism in a community considered highly affected by the social determinants of health, but in Georgia, Atlanta. CM was designed to help community members encourage one another in their local community to promote healthier eating practices by sharing their experiences and how they have been able to adopt a healthier way of living which would be locally, and culturally relevant to the African American community. The technology was a situated display in a local YMCA community centre

connected to members of the community through touch and a text messaging service. The project provided a platform to encourage dialogue between members of a community who typically experience a disproportionate amount of diet-related health problems. Through challenging the status quo, CM helped the local community to reject the cultural and environmental barriers to living a healthy lifestyle and opens up a dialogue on how to provide opportunities for citizens to engage in and manage matters of their own health, taking a more collectivist approach rather than focussing on the individual. Mobilizing communities to bring about social change through the medium of technology is promising and there is great potential for public health institutional workers to leverage the data generated by communities to facilitate a change in their service provision, making it more localised and relevant. Moreover, citizen sensing technologies are able to contribute to the development of smart cities/towns and through data analysis can facilitate the understanding of resource consumption, economic activity and human behaviour within a city. Pertaining to the digital civics' agenda however, reconnecting citizens through place and allowing them to explore and understand the data in relation to their localised context strengthens the relationship between local government and local citizens. In doing so, trust between citizens and local governments may be regained.

Bottom up strategies that view citizens as active change agents for their environment are becoming increasingly acknowledged as a potential driver to improve public health (Laverack, 2000; Maziak and Ward, 2009; Parker *et al.*, 2012; Huang, Cawley and Ashe, 2015). Recent work called for a shift in the conventional delivery of public health interventions whereby people are treated as passive recipients of information, to a much more collaborative and active effort (Huang, Cawley and Ashe, 2015; Roberto, Swinburn and Hawkes, 2015). The data that is available through FeedFinder (the rating of venues and text reviews) provide an opportunity to investigate how this data might be used in a public health setting for service delivery in breastfeeding support.

2.4 FeedFinder

This section describes FeedFinder in more detail; how the application was developed and how it works in principle to provide some context to the thesis and overall research.

A free location-based review mobile application deployed on both Android and iOS, FeedFinder has been deployed 'in-the-wild' since 2013. Typically, this involves allowing a technology to be used and evaluated in 'everyday living' conditions with minimal constraints (Rogers and Marshall, 2017). Since the launch, the application has been downloaded and an account registered over 14,000 times and mapping and reviewing over 5000 venues and reviews in the UK (June 2019). Through word of mouth, the application usage has spread both nationally and internationally, with reviews for venues now seen across USA, Asia and Australia. All of the content within the application has been input by the users of FeedFinder.

The development of FeedFinder followed a user-centred design approach with new mothers. The process was iterative, involving breastfeeding mothers in each stage of the process from initial exploratory interviews and design workshops through to generative ideation, low fidelity prototype testing and finally adding content to the final mobile app. The design process is further described in Balaam *et al.*, 2015. The criteria within the location-based review application was chosen with breastfeeding women to represent the needs of women when breastfeeding in public; comfort, hygiene, privacy and baby facilities. Figure 3 shows the application open at four different stages as seen by the user. Initially, a promotional website was hosted alongside the application containing research information, contact details of the primary investigator, and an interface that shows the number of reviews on a map. The application was publicised on

local news channels in the North East of England and in 2016 was nominated for a Rosalind Franklin Appathon award that recognises apps for social good.⁹

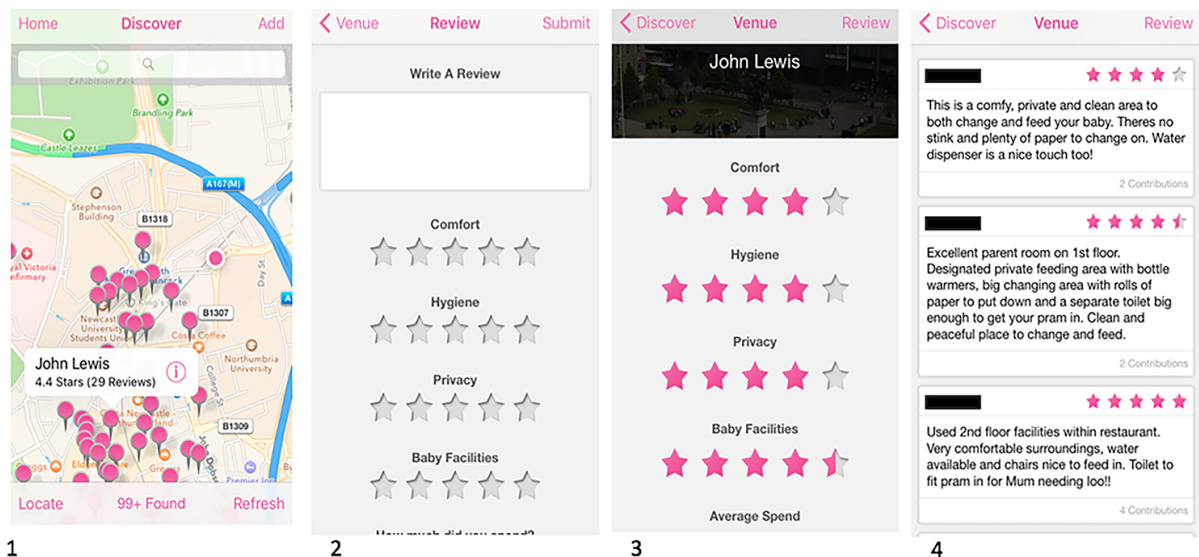


Figure 3 FeedFinder location-based review application. ¹ Opening screen showing GPS located map – typically presents where the user is located, but a user is also able to search for a different location. ² Adding a review to a venue – free text entry, star rating out of 5 for each of the chosen criteria ³ John Lewis average review scores ⁴ John Lewis free text-based reviews.

2.4.1 How FeedFinder works

Registering an account on the application enables the user to access all functionality. To register, users are required to input an email and password. At this stage, no further information is required to register – a decision made to reduce barriers to usage and a key functionality requested by the women who took part in the initial design workshops.

⁹ Rosalind Franklin Appathon Awards; recognising women in STEM research.

<https://www.i-sense.org.uk/events/all/rosalind-franklin-appathon-prize-and-tech-day-2016>

Searching for a venue close by – upon opening the application, the user is presented with the number of venues within the area of map presented as their location according to GPS, e.g. 99 venues found, Figure 3. A user can search for a venue or location using the text box provided. If the user finds the venue already exists, selecting the drop pin will take the user to a venue landing page within the app. The venue information includes descriptors pulled from Foursquare¹⁰ - a location based social networking site and application that uses crowdsourced data to identify buildings, businesses and attractions)(Foursquare, 2017). Foursquare data includes name, address, any images and then from FeedFinder data - the average star rating for each of the criteria; comfort, hygiene, privacy and baby facilities, as well as any text reviews that have been contributed by the users. If a new venue is to be added, the user is able to add a drop pin at the location of the venue and subsequently leave a review. To encourage reviews, when a user adds a new venue, they are not able to confirm and add to the map until it has been reviewed.

2.5 Breastfeeding

Breastfeeding is considered the optimal feeding method for mother and infant following birth and the health benefits are realised across low, middle- and high-income countries (WHO, 2015). Close to the top of the global public health agenda, breastfeeding is considered vital in reducing infant mortality of more than 800,000 babies each year (Victora *et al.*, 2016; UNICEF, 2017). Exclusive breastfeeding (only feeding an infant breastmilk – with no substitute or top-up from formula) is recommended by the World Health Organisation (WHO) until at least 6 months, followed by the addition of complimentary foods (solids) alongside breastmilk up until 2 years of age (WHO, 2015). Unfortunately, despite being one of the richest countries in the world, the UK has some of the lowest breastfeeding rates worldwide. The most recent data available show that while a high proportion of women initiate breastfeeding at birth (75%), by the 6-8 week

¹⁰ Foursquare – - (<https://foursquare.com/>)

check-up, less than 1% are exclusively breastfeeding and only 34% given any breastmilk at all (Public Health England, 2016).

2.5.1.1 Health, economic and societal implications of breastfeeding

There has been a wealth of research conducted on the benefits of breastmilk and effects of breastfeeding on health, for both infant and mother and over both the short and long term. Infants who are breastfed are much less likely to attend hospital for any illness (Kramer, 2010), and less likely to suffer respiratory, ear or gastrointestinal problems (Horta and Victora, 2013). The risk of non-communicable diseases is reduced by 13% for obesity and 35% for diabetes in adults who were breastfed (Gunderson, 2008; Rito *et al.*, 2019). Studies comparing cognitive ability and development indicate a slight advantage for those children who had been breastfed; associations between intelligence tests and breastfeeding consistently associate breastfeeding with a higher performance (Victora *et al.*, 2016). However, there are a number of potentially confounding factors in these associations, for example it is probable that women with higher levels of education are more likely to breastfeed their infants and do so for longer and therefore this could be a contributing factor to the recorded intelligence of the children (Brown, 2016).

In mothers, it is reported that longer duration of breastfeeding helps to reduce the risk of breast cancer. According to a study that synthesised results from 47 different epidemiological studies, the cases of breast cancer in developed countries would reduce by an estimated 11% (50000 cases) annually if women had two children and they were breastfed for 18 months each, if women breastfed each baby for 6 months each, this estimate would be 5% (25000 cases) (Beral *et al.*, 2002). The risk of ovarian cancer is also reduced by 30% following longer periods of breastfeeding, though when adjusted for socio-economic profile and parity, this risk reduces to 18% (Victora *et al.*, 2016).

Maternal depression appears to be lower in mothers who breastfeed though it might also be considered that depression can affect the act of breastfeeding. In contrast,

failure to breastfeed could also lead to a mother experiences maternal depression (Dias and Figueiredo, 2014).

Economically, it is proposed that the NHS could save at least £40 million per year if breastfeeding rates increased in the UK (NHS, 2014) as well as boosting economy for example, by reduced leave for parents through fewer illnesses in babies in the UK. For example, a study conducted in 2015 discussed the economic implications of supporting exclusive breastfeeding mothers at 1 week to continue to breastfeed until 4 months, would save £11million. If the number of women who breastfeed from 7-18months were to double, this would save an extra 21million and if neonatally the number of babies received breastmilk increased from 35% to 75%, this would save another £6million. The authors compare the suggested increased rates as achievable given that in other countries such as Norway or Sweden 80% and 68% of babies are exclusively breastfed at 6 months respectively (Pokhrel *et al.*, 2015). This is also recognised globally as UNICEF report that tens of thousands fewer sick babies would be admitted to hospital if breastfeeding was the optimal feeding method over formula (UNICEF, 2017).

Despite the huge health and economic benefits of breastfeeding seen across the globe, there are multiple barriers that prevent or cut short breastfeeding.

It is reported that in the UK that 9 out of 10 women stop breastfeeding before they want to (Public Health England, 2015) and while we have come a long way in the last two decades, women still feel uncomfortable breastfeeding in public. Public Health England reported in 2015 that of the women who shy away from breastfeeding, two thirds do so for fear of doing it in public. The women surveyed as part of Public Health England report proceeded to describe the difficulties of finding a safe place to breastfeed when out and about in public. Women often arrange their day such that they remain close to home or to designated lactation rooms, to avoid having to nurse in public (Scott and Mostyn, 2003). Many qualitative studies have highlighted the reasons and experiences of women who breastfeed and who choose not to breastfeed or stop breastfeeding before recommended (Boyer, 2011; Fox, McMullen and Newburn, 2015). Some reasons

for not breastfeeding or continuing to breastfeed include lack of both family and social support, not wanting to breastfeed in public and or experiencing pain or discomfort.

When breastfeeding in public stories are shared, it is often highlighting and describing negativity from the general public or organisations (The Guardian, 2008, 2014). Many online and print media stories have highlighted high profile cases whereby women have been made to stop or cover up when breastfeeding in public. For example, in 2014 in high-end Claridge's Hotel restaurant in London, UK a woman was handed a napkin by a waiter and asked to cover up whilst breastfeeding during Christmas tea service (The Guardian, 2014). The Guardian newspaper reported the story, and UKIP leader of the time Nigel Farage commented on the story, also supporting the notion that women should feed discreetly when out in public. Claridge's responded to the media by stating it is their company policy that women who breastfeed must cover up when doing so. This emphasis on feeding discreetly and privately has made some women feel exposed when breastfeeding in public and one of the reasons why they choose not to do so (Callaghan and Lazard, 2012).

A shift in cultural norms is needed for women to feel more relaxed to feed in a public place (Boyer, 2010). Breastfeeding is heavily affected by culture and the sexualisation of women's breasts is just one of the many reasons why the public perceive bottle feeding to be more acceptable than breastfeeding in public (Sayers, 2014). In the UK, and other western societies the sexual connotations associated with the breast have overshadowed the biology and therefore the primary function of the breasts as an organ to nourish our young. Breastfeeding can often be considered intimate and personal and therefore not fit for public consumption (Boyer, 2010). Media campaigns such as those ran daily by tabloids i.e. The Sun, Daily Sport, etc. have often ignited and supported the belief that breasts are a sexual object to be admired and objects of the male gaze. It is not often that a woman's breasts would be portrayed in the media, either print or TV in a non-sexual way (Brown, 2016).

With the opportunity to leave anonymous opinions online, it is not difficult to get a snapshot of how some members of the general population respond to breastfeeding in public, for example it is easy to check the comments section on an article depicting a breastfeeding celebrity. For example, supermodel Candice Swanepoel was ‘caught’ pictured breastfeeding her infant on a modelling shoot by the tabloid newspaper the Daily Mail – seemingly not at all aware that she was being ‘photographed’. Underneath the images, a barrage of abuse and explicit comments from the public were contained in the comments section, see Figure 4

This type of response, seen in Figure 4 could be down to a particular readership or a dislike to a certain celebrity, or mindless ‘trolling’. However, it highlights that breastfeeding continues to be a social issue.



Figure 4 Image of Candice Swanepoel breastfeeding in the Daily Mail and some comments taken from underneath the article.

2.6 Supporting infant feeding practices at the local level

This section provides an overview of the support that is provided by public health services in local government for women who choose to breastfeed.

In 2013, local government in England took on the public health responsibilities previously held within the services of the National Health Service (NHS). This new era of service delivery aimed to embed public health function into all activities to create a localised public health system based on localised evidence and democratic accountability (Department of Health, 2012). A key duty for local authorities in this time was to take the appropriate steps to improving the health of the local community which they serve while reducing health inequalities (Department of Health, 2011). Though the responsibilities outlined did not explicitly incorporate any acknowledgement of promotion breastfeeding, it can be reasonably associated within responsibilities to promote healthy lifestyles, reduce infant mortality and initiatives to tackle obesity (Davies, 2019).

In the UK there are 375 different government councils that operate at different levels depending on the area. Ultimately, councils are responsible for ensuring the wellbeing of residents living in their area and are committed to working with local partners and residents to prioritise the local needs of the populations they serve. Across most of England there are two tiers to local councils; county and district. Providing a range of services, they operate directly or commission outside organisations to work on their behalf. In the North East of England there are 13 different councils responsible for service delivery. The research reported in this thesis was carried out with guidance from three of these councils primarily; Newcastle City Council, Gateshead Council and Northumberland while also connecting to the other remaining councils through strategic regional meetings and dissemination events (described in more detail in chapters 6 and 7).

An integral part of the role of local government in promoting health and wellbeing of the population is the commissioning of infant feeding services. This includes a multi-organisational approach working together across key public health measures, e.g. increase awareness and education of breastfeeding for parents, implementing policies

for improving parent and child health and wellbeing, while reducing the cost to services, reducing health inequalities, reducing childhood overweight and obesity, improved mother-infant relationships and increased life chances for children (Commissioning local infant feeding services: a summary, 2014). Breastfeeding is a top priority for both antenatal and early postnatal services and the infant feeding commissioning statement for the ongoing support for parents and infants across all local authorities states that –

“Women are offered; proactive, ongoing, practical, face to face breastfeeding support and Women know how to access further infant feeding and social support if required e.g. at children’s centres, via peer to peer or specialist support.”

There are 12 key principles for establishing robust support for parents and their infants of which three principles explicitly target continued community support of breastfeeding. Public health services are responsible for maintaining:

“ 5. Women are enabled to continue to breastfeed for as long as they wish, and when required specialist support is available. Women are welcomed to breastfeed in their communities and are supported to continue to breastfeed when out and about

7. All women are equipped with the knowledge to be able to plan their return to work whilst breastfeeding, and businesses, shops and public premises within the local authority welcome breastfeeding women.

10. The local authority monitors and reports investment on services to support, promote and protect breastfeeding.”

While the level of support available across the different local authorities varies (more detail is provided in Chapter 6), the overall ambition is that breastfeeding is normalised and widely accepted across society, supported by everyone, from the general population to public services, outside of the home and returning to work. However, cuts to funding

and service provision have impacted on breastfeeding services, particularly in the local community (The Better Breastfeeding Campaign, 2018; The Guardian, 2018).

The investigation of FeedFinder in this thesis begins to understand whether a civic technology can be used to help local public services achieve their aim.

Chapter 3 Methodology

3.1 Introduction

The previous chapter provided a narrative review of relevant public health and HCI literature, describing the use of technology in public health and highlighting the potential of civic technologies and citizen-generated data to be used in public health service design and delivery. As increasing breastfeeding rates remains a public health priority, and cuts to breastfeeding services continue to rise, this work was well situated to investigate how FeedFinder and the citizen-generated data it can afford might be of potential use to breastfeeding support services. This current chapter describes the research approach that was adopted to achieve the aim of understanding the role of citizen-generated data in public health.

The research undertaken is best viewed by three different strands, see Figure 5, though it is important to note these strands were not carried out independently of one another but overlapped throughout the research. Strand 1 investigated FeedFinder, including an analysis of the review data and survey of users. Strand 2 focussed on investigating whether FeedFinder could be a useful resource for breastfeeding support services. Strand 3 was a user-centred design, development and evaluation of a FeedFinder data analytics website, community breastfeeding policy, poster and informative video in response to the work undertaken in strand 1 and 2. The different strands were necessary for achieving the aim of the research and each strand was driven by assumptions made in action research, whereby a process of reflection and action are used to guide the research process while working closely with service providers and other stakeholders.

3.1.1 Action Research

Originating in education, action research can be described as a strategy of enquiry used to improve the approach or methods associated with social action, policy reform or other systemic changes (Jason, 2004; Kindon *et al.*, 2007). Participatory action research (PAR) has been defined as a collaborative process whereby social change is the goal but learning is considered a vehicle for empowerment and increasing citizen voice. Through a cyclical process of reflection and action, or sometimes described as a hierarchical linear process, the overall aim is to iteratively develop workable solutions to problems outlined while working with a 'host' community, service or organisation. Through the process of co-discovery, theory is tested through practical interventions, reflection and action and ultimately co-generation of evidence-based knowledge (Kindon, S.L., Pain, R. and Kesby, 2007). The founder of PAR, social psychologist Kurt Lewin stressed the importance of actively involving participants and communities in trying to understand and address their complex problems. Frustrated by traditional science methods and its limitations, he developed "comparative research on the conditions and effects of various forms of social action, and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action" (Lewin, 1946, 1948; Minkler, 2000; Wallerstein and Duran, 2006; Hayes, 2011; Stringer, 2013). Cycles of investigation are used to establish effective solutions which combine the complex context in which the investigations take place while attempting to increase efficacy and value of the work carried out by the partners involved and reducing researcher objectivity. The focus of PAR is not to discover generalisable solutions typically seen in traditional research processes in public health, but transferrable localised solutions which can be altered in different contexts. The lack of generalisability has brought much criticism toward this approach among the academic community, while calling out the lack of scientific rigor (Minkler and Wallerstein, 2008; Coghlan and Brydon-Miller, 2014). However, unlike the 'gold standard' randomised control trial (RCT), which aims to discover generalisable explanations related to a specific number of variables, PAR includes the "complex dynamics" of any social context

(Stringer, 2013). A central focus of the response to this criticism is the PAR approach focussing on trustworthiness; a valid and appropriate alternative in this form of scientific inquiry (Hayes, 2011). Speaking to the Digital Civics research agenda, PAR can be used to work with collaborators to co-define social problems, through co-discovery of new knowledge, attempt to work through solutions. However, unlike a traditional process of co-working throughout the entire process, the research conducted in this thesis draws on collaboration efforts of different stakeholders at different stages of the research. As Kindon (2007) notes, PAR is not always a linear, or cyclical process that involves participation at each stage, but can vary depending on the research undertaken. Participation can vary considerably and is dependent on the context and situation at hand. Some collaborators might dip in and out of the research process at different times based on different commitments or interests, and institutional challenges are often present. It can be assumed that PAR can be chaotic and messy and but what makes the research relevant is not only those involved but the context in which the research is conducted, used and interpreted (Kindon, S.L., Pain, R. and Kesby, 2007).

3.1.2 User-centred design

User-centred design (UCD) is a broad term to describe design processes in which end-users influence how a design takes shape. It can be described as using a variety of different methods but essentially it is a philosophy that puts the user at the centre. Norman and Draper's (1986) seminal work on user-centred design provided a set of core principles that guide the design and development of digital systems. Their goal to "understand the fundamental principles behind human action and performance ...[and] devise systems that are pleasant to use" created a discourse around the ways that technology could be designed to account for user needs (McNaney, 2016). There are numerous ways in which users can be involved but importantly they must be included one way or another. For example, sometimes users are consulted about their needs through different forms of consultation to gather requirements e.g. design workshops, ethnography, interviews, focus group and are then included at other specific usability

testing stages throughout the process (Norman and Draper, 1986; Abras, Maloney-Krichmar and Preece, 2004). Taking a more collaborative approach, participatory design (PD) methods provide an opportunity for end-users of a technology to be involved every stage of the design and development process (Ehn and Sundblad, 2000; Abras, Maloney-Krichmar and Preece, 2004; Björgvinsson, Ehn and Hillgren, 2010).

The research conducted in this thesis followed a traditional UCD approach, gathering requirements through interviews, meetings, and design workshops with multiple stakeholders through strand 2 and strand 3, concluding with an evaluation of the FeedFinder website, community breastfeeding policy, video and poster with multiple stakeholders at a Fuse event. Fuse is the Centre for Translational Research in Public Health in the North East where five universities and other partners in public health come together to address challenges in public health research and practice; improving health and wellbeing and reducing health inequalities.

3.1.3 Mixed Methods

Established as the third research paradigm, a mixed method approach usually consists of a combination of both quantitative and qualitative data collection and analysis processes brought together to understand a significant research problem or phenomena. More recently however, using multiple qualitative methods has also been recognised as mixed methods or multi-methods (Hesse-Biber, 2010), but the core notion being across both descriptions is that the integration of multiple forms of data collection, or analysis yield additional insight beyond what would be achievable if they were conducted independent of one another (Creswell, 2017). Though a mixed methods approach has gained much traction over the last decade there are still debates on whether methods with different philosophical underpinnings should be used together (Tashakkori and Teddlie, 2010; Denzin, 2012). Other researchers disagree and support the conclusion that it has been done successfully and therefore this assumption should now be discredited (Denzin, 2012). There is also debate over language and

terminology, where sometimes ‘triangulation’ is used to describe mixed methods, for example, triangulation is often used to describe the use of qualitative data with more rigorous quantitative methods to confirm findings (Denzin, 2012; Howe, 2012). This way of describing triangulation of methods continues to support the undervaluation of qualitative methods. Further, key methodological researchers, for example e.g. Teddlie and Tashakkori (2009), Howe (1998) and Maxcy (2003) advocate the use of mixed or multiple methods and support the idea that there is no incompatibility at the epistemological levels. Rather, taking a pragmatic approach rejects any conflicts between different paradigms and is focussed on practical consequences and whichever tool works. The choice of methods in this research study were dependent on the strand of research underway, research question and social context in which the research was taking place.

3.2 Research aims and objectives

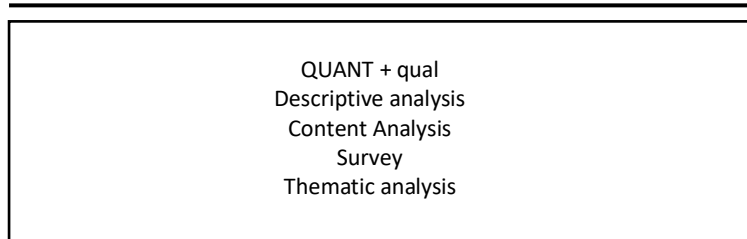
To recap, the primary aim of this research is to understand the role of citizen-generated data in the context of public health and breastfeeding support.

The objectives to achieve this aim were as follows:

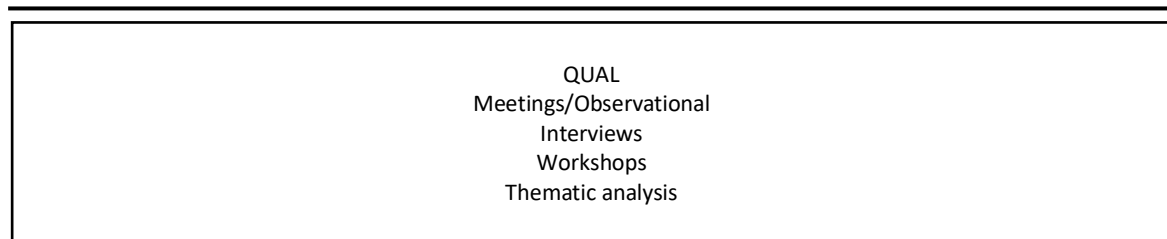
- To gather an understanding of the type of data available within FeedFinder
- To describe the FeedFinder users and motivations of use.
- To investigate if the data available within FeedFinder is of value in the context of breastfeeding support within public health.

Figure 5 Methods used in each strand of the research (capitalisation signifies the dominant method used).

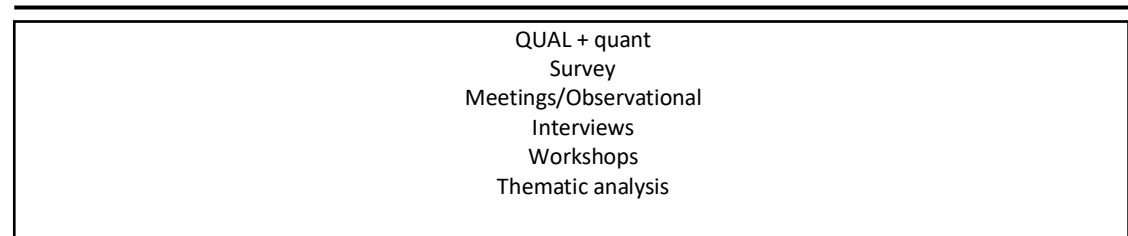
Strand 1



Strand 2



Strand 3



3.3 Ethics

Ethical approval for this research study was granted from Newcastle University Ethics Committee. Two separate approvals were granted to cover all strands of the research, and approval letters are shown in appendix 1. As FeedFinder was initially developed as part of a research project, users were informed when registering an account of the potential use of the data in research activities. All data used in the research has been anonymised. Some women use their own name as their username which is clearly visible in FeedFinder when looking at the text review data. The text review data was used in workshops with breastfeeding peer support workers, but no usernames were included in the activities.

During the course of the research the new General Data Protection Regulation (GDPR)¹¹ was released. This new regulation impacts on the use and storage of personally identifiable data within the European Union. Measures were taken to inform all new users after the release of FeedFinder of the privacy regulations of Newcastle University when using the application. All data handling and storage were in line with the Data Protection Policy at Newcastle University. As a rolling research project, FeedFinder requires consent from all users who download and register an account with the application. Each user is notified of the compliance with GDPR regulations within the university.

¹¹ GDPR is a regulation in EU law on data protection and privacy for all individual citizens of the European Union and the European Economic Area. It also addresses the transfer of personal data outside the EU and EEA areas (Wikipedia, 2019)

3.4 Research context

In 2013, after a small publicity push including a feature on regional news, promoting to a small network of health professionals and a series of tweets¹². FeedFinder (Balaam *et al.*, 2015) was deployed for free on both Google Play and Apple stores. Over the following year or so, and with minimal researcher input, what began as a small research project had soon gained momentum in the breastfeeding community. Venues and reviews within the application spread beyond the North East of England, to the rest of the UK with some reviews also seen in Australia, America and Asia. By the start of this thesis, there were around 2000 reviews and venues mapped within the application. From a public health perspective, FeedFinder presents a new and interesting approach to breastfeeding support, by and for the very women who are breastfeeding. As noted in the literature review in Chapter 2, health-related research involving digital technology interventions are usually focussed on arriving at a summative evaluation of the health/clinical outcomes as a primary goal rather than investigating engagement with the technology, ease of use, or lived experience (Free *et al.*, 2013; Blandford, 2018). This gap in health and HCI research influenced the first strand of research in attempting to understand the FeedFinder data, how it had been used, and how users described their engagement with the application in relation to their breastfeeding experience. With challenges noted on the trust and legitimacy of civic participation through social computing technologies (Harding *et al.*, 2015; Kostkova *et al.*, 2016; Ostherr *et al.*, 2017), the goal of the second strand of research sought to understand how FeedFinder and the data it presents from the breastfeeding community could be used in public health breastfeeding support. Taking an action research approach with public health services provided an opportunity to explore FeedFinder in relation to their service provision. As noted in Chapter 2, resources for public health improvement in North East of England have been significantly impacted by cuts and reduced funding opportunities.

¹² <https://twitter.com/feedfinderapp>

Working closely with public health improvement and parents to identify the needs and values of the breastfeeding support service within the North East of England, the final strand of research developed a website that enables public health improvement practitioners, local public-facing organisations and other interested stakeholders to explore FeedFinder data and use this information to potentially increase support for women choosing to breastfeed in public. The website is designed to provide an opportunity whereby collective responsibility for a breastfeeding friendly community is shared among multiple stakeholders.

3.5 Research Approach

This section outlines the research approach and describes the different components considered important; epistemological perspective, research design and research methods. To develop an appropriate research approach, the different strands of the research should be representative of the logic of enquiry, while drawing on the beliefs and strategies of the researcher but also considering the values and needs of the multiple stakeholders involved (Pope and Mays, 1995; Repko and Szostak, 2008; Hammarberg, Kirkman and De Lacey, 2016). A stakeholder can be defined as a person or organisation with an interest in a service, practice, process or decision. This may be in the form of financing, implementation or outcome of the point of interest (Medical Dictionary, 2019). In this thesis, stakeholders are defined by a shared interest in the practice of breastfeeding and include parents, breastfeeding support services, public health improvement practitioners and representatives from public-facing organisations that are providing a space where women can breastfeed.

As Creswell (2017) outlines further, there are three key elements to consider when deciding on a particular research approach. Research cannot be conducted independent of epistemological world view, where worldview implies 'a basic set of beliefs that guide action' (Guba, 1990; Denzin and Lincoln, 2011; Slevitch, 2011; Creswell, 2017). A researcher's discipline, training, life experience, attitude and beliefs can be influential in shaping their philosophical stance. Considering the primary discipline of the researcher,

emerging from a predominantly positivist science background in public health nutrition, time has been invested in learning about other perspectives and how they influence the type of research carried out. Although usually the philosophical ideas of the researcher/s are largely hidden (especially in fields other than social science), they should be identified as influential to the practice of the research being conducted (Slife, Williams and Williams, 1995; Creswell, 2017). Providing information on the philosophical worldview supports the rationale for choosing particular approaches. For this research, a pragmatic epistemological perspective was adopted and is described in further detail in section 3.5.1. Pertaining to some core principles of action research (described in further detail in section 1.2.2.1 in research design), much time was invested in building up a rapport with breastfeeding support and public health improvement practitioners over the course of the research.

3.5.1 Epistemological perspective

As researchers, our epistemological perspective or philosophical worldview, i.e. how we view and experience the world, have an influence on the type of research conducted, and how findings and results are interpreted. Creswell (2017) describes examples of four major types of worldview that influence research practice and how each can impact on the type of research approach and design used; Post positivist, Transformative, Constructivist and Pragmatism. In addition, the specificities of the discipline in which research is conducted guide the construction of knowledge and can be understood in the context of disciplinary perspectives. When interdisciplinary research is undertaken, we can draw from different disciplines, to broaden our perspective and widen our thinking and approaches to a given research question or challenge. There are many definitions of interdisciplinary research (Choi and Pak, 2006, 2007), and more recently, the role of interdisciplinary research has been deemed important in addressing complex, social problems. When responding to the British academy's call to action on interdisciplinarity, The Royal Society argued:

“Many of the major challenges that society faces today will require solutions developed through interdisciplinary research and cross-disciplinary collaboration. Improving support for and addressing the barriers to this work could contribute to major scientific breakthroughs at the interface of disciplines, develop new technologies and ultimately support the economy and develop novel solutions to societal challenges.” (Gleed and Marchant, 2016)

This research conducted in this thesis is situated at the intersection of public health and HCI, drawing on both disciplines to better understand the role of citizen-generated data in public health. In doing so, a mixed method, action research driven approach was undertaken, placing pragmatism at the heart of the research to inform the research design decisions.

Traditionally, evidence-based research (within the discipline of public health) focuses on describing and explaining the way things are and relies on being able to apply rigorous methods to prove certain hypotheses are true, which can be akin to the ‘post-positivist’ epistemological stance, i.e. an ‘objective reality that can exist and be measured’ (Denzin and Lincoln, 2011; Creswell, 2017). In contrast, design-oriented research, like much of the research undertaken in HCI, focusses on ‘what could be’ and has a particular emphasis on the process of understanding ‘what could be’ to provide insight.

Pragmatism (wherein much of action research and design research lies) is about making things happen and recognising that it may sometimes require an evidence-based approach for those who need it (i.e. policy makers, public health practitioners), and sometimes a more constructive approach which is helpful for opening up possible worlds for designers and HCI researchers alike. The approach from design-led research is not only interested in documenting, describing and explaining the way the world is but also in changing it by introducing new ideas, practices and technologies to the communities and people being designed for. Tensions between the different disciplines can be resolved by seeking pragmatic and workable solutions, working closely with

stakeholders, and using mixed methods to address particular research objectives as undertaken in this research project.

A pragmatist perspective focusses attention on the research problem at hand and doesn't conform to any one system of philosophy, instead, uses pluralistic approaches to understand the problem. A mixed methods approach draws liberally on multiple paradigms to best meet the needs and purposes of the research. Pragmatists do not see the world in absolute unity, but rather the interplay of different social, historical and political contexts. In this research, the actions were a consequence of reflection throughout the different strands of research, the collaboration with different stakeholders at different stages of the research and the context in which the research was conducted.

3.5.2 Research Design

This section describes the research design, drawing on the assumption that whichever paradigm chosen - quantitative, qualitative or mixed methods, will guide the direction of the research conducted (Creswell, 2017). Three particular research paradigms drawn from both disciplines were used to influence the research design process for this work; action research, mixed methods and user-centred design. In this research process, mixed methods were used to form a deeper understanding of FeedFinder as a supportive tool in public health. Thinking pragmatically, and working very closely with collaborators, methods were selected based on what was deemed appropriate at the time to address the research objectives for each strand of research. For example, when invited to a strategy group meeting for infant feeding coordinators by one collaborator, it was not considered appropriate to audio record the meeting as a guest. Instead, it was an invitation for the researcher to describe the research being conducted and notes were obtained from the meeting based on any feedback or questions regarding the research. Being pragmatic in the way research was conducted was paramount in maintaining good working relationships, ensuring that collaborators and those working

alongside were not made to feel scrutinised by recording every moment. The complexities of working with multiple stakeholders has presented many challenges along the way, which are described in a more detailed self-reflective account in the thesis discussion, Chapter 8.

3.5.3 Research Methods

This section describes the methods used in the three strands of research conducted in thesis, but it is important to note again, that these strands were not carried out independently of one another but overlapped throughout the trajectory of the research, particularly strand 2 and strand 3. The data collection for this thesis was conducted in 2015-2018. The collaboration with different stakeholders was a cyclical process with different stakeholders joining the research at different stages to offer expert opinion. For example, in strand 2, breastfeeding peer support teams were involved in the investigation of the FeedFinder application in breastfeeding support where during strand 3, public health improvement teams and policy advisors at the local council were on board to provide expert advice on the development of the website and community breastfeeding policy. The finer detail of stakeholder involvement is described in each chapter. An overview of the strands and methods used is shown in Figure 5 and described in further detail below.

3.5.4 Strand 1: Understanding FeedFinder

This section of the chapter explains the data collection and analysis process used to develop a rich understanding of the type of data available within the FeedFinder mobile application. Following a simple study design, the main aim of this work was to better understand FeedFinder and in doing so, the strand of work set out to describe the data available in FeedFinder, articulate the ways in which FeedFinder had been used, by whom and consider how this might have the potential to benefit breastfeeding support services.

A survey was developed to elicit a demographic profile of current and past FeedFinder users. Surveys are a well-established method in public health research for collecting large amounts of data, and when carried out digitally, can collect responses from many people simultaneously. FeedFinder users were contacted via email and asked to complete a short survey developed on Google forms. This method of survey administration was used to generate optimum response rate due to the familiarity of Google and simple, easy to complete design on a mobile device. As well as typical demographic questions asked in public health research, e.g. age, post code, occupation, parity, etc. open ended questions were used to gather attitudinal responses to FeedFinder and how it had been used in breastfeeding practices, the survey questions and analysis of the responses are described in much more detail in Chapter 4. SPSS was used to describe the demographic characteristics of the FeedFinder users, and an inductive thematic analysis was carried out to understand the motivations of use. The process of evaluating thematically was drawn from Braun and Clark (2006).

FeedFinder review data was downloaded from the SQL database including venue data (name, address, post code, type of establishment) and text review data (free text review, star rating criteria for privacy, hygiene, comfort and baby facilities). This was then uploaded to SPSS for descriptive analysis.

Venue location was mapped against the IMD for England. The IMD provides a score of relative deprivation based on multiple factors for a given small geographic area. The seven factors considered to develop the score include income deprivation, employment deprivation, crime, education, skills and training deprivation, health deprivation and disability, living environment deprivation and barriers to housing and services (The English Indices of Deprivation, 2015). Mapping the venues to IMD provides an

opportunity to monitor the areas where women who are using FeedFinder are breastfeeding in areas of high vs areas of low deprivation.

The text review data from FeedFinder was analysed in order to understand what FeedFinder users were sharing with one another when reviewing venues. A content analysis approach was considered the most appropriate method given the volume of review data and overall aim. Typically, a content analysis approach can be one of three different types; conventional, directed and summative according to Hsieh (Hsieh and Shannon, 2005). Conventional analysis is considered an inductive analysis where the codes are derived directly from the data; a process used primarily to describe a particular phenomenon. The benefits of using such an approach include not imposing any pre-conceived ideas onto the data, but allowing the codes, and subsequent categories to explicitly come from the textual data being analysed. While most researchers consider content approach to be a qualitative method, due to the summative approach some researchers argue that the enumeration of textual data categorises content analysis as a mixed methods description. Ultimately, meaning is made from the content of textual data and typically goes beyond simply counting words to studying language intensely to classify huge datasets of text into categories that are representative and hold meaning (Weber, 1990; Hsieh and Shannon, 2005).

The findings in this strand of research provided the foundation of the thesis and were used to inform strand 2 and strand 3.

3.5.5 Strand 2: Can FeedFinder be used in breastfeeding support?

Drawing on key elements of action research and taking a pragmatic approach, this strand of research used various qualitative methods. At the start of the research, breastfeeding support services commissioned by the local authorities in Newcastle, Gateshead, Sunderland and Northumberland were contacted via email were invited to collaborate on this research project. Partnerships were established with Newcastle

primarily, Gateshead and Northumberland, an overview of the type of service provided is described in further detail as part of the research background in Chapter 2. The initial meetings with the breastfeeding support services uncovered some key challenges relating to breastfeeding support in the community. Further work as part of this strand explored how FeedFinder might be used in a supportive role within breastfeeding services. Meetings, interviews (one to one and group) and workshops were conducted with the breastfeeding peer support service working at the frontline of breastfeeding support in Newcastle and the North East of England and are described in further detail in Chapter 5. The qualitative data collected as part of this strand of research was analysed using the same inductive thematic analysis as mentioned previously (Braun and Clarke, 2006)

The outcomes of the work conducted as part of strand 2 led to the design requirements and development of a FeedFinder website, community breastfeeding policy, poster and video as part of strand 3 of this research.

3.5.6 Strand 3: Design and evaluation of the FeedFinder website

Following on from the previous two strands of research, the final strand included the design, development and evaluation of a collection of resources for additional support of breastfeeding. The process followed an iterative, user-centred design cycle with multiple stakeholders who were intended as end-users. The resources included a FeedFinder data analytics website, community breastfeeding policy, poster and video. The resources are intended for use by stakeholders interested in supporting breastfeeding, from parents to public health practitioners, breastfeeding support services and public facing organisations. As such, further recruitment of stakeholders as part of this strand of research was necessary.

Local public facing organisations in the North East were recruited through TWAM to contribute to the development of the policy. Along with public health practitioners and

breastfeeding support services, meetings were held that contributed to the design and development of the aforementioned resources.

Breastfeeding women who were not known users of FeedFinder were invited to take part in an online survey and subsequent workshops on breastfeeding experience and added further contribution to the policy, poster and video development. The survey was developed using Google Forms. The survey was advertised and shared on social media, Facebook and Twitter. Online breastfeeding forums were used to advertise the survey. An open link to the survey was used to invite all women who had access to the advertised post and survey link. Data collected as part of the survey were analysed in the same way as the survey conducted in strand 1, see 3.5.4.

Current publicly available breastfeeding support resources for the local community in England were reviewed. A sample of 100 local authority websites were accessed and data recorded in an Excel spreadsheet. This was part of the formative work which informed the design and development of the website and community breastfeeding policy. The detail of the review process is described in further detail in Chapter 6, 6.2.1.

Following on from the development of the resources, an evaluation involved 31 key stakeholders as part of Fuse (Centre for Translational Research in Public Health). The aim of the evaluation was to determine if the FeedFinder website and community breastfeeding policy with supporting video could be used to support breastfeeding services and the wider community better meet the needs of breastfeeding women. Two evaluation activities were conducted using scenarios and card sorting techniques to elicit feedback on the resources and better understand how they might fit within a breastfeeding support service within public health or be a useful resource for local public facing organisations to better support breastfeeding women.

Chapter 4 Understanding FeedFinder

Parts of this chapter have been published here:

Emma Simpson, Andrew Garbett, Rob Comber, and Madeline Balaam. 2016. Factors important for women who breastfeed in public: a content analysis of review data from FeedFinder. BMJ open 6, 10: e011762. <http://doi.org/10.1136/bmjopen-2016-011762>

4.1 Introduction

To investigate the potential of using FeedFinder, a clear understanding of the data available within the application and who, why and how the application had been used to date was needed. As the research progressed, the FeedFinder application has continued to be used. This work was conducted at the start of the research process (2015-2016) and presents the findings from analysing a sample of the FeedFinder review data and surveying a sample of FeedFinder users. This current chapter presented strand 1 of the research; understanding FeedFinder. This information helps to provide an understanding of what type of data could be available to public health practitioners and other interested stakeholders working in breastfeeding support. For example, this information can help public health authorities to know what is important to women when they chose to breastfeed in public, what they are looking for from the services provided and what might make them feel comfortable and supported.

Two objectives were driving this strand of research and contributed to achieving the overall aim of the thesis:

- To gather an understanding of the type of data available within FeedFinder.
- To describe the FeedFinder users and motivations of use.

To drive the analysis of the data the following research questions were included:

- i) What are the demographic characteristics of the FeedFinder users and how does this compare to the demographic characteristics of breastfeeding women in the UK?
- ii) How is FeedFinder used?
- iii) What information are FeedFinder users sharing with one another?

4.2 Background

FeedFinder is an example of a community driven application whereby citizens engage with and share with one another their lived experiences. FeedFinder was developed following an iterative user-centred design approach with breastfeeding mothers in the North East of England (Balaam *et al.*, 2015). During workshops local mothers expressed their negative experiences of breastfeeding in public, and as a result, the initial concept of FeedFinder was derived from workshop discussions around a desire for a ‘TripAdvisor’ for reviewing places on their breastfeeding friendliness and acceptance. The application was launched in 2013 and has since attracted over 14,000 registered users, mapping and reviewing over 5000 venues worldwide at the time of writing (2019). FeedFinder is an example of a successful research project that transformed into a research product through sustained usage (Odom *et al.*, 2016). Lately there has been a shift in discourse around understanding technologies in situ – not only for the short trajectory of a research project but for the extended engagement over the long term. This shift in discourse has offered new ways of thinking and reporting on designing for continued use and larger scale deployments (research products) (Odom *et al.*, 2016). The notion of prolonged use and the potential development into a research product and possibly large (even global deployments) is increasingly important within HCI research, particularly when prototypes or tools have been developed for purposes to support democracy, community engagement, or health-related behaviours (Taylor *et al.*, 2013, 2015; Vlachokyriakos *et al.*, 2015). In doing so, citizens and communities are empowered to become agents of change and democracy where technology can support the continued

dialogue with institutions (Vlachokyriakos, Crivellaro, Le Dantec, Gordon, Wright and Ol, 2016). In relation to this, FeedFinder has the potential to provide an opportunity to understand how a civic technology and citizen data might be used in public health but until this point, there has been no investigation of FeedFinder in use. In a health-related context, civic technologies have the potential to allow communities to create and share credible knowledge-based experiences of dealing with or responding to health issues while increasing community wellbeing. FeedFinder is an example of public health 2.0 where the breastfeeding community are sharing their own knowledge-based experiences with one another so that informed decisions to breastfeed in public can be made. This research draws on the seminal work conducted on the role of civic technology in the formation of 'publics' to describe a group of people coming together to form a collective voice around a connected issue (DiSalvo, Maki and Martin, 2007; DiSalvo, 2009; Le Dantec *et al.*, 2011; Le Dantec, 2012; Le Dantec and DiSalvo, 2013; Asad and Le Dantec, 2017; Balestrini *et al.*, 2017). The technology acts as a broker to engage citizens in matters of concern, which can be used to engage in conversations with public service providers and potentially influence change. In a similar vein, FeedFinder can be described as a tool to facilitate users coming together (publics) to compare the breastfeeding experience against the 'presumed rationality' (that society is not supportive of public breastfeeding) (Balaam *et al.*, 2015).

To begin to unpick how this might be beneficial to public health bodies working in breastfeeding support, this strand of work aimed to understand if there is any value in the data that is provided within FeedFinder, how might it be useful in service provision of breastfeeding support in the UK, is it representative of breastfeeding experiences compared with existing literature and how might it be used to inform public health practice or policy development.

To contribute further knowledge and understanding on how applications like FeedFinder are used, and by whom, an analysis of the FeedFinder users and the data it affords was conducted and reported here. The following sections describe the FeedFinder users

which is then followed by the analysis of available FeedFinder textual data. All qualitative data is pseudonymised.

4.3 FeedFinder Users

This section of the chapter describes the work undertaken to understand the FeedFinder users. In doing so, this provides a better understanding of the type of people using FeedFinder, which can be used to inform stakeholders working in breastfeeding support, noting how it compares to the overall picture of breastfeeding women in the UK. For example, are the people using FeedFinder similar in demographic characteristics to breastfeeding women in the UK, or Newcastle and the North East? This information has the potential to identify particular groups of the population which may need further support or targeted interventions to increase breastfeeding rates. It can also help to further understand the breastfeeding experience of the women who are using FeedFinder when combined with the analysis of what women share on the map, where they breastfeed and what type of information they share when leaving a review. This also provides further insight for research, policy and practice by comparing with breastfeeding experiences reported in existing literature (see Hauck, Langton and Coyle, 2002; Fox, McMullen and Newburn, 2015; Roll and Cheater, 2016).

From an HCI perspective, the contribution of this strand of work provides a better understanding of users of civic technologies in the context of public health and could help to inform the design of civic technologies for future work in this space.

To collect this information on users, a survey was distributed to FeedFinder users and is described in more detail in the following section.

4.3.1 Survey Method

As mentioned previously, no demographic data are collected when registering an account with FeedFinder and an online survey was developed to obtain this information about users. A survey was designed on Google forms because of the familiarity and ease of use (optimisation of the form on a mobile device). Due to the nature of the

FeedFinder usage (on a mobile device) and the fact that many parents use their mobile device during times of breastfeeding or seeking out advice or information on parenting (Gibson and Hanson, 2013) the ability to complete the survey easily on a mobile device was important. The length of the questionnaire was kept short not to overburden the users. All users who supplied an email address by August 2017 were contacted via email. The survey was open from August 2017 until December 2018, to provide an opportunity for late responses to email requests being fulfilled. Only one email was sent to users of FeedFinder during this time and subsequent General Data Protection Regulation (GDPR)¹³ regulations prevented further emails being sent. The responses to the survey were captured in Google sheets and downloaded to Microsoft Excel for further analysis. The data was cleaned by removing responses from FeedFinder users outside of the UK and spelling mistakes corrected before analysis. Descriptive statistics were performed in SPSS¹⁴ to summarise each of the demographic questions asked.

The IMD was used as a marker to assess the relative level of deprivation of the users who provided post code information. Using IMD as a marker enables the generation of a comprehensive demographic profile of FeedFinder users in the sample that can be compared with breastfeeding statistics. Mapping the IMD of user post codes is useful in identifying the reach of the application and also to compare with breastfeeding statistics linked to IMD. The online tool¹⁵ for post code look-up and IMD matching enables input of post codes into a text box and the tool then automatically generates matched IMD data into a .csv file for download. In the UK, the IMD is used to classify areas by level of deprivation based on a calculation of multiple factors including 'household, environmental, educational, working and social conditions, activities and facilities which are customary' – a complex analysis of these different factors provides a score from 1 –

¹³ General Data Protection Regulation (<https://eugdpr.org/>)

¹⁴ IBM SPSS <https://www.ibm.com/products/spss-statistics>

¹⁵ Post Code checker IMD <http://imd-by-post.code.opendatacommunities.org/imd/>

32844. The score represents the 32844 Lower Super Output areas (small areas, often referred to as 'neighbourhoods' in the literature for ease of reporting) which can have a population level up to 3000, but an average of 1500 where 1 is considered the most deprived and 32844 the least deprived. Reporting the IMD of an area is usually quantified in existing public health reporting literature (see e.g. (Haggarty *et al.*, 2009; Walsh *et al.*, 2010) by using deciles, for example, area X is among the 10 per cent or 20 per cent most deprived small areas nationally (The English Indices of Deprivation, 2015).

As some of the questions on the survey were used to elicit opinions and experiences, the questions were purposefully open-ended and were therefore analysed differently. Using the process from Braun & Clarke, responses to the open-ended questions were thematically analysed (Braun and Clarke, 2006). The process of thematic analysis follows a six-stage process; (1) getting familiar with the data, (2) initial code generation, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes and lastly (6) reporting. NVivo 11 was used to store and analyse the data. NVivo software tool enables the management of qualitative data, for easier coding and tracking of codes and ability to group into sets of codes (themes). Codes were derived directly from the data and constructed through inductive reasoning. Codes were then grouped together in a hierarchical structure to generate common themes and reported thereafter.

4.3.2 Survey Results

The results from the completed online survey from FeedFinder users is described here. In total, 6459 users were contacted, and 206 responses received. Of the responses, 7 were removed in the data cleaning process; 5 were from another country, e.g. USA, Thailand and Australia, two were removed due to duplications of the same response. The following results presented are from 199 FeedFinder users.

The average age of the FeedFinder users in the sample was 33, with the youngest being 21 and oldest 53.

Of the FeedFinder users who completed the survey, 192 completed the question on ethnicity. The majority of the sample surveyed described their ethnicity as 'White British' 53.3% (n=106), with a further 16.6% as 'British', or British Irish 2.5% (n=4) and British Indian 1.5% (n=3), Table 2. This table shows the results grouped into ethnicities rather than listed as described by the users.

Table 2 Ethnicity of FeedFinder users who responded to the survey.

<i>Ethnicity</i>	<i>Total of sample</i>	<i>Percentage of sample</i>
<i>Asian</i>	3	1.6
<i>British (White)</i>	147	76.6
<i>British (Other)</i>	36	18.8
<i>Turkish</i>	1	0.5
<i>European</i>	1	0.5
<i>Other</i>	4	2.1
<i>Total</i>	192	100.0

Users were asked to describe their status regarding parenting role and 97.5% (n=194) of the sample were mothers, 1% (n=2) were fathers and the other 1.5% (n=3) were health professionals, Table 3. In addition, most of the users downloaded the application when already a parent 90.5% (n=180), or pregnant 6.5% (n=13), and the remaining accounted for those working in a professional capacity in breastfeeding support. For the remaining reporting of findings on FeedFinder users, the health professionals were removed from analysis.

Table 3 Role of FeedFinder user.

<i>Role</i>	<i>Total of sample</i>	<i>Percentage of sample</i>
<i>Father</i>	2	1.0
<i>Mother</i>	194	97.5
<i>Other</i>	3	1.5
<i>Total</i>	199	100.0

The IMD tool returned 43 unmatched post codes in the analysis. For the remaining post codes analysed, (n=149), 16% of the sample were in the 20% most deprived areas and 18.7% were categorised in the 20% least deprived compared with other small areas. Of those categorised in the middle of the deprivation decile scale, 24.1% of the sample were in the middle.

FeedFinder users provided 120 different occupations, see most frequent 5 reported in The most common reported occupation was teacher (n=10) and stay at home parent (n=14), followed by administrator (n=7), sales (n=7), teaching assistant (n=6), doctor (n=5) and nurse (n=5).

Table 4 Most frequent self-reported occupation of survey sample

<i>Top 5 Most Frequent Self-Reported Occupations</i>	<i>Number of Sample</i>
<i>Teacher</i>	10
<i>Stay at home parent</i>	14
<i>Administrator</i>	7
<i>Sales</i>	7
<i>Teaching Assistant</i>	6

Patterns of FeedFinder usage

Recurring patterns identified in the inductive analysis of the data identified two distinct type of users; contributors and explorers. The two different categorisations were used to describe FeedFinder users who described their primary usage as either *‘to leave a review’* (contributor) or *‘to find places to breastfeed’* (explorer), respectively. The majority of the users were categorised as ‘explorers’ and typically consumed the information shared by other women. They actively searched for locations and/or browsed reviews to find suitable places to breastfeed in public, or *“just see what’s out there”*. Some women described the application as disappointing due to lack of reviews in their locale, while some users noted the significance of adding reviews and data to make the application more useful, like Hattie described,

“Searched for places to go and I noted that there were not a great many places on there for my area so added a few places of my own from my experience”.

The length of time FeedFinder was used by the sample of users is reported in Table 5. The missing 1% of data are attributable to those users who failed to answer this question in the survey. The self-reported length of usage varied among the users, but mostly FeedFinder was used for around 1-3 months but this ranges from ‘one hour’ up to 18 months and still using.

Women reported several reasons for no longer using FeedFinder, usually referring to establishing places to feed and no longer having a need to use the app, as Amelia noted:

“...search for places to go where I could feel comfortable breastfeeding. Once I got to know places in the areas I’m often in, I stopped using the app. Plus my phone doesn’t have much space on it so I had to remove it for space reasons.”

Some other users described the disappointment with the content within FeedFinder being a barrier to continue using. This indicates a design flaw where users are not aware

of how they can contribute their own experience to the FeedFinder map which would kick start a resource for other mothers, and hopefully through a domino effect will become useful to many mothers in their areas. One example of this from Jennie in Northern Ireland described:

‘not enough places...it didn't really impress me. Few Northern Ireland users. I only used it once’ or those who continued using, *‘seek out places whilst travelling to a different, unfamiliar location.*

Table 5 Length of time using FeedFinder

<i>Length of time using FeedFinder</i>	<i>Total of sample</i>	<i>Percentage of sample</i>
<i>0 – 1 week</i>	33	16.6
<i>1 week – 1 month</i>	38	19.1
<i>1 – 3 months</i>	46	23.1
<i>3 – 12 months</i>	31	15.6
<i>12 months +</i>	2	1.0
<i>Still currently using</i>	16	8
<i>Total</i>	197	99

Table 5. indicates the frequency of FeedFinder usage, showing that the most common usage was around 4 times a month, 31.2% (n=62) while using the application daily was the least common.

Table 6 How often FeedFinder is used by the sample of users surveyed

<i>How often FeedFinder is used</i>	<i>Total of sample</i>	<i>Percentage of sample</i>
<i>Daily</i>	4	2.0
<i>More than once a week</i>	25	12.6
<i>Up to 4 times a month</i>	62	31.2
<i>Once a month</i>	48	24.1
<i>Rarely</i>	54	27.1
<i>Total</i>	199	100

The way in which the application was used to plan trips outside of the home was noted by the majority of users. A significant proportion of the FeedFinder users said they used the application to seek out places they could breastfeed, either in their locale, or before travelling to an unfamiliar destination. Rebecca and Jodie, each describing their experiences of why they used the application and felt motivated to do so –

“Wanted to use it to find breastfeeding friendly places near me” (Rebecca)

“Was planning a shopping trip to an area I'd never breastfed before (Manchester) and wasn't sure where I could find feeding rooms” (Jodie).

While some women used the application to pre-emptively search before leaving the house, others made use of FeedFinder while on the go. In both instances, mothers had an intention to breastfeed and in doing so, they had planned to breastfeed in public.

Motivations

The findings presented here include two key themes relating to motivation; *responsibility and duty of care* and *addressing societal expectations*. The following paragraphs describe the themes in more detail and contain direct quotes from the pseudonymised FeedFinder users.

Responsibility and Duty of Care

Peer-to-peer advice and information sharing is common among parents, especially new parents. The sharing of information with one another in the application symbolised a sense of responsibility to enhance the breastfeeding experience of other mothers. Bearing the importance of making women feel that they can feed anywhere, one mother, Verity felt very strongly about sharing helpful information and making it her duty of care to let other women know. She herself felt very confident breastfeeding everywhere but used the application to take on the role of supporting other mothers to eventually feel the same. As she describes why she downloaded FeedFinder:

“To leave reviews of as many places as possible and aiming to demonstrate that its ok to feed in numerous places locally. I also try to give helpful information about the baby facilities or if the staff were extra helpful. I'm quite confident feeding anywhere but I recommend the application to new mums or ones who are less confident feeding in public, as a way to reassure them of all the local bf friendly places.”

This role of responsibility and providing a duty of care was present among many mothers who responded to the survey, particularly those who were contributors to the application. Leaving reviews for other mothers to enhance and support their breastfeeding experience when breastfeeding outside of the home as a form of care for another woman was common. Michelle described that she used FeedFinder:

“To help other mums and myself find somewhere to feed cos I didn't know a lot of places on my 1st born when I breastfed”

Another user, Marie, described the cathartic nature of the application and her role in advocating for increased usage:

“When I found the app, I was surprised that such a good idea had so few downloads and reviews! I felt so anxious and intimidated by the thought of breastfeeding in public. It only had a few reviews of places near to me but I found them to be quite helpful. Now I've gained confidence with breastfeeding in public, I regularly leave reviews in the hope that I can help other new parents, probably feeling as anxious and intimidated as I was! I tell everyone I can about the application in the hope that they will add to it too and help it to grow!”

The use of the application further engendered this notion of responsibility and duty of care among the users who had downloaded FeedFinder in their professional capacity. The majority of whom described recommending the application to new parents, while one user Pam, a nurse, described sharing FeedFinder as a resource:

“I am a family nurse working with vulnerable young parents. One target of the family nurse partnership programme is to increase numbers of breastfeeding. I share the website as a resource with families that I work with”.

Vulnerability

In moments where women are sharing their experiences of breastfeeding in public spaces in FeedFinder, some women expose their emotional vulnerability. Oftentimes, women relay how the thought of breastfeeding in public makes them feel anxious, as Katie noted:

“I had just had my baby and was breastfeeding. I felt really anxious and nervous about going out and breastfeeding in public so I was looking for breastfeeding 'friendly' places which had been reviewed by other mothers. Using the application finally gave me the confidence/ reassure to leave the house!”

It is not always new or first-time mothers that feel anxious or nervous breastfeeding in public, sometimes that feeling never passes and women continue their anxieties or worries throughout their breastfeeding journey, with Ellen stating:

*“I’m **always** worried about feeding in public so wanted to find places to feed which I knew would be breastfeeding friendly.”*

Some women also note how they prefer a private space, as a way to discount their vulnerability but also nodding to the expectation that women should be discrete while breastfeeding. Kim suggested a way to modify the application to highlight areas of privacy:

“i thought it was for feeding rooms, and feeding facilities, but in my area, there were a few reviews of places people have fed, which i didn’t feel were suitable as i was looking for a private area. i understand this is what the application is for, but maybe splitting it so there is a section for breastfeeding friendly places and feeding rooms would help those that still feel shy about feeding publicly”

The analysis of review data provides details on what kind of information women who are breastfeeding think should be available when deciding where to breastfeed when out in public.

In addition, the thematic analysis generated two further themes which were intertwined within the primary themes of motivation and linked more broadly to breastfeeding experience; *exposing vulnerability* and *FeedFinder as a supportive health technology*, both themes are described in more detail below.

Addressing Societal Expectations

It is not uncommon for women to expect a sense of hostility from society towards breastfeeding. Most of the published experiences of women breastfeeding are considered negative (Henderson, Kitzinger and Green, 2000; Leahy-Warren *et al.*, 2017) and some women reported in the Public Health England survey that they do not want to breastfeed at all for fear of having to do so in public (Public Health England, 2015).

This was also echoed among the breastfeeding women who responded to the FeedFinder survey and expressed a desire to locate a 'safe' place to breastfeed. This notion of the outside environment being unsafe for breastfeeding further supports the condition that women feel vulnerable when breastfeeding, especially as a first-time mother, as one mother Kali noted:

"I wanted advice and reassurance on where I could breastfeed and feel relaxed/safe".

When women do breastfeed in public, it is often a positive experience and that leaves some women surprised like another mother, Helen stated:

"It was much more scary in the early days and I was once really surprised by how welcome me feeding my LG [little girl] was in a real pubby pub and thought other people needed to know this".

Again, the notion of vulnerability is intertwined with the expectations of breastfeeding in public, this exposure of vulnerability provides a sense of reassurance from one mother to another, as it signifies 'you're not alone'. Acknowledging the support of the Equality Act 2010 in protecting breastfeeding women from discrimination Georgia, a first time mum recalls:

"I was breastfeeding as a first-time mum and it's good to know which coffee shops/restaurants would support me if I was challenged by a member of the public as they are advertised as BF friendly".

FeedFinder as a supportive health technology

For most women, FeedFinder is considered an additional provision to support making an informed choice about breastfeeding in public. The application was used to find places as rated by other similar (breastfeeding) women to ensure feeding their infant can be done safely, and comfortably, while enabling women to leave the security of their own

home. FeedFinder providing additional support was often described in tandem to exposing vulnerabilities around breastfeeding in public. The way in which women described FeedFinder in a positive and supportive context provides circumstantial evidence to suggest FeedFinder is serving a much-needed purpose in breastfeeding support. Niamh was very grateful for the additional support FeedFinder was able to provide when she claimed:

“Really helped me pluck up the courage to get out and about and i have recommended it to others. In my experience of having my first baby i felt that more support was giving towards bottle feeding so this application really did help me so thank you very much!!”

The application would be rendered useless without the input of reviews from the breastfeeding community, though some women took on an advocacy role to further support the growth of the app.

Increasing the normalisation of breastfeeding in public was a focal point for some of the mothers using FeedFinder. Gabrielle described how thankful she was for the app:

“I think this application is a great idea and works really well. I wish more people knew about it from the start of their breastfeeding journey so they would know where they could go and feed in comfort and not be worried that they would be moved/thrown out. It really helped me to gain confidence in public feeding and I now will do it anywhere, even with my wriggly 18-month-old! Every little thing helps to normalise breastfeeding in public so thank you to the makers of this app!”

Describing the expectation of certain areas being less welcoming of breastfeeding, June, another advocate for normalising breastfeeding describes:

“It is excellent and easy to use but thankfully I didn't really need it as I live in a liberal area where breastfeeding is welcomed - I can imagine if I lived in a less open-minded

location, it would be invaluable. I may use it when on holiday, although I am used to feeding anywhere and am most likely to adopt this approach even if I get a few raised eyebrows - I like to normalise breastfeeding in public and hope in the future this service won't be needed as women will comfortable feeding wherever suits them best"

4.4 The FeedFinder data: What information are FeedFinder users sharing with one another?

This section of the chapter describes the review and rating data obtained from FeedFinder and was undertaken to understand what information women share with one another when breastfeeding in public.

The results from this analysis of data provides a better understanding of the type of information women find useful when breastfeeding in public while building on the previous analysis to extend the knowledge of application usage for breastfeeding support. The data set includes all venues mapped within the application with free text reviews and the criteria rated out of 5 stars (comfort, hygiene, privacy and baby facilities).

4.4.1 Method

This section describes, in detail, the different approaches used in the study design to capture and analyse the FeedFinder data. As the data captured through the application is both qualitative and quantitative, the study design follows a mixed methods approach.

Data from FeedFinder is contained within its own MYSQL database and RESTful Application Programming Interface (API) which communicates between the database and the application. Using a MAMP server and MYSQL database, data was retrieved and exported to Microsoft Excel. Data cleaning processes involved removing data not located within the UK, duplications (i.e. the same text reviews were checked for the same time stamp and considered a duplicate if an exact match).

Content analysis of text review data

A content analysis is a common approach that derives meaning from the content of textual data. Though a content analysis is considered a qualitative research method, some researchers argue that it is a mixed method due to the enumeration of textual data it often produces. However, content analysis typically goes beyond simply counting words to studying language intensely to classify huge datasets of text into categories that are meaningful and representative (Weber, 1990; Hsieh and Shannon, 2005). According to Hsieh and Shannon (Hsieh and Shannon, 2005) there are three main types of qualitative content analysis; conventional, directed and summative. For example, conventional analysis is considered an inductive analysis where the codes are derived directly from the data; a process used primarily to describe a particular phenomenon. The benefits of using such an approach include not imposing any pre-conceived ideas onto the data, but allowing the codes, and subsequent categories to unequivocally come from the textual data being analysed. Directional content analysis can be described as a deductive analysis approach and based on particular guidance, theory or relevant research findings to draw out codes and subsequent categories. Typically, a deductive approach would be used to add further knowledge to an existing theory associated with the research topic. Summative analysis involves using the content or keywords to count and compare, followed by an interpretation of the fundamental context. This process is not necessarily concerned with understanding meaning but indicates an interest in usage of words and quantification. For this analysis, a conventional content analysis was adopted because of the inductive nature of the approach.

All reviews within the UK from FeedFinder up until June 2015 were obtained. In total, 1869 reviews were downloaded to be analysed for sentiment and content analysis. A research team was formed to validate the coding and analysis process through member checking and peer-to-peer debriefing to ensure credibility and validity for publication. Three independent researchers (Simpson, Garbett, Balaam) openly coded the same random selection of 5% of the data set (n=90) and reconvened to discuss the commonalities and inter-coder reliability. Each researcher then coded an additional 5%

applying the codes that had been generated in the previous selection and adding to it any new ones that surfaced.

The remaining text reviews were coded by the researcher and any queries were discussed with the research team and supervisory team. A further sentiment analysis was carried out on the reviews - coding each review as positive, negative or neutral based on the descriptive words and context of the review.

Adding to the content analysis of the text reviews, the researcher summarised the average and overall rating of the measures collected through FeedFinder: comfort, hygiene, privacy, baby facilities. The type of venues reviewed were categorised with data available from Foursquare¹⁶ - a location based social networking site and application that uses crowdsourced data to identify buildings, businesses and attractions) (Foursquare, 2017), e.g. cafes, pubs, restaurants, public health service providers, public spaces and miscellaneous. The Indices of Multiple Deprivation were cross referenced with the location of venues mapped (The English Indices of Deprivation, 2015).

Sentiment analysis

Sentiment analysis is a process that is applied to text data to determine whether the sentiment is either positive or negative, or even neutral. The process is often used in the context of opinion mining or analysing conversations in online social networks (Gonçalves *et al.*, 2014). The continued portrayal of breastfeeding in a negative way influenced the decision to perform an analysis on the FeedFinder review data. The aim was to determine the sentiment of the review data that is whether the reviews are usually positive, negative or neutral. The process was done manually and checking in

¹⁶ Foursquare <https://foursquare.com/>

with members of the supervisory team with any queries following a discussion of the data.

FeedFinder criteria analysis

The criteria within the application considered important for meeting women's breastfeeding needs; comfort, privacy hygiene and baby facilities are rated out of 5 stars. The average ratings were calculated for the included venues.

4.4.2 Findings of the FeedFinder data analysis

This section presents the findings of the analysis of data available in FeedFinder.

Venues

Since the launch in 2013, there have been 4203 individual venues mapped within FeedFinder. Each venue rating has been inputted by a member of the community of users. As the research is concerned with public health and breastfeeding in the UK, 195 venues were excluded from the dataset due to location being in a different country. In some cases, the online IMD tool was unable to match the post code. In total, 4008 individual venues were obtained for further analysis.

Indices of Multiple Deprivation and venue location

The online IMD tool was used to map the post code of venues to assess levels of deprivation. Post code data was available for data 1633 venues in England (40.7% of the full data set). The analysis indicates that 23.3% of venues reviewed were in the 20% most deprived and 12.8% were located in the 20% least deprived. The remaining venues were distributed similarly across the three middle quintiles.

FeedFinder criteria ratings

Users are able to rate venues (out of five stars, 0 being the lowest and 5 being the highest) based on four different measures that are considered important for meeting their breastfeeding needs; comfort, hygiene, privacy and baby facilities. It is considered

that 3* out of 5 would be an average rating, poor <3 and excellent >3. The average rating for each measure for all reviews obtained is shown in Table 7. Each measure overall had an average >3 of 5. Hygiene was rated highest at 4/5 overall and privacy and baby facilities were rated lowest at 3/5.

Table 7 Average rating for each of the criteria; comfort, hygiene, privacy and baby facilities.

<i>Criteria</i>	<i>Comfort</i>	<i>Hygiene</i>	<i>Privacy</i>	<i>Baby facilities</i>
<i>Average rating</i>	3.8	4	3	3

Free text review data

The aim of the analysis of free text reviews was to determine what information women consider important and relevant to share with one another when facilitating the decision to breastfeed in public. As mentioned, a conventional content analysis was chosen (Hsieh and Shannon, 2005). This section describes the process of coding and analysis of the reviews and presents the findings.

In total, 1869 reviews were obtained for analysis at the time of data extraction. Data cleaning processes removed 112 of the reviews due to locations outside the UK, no textual data present (i.e. the user only reviewed a venue using the star criteria) and duplications. This provided a total of 1757 text reviews from 783 contributing reviewers and 1416 individually mapped venues.

There were 66 separate codes generated from the analysis that were then categorised into 14 separate groups/categories, see appendix 2.

Altogether, the 1757 reviews were assigned 6540 individual codes. The length of reviews varied widely across the data set from concise descriptive accounts to a much more detailed explanation of the FeedFinder user's experience while breastfeeding at a venue. Illustrative examples of the types of reviews and coding are shown in Table 9.

Total number of codes assigned from each category and %, including the proportion of the reviews that were considered negative. The categories are explained further below.

Table 8 Categories derived from analysis of data. Total number of codes assigned from each category and % and what proportion of the reviews were negative (Simpson et al., 2016).

<i>Categories</i>	<i>Total number of codes</i>	<i>% of reviews</i>	<i>% of reviews identified as negative</i>
<i>Facilities</i>	862	49.00	0.55
<i>Service</i>	836	47.58	0.26
<i>Privacy</i>	723	41.15	0.70
<i>Qualities</i>	690	39.27	0.15
<i>Furniture</i>	619	35.23	0.03
<i>Built environment</i>	526	29.94	0.08
<i>Visit</i>	365	20.77	0.17
<i>Food and drink</i>	359	20.43	0.14
<i>Misc.</i>	342	19.46	0.34
<i>Inclusivity</i>	331	18.84	0.41
<i>Support</i>	324	18.44	0.05
<i>Experiential</i>	260	14.80	0.21
<i>Atmosphere</i>	194	11.04	0.05
<i>Entertainment</i>	130	7.40	0.11
<i>Total</i>	6560		

Categories

Almost half of the reviews contained at least one reference to facilities and service, 49.0% and 47.58% respectively. The facilities category covered any codes relating to a range of amenities including changing, bottle feeding facilities, plug sockets and Wi-Fi availability. Services included explicitly mentioning staff, hospitality and a venue being welcoming of breastfeeding. Of those reviews that mentioned staff and hospitality, there was particular emphasis on the ways in which the staff were helpful, i.e. providing table service when they usually have an order and receive at the counter style procedure. This information is useful for multiple stakeholders interested in breastfeeding support and can provide a list of criteria to share with local organisations to consider providing for women who are breastfeeding in their premises. Public health authorities can use this information to determine training materials and resources for local organisations.

Over 40% of reviews contained information on the level of privacy available in a venue. Reviews were coded for privacy if a review mentioned a designated area for breastfeeding (n=240), if there was expectation to feed in a disabled toilet (exclusion from public space) (n=9), or the reviewer simply offered an opinion on the level of privacy available (n=474). Qualities of a venue were also frequently mentioned in reviews, 39.27%, including reference to how relaxing, comfortable, clean the venues were (although this may have been a result of the five categories women are asked to rate a venue by), but also other qualities including the lighting, music and temperature. In most cases, comfort was often described alongside the type of furniture provided (35.23% of reviews). The built environment included information on access (with a pram), space, outdoor facilities and wayfinding within a venue which were included in almost 30% of reviews.

Almost 15% of reviews included an experiential account of breastfeeding in the public space including anecdotes, reference to stigma and whether they stated to be a new/first time mother, or first public feed. In addition, only 83 reviews contained reference to social stigma associated with breastfeeding in public, including review text such as “...no-one batted an eyelid” and “...you might get some odd looks or comments from some customers who are not used to seeing babies being fed.”.

Inclusivity was described as being baby/toddler and child friendly. Table 8 also indicates which of the categories were more prominent in the negatively coded reviews and privacy was mentioned most; 12 reviews in total. Inclusivity in the reviews with negative sentiment was mentioned in 7 of the reviews. For example, women expressed disgust with expectations to nurse an infant in a baby changing toilet, with comments such as “A chair in a nappy changing...Wedged between toilet and nappy bins. Pretty disgusting and marked as a designated feeding area. I wouldn't feed an animal in there...”

Sentiment analysis

Descriptive words used and context of the review were assessed manually for sentiment. The view, opinion or emotion that can be detected from the review text is described as the sentiment. Each of the text reviews were expressed as being either positive, negative or neutral. Examples of the types of reviews are illustrated in Table 9. Some reviews contained positive and negative elements and were therefore coded as neutral as it was difficult to distinguish the sentiment. Of the reviews analysed; 1757, the majority of reviews were considered positive—80.3% (n=1410) with 15.7% (n=275) neutral and 4.1% (n=72) negative. Further analysis of the reviews indicated that, of the 74 negatively coded reviews, only three of those were because someone in the venue asked them to stop breastfeeding or made them feel uncomfortable doing so. In total, only 0.2% of the data set experienced a negative reaction from the public.

Table 9 Examples of text reviews obtained from FeedFinder with codes assigned and sentiment analysis.

Sentiment of review	Example	Codes
Positive	“Lovely cafe, staff have always been welcoming and have often brought drinks to our table when feeding. One member even offered to cut my food up when i was with my new-born. Lovely changing facility too.”	Welcoming, staff, hospitality, changing, anecdote
	“Excellent facilities. Discreet corners in cafe and a designated feeding room that is separate from changing room. Always felt comfortable feeding in cafe. Staff very helpful, carried tray to table. Also free Wi-Fi to keep you entertained during those lengthy feeds :-)”	Facilities, designated area, privacy, changing, comfortable, revisit, staff, hospitality, Wi-Fi,
Negative	“Feeding area is disgusting and unsanitary. As well as being in an awkward place. Will not be using it again. Was absolutely appalled.”	Cleanliness, designated area
	“Appalling! Was told that I was no longer allowed to breastfeed my daughter (sibling of son who attended nursery) unless I covered up or fed in a different room away from children.” “bosom	Stigma, exclusion
Neutral	“Bosom buddies Thursday 9.30–11.30”	Classes
	“Room at the back for feeding and changing.”	Designated area, way finding, changing

4.5 Summary of findings

This chapter aimed to better understand FeedFinder and the data that is available for breastfeeding support and it did this by investigating the users of FeedFinder and what information they share with one another.

In summary, the FeedFinder users who responded to the survey were predominantly White British, average age of 33, educated to degree level (based on occupation) and more women lived in the least deprived areas of the UK than the most deprived. Women used FeedFinder for a number of reasons which included being motivated by responsibility and duty of care to leave reviews for other women. The usage of FeedFinder varied depending on breastfeeding practice, confidence established and whether the user considered FeedFinder useful or not. Most of the users were mothers and the findings indicated that rarely any health professionals were using FeedFinder. The data available within FeedFinder demonstrates what women share with one another and this was predominantly positive. Most venues were mapped in more deprived areas than in the least deprived areas. Factors important for women who use FeedFinder when breastfeeding in public included facilities, service provided by staff, and the level of privacy available within a venue as the top mentioned categories and the sentiment of the text reviews within FeedFinder were mostly positive. This information is useful starting point to investigate the use of FeedFinder in breastfeeding support.

4.6 Discussion

Pertaining to the objectives of the research, this chapter provides an understanding of the type of data available within FeedFinder and describes the users, patterns and motivations of use. This provides the foundation of the thesis, having a deeper understanding of what could be on offer to those working in breastfeeding support and other interested stakeholders. In addition, this work can contribute an understanding of how FeedFinder relates to what is already known about breastfeeding in the UK. The following sections provide a synthesis of the findings in relation to the objectives for this strand of work and situate the work within the overall aim of the thesis.

4.6.1 Objective 1 - To gather an understanding of the type of data available within FeedFinder.

This objective contributes an understanding of what data are available within FeedFinder which included an analysis of the criteria that was noted as important for meeting the breastfeeding needs of women (comfort, hygiene, privacy and baby facilities), the venues mapped by FeedFinder users and analysing the text review data that has been input on the mapped venues. This discussion also answers the research question:

- i) What information are FeedFinder users sharing with one another?

The findings can be used to inform those working in breastfeeding support of the data available within the application and therefore investigate how it might be used in breastfeeding support as part of public health practice moving forward in the research.

Similar to other technologies adopted for the transition to parenthood, FeedFinder provides additional support which may otherwise be lacking and allows users to engage in everyday matters of concern such as breastfeeding in public (DiSalvo, 2009; Le Dantec, 2012; Johnson, 2015a).

A significant barrier to the uptake of breastfeeding among women is the fear of having to breastfeed outside of the home (Public Health England, 2015), with the media often reinforcing those anxieties by reporting on mothers' negative experiences (Agboado *et al.*, 2010; Dyson *et al.*, 2010). Other literature describing the rhetoric of breastfeeding in public define success as being naturally discreet, unnoticeable and ideally in private to avoid unwarranted negativity from the public (Cattaneo *et al.*, 2010; McAndrew, Thompson and Fellows, 2012), putting unprecedented pressure on already 'vulnerable' breastfeeding women. This analysis further reinforces this ideological position on breastfeeding in public with over 40% of the text reviews referencing 'privacy', which also included being able to feed 'discreetly' and locating a designated breastfeeding area. Women often provided advice on 'nooks' and hidden corners where women can

feed privately without disturbing the public. Further analysis indicated that in the reviews containing negative sentiment, privacy was mentioned most often.

In the free text comments, users of FeedFinder reported on a number of different aspects relating to their breastfeeding experience, but mainly facilities available within a venue, service and hospitality from staff, qualities (mainly comfort) and level of privacy available. Similarly, findings presented in the Infant Feeding Survey (IFS) (McAndrew, Thompson and Fellows, 2012) described women having an expectation of facilities being provided, though the intricacies of the type of facilities was not outlined in the IFS. In the findings from the content analysis of FeedFinder review data, women using the application frequently reported on the facilities available within a venue, mostly providing information on the changing facilities but also described the availability of alternative feeding facilities (bottle warmer, microwave), plug sockets and Wi-Fi. This information is useful for both those working in breastfeeding support, but also local organisations who might be interested in providing better facilities for breastfeeding women in their premises.

Contributing further understanding of what is important for women breastfeeding in public, over 47% of the reviews contained information on 'service' provided which includes hospitality but also, 'support' was featured in 18% of the reviews, as well as 'inclusivity' (18%). All of the categories include reference to the effect of other people on the experience of breastfeeding. The role of strangers in supporting the prolonged duration of breastfeeding for women has been noted elsewhere (Boyer, 2010). This information is useful for developing policies for supporting breastfeeding women, incorporating elements that provide useful information for the public or organisations on how they can behave better to support breastfeeding women. This data was integral to the development of the community breastfeeding policy that was part of the third strand of research and is explained in further detail in Chapter 6.

4.6.2 Objective 2 - To describe the FeedFinder users and motivations of use.

The findings discussed here as part of the second objective are also discussed in relation to the research question:

- i) What are the demographic characteristics of the FeedFinder users and how does this compare to the demographic characteristics of breastfeeding women in the UK?

The FeedFinder users who completed the survey were mostly mothers (97.5%) and a very small percentage of people working in breastfeeding support roles. This indicates that although FeedFinder has some useful benefits (as shown in the findings presented on the data available) it is an untapped potential for public health practitioners, or breastfeeding support workers. Although some of the users that were in a supportive capacity described how it had been of benefit in providing support for their role in helping breastfeeding mother's breastfeed in public.

The mothers using FeedFinder are of a similar demographic profile to other reported breastfeeding mothers in the UK. Typically, older, university educated and from areas of lower socio-economic deprivation are considered likely to breastfeed while the prevalence of breastfeeding is particularly low among very young mothers and disadvantaged socio-economic groups (Brown *et al.*, 2010). The difference in breastfeeding practices across socio-demographic groups amplifies the pre-existing health inequalities and further contributes to a cycle of deprivation (Royal College of Paediatrics and Child Health, 2017).

A woman's decision to breastfeed and continue breastfeeding for the recommended duration of at least 6 months is heavily influenced by her network of support. As well as the support from friends and family, there is a collective responsibility of society to ensure women who want to breastfeed are able to do so (Rollins, Bhandari and Hajeer, 2016). Some women experience difficulty breastfeeding and having extra

social support is vital for ensuring women do not stop breastfeeding before they wish. Application usage was inversely correlated with an increase in self-confidence to breastfeed in public spaces, as women noted that their usage of the application declined as they established confidence to feed anywhere, see section 4.4.2. Therefore, FeedFinder can be considered an important tool for enabling women to increase self-confidence breastfeeding in public. By providing a supportive health technology, women are able to find safe, comfortable places to breastfeed for those initial public feeds. Seeking information and support through a digital medium is a plausible option for many women who may not be able to attend social groups provides by the NCT or La Leche League or for those women living in areas affected by the cuts to breastfeeding services (The Better Breastfeeding Campaign, 2018). Given the time sensitive issue of breastfeeding, FeedFinder alleviates some of the anxieties and pressures of finding a suitable place to breastfeed quickly, as voted by other breastfeeding women. Revisiting the notion of ‘publics’ described in more detail in Chapter 2, in HCI research, social digital applications similar to FeedFinder encourage the formation of ‘publics’, where like-minded people come together easily to address everyday matters of concern (Hallahan, 2000; DiSalvo, 2009; Johnson, 2015b). Digital technologies and social media applications scaffold the collective voices of citizens while amplifying them to be heard, but opportunities remain on how this can impact on service provision in public health settings, which this thesis aims to investigate.

The findings from the sentiment analysis suggested that mothers who use FeedFinder have mostly positive experiences when breastfeeding in public. Compared with the IFS which reported 11% of women surveyed had been asked to stop breastfeeding in a public place, the results indicate a much lower proportion of women experiencing any discrimination towards them. It must be acknowledged that perhaps the FeedFinder data are biased in this sense. For example, some of the women who are motivated to contribute to the FeedFinder map, may do so to motivate and encourage other women to breastfeed (as an advocate for normalising breastfeeding) and if they were to share their negative experiences this might have the opposite effect and further support the

fear of breastfeeding in public as reported in the Public Health England survey. In addition, knowing the demographic profile of a sample of FeedFinder users, it is acceptable to suggest that some women using FeedFinder possess characteristics that might make public breastfeeding easier such as maternal age, ethnicity, level of deprivation, education, profession, attending breastfeeding support groups and personal or familial breastfeeding experience (Condon *et al.*, 2010; Fox, McMullen and Newburn, 2015). Although it must also be acknowledged that some women using FeedFinder may have under-reported their negative experiences or that the attitude to breastfeeding in public is changing as awareness is increased with initiative such as Start4Life¹⁷ or the UNICEF Baby Friendly Initiative¹⁸ (Condon *et al.*, 2010; Giles *et al.*, 2015).

In reference to the stigma around breastfeeding in public, women mentioned instances where “*no one batted an eyelid*” and they “*never had any bad comments*” and of the total number of reviews analysed, only 83 instances referred to an expected negative response from the public. This suggests a small proportion of the breastfeeding users of FeedFinder themselves are informing and reassuring each other that although a negative reaction might be expected, it rarely happens.

The challenge here is how this can be translated to be useful for breastfeeding support and how the data within the application can be kept up to date and relevant, helping new mothers to find out about the positive experiences that other breastfeeding women describe. From the textual data analysis, it can be concluded that in FeedFinder, the breastfeeding mothers produce informative content for each other about locations for public breastfeeding, suggesting that they have a feeling of responsibility in

¹⁷ Start4Life (<https://www.nhs.uk/start4life/baby/breastfeeding>)

¹⁸ UNICEF (<https://www.unicef.org.uk/babyfriendly/>)

supporting other new breastfeeding women as their motivation for producing content within the application.

FeedFinder provides an alternative means for collecting information on breastfeeding practices in public and the data can inform practice, policy, academic and local communities on how best to support women breastfeeding though the sample of users are not representative of all UK women and may infer biases.

The challenge is to widen the demographic of users to include younger, less educated, less affluent and more culturally diverse women to feel like FeedFinder can be a useful tool to help them navigate different feeding practices and enable them to breastfeed if they wish to do so.

Given the potential success of FeedFinder as a supportive health technology for some breastfeeding women, public health professionals have the opportunity to use the application in their role. The following chapter begins to unpick what it would mean for the breastfeeding support services to use FeedFinder in their role.

4.7 Study Limitations

The first limitation of this work was the low response to the FeedFinder survey, compared with the number of users contacted. In total only 199 valid survey responses were included when there are over 14000 registered user's accounts. The findings may have included a wider demographic if more people responded to the survey. The survey was conducted after the application had been in deployment for 4 years. Many of the users will have stopped using the application for some time and therefore may have not responded as they do not count themselves as current users of the application. Some users may have signed up to FeedFinder with a fake email to prevent being contactable for further research. It was clear from the findings that use of the application varies. For example, it is likely that a user will use the application only for as long as they are

breastfeeding, and in some cases, they might not use the application after establishing confidence in breastfeeding outside of the home.

There were aspects of the methods that would require revision if conducted again which includes some of the survey questions. For example, asking users about ethnicity caused some confusion. Some respondents described their race and it was difficult to categorise the different ethnicities as they did not all align. Moving forward, it would be best to include an example which would help to reduce confusion between race and ethnicity. This is important as different cultural factors associated with ethnicity may impact on breastfeeding practices.

The FeedFinder data included in the analysis was conducted at the start of the research project and provides only a sample of the review data which may present a limited list of the factors that were generated as important for meeting breastfeeding needs in public and must be acknowledged. In addition, as the research progressed and familiarity with breastfeeding experiences developed, the content analysis may have yielded different results if conducted at a later stage in the research. As with all qualitative methods, opinions and experiences of the researcher may impact on the outcome of the analysis which may have been different if it was conducted at a later stage.

Further limitations were noted on the representativeness of the sample of FeedFinder users and breastfeeding experience. Although the analysis of review data discovered the FeedFinder users have a positive experience when breastfeeding in public, this may not be representative of all women's experiences of breastfeeding in the UK and further investigation with women wider than the demographic was needed and this then contributed to the research approach in strand 3 of this research, Chapter 6, where a further online survey was conducted to capture experiences of breastfeeding women who were not previously known users of FeedFinder.

4.8 Chapter summary

This chapter has described FeedFinder users in detail and the wealth of available data it can provide. To progress in understanding the role of FeedFinder and citizen-generated data in public health, the following chapter begins to investigate how FeedFinder and the data available might be used in breastfeeding support as part of public health services. In doing so, the following questions remain - How is FeedFinder used by breastfeeding support services? Can the data be used to provide better breastfeeding support for women?

FeedFinder provides a wealth of data that has the potential to be used in a public health context. Gaps in the mapping of venues highlights geographic areas that may require further interventions around breastfeeding support, while understanding the demographic profile of currently mapped venues and their locations provides a rich picture of current breastfeeding practices in public in the UK.

Understanding the FeedFinder users identifies where there are gaps in the representativeness of the FeedFinder population. This information can be used to further support interventions to raise breastfeeding awareness in marginalised groups around the normalisation of breastfeeding. In the following chapter, this research engages with services at the forefront of breastfeeding support and explores how FeedFinder and the data it provides has the potential to be used in practice.

The analysis of the review data concludes that women leave informative and predominantly positive reviews for one another. According to the users of FeedFinder, facilities, level of privacy and staff hospitality within a venue appear to be the most important factors for enabling a woman to breastfeed comfortably in a public space.

Chapter 5 How can FeedFinder support the role of breastfeeding support services?

Part of this work has been published:

Simpson, E., Comber, R., Garbett, A., Jenkins, E. I., & Balaam, M. (2017, May). Experiences of Delivering a Public Health Data Service. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 6171-6183). ACM.

5.1 Introduction

This chapter and strand 2 of research is an investigation of FeedFinder and its role within breastfeeding support in the North East of England. In doing so, the research explored the way in which having access to FeedFinder might impact their role in breastfeeding support, and how they might respond to the review data that is available. The data presented in this chapter was captured using multiple qualitative methods including interviews, meeting notes and workshops. The following sections provide a recap of the objectives driving the work, with a description of the relevant contextual framing of this strand of work. This is then followed by an overview of who was involved and the different methods used to capture the response to FeedFinder and the findings are presented which begin to unpick how the citizen-generated data within the application can be considered in the context of breastfeeding support services within public health.

Aim and objectives of this chapter and strand of work:

To recap, the overall aim of the research is to understand the role of citizen-generated data in the context of breastfeeding support in public health. This strand of work was concerned with how FeedFinder (in its initial form of a mobile application) could potentially be used by breastfeeding support services.

In order to achieve the aim of strand 2 of work, the following objectives guided the research:

- To describe the use of FeedFinder within the breastfeeding peer support service.
- To explore the acceptability and feasibility of using FeedFinder and the available data in breastfeeding support within public health services.
- To define key requirements for the development and use of FeedFinder as a public health data service.

5.1.1 Research context and collaborators

This section of the chapter provides an outline of the research context for undertaking this strand of research and describes the involvement of different collaborators in the investigation.

It is widely reported that for women to be successful at breastfeeding they must have a sound network of support, family and friends, health professionals, increased accessibility to peer support networks, breastfeeding support groups as well as support from employers and the wider community (Clifford and McIntyre, 2008; Nash, 2014; Thomson, Esbich-Burton and Flacking, 2014). This work explores the role of breastfeeding support in the wider community and was carried out with breastfeeding peer support teams commissioned by the local authority. It was believed that a number of organisations might have a vested interest in the data FeedFinder collects. In particular, I envisioned that the organisations would be motivated to act on reviews on the FeedFinder map, i.e. contacting local organisations/businesses who had received negative comments, or low star-rating and commending those places that were receiving consistently good ratings. This, in theory, would enable women to graduate from simply having a voice about breastfeeding services within the community, to having a say (Simonsen and Robertson, 2013), through impacting on the delivery of services. Where, polyvocality is considered important for decision-making process to

include a diversity of perspectives and experiences (Dombrowski, Harmon and Fox, 2016).

This strand of work was carried out with mostly Newcastle breastfeeding support services. The role of the breastfeeding peer support service is determined by the Service Level Agreement provided by the local authority. As part of this, the support service is to provide city wide breastfeeding support for women which may include, one to one support, or social group support provided once a week. In Newcastle there are 1000 live births each month. At the start of the research process, the breastfeeding peer support service involved one leading manager, and 9 paid staff working across the week in part time positions to make up 40 hours in total and work city wide in Newcastle. In addition, there are 52 volunteers who are required to one hour a month to keep their contract.

A similar structure of tiered support is seen across the North East with the local authority commissioning local peer support services to provide community support for breastfeeding region wide, e.g. Gateshead, Sunderland and Northumberland. In Gateshead, a similar set up including a manager of breastfeeding support service commissioned by the local authority overseen the work of a team of breastfeeding support workers but this particular strand of work was conducted with the public health improvement practitioner and manager of the breastfeeding service in Gateshead. Over the course of 24 months conversations were had with multiple stakeholders working in breastfeeding support in the North East of England - some of which proved successful, leading to further collaborative work and promotion of FeedFinder, while others were without fruition. As motivated by the inclusion of stakeholders in the research, a great deal of effort was spent establishing relationships with breastfeeding peer support services. The rationale for targeting peer support services was outlined in the previous chapter, as they directly provide breastfeeding support, it was alleged (by the author of this thesis) that they would be in a good position to use FeedFinder with and for breastfeeding women in their service. As the research and relationships

developed, many additional meetings were attended, sometimes passive and other times as an active attendee; providing an opportunity to raise the profile of the research and FeedFinder and attempt to engage different stakeholders in the process. For example, the National Infant Feeding Network (NIFN) North East representative invited the researcher to speak at the regional North of England meeting which then resulted in being invited to speak at the breastfeeding festival which was held in Newcastle in 2017. These networking opportunities and time invested helped to raise the profile of FeedFinder and generated some national interest to collaborate, e.g. Leeds and Watford. The links made throughout the research helped to develop the promotional

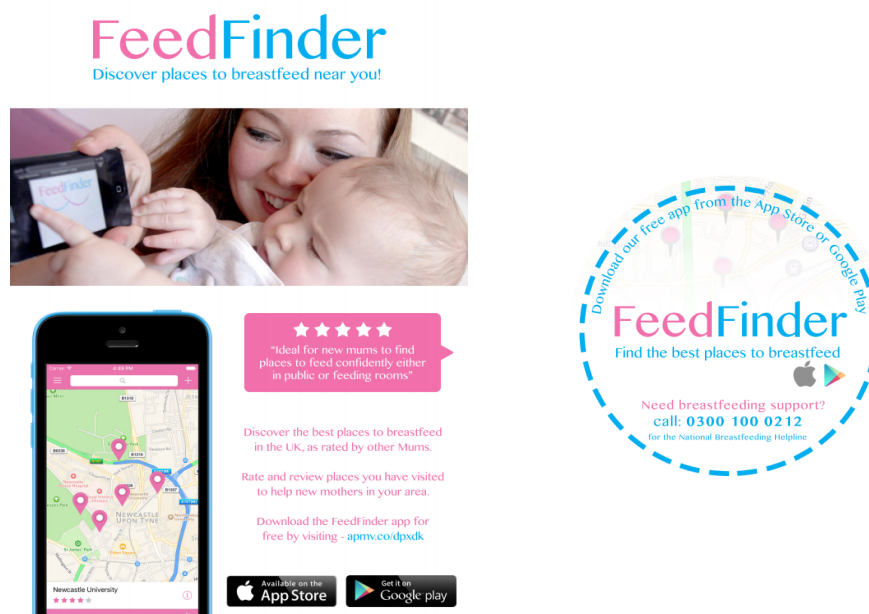


Figure 6 FeedFinder promotional material.

materials for FeedFinder and provide a network of interested stakeholders that were then invited to evaluate the website development in Chapter 7.

5.1.2 FeedFinder Promotion

FeedFinder popularity has mostly spread serendipitously worldwide, however, in the North East of England where this research was conducted, sterling efforts have been made to promote the application by researchers and the stakeholders involved in the research. Quantitative analysis of user interactions with FeedFinder outlined in Chapter 4 highlight that users will typically engage with FeedFinder over different time periods,

mostly from 1 month to three months. As such, there is a need to continuously raise awareness of the application among new and expectant mothers to ensure the FeedFinder map is kept up-to-date and relevant. It was assumed that breastfeeding support services, based on their outreach, networks and activism would be well placed to support the promotion of FeedFinder over the long-term. As the relationship with services developed, a request for traditional paper based promotional material was adapted from the original promotional material used in the release of the application, see Figure 6. A sticker was also adapted to include the national breastfeeding helpline based on feedback from service providers. Part way through the research it was decided to give stickers with red books (the red book is the child measurement diary that is given to all new parents to keep record). Presentations introducing FeedFinder have been given at a range of regional and national events, breastfeeding picnics and 'latch on' events. At each event attended, a QR code was shared on a leaflet, linking to a Dropbox file containing the sticker and leaflets to download and order or print for distribution. A Twitter account and Facebook page was set up in an attempt to raise the profile of FeedFinder more generally. Efforts have been made to attract users and sustain the community, but the majority of users hear about FeedFinder through word-of-mouth, as noted in Chapter 4.

5.2 Methods

This section of the chapter describes the multiple qualitative methods used to understand FeedFinder and its potential role within breastfeeding support.

5.2.1 Data collection and analysis

In total, there were 20 meetings and interviews combined with breastfeeding support services in the North East of England. The different methods included meetings (either one to one or group based) or interviews (one to one or groups based). The table provides information on the attendee's ES (the researcher) and the breastfeeding support workers = BSW, and the overview or outcome after each session. In all

interactions the research focus was reiterated, and it was made clear that data would be collected as meeting notes, unless explicitly recording meetings or interviews, in which case additional written consent was obtained. Throughout each meeting the researcher discussed the group's use of FeedFinder, their efforts promoting it, and an exploration of the FeedFinder data and review and discussion of the FeedFinder map of venues and reviews. The data included free-text reviews on venues within their locale, star ratings for the venues (based on the criteria within the application - hygiene, privacy, and comfort and baby facilities).

Other interviews carried out with the breastfeeding peer support team were guided by semi structured interview questions, which were developed according to the aims of the strand of research. This enables the conversation to be led by the interviewee, providing an opportunity to be flexible and provide as much detail as possible without being constrained by the researcher. To disrupt any power imbalances, non-academic language was privileged and helped to develop rapport with the service providers, not only in the interview process but over the trajectory of the research project.

A workshop was conducted with the aim of obtaining feedback on the FeedFinder review data. Prints of FeedFinder reviews were shared and feedback was gathered. All instances of recorded data were transcribed verbatim and an inductive thematic analysis approach was adopted (Braun and Clarke, 2006). Each transcript was manually coded and NVivo 10 used to group codes into hierarchical themes that are presented in the findings section.

5.3 Findings

This section of the chapter provides the findings from the thematic analysis of the qualitative data collection. Themes were generated from the data around 'FeedFinder Accessibility and Unravelling the Data', 'Professional Support of FeedFinder' and 'Whose Role is it Anyway', 'Adding to the Map and Encouraging Use'. The goal was to

understand the ways in which FeedFinder could potentially be part of the breastfeeding support service. This strand of research was concerned with the potential uses of the data breastfeeding support, how this data should be made available as part of a service, as well as the ways in which the breastfeeding peer support service could help sustain the FeedFinder community and increase the awareness of the application and review data. The initial meetings and interviews identified a number of key challenges and resource constraints on the service. The breastfeeding peer support service highlighted three main challenges in relation to providing support for women –

- (1) Obtaining support from organisations in the area – the team manager expressed their desire to approach local organisations with a list of guidelines and recommendations that would help them to promote and support breastfeeding, but funding cuts had put a strain on resource,*
- (2) a way to access up-to-date information on places to breastfeed in the local area other than department stores which weren't always an option for some women and*
- (3) An easier way to track places (organisations) that do not provide sufficient breastfeeding support.*

Although many of the support workers had heard about FeedFinder, they hadn't used it themselves, or seen it used in practice. Promoting the application became part of their service delivery plan when the research relationship began, but none of the team had the application installed on their own mobile phones or were aware of how the application worked, though they had been recommending FeedFinder for women to download. In addition, some of the breastfeeding support workers expressed a potential conflict in their desire to discourage women from using their mobile phones while breastfeeding, claiming '*they should be attentive to their babies and strengthen the mother-baby bond*'. This perspective suggests a conflict between support workers and what is described by women about the supportive role of technology in parenthood reported in the literature (Gibson and V. Hanson, 2013; Lupton *et al.*, 2016).

5.3.1 FeedFinder Data Accessibility and Unravelling the Data

It was immediately clear that accessibility of the FeedFinder review data presented some challenges for the breastfeeding peer support service. It was evident that the mobile application itself did not provide the data they needed, or necessary filtering options. As the breastfeeding support service work across the city, they described how they wanted to be able to look at the data from a wider geographical perspective, e.g. city overview, or by super output areas. This would allow them to monitor and compare areas based on the levels of deprivation as reported by IMD (The English Indices of Deprivation, 2015). As Marie details: *“I think if you’re looking at super output areas if we’re working in a specific area, like at the moment we’re focusing on the west...obviously we’re working there so we can look and if one of our areas is a two [breastfeeding friendliness rating] then we can look at it and one of our goals could be can we get it up [breastfeeding friendliness rating]?”*

The design of FeedFinder as a mobile application meant that support workers would have to investigate each individual place and individual review to find opportunities for action. In addition, it was almost impossible for the support service to identify recently added places or reviews, making it difficult to assess whether a review for a venue could be considered out of date.

Each subsequent meeting involved looking at some of the reviews from the application together in an attempt to provoke a response to how they would act on the data however often the group became entangled in much more nuanced debates about the contextual factors which may have influenced the review. Using their own experiences to compare, they debated at length whether the data would actually warrant any action in response. At times, they described the evidence as ‘weak’ and called for a process where they could retrieve further information from both the women and or the business owner for confirmation and to look at it from a *‘factual point of view’* as this conversation illustrates –

Kate: but that's the thing isn't it, I mean it says 'not a great place to feed not enough room' but again they might have twins, or they might have a child and then two other toddlers.

Marie: I think whatever they write you...

Kate: have to read between the lines a bit...

When discussing the data, they described how it became a matter of subjectivity and proposed numerous questions they would ask the woman who left the review. They proposed ways to further improve FeedFinder to be a useful resource for them. They suggested a social element, where they are able to respond to the women and ask for further information:

Marie: so that one there I would say, ok, not a nice place to feed, not enough room, I would pick out the bunch of all of these [reviews] and if the lady has left the name and contact number [imaginary scenario] and then you can get a bit more detail, what do you mean by not enough room,...because it could be arms on the chair, it could be the door opens inwards so you can't get your buggy in and shut the door, or it could be I've got twins, you know, so it is reading between the lines, but that is a potential option for a person to leave their [contact details]

It is notable that most of the dialogue around the data was framed in this way – seeking out the social and contextual factors which could have contributed to a woman's experience, and the possibility that a woman may have made a misjudgement which could be further clarified by speaking with them or with the organisation/business.

Marie: "staff skirted around the subject of breastfeeding, so we didn't receive a clear answer", so she obviously asked, but what was the questions...

Jodie: "maybes a telephone call to the Centre X or you know, its whether actually she asked...they might have actually given her somewhere else, she might have

assumed that this is where I need to sit when actually that chair might have been for a toddler...”

As they suggested ways in which the application could be further developed to allow facility to contact the women to clarify their experience, they also wanted to be able to let women know their review was valid and had been noted:

“would you then, say if you sent that email to say Store X or whatever would you then comment underneath about what you had done” and further “I think to reply to a comment to say 'hello we will look into this' or something is great, you know, to show that something is happening”.

However, differences were observed between the idea of what’s important and ‘valid’ when breastfeeding in public, with contrasting views from the breastfeeding women and those who provide support. The breastfeeding support team overlooked much of the data that made reference to changing facilities and were more interested in whether a venue was welcoming of breastfeeding, regardless of the changing facilities. While in contrast to data from Chapter 4 in which a breastfeeding mother indicated:

“I do tend to share, kind of, baby changing and feeding facilities because they often go hand-in-hand”. (Mother using FeedFinder)

In discussions on amendments to the FeedFinder application guidance to women to talk less about facilities was mentioned by Jodie:

“that’s what you want to know, whether they are Breastfeeding Welcome but if we’re going right oh well that says about the baby facilities but we don’t want to know about that but we’re asking them to star it, so I would scrap that and have ‘is it Breastfeeding Welcome ’ [instead of baby facilities].” (Jodie)

At times, they explicitly described how they were *'not interested in a place being child friendly'* but rather *'are they able to breastfeed'*. This was also reinforced when they questioned a woman's choice of venue after she reported that the place wasn't child friendly, however they also suggested an organisation/business has a right to respond.

Jodie: *"the thing is with this, because whether or not you, because it is Marco Pollo, whether or not there is some sort of email that goes to them or another establishment that says 'just to let you know we have received a review, blah blah blah'. and I do feel quite strongly you have got to give them the right to reply [the business], so they have to know, well they might say our staff, well I don't know..."*

Marie: *"but then Marco Pollo there's a flight of stairs but there's seats downstairs"*

Jodie: *there is but that's not our issue, our issue is not about being child friendly, it's about breastfeeding*

Marie: *"I think the issue here is she is saying it was happy for breastfeeding, the other issues are about the stairs and position next to a large group sometimes that is way out of our hands, we can't, that is their choice of venue, they have chosen a venue that has got a flight of stairs and no lift so it's not baby friendly but they are not saying it's not breastfeeding friendly."*

However, there were times when the breastfeeding support staff looked beyond their service level agreements and unpicked the data from the perspective of having been a breastfeeding mother. Drawing on their own experiences to sympathise when places don't provide the space to change and feed separately, Jodie recalls:

"the baby changing is the toilet for babies so why would you make that the feeding room? it causes bad feelings for people waiting to change their babies because if you're feeding in there and there's a queue of people waiting to

change then you come out, because I've experienced it, people will be glaring at you." (Jodie)

There are certain expectations that the breastfeeding peer support workers consider when reviewing the type of venues where women choose to breastfeed. This raised some interesting questions on whether a review was legitimate, based on their previous experiences. For example, the peer support workers discussed the implications of a well-known department store having directed a woman to an outside disabled toilet in order to feed, with Marie questioning whether the review was correct:

"there is, they have got, ah I might not have been in that one, but most [of the stores] have got a feeding room".

Whereas, a review from a DIY store where a woman was shown to a ladies' toilet and given a stool to sit on was accepted:

"when somebody says oh you can go to the toilet and breastfeed would you go and eat your dinner there?" rather than *"well done not just you know, what's that like a s**t sandwich, well done for doing this, the place was awful but??"*

5.3.2 Professional Support of FeedFinder

It was assumed that an institutional seal of approval will likely help in promoting the use of the FeedFinder and the data it affords. However, there were some hesitations noted on using the app, relating to reputation and professionalism.

In some cases, support workers disagreed with the premise of the application, and suggested they could not endorse it. They suggested, for instance, including venues with a 1-star review might be considering promoting a venue that may not be breastfeeding friendly. Some concerns were expressed when the support services realised their right to anonymity was waived depending on their chosen username when registering an

account on the FeedFinder app. This prompted dialogue around whether or not they would want to be identified by their own name when acting in a professional capacity.

Jen: *"nobody would know like my name for example, you don't have to put your full name, do you, like JC or jenc, but no one would really know that is me as a person, especially if you don't put a picture, if you don't make a full profile, if I made a profile to say I'm from City X breastfeeding support, blah blah, then you know... I don't think I would put a picture on, and I've left a few reviews at different places that I have been which aren't related to work but I've thought it would be nice here [to breastfeed]"*

Here, Jen is concerned that 'outing' herself as a breastfeeding support worker might have implications for how her reviews are received and understood by the community, and potentially also organisations. She is concerned that everything she adds to the FeedFinder map is viewed in this 'official' capacity and would not want to be a target because of this.

The potential of sharing reviews on social media was explored. As a new feature, this provides an opportunity to open up the data for discussion online, but again, anonymity was a contributing factor which would inhibit a decision to share reviews. As Katrina describes: *"I think again, it's a professional thing that you're told, you know...to be very careful about what you put on. If I shared something, but somebody had put on a really out-there review then I might be seen to be promoting that. So I'd be very careful about that.... I probably wouldn't share it on social media, because then I'd be seen to be promoting it. I mean, promoting breastfeeding is a great thing but if somebody's written a dodgy review and I hadn't read it, you know, just for those kinds of reasons."*

Additionally, the idea of a mobile application which supports breastfeeding is problematic for some members of the public health community. There were clear contrasts in the views posed by both the breastfeeding women and the breastfeeding

support services. As Marie noted, *“we discourage women from using their phones when nursing as it is a distraction and they should be bonding with the baby”*. This conflicts sharply with modern parenting practice (Gibson and V. Hanson, 2013), as described by one of the FeedFinder users: *“... it’s usually if I’m feeding him or something...like lots of people I’m glued to my iPhone...I think where I’ve been, and I do it in blocks [add reviews]”*.

5.3.3 Adding to the Map and Encouraging Use

Through the data exploration at the monthly meetings, data ‘desserts’ (Loudenback, 2014) were identified which enabled them to work with local women to add reviews in those areas. This was conducted at the weekly social groups where they asked the breastfeeding women attending to share places they had breastfed, and the breastfeeding peer support worker input the data to the application. They also discussed the idea of incentivising the volunteers to take on the role of reviewing places and inputting onto the FeedFinder map. To encourage them to carry this out, the staff discussed the idea of providing a ‘prize’ for the most reviews left or the best review.

Marie: *“something that we could do is get the volunteers to go out there and try different parks and then say to them on top of that go and put your review on FeedFinder”*

Jen: *is it worth me emailing all of our volunteers that we know have got a baby, sorry or breastfeeding or pregnant and saying it’s like a little project for them?”*

Marie: *“we could send an email out to volunteers to generate interest again about [FeedFinder] or if they are finding it difficult or if they haven’t, or they don’t do apps and things if they forward the information we can put it on for them”*

Jodie: *“We could even put on a little prize for who gets the most increase of reviews or best...”*

Jen: *“I definitely see where volunteers fit into this, I mean because asking them to go out and about in their particular area to review establishments and or spread*

the word, obviously some of them are still breastfeeding, I just think it would be a nice volunteering opportunity for them without...it feeling like they have to do it... apart from that it's good from this point of view on this side too of trying to raise standards and raise numbers, so..."

In addition, the breastfeeding support team requested paper-based promotional materials to help the breastfeeding support teams to promote FeedFinder.

When discussing the promotion of FeedFinder within the local community, it was noted that regional competition could also function as a motivator for local service providers. Breastfeeding support workers often talked about 'doing better' than the adjacent cities in terms of breastfeeding rates and breastfeeding community support was an important sense of achievement *"oh we have got to beat City Y and City Z"*. This became of such importance to the breastfeeding service that it was agreed to incorporate a unique tracking link (for the service provider) on the leaflets and stickers that were produced for them so that they would be able to track their 'download' rate in comparison to other services.

In many cases, the breastfeeding support workers had good intentions, but any actionable insights generated from the data were either delegated to the role of a volunteer or toward the researcher *'you could just draft two standard emails', 'you could contact businesses', 'you could ask the women for further information'*. The resource constraints were stressed regularly, in addition to the already over stretched SLA with the local authority which meant any resulting actions from the data would be out of their current scope of work.

Through working together the responsibility for action was pushed back to the researchers or when money came into the equation – on the organisation to pay to receive their supportive services. As they noted:

Jodie: “So could we not just like, draft a letter?”

Marie: “No, its capacity for our team when it’s not in our SLA.” Kate: “Unless someone is going to give us some money?”

Jen: “Do the businesses know this exists [FeedFinder], they should do.”

Jodie: “I mean just a letter, not send it out but give it for {researcher} to send out.” Jen: “But what you going to put in that letter to improve on their services?”

Marie: “You can’t just say – “I don’t know if you would like to discuss it more and like a bit more understanding” I’m happy to use the central line for them to ring us but we can’t offer them any training we haven’t got the capacity and we don’t get paid for it.”

Kate: “But it’s you [the researcher] that would do that?”

Jodie: “...we could get them to pay us for it, get the business to pay for it...come in and we deliver a session for £10 all your staff. You know, you would get a certificate at the end of it to put in the window to say we have all been trained.”

5.3.4 User needs generated from the findings

The long-term engagement with breastfeeding peer support services in the North East of England provided an opportunity to explore FeedFinder use in practice as a mobile application. The key challenges relating to their role presented at the start of the research identified a niche part of the service where FeedFinder would have the potential to alleviate the resource constraints of providing community support of breastfeeding. However, in its current form, the mobile application provides a useful technology for women but lacks the functionality to be a useful resource for institutions and organisations involved in breastfeeding support. The following design requirements were gathered in direct response to the engagement with breastfeeding support

services to contribute to the development of a FeedFinder website. The following Chapter 6 describes the development of the website and engages with a wider stakeholder group to include the perspectives of local public-facing organisations and direction from public health improvement practitioners, policy makers and infant feeding coordinators at the local authority level.

Designing for Action

Taking inspiration from social platforms for change, such as Change.org, it is clear that time for action is limited, and that taking action should be as simple as clicking a button. Considering that, alongside providing relatively standard review, search and filtering features, a data interface should automatically highlight places where action may be required. Other review based health data services like (Patient Opinion, 2015) provoke action among service providers where the quality of care is lacking. In the case of FeedFinder, there is potential to identify places where venues are on a downward or upward trend (in terms of breastfeeding friendliness), areas within a locality where number of users is waning or gaining momentum. In discussing reviews with support services there was a level of meaning making undertaken by the group. An experience shared by an individual was rarely taken at face-value, but instead dissected to identify whether action was necessary, or whether the women's experience was as should be expected. The support service providers regularly called on their own experiences, as well as an institutional perspective on breastfeeding friendliness, to assess the legitimacy of a review. Complex disputes and issues around data interpretation and analysis have been reported elsewhere (McMillan *et al.*, 2016). A FeedFinder data service must thus enable negotiation of data collected; providing an opportunity for open dialogue around the data to consider action.

Further to this, trust and moderation of content continue to be an issue for institutions and private end-users, considering reputation to be at stake, if for example FeedFinder was found to contain libellous, or inflammatory reviews. An interface which enables support services, organisations and other women to explicitly respond to reviews would

provide an opportunity for negotiation of meaning, and appropriate action, akin to review services such as TripAdvisor and Yelp. Commercial services like these provide a platform where dialogue can occur between the consumer and the business operator, allowing space for negotiation and potential to reconcile (if need be). Such opportunities to respond may also help to increase confidence in the reliability and trustworthiness of the collected data. Much like the support service whom engaged in this research suggest, the data service should provide templates of emails, leaflets and posters which users (whether they be breastfeeding activists, breastfeeding support workers, or otherwise) can quickly download, adapt, print and circulate. Design requirements for action are listed below.

In its current form, the mobile application makes it difficult to perform searches of the data. Each individual venue must be selected to explore. From a support perspective, breastfeeding support teams would be interested in searching for area based and regional differences, the level of granularity expressed as useful would be by ward basis over the city of Newcastle. For example, this would be as specific as lower super output areas (as categorised by Government as geographical areas of up to 3000 habitants (The English Indices of Deprivation, 2015)).

Requirement 1 - The ability to search and view FeedFinder data over a chosen time period and or by geographic location (post code/area name)

The system should enable direct (e.g. view reviews) and indirect (e.g. trend analysis) interactions with the FeedFinder data. Stakeholders need to view FeedFinder data in a way that is useful for them to get a better understanding of breastfeeding from the perspective of FeedFinder users.

Requirement 2 – To enable the moderation of FeedFinder content

Trust and moderation of content continue to be an issue for institutions and private end-users, considering reputation to be at stake, if for example FeedFinder was found to contain libellous, or inflammatory reviews. Stakeholders need to be able to moderate

FeedFinder data so that they can reduce harm to the FeedFinder users and provide an opportunity for public facing organisations to rectify or respond to negative or harmful reviews.

Requirement 3 - The ability to view and download a report of places to breastfeed in an area that have been rated by FeedFinder users.

In certain area of Newcastle for example, it is not uncommon for some women not to have access to smartphones. Stakeholders require the ability to provide an up to date list of venues that women can breastfeed comfortably in their community which will improve their offerings as a service by widening their accessibility to women who may not be digitally literate or engaged.

Requirement 4 - To provide information on how to act on the data and advocate for better breastfeeding support.

The website should provide detail on how to act on the data. To support local government efforts to promote and sustain breastfeeding awareness, stakeholders require the ability to use the website to advocate for better breastfeeding facilities in public facing organisations. Stakeholders need to know how to act on the data that is provided by FeedFinder users to support their efforts to advocate for breastfeeding women.

Requirement 5 - To provide best practice information on how women are best supported when breastfeeding in public.

Public facing organisations may not be aware on how best to support women when breastfeeding in their venues. The website should provide this information so it can be easily accessible to all organisations who are proposing to support breastfeeding women.

Requirement 6 - The ability to interact with the policy monitoring and evaluation.

To support the upkeep and adherence to a breastfeeding policy, a user should be able to report that a policy with an organisation should be reviewed. The website should allow FeedFinder review data to be used to support this process.

Requirement 7 - The ability for organisations to interact with FeedFinder users and respond to reviews.

The FeedFinder website should provide an opportunity for organisations to engage with FeedFinder users and respond to reviews which may improve their offerings to breastfeeding women.

These requirements were developed as a direct response to the engagement with the breastfeeding support peer services in the North East and were used to inform the website designers of the core functionalities needed in the FeedFinder website development. Chapter 6 describes the collaboration with the website designers to implement these requirements into a functional FeedFinder data service.

5.4 Discussion

This chapter has outlined the way in which the breastfeeding support services have explored and used FeedFinder in their role in supporting breastfeeding women in the North East of England. Working with the breastfeeding peer support service highlighted three main challenges – (1) obtaining support from organisations in the area was limited by resource constraints, (2) a way to access up-to-date information on places to breastfeed in the local area was limited and (3) an easier way to track places (organisations) that do not provide sufficient breastfeeding support was needed.

Initially, it was clear that although FeedFinder was promoted to women in the support groups, there was little experience of the support team using FeedFinder themselves. A considerable amount of time was invested in showing the breastfeeding support group how the application worked and as requested, promotional materials were developed to

help raise awareness of the application. Promoting FeedFinder became part of their service delivery but any use of the data was not considered practical or easy to use. Being able to track review data across the North East was seen as essential to fulfil their role and identifying data desserts which could result in targeted interventions. As a result, this work identified the necessity for a web-based interface to allow better access to the FeedFinder data for achieving these goals and requirements were generated from the data. While FeedFinder can be recognised as an application which offers women a voice in sharing their experiences, it doesn't necessarily offer a 'say' (Simonsen and Robertson, 2013). Design requirements were identified by support teams that would potentially enable this data lead to real-world impact, and ultimately an improvement in services for breastfeeding women.

Having spent time engaging with individuals providing services to breastfeeding communities, it is apparent that the data FeedFinder collects is not made available to them in ways which are at all feasible given their existing time pressures. In addition, the type of data collected does not always meet their specific needs.

FeedFinder can be positioned as a technology through which lived experiences of political conditions can be better known and acted upon; i.e. breastfeeding is considered a political act which goes against the societal norms of public feeding discussed in Chapter 2.

FeedFinder is a platform where women can voice concerns and experiences, but few institutions or organisations were aware of the data or see the potential value as it stands within the application. In addition, and seen in other similar community based research there are challenges to working with communities bound by contracts and infrastructures (Latour and Weibel, 2005; Ehn, 2008). In this research, working with a breastfeeding peer support service over an extended period emphasised the lack of time and resource these services have, particularly when delivering on anything but non-essential frontline services. Therefore, the website should be intuitive and easy to use and have the potential to integrate seamlessly into the breastfeeding support service.

5.5 Chapter Summary

This chapter begun to explore what it would mean for FeedFinder and the data it provides to be used by breastfeeding support services. Over the research period, the public health improvement service involved were mostly the breastfeeding peer support service as they are on the frontline of delivery of services for breastfeeding support in the North East of England. The challenges faced by the peer support service were noted and FeedFinder considered useful as a way to reduce resource constraints by providing support for local women where service provision was lacking. This work opened up an opportunity to explore the nuances of the data and discovered that FeedFinder as an application doesn't provide the necessary filtering options and functionalities considered useful for breastfeeding support workers. The design of the website and supporting artefacts are described in the following chapter.

Chapter 6 Development of FeedFinder Website and Community

Breastfeeding Policy

6.1 Introduction

This chapter describes the process of design and development of the FeedFinder geo-analytics website, the community breastfeeding policy, poster and video. Building on the work described in chapters 4 and 5, this strand of work reached out to other breastfeeding women who were not known users of FeedFinder. In doing so, this work aimed to widen the demographic of women included in the research, in addition to working closely with public health improvement practitioners at the local authority level and local public facing organisations that provide a space for women to breastfeed. In developing the website, data was drawn from multiple sources (e.g. public health fingertips, IMD, and GPS) and layered with the data from FeedFinder within the website. Combining the FeedFinder review data from breastfeeding women with public health data and other publicly available data provides a better understanding of breastfeeding in a localised area, for parents, for interested stakeholders such as breastfeeding support workers, local public facing organisations and researchers alike.

Breastfeeding Welcome schemes are campaigns and initiatives are used in parts of the UK to support women choosing to breastfeeding outside of the home by usually providing information for local organisations to better support women, however previous qualitative work in Chapter 4 and 5 noted the current challenges of sustaining the campaigns and identified a gap in which a new digital breastfeeding support service could be welcome.

This work followed an iterative user-centred approach, engaging with multiple stakeholders and was a direct response to the work conducted in Chapter 4 and 5, understanding FeedFinder and understanding FeedFinder in the context of breastfeeding support, respectively. To recap, the diagram in Figure 7 shows the

different elements of research that have contributed to the overall design and development of the FeedFinder website and community breastfeeding policy. In addition to the qualitative work, a scoping review of current Breastfeeding Welcome schemes available across the UK was undertaken the findings of which will be reported here.

The objectives for completing this strand of work were –

- To review the available Breastfeeding Welcome schemes in the UK to support breastfeeding women.
- To engage with multiple stakeholders interested in breastfeeding support; parents, public health improvement, local public facing organisations.
- To design and develop a FeedFinder website and community breastfeeding policy.

The following sections will cover the work conducted as strand 3 of this overall research, firstly describing other platforms that adopt a citizen-led approach to service design, followed by a review of current Breastfeeding Welcome schemes in the UK. An online survey with breastfeeding women was conducted to capture experiences from women who were not known users of FeedFinder. All research leading up to and including this strand have contributed to the development of the FeedFinder website, community breastfeeding policy, poster and video. The chapter concludes with an overview of the core functionalities of the website and community breastfeeding policy document and accompanying training video to create a new service design for breastfeeding support. The following Chapter 7 provides a qualitative expert evaluation of the new service design with multiple stakeholders.

All screenshots of the website, policy and poster are located at the end of this chapter.

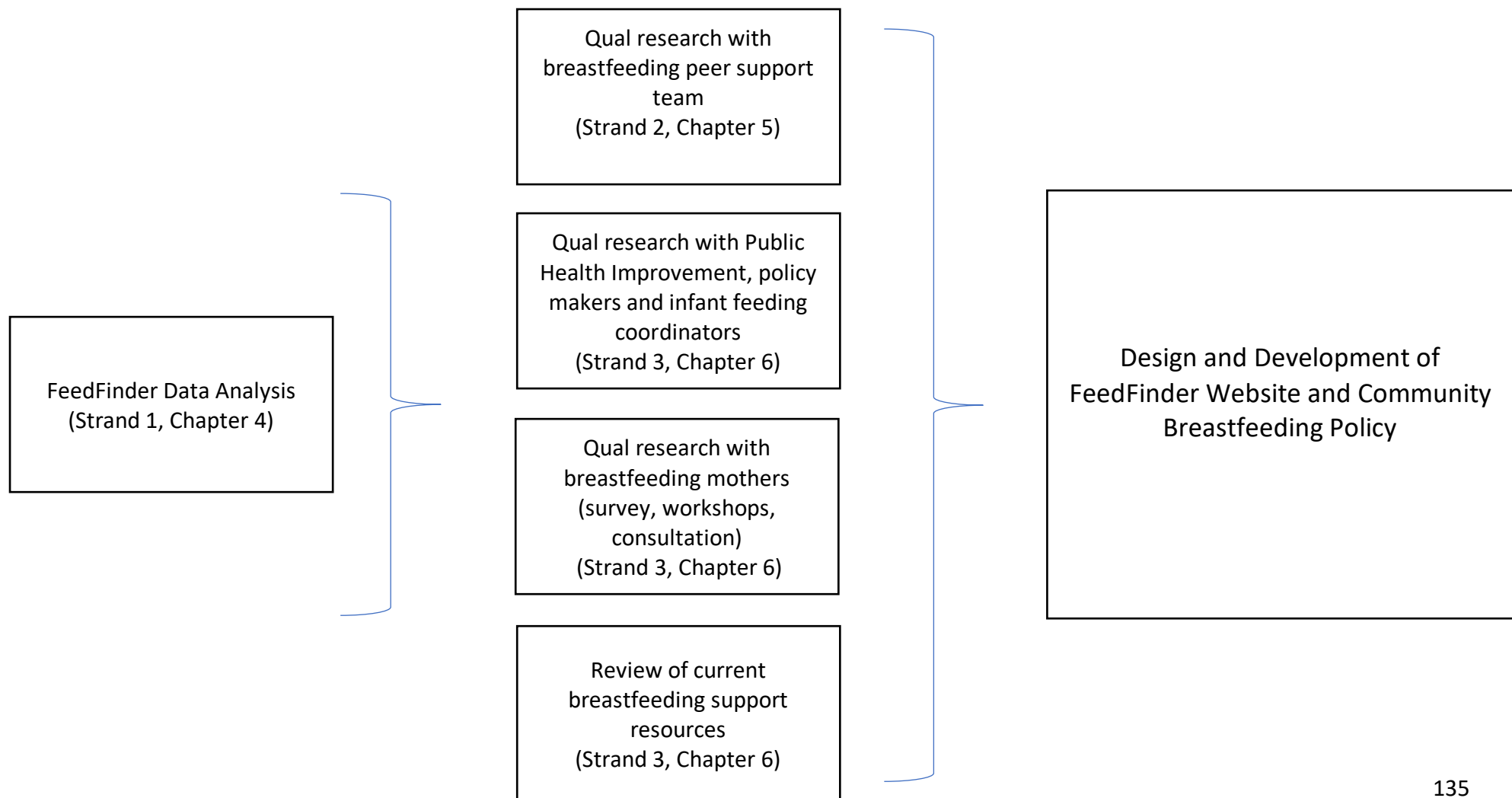


Figure 7 Data collection and contribution to the design and development of the FeedFinder website and community breastfeeding policy.

6.1.1 Citizen-led service design to support the development of the FeedFinder website

This section provides an overview of platforms and services that were considered as part of the process of design and development of the FeedFinder website as a data analytics tool.

The term ‘citizen-led’ refers to the placement of citizens at the forefront of any service, or democratic process whereby citizens can have an active role in shaping the design, commissioning and delivery of services (Igalla, Edelenbos and van Meerkerk, 2019). A more relational model of service delivery, the collective, usually self-organised initiatives are comprised of citizens who take responsibility to provide public goods, while often taking over the role from governments or companies. There are many terms that have been used to describe this including, ‘grassroots initiatives’, ‘civic engagement’, ‘citizen-led initiatives’ for example (Parker, 2003; Igalla, Edelenbos and van Meerkerk, 2019). Within the context of this thesis, FeedFinder as an application can be described as a citizen-led initiative, as the content within the application is contributed by the citizens using FeedFinder; the breastfeeding community. The breastfeeding community have taken a leading role in creating a potentially useful public health data service as a response to breastfeeding in public, mapping locations and generating a resource for other breastfeeding women, public health professionals, researchers and any other interested parties to engage with.

Platforms that enable sharing of experiences and aggregate data to create shared knowledge production but include for example, FixMyStreet¹⁹, Ushahidi²⁰, and HarassMap provide an opportunity for citizens to voice concerns around varying social issues, or crisis mapping. For example, Ushahidi is a crisis mapping platform ran by non-governmental organisations (NGO) globally where marginalised citizens are able to voice

¹⁹ <https://www.fixmystreet.com/>

²⁰ <https://www.ushahidi.com/>

global concerns and share in real-time their experiences of crises. Ushahidi has been used to harness the voices of many underserved populations by drawing on multiple data collection methods mediated through technology, e.g. short media messaging (SMS), social media platforms and applications, email and purposely designed surveys. Over the last decade, Ushahidi has had a huge impact in the developing world, for example, the platform has facilitated the democratisation of election processes in Kenya, facilitated crisis aid in disaster management in Haiti and responded to terrorist attacks for location of blood donation centres in Nairobi. Other projects have utilised the platform for additional purposes, for example, HarrassMap (HarassMap, no date) is a system that uses Ushahidi reporting functionalities for women to report cases of sexual harassment in Egypt. The aim of the platform is to change the way sexual harassment is viewed and understand how using social media, crowdsourcing and novel methods of data collection can be used to better understand the issue at hand (Bernardi, 2017). In a more similar vein to FeedFinder, FixMyStreet is a platform used by citizens in the UK to map issues in local areas, e.g. abandoned vehicles, lights out, potholes, etc. that are shared with local authorities. However, access to the reports, i.e. the response from local authorities and statistics of any reported fixtures are limited to local authority access only. Other platforms such as Change.org²¹ have been used to enable action through the click of a button, where citizens share a petition for a change they wish to see and through the sharing of the petition online, aggregation of signatures and support can be shared with decision makers to bring forth an opportunity to enact change.

Taking inspiration from the aforementioned platforms, this website design was to incorporate dynamic search functionalities, data exploration and be a call to action to enable the website to encourage a more supportive environment for breastfeeding.

²¹ <https://www.change.org/>

6.1.2 Supporting breastfeeding women in the community

As noted previously, in Chapter 2, section 2.5, public health services within the local authority are in a position to provide additional support for breastfeeding women and the local community, directly or through commissioning of localised breastfeeding support services (e.g. breastfeeding peer support services, charities). However, reduced funding opportunities has put additional strain on available resources, particularly in the North East of England. Previous research conducted as part of this thesis identified that FeedFinder was useful for sharing places that women can breastfeed safely in the local community as rated by other breastfeeding women. For services engaged in breastfeeding support, the FeedFinder data was noted to have the potential to track, in real time, the support of local organisations through the experiences shared by mothers. However, further developments were required in order to access the FeedFinder data suitably and for it to be of any use. This work aimed to engage with breastfeeding women and other stakeholders with an interest in breastfeeding, review the available resources for supporting women breastfeeding and develop an alternative digital tool for supporting breastfeeding in the community using citizen-generated data from FeedFinder.

6.2 Methods

This section of the chapter describes the different methods which contributed to the overall design and development of the FeedFinder website as an alternative breastfeeding digital support tool. This included a review of existing breastfeeding support resources, a qualitative study with breastfeeding mothers and collaborations with both public health improvement at different local authorities in the North East and public facing organisations.

6.2.1 Review of existing Breastfeeding Welcome schemes

To contribute to the design of the website, as well as drawing on existing platforms (e.g. change.org, AirBnB, etc.) a review of the resources the available in the UK that aim to

support women breastfeeding in the local community was undertaken. Typically, existing resources provide information for local organisations on how best to support breastfeeding mothers on their premises and information for mothers on which organisations are considered breastfeeding friendly. Oftentimes, the resources are defined as a 'Breastfeeding Welcome' scheme or campaign. Start4Life is a national initiative from the Government to raise awareness of providing an infant with the best possible start in life and promotes breastfeeding as the normal feeding method. As part of this campaign, PHE developed a 'Breastfeeding Welcome' or 'breastfeeding friendly' scheme. Work carried out in Chapter 5, discussing the support available for the breastfeeding peer support workers in identified the previous use of Start4Life campaigns for raising awareness of breastfeeding in Newcastle and recruiting local organisations to sign up to be Breastfeeding Welcome, however, lack of funding meant this was not sustained to continue beyond a couple of months of the campaign back in 2013. As the work undertaken to develop the website was concerned with the type of support available through local authority commissioned services, seeking out information on local authority websites across the UK was necessary to gain a better understanding of what is currently on offer.

First, all local authority websites in the UK were recorded in an excel file (n=343). In the UK, the structure of local government is complex and in England alone there are 326 individual constituencies that provide services for their local communities. There are varying levels of councils, some areas are multi-tier with county councils (lower tier) and non-metropolitan district (upper tier) both responsible for different services working together. In some areas, authorities operate as a single tier, unitary and metropolitan borough councils and are responsible for all services within the one tier, e.g. waste management, education, health and wellbeing. Due to the volume and project time constraints, a random sample of 100 local authorities was chosen to investigate the breastfeeding information available. The sample included local authorities from the different levels.

The method for reviewing the websites was a multi-step process -

- 1) Visit website linked with local authority
- 2) Search for 'breastfeeding'
 - a. If links to another website, follow link to access information
- 3) Record information available in Excel file.

All data obtained from the review of websites was recorded in an Excel file and captured information on whether it included any resources (yes/no), link to resource, information included, how it is monitored/evaluated, contact details. The summary of the data collected is given in the following section.

6.2.2 Summary of findings from resource review

Of the 100 reviewed websites, only 9 provided any information for local organisations to access to support breastfeeding information. Local authority websites were visited initially, a lot of the websites contained no information relating to breastfeeding, some included breastfeeding which was not relevant to this review and some websites had a further link to the local NHS service which provided information for breastfeeding women only. The majority of websites searched returned no results on breastfeeding, see Figure 8.

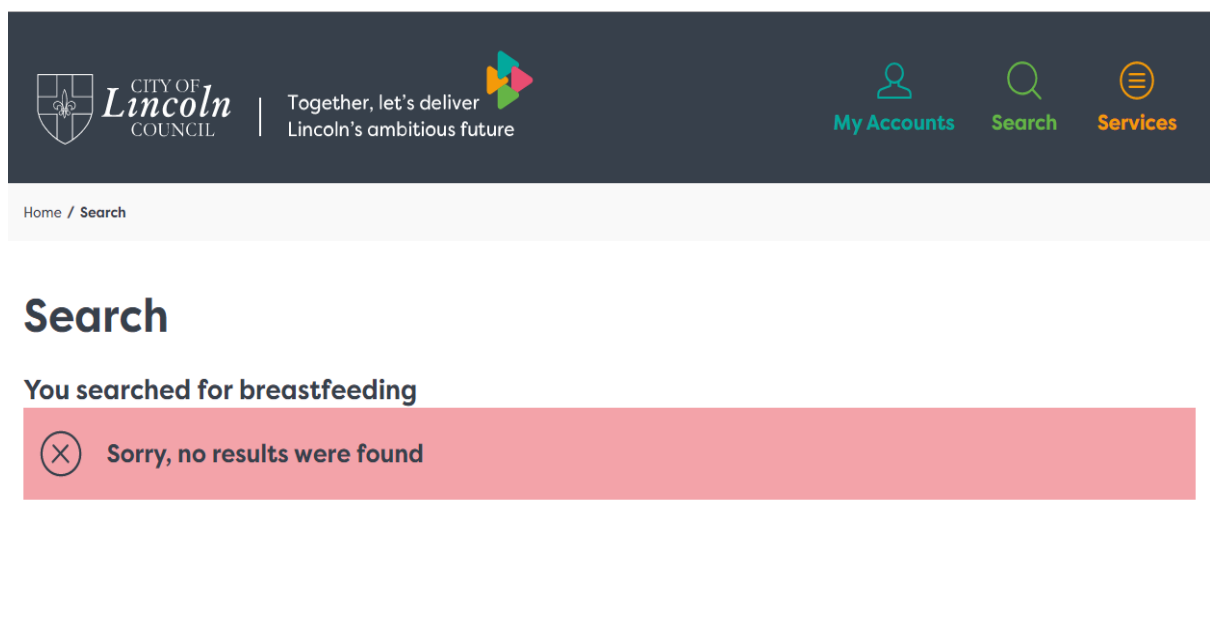


Figure 8 Example of search results from Lincoln on breastfeeding.

Of the local authority websites that did provide information relating to breastfeeding, most had information aimed at breastfeeding women only, e.g. how to initiate and sustain breastfeeding in terms of the biological processes and local support groups. Some sites contained information to share with family and friends, and some website links to information were broken or in one case led to a payday loan shark website. Mostly, when information was provided it was in the form of a static list of venues that had signed up to be 'breastfeeding friendly', but in some cases the list and link to PDF hadn't been updated since 2013, e.g. Cornwall, see Figure 9.



Breastfeeding Friendly Places

We have also listed a number of places that have signed up to be 'Breastfeeding Friendly' to try and help when you are out and about. These establishments have committed to being welcoming to breastfeeding mothers and so you should be able to feed in peace and comfort!

Bodmin
Folly Tea Rooms 3 Turf Street, PL31 2DH
01208 269250
Waffles Coffee Shop Market House Arcade, PL31 2JA
01208 75555
ASDA Launceston Road, PL31 2AR 01208 261800
Ginhouse The Piazza, Crockwell Street, PL31 2DE
01208 78778
Wetherspoons Fore Street, PL31 2HR 01208 261730
Bude
Arabica Coffee House 14 Belle Vue, EX23 8JL
01288 350133
The Bakery 12 Queen Street, EX23 8BB 012088
353133
The Cabin Crackington Haven, St Gennys EX23 0JG
01840 230238
Cafe Belloula 24 Queen Street, EX 23 8BB 01288
359530
The Castle Restaurant The Castle, The Wharf,
EX23 8LG 01288 350043
Cornish Ice Cream Cafe Lansdown Mews, EX23 8NU
01288 350523
Crooklets Inn Crooklets Beach EX23 8NF
01288 352355
G's Cafe & Diner 15 Queen Street, EX23 8AV
01288 353160
The Granary 29 Queen Street, EX 23 8AV
01288 356956
Lansdown Bakery & The Coffee Shop Lansdown
Road, EX23 8BH 01288 355973
Life's a Beach Summerhouse, EX23 8HN
01288 355222
New Atlantic Diner 5-7 Belle Vue, EX23 8JL
01288 354167
Rosie's Kitchen Crooklets Arcade Building, Crooklets
Beach, EX23 8NE 01288 354238
Tiandi 16 The Strand 01288 359686
Urchins Bistro 8 Princes Street, EX23 8AT
01288 352783
Waves 2 Lansdown Road, EX23 8BH 01288 488 082
Callington
Annie's Tea Room PL17 7AA 01579 383303
Co-op Coffee Shop PL17 7BE
Compton Park Restaurant Compton Park, Florence
Road, PL17 8EA 01579 383069
Comborne
Tyacks Hotel 27 Commercial Street, TR14 8JF
01209 612424
Specavers Opticians 4 Trelowarren Street, TR14
7RN, 01209 710022
Falmouth
Cavendish Coffee House 12 Market Street 01326
319438
Cavendish Deli 2 Bells Court 01326 319536
Marks and Spencer 44 Market Street, TR11 3AJ
01326 312684
Fowey
The Other Place 41 Fore Street 01726 833636
Fraddon
Kingley Village Fraddon, TR9 6NA 01726 861111
Gulvalien
Godrevy Cafe Godrevy Towans 01736 757999
Helston
C3 Restaurant 3 Coinagehall Street 01326 565633
Isles of Scilly
Old Town Cafe Old Town St Mary's 01720 422045
Launceston
Fontanella Cafe Market House Arcade 01566
775828
Jericho's Brasserie 4 Northgate Street, Launceston,
PL15 8BD 01566 770080
NO 8 8 Westgate Street 01566 777369
Liskeard
60's Coffee Windsor Place, PL14 4BD
01579 340264
Bean Coffee Shop 6 Fore Street, PL14 3JB 01529
344366
Fat Frog Cafe 6a Market St 01579 348815
Liskeard Library Darras Street, PL14 6AB 0300
1234111
Lux Park Leisure Centre Coldstyle Road
01579 342544
Mowgan Porth
Blue Bay Restaurant Trenance 01637 860324
01579 340264
Newquay
Cafe Irie 38 Fore Street, TR7 1LP 01637 859200
Newquay Zoo Trenance Gardens, TR7 2LZ
01637 87342
Fifteen Watergate Bay, TR8 4AA 01637 861000
Penryn
ASDA Jennings Road off Kernick Road, TR10 9LY

Penzance
Archie Browns Bread Street 01736 362828
Blue Bay Cafe Wharfedale Shopping Centre 01736
350485
The Cove Cafe West Cliff, Praa Sands 01736 763751
Penlee Museum Morrab Road, 01736 361325
The Green Bean Coffee Company 83 Market Jew
Street, 01736 363737
Perranporth
The Green Parrot Wetherspoons, St George's Hill
01872 574990
The Filling Station 9 St Piran's Road
Pickwicks 43 St Piran's Road, 01872 573089
The Watling Hole on the beach, 01872 572888
Redruth
Bombadings Pirates Soft Play Cafe, Highburrow
Lane 01209 219555
Carn Brea Leisure Centre Station Road, Pool
01209 714766
Carpenters House Knights Arcade 01209 218896
The Sandwich Stop 1 Alma Place, TR15 2AT 01209
215500
Westcountry Family Chiropractic & Cranial 2 Alma
Place, TR15 2AT 01209 219444
Saltash
China Fleet Country Club PL12 8UL 01752 854660
Saltash Leisure Centre Plougastel Drive 01752
840940
Waltrose Tamar View Industrial Estate, Carkeel,
Saltash, PL12 6LD 01752 849067
The Bookshelf Tearoom 96 Fore Street, Saltash
PL12 6JW 01752 845804
Kitchen Cafe 8 Fore Street, PL12 6JL 01752 844578
Jennifer's 62 Fore Street, PL12 6JW 01752 847911
Sennen
WhiteSands Lodge Sennen, Near Lands End
01736 871776
The Apple Tree Cafe Trevescan, 01736 811233

St Austell
Pollykith Leisure Centre Carlyon Road, PL25 4DB
01726 223346
The Eden Project Bodelva, PL24 2SG 01726 811911
The Eden Project Cafe, White River Place, PL25 SAZ
01726 338114
The Lost Gardens of Heligan Pentewan, PL26 6EN
01726 845100
ASDA Cromwell Road, PL25 4PR 01726 223800
St Just
Cape Cornwall Golf & Leisure Resort Cape Cornwall
01736 788611
Truro
Charlottes Tea House Coinage Hall, 1 Boscowen
Street 01872 263706
Cafe Elia Church Walk, Union Place 01872 270705
Mums and Little Ones Tinnens Court, TR1 2BD
01872 242446
Mothercare Pydar Street, TR1 2BD 01872 222491
Costa Coffee 2-4 Victoria Square, TR1 2ES
01872 241045
Tintagel
Charles Cafe, Restaurant & Deli Bossiney Road,
PL34 0AJ 01840 779 500
Wadebridge
Carrum Farm Centre St Minver, PL27 6QU
01208 869584
The Glasshouse 6 Eddystone Road PL27 7AL
01208 814800
The Picture and Coffee House 33 Moleworth Street,
PL27 7DM 01208 368191
Relish Food & Drink Foundry Court, PL27 7QN
01208 814214
The Sandbar Polzeath 01208 869276
The Waterfront Polzeath 01208 869655
Wadebridge Nursery School Fernleigh Road,
PL27 7AT 01208 814578

The law is on your side!
The Equality Act 2010 makes it clear that it's against the law
for a woman to get less favourable treatment because she is
breastfeeding when receiving services.

Real Baby Milk CIC,
5 River Side House, Heron Way,
Truro, Cornwall, TR1 2XN
Telephone: 01872 260429
Email: admin@realbabymilk.org
www.realbabymilk.org

www.facebook.com/realbabymilk
www.twitter.com/realbabymilk
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trademarked. This guide, its information and images within are
the copyright of Real Baby Milk 2013. All information is correct
at time of going to press.

realbabymilk.org facebook.com/realbabymilk 31

Figure 9 List of breastfeeding friendly places in Cornwall.

One website contained information about FeedFinder but falsely claimed that La Lecher League were responsible for the development of the application. One county council, Nottinghamshire contained the most comprehensive information for local organisations which asked the organisation to contact the named link at the district council who will send out a self-assessment to complete and then gave instructions “Once completed, the self-assessment will be reviewed by a breastfeeding support worker. Once you have achieved the Breastfeeding Friendly status, the organisation will be sent a certificate to display. The organisation will be sent relevant breastfeeding information and any changes that will enable them to continue to provide effective support to breastfeeding mothers.” Further to monitor, it is mentioned that they may be visited by a local breastfeeding mother or breastfeeding support volunteer, who will confirm whether the venue appears breastfeeding friendly but the website notes that not all venues will receive this visit. If, after a visit, the venue doesn’t yet meet the requirements of being breastfeeding friendly, they suggest they will work with the organisation to make any necessary changes to maintain accreditation, however it is noted that there may be occasions where accreditation is removed. The accreditation will last one year, following

which time the organisation should re-apply to complete the self-assessment via the district council. Another county council, Buckinghamshire, provided more detailed information on what constitutes as a public place and explains how a woman is protected by the Equality Act 2010 to breastfeed in a public place –

“Public places include any organisations or places that provide services to the public. This includes parks, transport, shops, libraries, hospitals and sports facilities.

The only places in which you could be refused access to breastfeed could be men-only single sex services or where there is a health and safety risk to you or your baby such as exposure to radiation.”

Further, information provided outlines the information provided in the Equality Act -

“Protection from discrimination - The law protects you against maternity discrimination and unfavourable treatment because you are breastfeeding for 26 weeks after you have given birth. This means that a service provider should not treat you unfavourably because you are breastfeeding. Unfavourable treatment could include refusing to serve you, giving you a poorer service or treating you differently because you are breastfeeding. If your baby is over 26 weeks old it is likely to be direct sex discrimination if you are treated less favourably than you would have been treated if you were not breastfeeding.”

In some cases, when searching for breastfeeding information, other documents would be returned, for example, in Hart district council, minutes from a counsellors meeting were provided (Radley *et al.*, 2015) whereby developing a ‘Breastfeeding Welcome scheme’ and making Hart a breastfeeding friendly district was mentioned on the action points but further searching, more recently to 2015 could not locate any information on a Breastfeeding Welcome scheme in Hart.

A second approach was an additional search performed on Google for 'Breastfeeding Welcome' or 'breastfeeding friendly' schemes and campaigns that are independent of the local authority/NHS route. The search returned results including charities and organisations with their own schemes for businesses to sign up to, but often at a cost. For example, the National Childbirth Trust (NCT) charge local authorities £7000 to be part of the Breastfeeding Welcome scheme for NCT. The cost of signing up is omitted from the website but an enquiry made through the collaborators at the city council obtained this information. The scheme is accessed through

<https://www.breastfeedingwelcomescheme.org.uk/>

Once a local authority has signed up, it is in their interest to then charge the local organisations who want to sign up to cover the cost of NCT resources (sticker, poster). Local organisations pay to sign up and as a result, obtain branded information from NCT to promote their venue as being breastfeeding friendly. There is a map on the website for parents to search for local organisations who may be part of the scheme. There is no information on when the organisations signed up or how adherence to supporting breastfeeding mothers is monitored.

Another website, based in Northern Ireland www.breastfedbabies.org, has a Breastfeeding Welcome scheme. The responsibility of the scheme lies with the Public Health Agency (PHA), but there is no information on how to best support mothers breastfeeding in public. There is section of the website dedicated to the scheme and to persuade organisations to sign up, but the language used further supports the rhetoric of societal expectations to breastfeed discreetly – *"Breastfeeding should be part of everyday life and can be done very discreetly."* An agreement is issued once an organisation signs up and the website lists the organisations who have signed up on their website for parents to access alongside a map where users can search for areas or organisations that have signed up.

Another independent scheme is from the Breastfeeding Network,
<https://www.breastfeedingnetwork.org.uk/>

The breastfeeding friendly scheme ran by the network provides some free resources (certificate to download) but little information on how to support a woman. The service costs £25 to send a sticker and £800 a year to be included in their 'breastfeeding friendly business' locator. There is a total of 25 businesses signed up to the scheme (as listed on their website in 2018) but the website itself has not been updated since 2014.

Of the reviewed websites from both local authority and independent sources, those that provided free resources and asked an organisation to sign up often listed the organisation on their website, but little information was provided on how they maintain that an organisation is continuing to support breastfeeding or how recently they signed up, it may be that the organisation has been a member of the scheme for several years, and could in fact changed hands in the interim or it was more recent – but there was no way of knowing. It is well documented that women frequent coffee shops and cafes when breastfeeding outside of the home (Balaam *et al.*, 2015), further the issue with recruitment, retention, and therefore high staff turnover, is well documented and well recognised in the hospitality industry (Poulston, 2008). The more dynamic map-based platforms are costly for a local authority or organisation to maintain. None of the websites mentioned 'policy' but rather, used terms such as 'agreement', 'pledge' and 'scheme' to describe the information that organisations must agree to. Overall, it was not particularly easy to find free, impartial information on how to provide support for mothers when breastfeeding at the time of the research, but it is acknowledged that by selecting only a sample of websites to review, such information may be available but not included in this review.

6.2.3 Qualitative research with breastfeeding women

In Chapter 4, the work undertaken reported on the user demographic of FeedFinder and presented an analysis of the FeedFinder reviews which were used to develop a list of the criteria most important to women to meet their breastfeeding needs when out in public. In order to reach a wider demographic, it was important to reach out to other mothers

who might not have engaged with the FeedFinder application and may share different views, needs and values relating to breastfeeding.

Survey design

An online survey was developed using Google forms. This approach was chosen to facilitate reaching a wider demographic, through sharing of the survey on social media platforms and parenting forums. Using an online survey allows multiple people to complete the survey simultaneously and increase completion rates. The development of the survey was informed by Tomfohrde and Reinke (2016) who developed a short questionnaire for capturing information from breastfeeding women.

The questionnaire included 15 questions, see appendix 3 which women were asked to recall a positive breastfeeding experience and a negative breastfeeding experience, and to offer a piece of advice they would give a local organisation to support breastfeeding women. They were then asked for any other comments they would share relating to their breastfeeding experience and whether they had heard of FeedFinder. The same demographic questions as has been included in the FeedFinder user survey, e.g. age, post code, parity, occupation.

The survey was shared on Facebook, Twitter and on popular parenting forum Mumsnet. The post on Facebook was shared on the researcher's personal Facebook page and in different breastfeeding groups. Access to the breastfeeding groups was granted through contacting the administrator of the group and requesting permission to share research request. In some cases, access to the breastfeeding groups were administered through answering parenting questions in which case a decision was made not to join under false pretences unethically. The groups that were accessed were: - 'Breastfeeding Mams' (Newcastle breastfeeding specific support group for Newcastle), 'Slings and Things North of the Tyne', 'Slings and Things North of the Tyne Off Topic', 'North Tyneside Breastfeeding Mums', 'Breastfeeding Yummy Mummies Off Topic', 'The Breastfeeding Network (UK)'

'La Leche League Newcastle & North Tyneside', 'Breastfeeding UK', 'Breastfeeding Mama Talk'. The post was shared 71 times on Facebook, liked 13 times and 24 comments tagging friends of friends. However, it is difficult to track the spread of the post via other friends. On Twitter, the tweet was shared only once and on Mumsnet, there was no interaction with the post.

The survey yielded 269 responses but after data cleaning, 20 double entries were removed and a total of 249 individual women responded to the survey; 34 indicated they would be happy to take part in further research

Two design workshops, each with 5 women were planned; three attended one workshop and two the other. The aim of the workshop was to explore further the responses to the survey and using elements of the 'futures' workshop approach (Lauttamäki, 2014), where participants are asked to imagine an ideal/utopian 'solution' to social problems without any constraints, which are then narrowed down to reflect current possibilities with constraints. In these workshops, women were asked to imagine a world in which breastfeeding was the norm and then focussing in on how this might be packaged in a way to reflect a 'breastfeeding support toolkit' that could be shared with the local community.

Following the survey and workshops, the 34 interested women were contacted via email for and asked to give feedback on the design and development of the breastfeeding support service, which is reported in Chapter 7.

6.2.4 Summary of findings from breastfeeding women

Of the 249 individual women who completed the survey, 30% (n=75) had heard of FeedFinder and of these 75 women, 48% (n=36) had used FeedFinder. The remaining women, 67% (n=169) had not heard of FeedFinder and 3% (n=5) were not sure. The average age of the women was 32 years (range 19 to 55). The respondent aged 55

added a further note to say she had breastfed many years ago so was removed from the analysis reducing aged range to 19 to 50 years.

On average, women had two children (range 1-4). Most of were from the North East of England (79.4%) but this spanned across multiple towns and cities in the region, e.g. Durham, Sunderland, Teesside, Newcastle, Northumberland, County Durham and Darlington. Of the 249 women surveyed, 4 women did not share a post code and of the remaining 245, 18 of those were returned as unmatched, as some were incomplete, and others may have been mistyped. The results from IMD analysis revealed that the women were distributed across different deciles, see Table 10. The results for the 227 post codes are shown in Table 10. The data show that women mostly live in areas considered more deprived, with a high proportion of women living in the most deprived third of the country.

Table 10 IMD ranking for the post codes provided by women in the survey.

<i>Decile from most deprived to least deprived in England</i>	<i>Percentage of women in each decile % (n)</i>	
1 (most deprived)	9.7 (22)	Decile 1-5 55.9%
2	10.6 (24)	
3	16.7 (38)	
4	8.8 (20)	
5	10.1 (23)	
6	9.7 (22)	Decile 6-10 44.1%
7	8.4 (19)	
8	10.1 (23)	
9	4.8 (11)	
10 (least deprived)	7.5 (17)	

Data were analysed thematically and cross-cutting threads and patterns in the data were grouped into the following themes and reported in context to other published work on breastfeeding in public. This analysis does not provide a comprehensive analysis of all patterns and themes that were interpreted in the data but draws out the relevant

themes that resonate with the main aim of this strand of research; to design and develop a digital breastfeeding support tool.

Communication from the public shapes a woman's breastfeeding experience

Over 70% (n= 175) of the women surveyed reported a negative experience when breastfeeding in public, and this was mostly attributed to members of the public affecting the way in which breastfeeding was experienced. This was reported in many different ways but mostly due to the reactions from the public through, verbal and non-verbal communication i.e. 'tutting', 'moving away', 'staring', 'glaring', with some women describing the emotional responses to how they experience discomfort frequently when breastfeeding in public, as she noted *"Feeling or actually being stared at, at least once every public feed. 😬"* the expression of 'discomfort' being interpreted from the use of the emoji and some women described the direct verbal negativity, for example, one woman reported *'I was told what I was doing was indecent'* and speaking to the rhetoric of breastfeeding in society, she goes on to describe, *"Breastfeeding is kind of taboo with certain people to begin with. But once my baby turned into a toddler (she's 2 and a half now) people start to notice more that you're breastfeeding and so I've had people continuously stare whilst I feed my child, turn away and laugh, and got mean/disgusted stares off of people."* Many women were either told directly or within earshot of a disapproval from many members of the public.

The data reflects what other research has noted on breastfeeding experience in public, where Boyer argues the role of strangers in breastfeeding experience is important in shaping mothers' feelings about breastfeeding practice. Drawing heavily on conceptual work, Boyers research notes how reactions from strangers and the 'discomforting affective atmospheres' can powerfully shape a woman's experience of breastfeeding overall, and in turn, affect the duration for which she breastfeeds. The affective atmospheres can be described as the mood or sense of which passes between people but which is shaped by different social, spatial and cultural contexts (Boyer, 2018). This

is further supported through the data analysed in this research as women frequently noted the sex and age of members of the public who acted negatively towards them, as well as noting the place in which the negativity occurred. For example, one woman reported on a group of adolescent males and their reaction when describing her negative experience, scribing *"Young teenage boys sniggering in McDonalds. I'm sure they were also trying photograph me."* In contrast to the adolescent reaction, other women reported their negative experience being due to older adults making them feel uncomfortable *"An older lady tutting constantly even though I was fully covered up."*, and *"Having a older gentleman saying to his wife 'can we move as that's putting me off my lunch' whilst I was feeding in a café."* This is in contrast to work by Acker (2009) who reported that older adults are more accepting of breastfeeding in public than younger adults which was apparent in their survey of students and older adults in the United States. They also noted the acceptance was higher when women breastfed in a private location opposed to breastfeeding in an open public space. The hyper sexualisation of breasts, sexism and familiarity were found to engender negativity towards breastfeeding women but this was tempered by experience, gender and sexism levels which was captured in their survey (Acker, 2009).

Some women noted the difficulty of finding somewhere to breastfeed and the lack of good facilities available which is similar to the findings from the Public Health England report on breastfeeding experience (Public Health England, 2016), mothers in this survey described *"...I've had no negativity however it can be difficult to find somewhere to feed, I had to feed on a park bench before as the cafe had no tables"* and *"Thankfully I've never had a negative experience with a member of the public however I have found lots of 'feeding rooms' woefully inadequate and little more than toilet with a plastic chair in..."*. These women had not used or heard of FeedFinder.

All of the women in the sample but four described a positive experience when breastfeeding in public and to similar to the reported negative experiences, women mostly described the affected emotional response to members of the public, and their

'lack of' reactions, such as *"Nobody has complained about me feeding!"* or *"...No-one commented and was treated as normal"* and *"Being able to feed my baby when he's hungry without any judgement"*, some members of the public go that extra mile to parse how they feel towards seeing a woman breastfeeding, for example *"People have passed some lovely comments, such as: good for you, it's beautiful to see and how lovely to see a breastfed baby. I've been offered more comfortable places to sit and asked if I needed anything. Water or food."*

Make it company policy!

Some women in the survey reported that they are aware of the law that protects them to breastfeed wherever they wish, and they want businesses to promote this information so other patrons know women will be protected should they have opposing views. There were requests that organisations acknowledge that women are protected to breastfeed within a company policy and staff training, as one woman noted *"I think businesses don't need to do much but make it company policy. Maybe some training on how to support a lone breastfeeding mother. For example, if they are in a cafe/restaurant popping over to ask if they need a glass of water or if they can get anything else for them."* Other women expressed the desire to have signage that was clearly visible so that they knew they would feel protected and again, acknowledging the generational differences as a key motivator, for example, *"Would it be possible to make some signs or have a campaign that explains to the general public that breastfeeding is normal, it shouldn't be confined to indoors and it's a woman's legal right to feed her baby wherever she chooses or needs to? It's the older generation (60+) that tend to give you funny looks, because in their day they just didn't go out or would go to friend's houses to socialise if they were breastfeeding (I quote my mum)"* and another mother noting how it would increase confidence to breastfeed if there was clear support available, *"I think it's nice when there are very visible signs. It means that you can confidently feed knowing that if anyone were to object, they would have to do so in the knowledge that they're opposing something supported by the establishment they've chosen to visit, which surely must make them re-evaluate whether their viewpoint is*

acceptable. Additionally, it also indicates that the staff there would support you, rather than the 'complainant', if they were to start causing a fuss. If somebody starts passing comment and you can just point at a sign that says 'breastfeeding mothers welcome here', they've really not got a leg to stand on!" This was also evident in the outcomes of the workshop when discussing the language implications of using terms such as 'guidelines' as a way to get organisations on board, as one of the mothers noted *"I think it would be nice for a breastfeeding mum to know that she's got more than just guidelines to throw at someone and say, "It's the guidelines." If she can turn round and say, "Well it's policy."*

As part of the conversations around a breastfeeding support toolkit for local businesses, the women in the workshops described how a training video might help to raise awareness of breastfeeding but also that this would be a welcome resource for new mothers in general, where women could learn about the resources that were available to them once their baby had arrived.

Mum 1: Yes, so anyway if there was a video that was made that staff could say, if there could be almost even the same video or something very similar to promote the fact that there is a policy in Newcastle that could be shown. There's a video you can watch with the health visitor when they first come to see you, a video was then shown to me. I'm in North Tyneside technically. Even if it was online, a video online to say, "Welcome to being a mum in Newcastle. These resources are available for you," to use the FeedFinder app, to promote that on there. These are the places that you can go because you know nothing. It's really up to yourself to have to find all these things out and start from scratch. There doesn't seem to be anywhere... if you're walking round town there's nothing about mums, there's nothing about babies.

There's nothing promoted around at all unless it's online so yes, if there could be something that would be really good. Then the more that those businesses are obviously open and warm and friendly, then there's going to be less of those cold stares because... it won't happen immediately.

Mum 2: That's it, if you're just aware that there is a policy, it's going to make you look out for the places who are making it.

Mum 1: That would make me feel better knowing that if someone said something I could say, "Well actually it's the policy here." If you've got something else on your side.

Researcher: So it needs to be a whole new approach?

P1: It needn't be a scary policy. The policy is just don't tell us to leave please.

The analysis of the data obtained through the survey and workshops led to the decision to develop a video to go alongside the development of a community breastfeeding policy. The video was developed using data from FeedFinder, published scientific literature, data from the women in the survey and workshops and in collaboration with the public health improvement teams in Newcastle. To ensure the video truly captured the way in which women want to be supported, the video was shared with women who signed up to be involved in the research beyond the survey and workshop. This feedback contributed to the design of the video. The evaluation of the video is reported in Chapter 7.

6.2.5 Public Health Improvement at a local authority

Parallel to the work undertaken with breastfeeding women, the working relationship developed further with public health practitioners from Newcastle City Council and Northumberland County Council. As part of the 'Child Friendly Cities' Initiative by UNICEF (*Child Friendly Cities Initiative UNICEF*, no date), Newcastle City Council pledged to work alongside other organisations, including academia to ensure communities are more child-friendly. This work fits within the framework to support the local community in becoming more welcoming of breastfeeding and give children the best start in life.

Early meetings with the team established the common objectives of both the research undertaken and the goals of the local authority within the child friendly cities remit which was ongoing for three years to establish improved child wellbeing in the city.

Regular meetings contributed to the iterative design and development of the website, community breastfeeding policy and video.

Across the trajectory of the research, public health practitioners linked the researcher with representatives who work in departments associated with managing local businesses and local policy making. For example, discussions were held with a policy advisor on how best to approach the development of the policy and implementation city wide. The outcome of the discussion linked with the business operations manager in Newcastle with an outcome of implementing the policy within the Better Health at Work Award (BHWA)²². The BHWA is an initiative that recognises the promotion of better health and lifestyle within organisations. It is a free initiative rolled out across the North East and Cumbria. As part of the award an organisation can meet certain criteria that will enable them to attain a bronze, silver, gold or continuing excellence award. Each organisation is allowed a year to build up to attaining an award, but this can also be negotiated. The breastfeeding policy designed in this work is to be included in the silver award. Each year the representative from the local council forms an assessment of the criteria to ensure award can be attained. As of April 2020, the policy is going to be included in the BHWA.

When developing the policy document one of the main conflicts that arose in this work was the use of language towards a breastfeeding 'policy', with the business operations manager from the local authority expressing the desire to change the wording to be less formal and use 'guidelines' opposed to using 'policy' because '*businesses might be put off by the term policy*'. Further explaining the reasoning behind this, he suggested that it would be much more likely to be adopted by businesses if 'guidelines' was used instead. However, exploring this in the work with breastfeeding women, this contradicted the expressed views which the women gave in both the online survey and in the design

²² <http://www.betterhealthatworkne.org/>

workshops where they expressed that they wanted to feel protected and the adoption of policy (not merely guidelines) would support this.

6.2.6 Involvement of Local Public Facing Organisations

This work aimed to recruit local organisations in the Newcastle area to contribute to the development of the community breastfeeding policy and assess acceptability and feasibility of implementing the policy. Effort was made to recruit businesses city wide with varying degrees of success. Many back and forth communications were not successful. For example, contact was made on multiple occasions to Greggs and a human resources contact was identified and emails exchanged about an interest in working together but emails were not responded for months and in the end, the decision was made not to pursue further. This coincided with the time of the vegan sausage roll release which saw Greggs gain much attention and it may be that they became too busy to respond.

TWAM is a museum and arts service operating across the region. Each site is open to the public, with some of the sites also having café facilities. TWAM sites are visited frequently by families with babies and older children and they expressed interest in working in collaboration to implement a policy that would be used across the sites. One site in particular, the Great North Museum worked closely to develop the community policy and adapt facilities to meet the needs of breastfeeding women according to the findings of this research that is what breastfeeding women in FeedFinder and the wider survey had expressed as being important. The relationship began as TWAM reached out to the public health improvement collaborators for guidance on how best to support breastfeeding in their venues. This shared interest in supporting breastfeeding in the North East provided a good foundation for working together going forward. Previously, TWAM had been in contact with the breastfeeding peer support service who were offering guidance but at a cost, which they were not able to cover as they receive no public funding for any of the venues, which are governed by a board of trustees. The

relationship continued over 12 months of the research and plans to continue beyond the thesis submission.

Initial consultation meetings were held with the researcher, public health improvement practitioner, infant feeding coordinator, human resources manager and representatives from the sites listed previous to discuss the potential for adopting a policy within each of the establishments. TWAM human resources manager sought to implement a site wide policy and close contact with the research continued throughout with attendance at meetings at the individual level (mentioned above) and with further representatives from across the different sites attending the strategy meetings. TWAM are responsible for 19 different venues listed in Table 11.

Similar to the work reported in Chapter 5, the FeedFinder application was shared with the TWAM team (as they had never heard of it) and the data from within the application that was relevant to the venues listed in Table 11 were discussed. TWAM were keen for women to continue to review their venues based on the development of their facilities in line with the criteria women had considered important when breastfeeding outside of the home.

The development of the community policy was based on data from the FeedFinder data analysis in Chapter 4 and the survey completed by mothers reported earlier in this chapter. To go alongside, and to promote the policy, a poster was iteratively designed with public health improvement practitioners and TWAM, see Figure 11. The policy document and breastfeeding friendly poster was shared with the TWAM representatives and feedback contributed to the iterative design process. Changes were made accordingly to fit within the remit of the venues but overall, TWAM were happy with the community breastfeeding policy statements and planned to roll the policy out venue wide.

Table 11 List of venues associated with Tyne and Wear Archives and Museums

<i>Tyne and Wear Archive and Museum/ Newcastle and Gateshead Cultural Venues</i>	<i>Location and description</i>
<i>Great North Museum</i>	Newcastle, Museum
<i>Hatton Gallery</i>	Newcastle, Art Gallery
<i>Discovery Museum</i>	Newcastle, Museum
<i>Laing Art Gallery</i>	Newcastle, Art Gallery
<i>Shipley Art Gallery</i>	Gateshead, Art Gallery
<i>South Shields Museum and Art Gallery</i>	South Shields, Museum and Art Gallery
<i>Arbeia</i>	South Shields, Roman Fort
<i>Segedunum</i>	Wallsend, Roman Fort and Museum
<i>Stephenson Railway Museum</i>	Wallsend, Museum
<i>Northern Stage</i>	Newcastle, Theatre
<i>Live Theatre</i>	Newcastle, Theatre
<i>Baltic</i>	Gateshead, Art Gallery
<i>Sage</i>	Gateshead, Culture Centre
<i>Seven Stories</i>	Ouseburn, Book Centre and Museum
<i>Life Science Centre</i>	Newcastle, Science Museum
<i>Theatre Royal & City Hall</i>	Newcastle, Theatre and Concert Venue
<i>Tyneside Cinema</i>	Newcastle, Cinema

6.3 The Community Breastfeeding Policy, Poster and Video

A policy can be described as a set of actions or a plan to carry out actions for a particular situation or to achieve an overarching value or goal. In public health, the development of a policy is often based on evidence which can take many forms. As noted in many reports and published literature, breastfeeding rates fall short of the recommendations by the WHO and it is known that women shy away from breastfeeding for fear of breastfeeding in public or fear of not being accepted by the general public, see section 2.5 Breastfeeding. There is clear evidence base for the need for a policy for breastfeeding support in the local community.

Data-driven policy can be described as the inclusion of usually quantitative types of data that create evidence base for policy. As Poel et al (2015) notes there are normally two

main types of data considered in policy making, which the first can be described as 'public dataset's' that are freely available data sets usually managed through government websites containing descriptive statistics about certain aspects of society, e.g. population, education, economy. The second main type is described as the data that is collected through digital mediums, e.g. sensors, social media, mobile phones and are considered a 'new' type of data for policy making (Poel *et al.*, 2015).

The community breastfeeding policy see Figure 10, was developed using data from FeedFinder and involved consultation processes with stakeholders, both face to face and via email. The content analysis performed in Chapter 4 provided a list of criteria that were considered important for meeting a woman's breastfeeding needs (according to FeedFinder users). This was then used to develop some statements that would include those factors and were discussed further with public health improvement practitioners at the local authority. It was considered important (much like the language used in the naming of the resource, i.e. policy vs guidelines) that the statements not be exhaustive so that they could be seen as less onerous to implement, and therefore increase the likelihood of an organisation being on board.

The overarching value is to be supportive of breastfeeding and the statements provided as part of the policy are considered important by women and public health professionals in achieving a supportive breastfeeding status. The language on the policy had to align with providing a supportive environment for all feeding mothers and this is something that was discussed at length with public health improvement. The final decision included a statement within the policy that acknowledges the inclusive environment which an organisation should promote.

The development of the poster was an iterative process, see Figure 11. Both public health improvement and the TWAM stressed the importance of publicly displaying the policy in a format that the general public could see at front of house. The decision to include the universal breastfeeding logo was to increase awareness and recognition at a

glance that a venue was breastfeeding friendly. The information on the poster is important to ensure that all women are supported to feed, not only breastfeeding women. Multiple versions were shared among the public health practitioners and TWAM until all stakeholders agreed on the final version presented here.

As requested by women in the workshops, a video was developed to be shown to staff in the organisation who sign up to the policy. The video was designed and developed in consultation with public health improvement and the infant feeding coordinators and breastfeeding mothers. The aim of the video was to provide accurate, informative content for people to understand the benefits of breastfeeding and why it is important to show support. The video was to be simple and easy to understand and not too long. Some stills from the video content are shown in Figure 12. Adobe Spark²³ was used as it is a free, simple to use platform that provides templates and themes for making videos based on the objectives of the video. Making the video was an iterative process which changes made accordingly after each engagement with one final meeting dedicated to finishing the video with the public health improvement team before sharing with the breastfeeding strategy group meeting for Newcastle. The video is on the FeedFinder website, policy section²⁴.

To accompany the policy and video, and to increase awareness for the general public and breastfeeding women about the policy and how they might be supported, a poster was designed to go alongside and be displayed front of house of any organisation who adopts the policy, Figure 11. The language on the poster was designed to be inclusive of all feeding mothers with the text below the 'We are breastfeeding friendly' stating that all feeding women are protected by the policy.

²³ <https://spark.adobe.com/>

²⁴ <https://feed-finder.co.uk/breastfeeding-policy>

Our Breastfeeding Policy

By adopting this policy, we, []
agree to the following principles to support women breastfeeding.

- *We will be welcoming of breastfeeding mothers.*
Breastfeeding women need to be reassured that it is widely accepted and welcome to breastfeed anywhere. A look is important and can say 1000 words, if you happen to catch their eye, don't stare but give a little smile and she will feel at ease.
- *We will not allow any other member of the public to discriminate against breastfeeding women.*
It is against the law to discriminate against a woman breastfeeding. Women are protected under the Equality Act 2010 to breastfeed anywhere in a public place. Discriminating against a breastfeeding woman may lead to prosecution.
- *We will ensure our staff are friendly and polite towards breastfeeding mothers and their children.*
Breastfeeding women are often nervous and fearful of the public's reaction to breastfeeding, it is important that women are made to feel welcome.
- *We will ensure that our staff are helpful and provide table service whenever possible to breastfeeding women.*
A breastfeeding woman might be sitting in the same place for a long time while her baby feeds. By offering table service, this can provide a better experience for women.
- *We will provide free drinking water.*
Breastfeeding is thirsty work! Providing free drinking water can make sure a woman is kept hydrated while nursing her baby.
- *Changing facilities will provide a changing mat (at least) or changing table and a waste bin for dirty nappies.*
Babies often need their nappy changed after feeding, providing changing facilities will enable this to happen comfortably.

- *We will ensure our changing facilities are kept clean and checked on a regular basis.*
Feedback from women suggest unhygienic changing facilities negatively impact their breastfeeding experience.
- *Although this is specifically related to breastfeeding, these principles apply to all families, whichever feeding method they choose.*
- *All new employees will be provided with adequate training on how to support all mothers and their children*

If possible in our venue:

- *We will provide a private/semiprivate area for women to breastfeed.*
Some women prefer more privacy than others and would prefer to breastfeed in a designated area (but not in a toilet!). If there is no way of providing a private space, ask what can I do to help make you feel comfortable?

In addition to this policy, the website contains a short video from our local women on how they want to be supported. We will encourage all new staff to watch the video as well as reading this document.

The staff member responsible for the implementation of this policy to all staff is [].

This policy has been developed in collaboration with Newcastle University, Newcastle City Council and the NHS Foundation health visiting service.

Further information on breastfeeding can be found here:

National Breastfeeding Helpline Tel: 0300 100 0212

NHS Breastfeeding Support

<https://www.nhs.uk/conditions/pregnancy-and-baby/breastfeeding-help-support/>



The Newcastle upon Tyne Hospitals
NHS Foundation Trust



Figure 10 Community breastfeeding policy statements.

We are breastfeeding friendly.

We have a policy in place to support all feeding women, please ask for more details and let a member of staff know if there is anything we can do to help.



The Newcastle upon Tyne Hospitals
NHS Foundation Trust



Newcastle
City Council



Visit the
FeedFinder
website and
see what other
women say
about our
organisation.

Figure 11 Breastfeeding friendly poster as part of the policy resource.

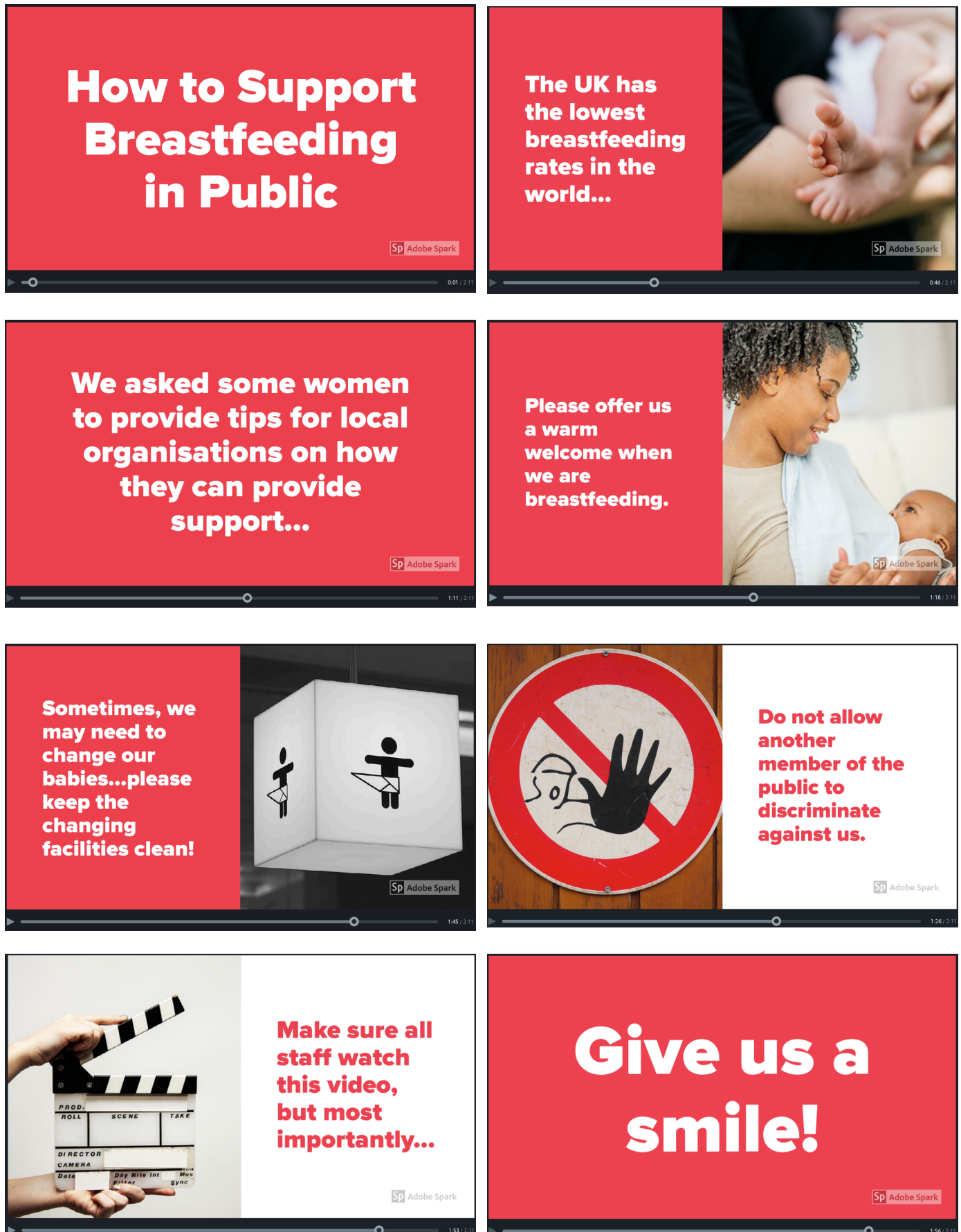


Figure 12 Selected stills from the video.

6.4 FeedFinder Geo-analytics Website

The FeedFinder website development was an iterative process which involved two separate attempts and collaboration with two different developers. It is important to note the work that went into both design iterations was costly in time, as the development work had to be repeated as described below.

The original FeedFinder website development began initially with a developer who was an intern working at Open Lab, Newcastle University. The first prototype was based on the requirements gathered through the first two strands of research, outlined in Chapter 4 and Chapter 5. The developer attended meetings with the breastfeeding peer support team to familiarise himself with the context of the work undertaken by the breastfeeding support team, gain a better understanding of breastfeeding overall in the UK, and better understand the FeedFinder application and the data it provides. Following the development of the first working prototype, a task based cognitive walkthrough was performed with the breastfeeding peer support team (described in more detail in Chapter 5) which yielded both positive and negative responses. Shortly after this, the developer left the department to take on a new role in industry and the website development came to a halt.

It took several months to find resources to develop the website further but eventually, a team of two developers were recruited both with expertise that was invaluable to the project, with one having developed the original FeedFinder application, Andy Garbett and Aare Puusaar, a fellow digital civics colleague with expert knowledge of data systems.

Intended Website Use

Though the website is intended for use by multiple stakeholders interested in breastfeeding, the primary purpose is to alleviate resource constraints for public health services in providing support for women choosing to breastfeed in the local community. The website will do this by enabling the organisations to sign up themselves, and

mothers can review the organisations through FeedFinder. The process of development involved the key stakeholders from public health improvement and infant feeding coordinator commissioned by the local authority in a user-centred iterative design process where every core development was shared with the team for feedback and altered accordingly. The type of data to be included, the menu bar and website content was discussed and decided through the engagement process. The following sections describe the website in more detail and screenshots are provided with annotations help to visualise the different features and functionalities. The description of each function is contextualised in terms of breastfeeding support and the potential it may have.

Data included in the FeedFinder website

To recap, the data available to view in the FeedFinder application includes the venue information (where women have mapped), the criteria for rating the venue (comfort, hygiene, privacy and baby facilities) and the text review (including number of likes of the review), this also includes the date of each review. From the FeedFinder database, the website is able to illustrate the density of venues in a geographic area, average rating criteria for an area, density of reviews for an area using choropleth map style, see Figure 15. Choropleth maps are a common way to display average data by changing the colour/shading of areas within certain boundaries and indicate low to high averages through a gradient of shades/colours (Dataviz, 2019). Other data that is included in the website is from the Office for National Statistics (ONS) which included the population data and IMD.

Search functionality

On the landing page of the FeedFinder website, a user is able to see an overview map of the UK as a central point, see Figure 14. There are multiple options to search the map including - scrolling on the map, zooming in and out to the desired granularity or using the search box which is sensitive to – address, post code, name of area, point of interest, for example. Users can locate themselves by selecting the ‘locate’ icon in the map, highlighted in Figure 14. The user can also select ‘Start Exploring’ which will lead to the

venue explorer page shown in Figure 16 – a dynamic map with search results on the left hand side of the screen which will present the information associated with the search terms the user has input. As the user moves around the viewport map, the content on the left changes to represent the information within the map boundaries.

Figure 15 illustrates the choropleth map on the landing page showing the density of venues around the North East of England. This feature is useful to identify data deserts that might foster the development of an intervention in those areas to increase awareness of FeedFinder and encourage reviews of available venues. The choropleth map can also show the density of reviews from the FeedFinder users and the average rating for all criteria (comfort, privacy, hygiene, and baby facilities) which can be considered a marker of being ‘breastfeeding friendly’.

Venue explorer page

The venue explorer page comprises of two core elements side by side, the viewport to the right which contains the searchable map and the panel on the left which contains the data within the map boundaries. The split search map is inspired by the layout of AirBnB. The page is dynamic, and the movement of the map changes the data returned on the left-hand panel. The map highlights the venues that have been reviewed (in blue dots), and venues without reviews (red dots). This might happen if a FeedFinder user maps a venue within the application where they have breastfed but not felt compelled to leave a review. This information can be useful for planning interventions aimed at raising awareness of breastfeeding friendly venues by sharing this information with breastfeeding support services or parents to encourage the reviewing of places with no ratings. In addition, the viewport enables the layering of different choropleth maps to show the population density and IMD through the stats function or the density of venues reviews and average rating through the heat map function. This enables users to get an overview of data in the map viewport but also the more details information in the left-hand side panel, see Figure 16. The number of venues, reviews and average rating are also shown on the left-hand panel, above the more detail’s information on venues in the viewport. The information in the left-hand panel can be sorted by most recently

added venues, most recently added reviews and also by the average rating of criteria (breastfeeding friendliness) and by the highest number of reviews per venue. In addition, users can also sort the venues listed by choosing date parameters which allows for comparison of old versus new reviews which enables the tracking of community support of breastfeeding over time. The sliding scale of average criteria rating enables the user to show the unrated, lowest rate and highest rated venues which can identify those venues that may require a further investigation or training to help support them become more encouraging of breastfeeding. When a user searches for venues, the results can be shared by copying the link at the top of the page and anyone with access to the link will be taken directly to the search results. In the context of breastfeeding support, this link might be shared with breastfeeding support services, or strategy groups to discuss any training or interventions for specific areas or venues.

Venue landing page

The venue landing page, see Figure 18 to Figure 22 is presented as a new page when selecting one of the venues in the left hand side panel on the venue explorer page, Figure 17. At the top of the page the address information of the venue is listed as the overview with images either 1) submitted by FeedFinder users within the application or 2) pulled from Foursquare. The venue can be reported by selecting the flag on the right-hand side which states 'report this venue'. This will then send an email to the researcher. The following section of the page shows the average rating of the venue as an average overall for example and the 4.39 average score from 30 individual reviews for John Lewis department store in Newcastle (Figure 18). The criteria ratings (comfort, hygiene, privacy and baby facilities) are showing in the rating breakdown as averages for each and also in the review summary graph. The top right-hand corner features the icons for sharing and taking action. A user can share the venue page with their social network on Twitter or Facebook or through email. Selecting the 'take action' button will take the user to Figure 22, where they are able to contact their local MP. This was provided as a way to advocate for better services for breastfeeding support including more funding or training for local organisations. Sharing the link to the page returns the

exact information as seen on the screen, depending on the venue. Figure 19 lists the individual text reviews from FeedFinder users for that venue. The reviews can be sorted by recent, most and least highly rated and there is a search term box for looking for particular keywords. For example, women have different needs and preferences when breastfeeding in public. This function enables women to search for particular reviews that might fit with their own preference, e.g. privacy. If a woman wants to visit a venue but is unsure if it has private areas, she can search on the website beforehand and make her decision to find a suitable place to breastfeed based on what other women have described. Text reviews can also be flagged which will send an email to the researcher to check the review. The following section describes the data in the venue neighbourhood, including all of the local authority and ward information, average age of population, ethnicity, and breastfeeding rates, including pregnancy statistics. Further information is provided on the general health of the population and the levels of childhood obesity. This information allows for interested stakeholders to get a rich understanding of a neighbourhood in terms of the breastfeeding through the combination of quantitative and qualitative data. This would enable the targeting of interventions based on specific parameters of the area. For example, are there older adults in an area (who may have more of a negative response to breastfeeding women, as seen with this data earlier in the chapter) who may need a different approach for encouraging the support of breastfeeding mothers in the community. Another example might be the inclusion of different languages on promotional materials based on the ethnic make-up of the area.

Policy page

The policy page can be accessed through the top menu bar. The page includes the written policy statements and the video for information which is intended for use with the staff at the organisation seeking to implement a breastfeeding policy but publicly available for anyone to watch. The information on the website is as follows:

“The following statements have been considered important for supporting women when breastfeeding in public. If you are a public facing organisation and you would like to

*download this policy and let women know you are breastfeeding friendly, please complete this **form**.*

Once you have signed up, you can download the policy in PDF format with an additional public facing poster to display in your premises.”

Organisations are able to sign up through the link in the web page which then directs to a Google form where the organisation inputs their contact details. At the end of the form the person who completes the form is able to download the policy as a printable document along with the poster to display in the premises. It is then up to the organisation and their responsibility to ensure that the other staff in the organisation are aware of the policy and this is maintained throughout the organisation and is regularly refreshed (when new staff join).

About page

The about page contains all information regarding the project and a summary of the formative research undertaken before the website development, see Figure 13.

About

This data dashboard is part of an ongoing [Digital Civics](#) research project funded by [EPSRC](#) at Newcastle University.

We've designed and built FeedFinder and this data dashboard as part of a collaborative research project with breastfeeding mothers, public health practitioners, infant feeding co-ordinators and local public facing organisations in Newcastle. This resource may be of interest to parents, policy officials and other stakeholders to make local and national comparisons and to develop targeted breastfeeding support services. In time, the resource will enable the monitoring of quality and effectiveness of services.

If you have any questions about the research project then please contact:
Emma Simpson at emma.simpson@newcastle.ac.uk

Breastfeeding

Increasing breastfeeding rates is a key public health priority in the UK and providing support in the local community can make new parents feel much more confident, as well as giving their babies the best start in life.

We know a lot of women stop breastfeeding before they want to and some women don't initiate breastfeeding for fear of being unsupported in public. We listened to women and have co-developed this resource, including a free downloadable policy to provide support for the local community in becoming more breastfeeding friendly.

What is the law?

Women are protected to breastfeed anywhere they want under the Equality Act 2010. The Equality Act describes it as sex discrimination if a woman is treated unfavourably. A woman should not be asked to stop breastfeeding, and if she is, she can complain to the Government Equalities Office and file a claim for discrimination.

What is FeedFinder?

FeedFinder is a free mobile application developed with breastfeeding mothers to provide them with an easy way to find and share suitable places to breastfeed when out in public. Women are able to find, rate and review places based on how breastfeeding friendly they are. Since the launch, the app has been used by over 12,000 women who have reviewed over 5000 venues. Some of the reviews have been analysed and contributed to the development of this resource.

Why do we need a resource like this?

In the UK, we have some of the lowest breastfeeding rates seen across the world. Yet, the benefits of breastfeeding are widely acknowledged for mother and baby. For example, increasing breastfeeding rates could cut the occurrence of common childhood illnesses such as ear, chest and digestive infections while saving the NHS up to £50 million each year. The [World Health Organisation](#) recommends breastfeeding exclusively for the first 6 months, followed by complimentary foods until an infant is at least two years old. Breastfeeding initiation has increased in recent years but the number of women who continue to breastfeed for the recommended duration are very low and increasing the number of women breastfeeding continues to be a public health priority. The most recent figures from Public Health England for breastfeeding in 2018 have indicated a decline at the 6-8week check-up compared with previous years.

Unfortunately, we live in a society that sometimes makes it difficult for women who want to breastfeed. The perceived lack of support from the general public means a lot of women choose not to breastfeed at all, or when they do, they choose to stay home to avoid any unwanted attention. We wanted to develop this free resource to show the local community how they can support women when they are breastfeeding, from a warm smile to a free glass of water – your behaviour can have a positive impact on a woman's experience when she is breastfeeding – and it may even help women to breastfeed for longer. By sharing this free resource, we want women to know they are supported by their local community.

How was this data dashboard and policy developed?

Our collaborative approach involved a combination of different methods with the aim of including as many voices as possible. To begin with, we analysed the text reviews from FeedFinder to develop a list of factors that were considered important when meeting women's breastfeeding needs.

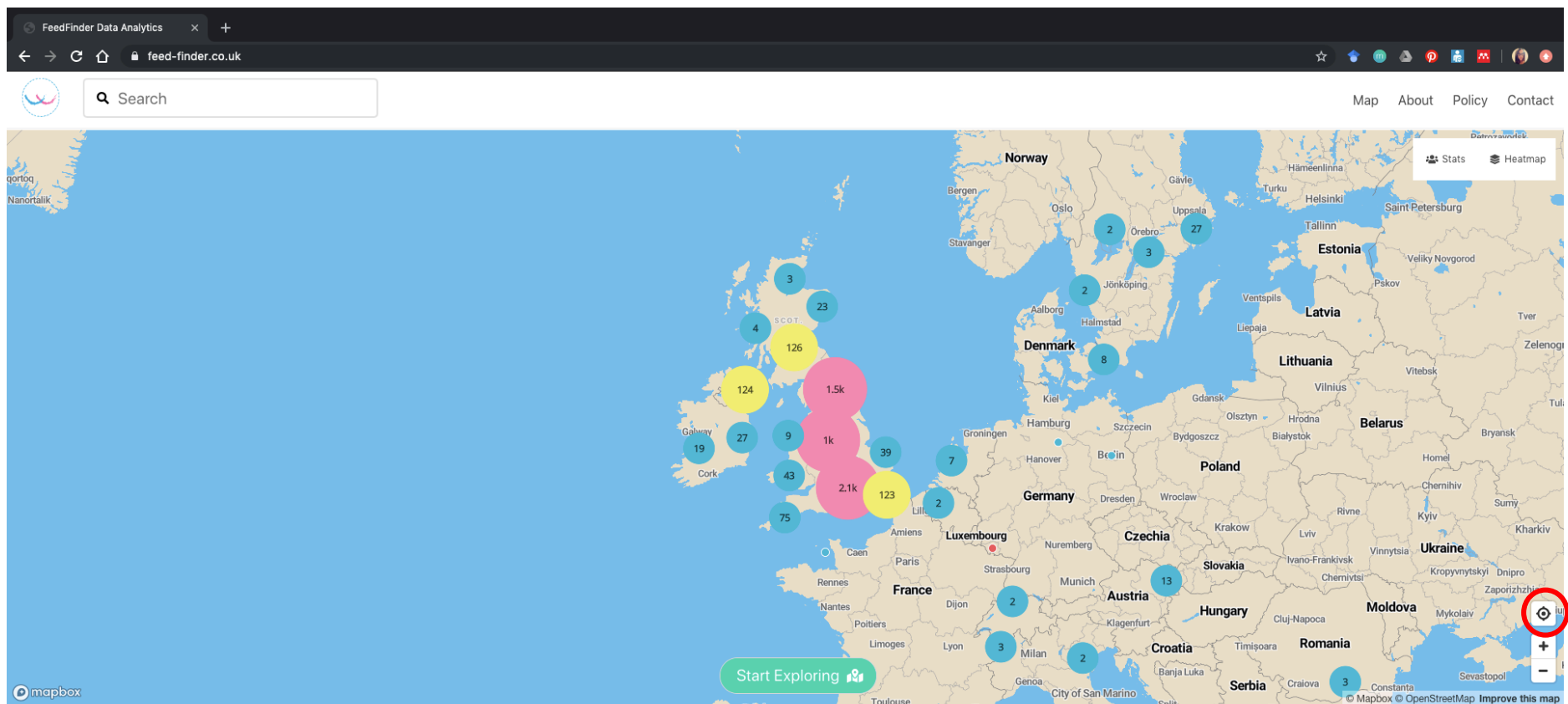
We conducted interviews, online consultations, meetings, observations and workshops with parents, infant feeding coordinators, and public health practitioners.

FeedFinder reviews were used to guide the initial development of the policy and data dashboard and women were invited to comment and provide feedback. An online survey through social media captured opinions on breastfeeding in public from 250 women.

Figure 13 About page on FeedFinder website

Contact page

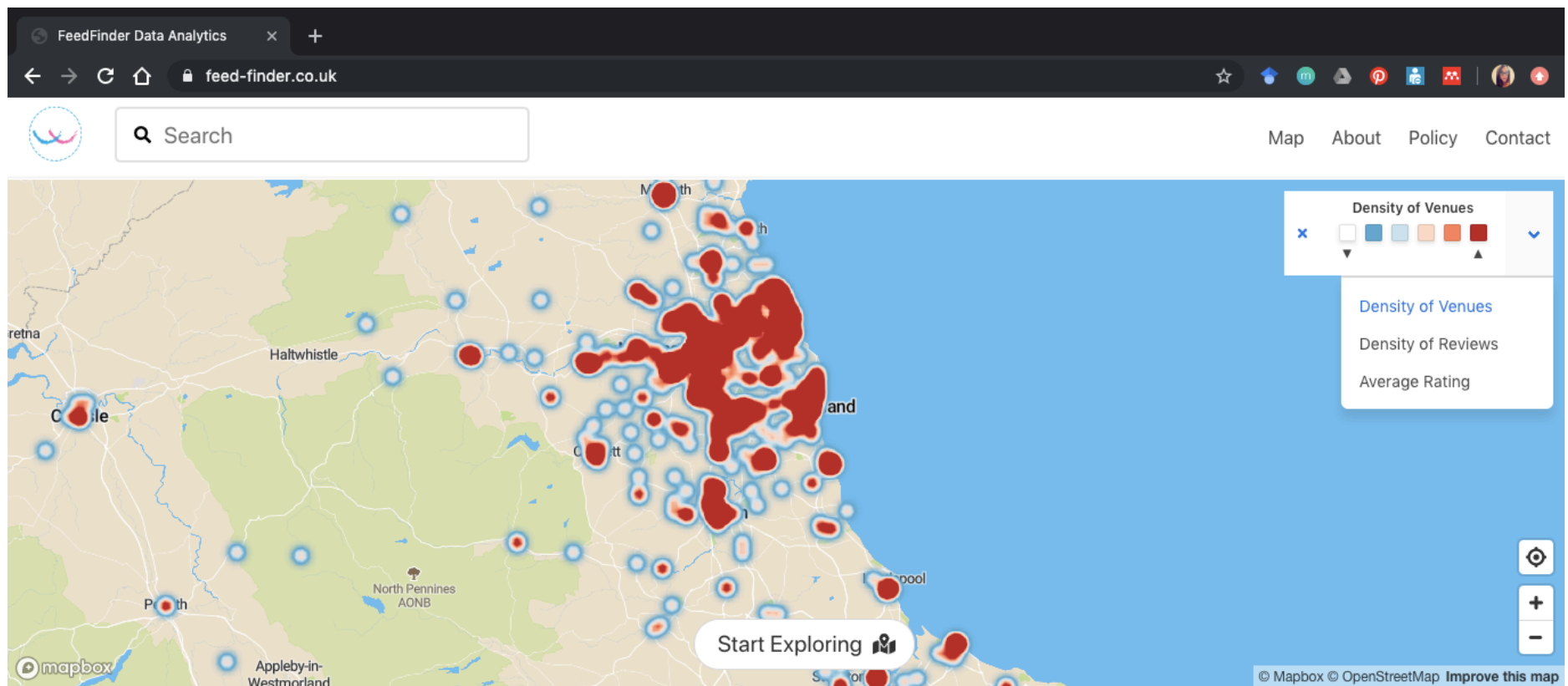
Email addresses are provided for the research and the admin staff at Open Lab. In addition, breastfeeding helpline information was provided as a request from breastfeeding mothers and public health.



Welcome to the FeedFinder dashboard

Find highly reviewed, suitable breastfeeding locations from the FeedFinder mobile application
Use our data dashboard to uncover government public health information about breastfeeding friendly areas

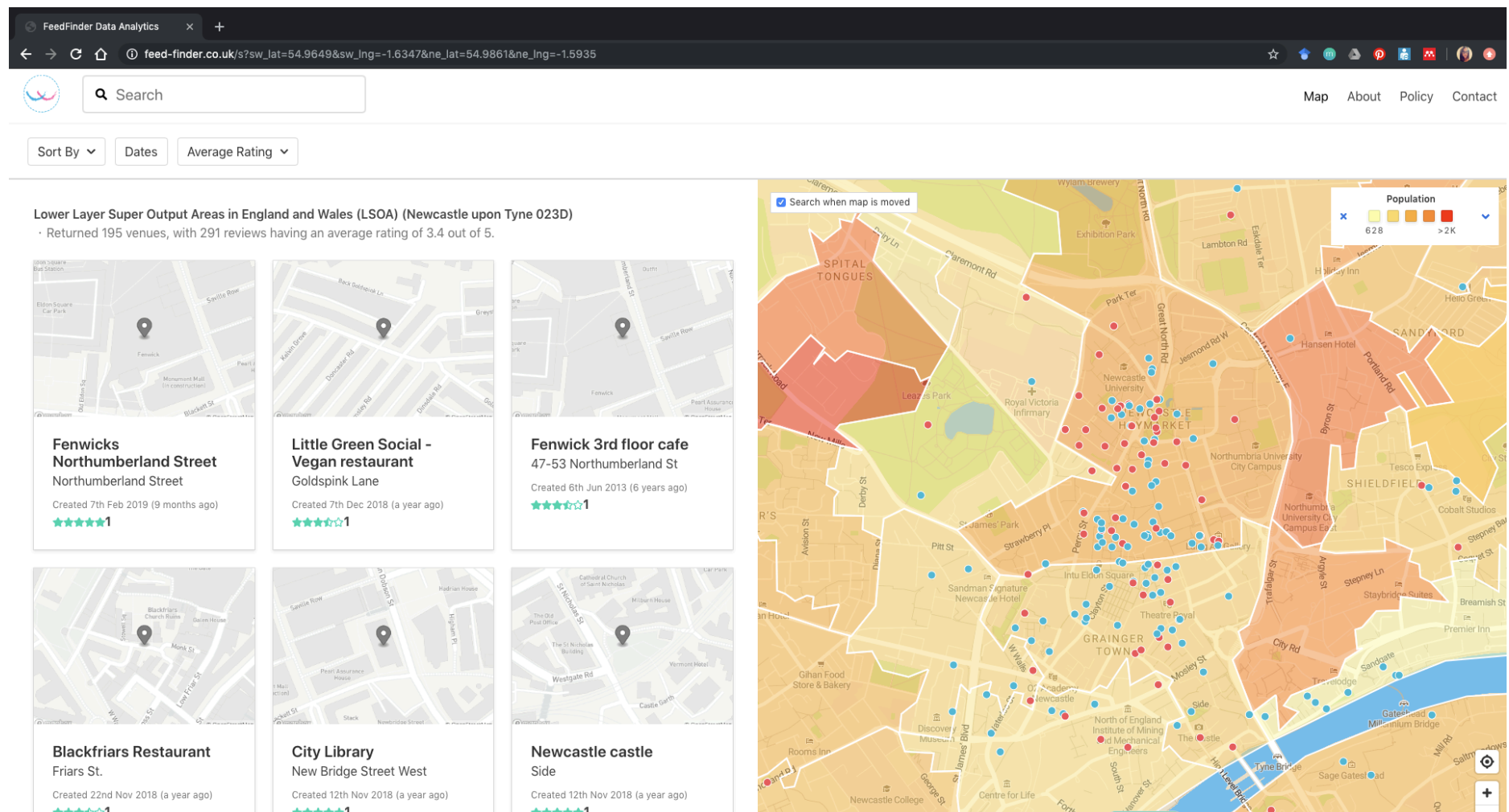
Figure 14 Landing page of the FeedFinder website



Welcome to the FeedFinder dashboard

Find highly reviewed, suitable breastfeeding locations from the FeedFinder mobile application

Figure 15 Map showing the density of venues via heatmap.



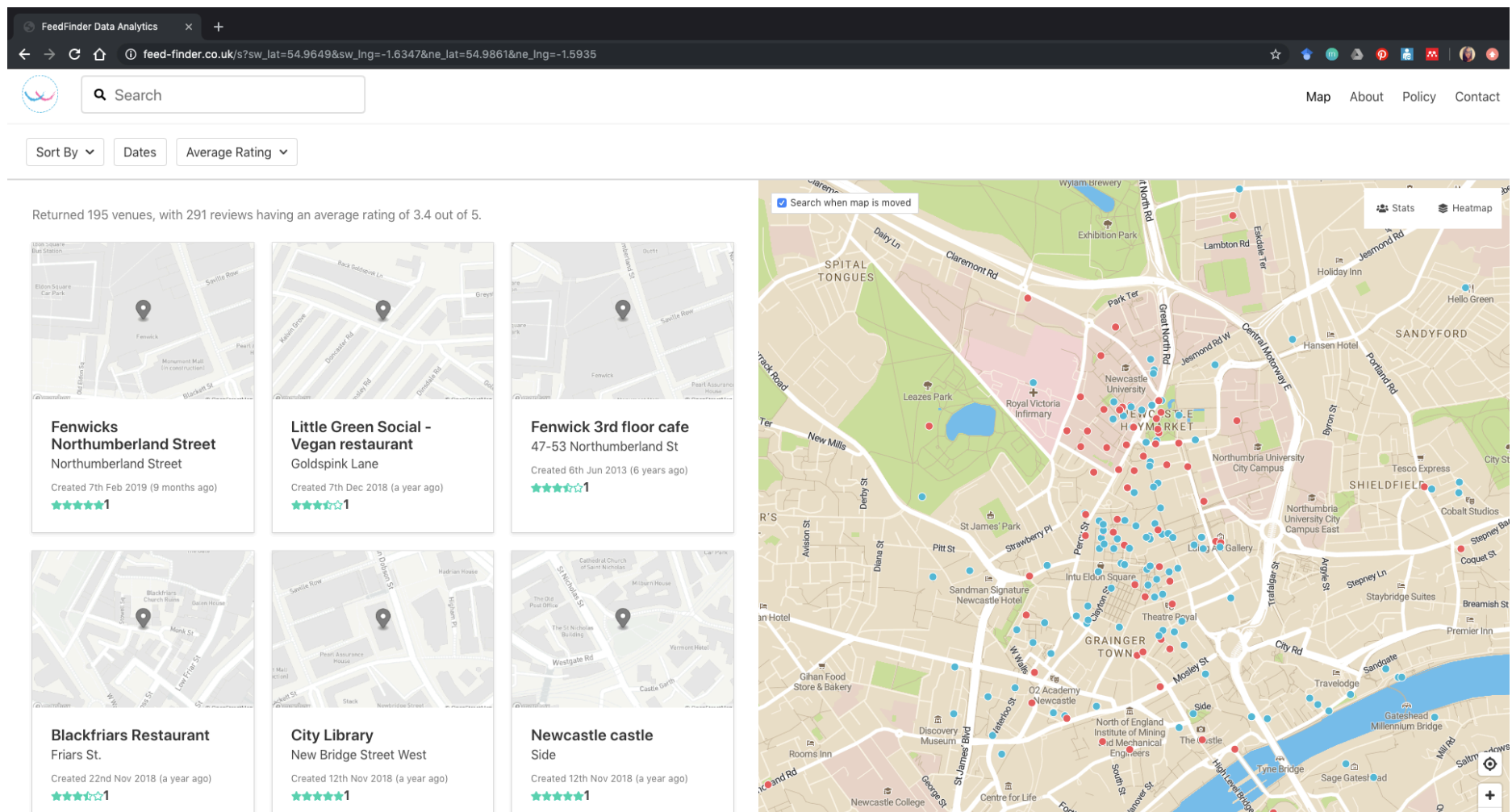
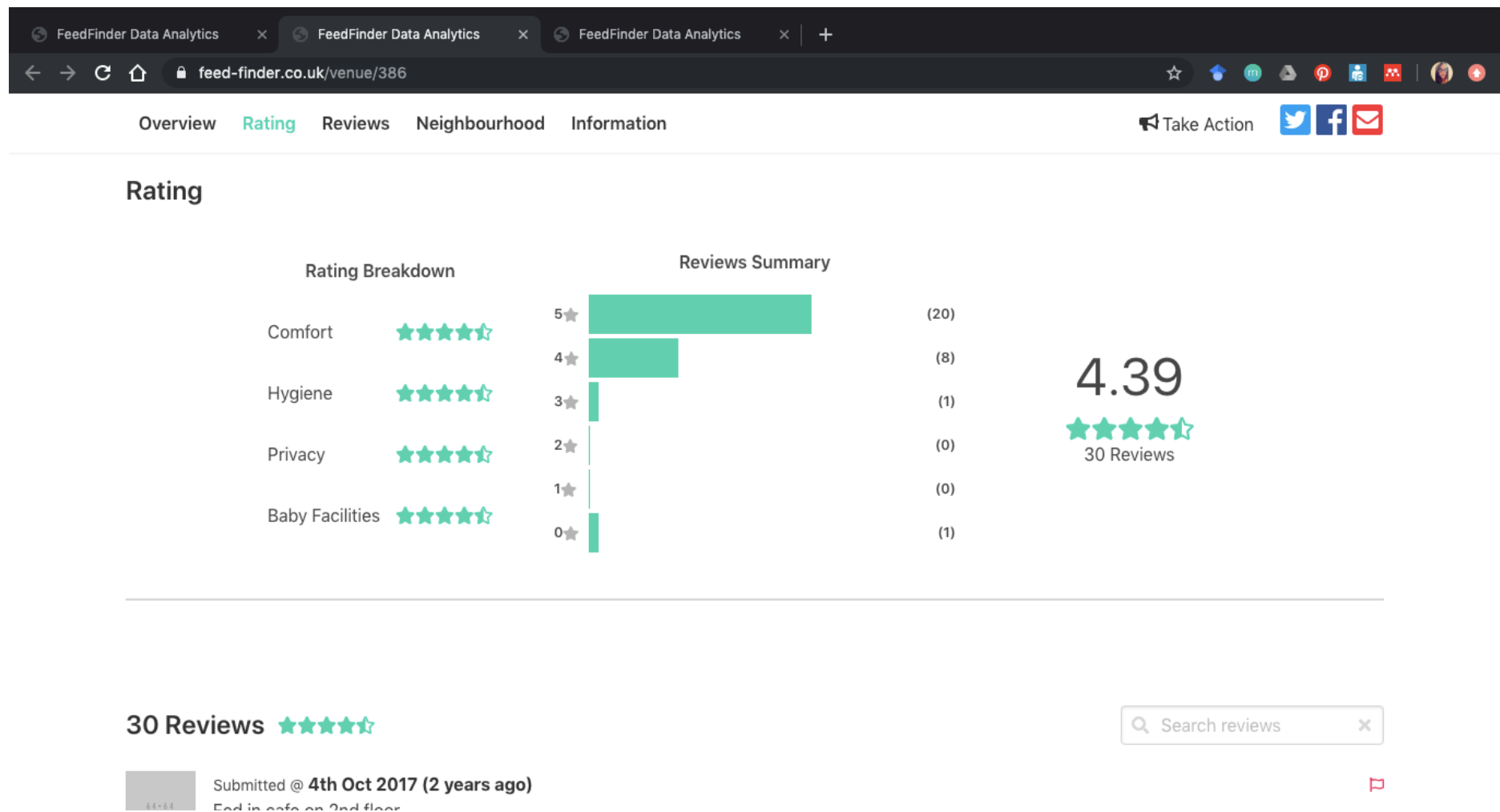


Figure 17 FeedFinder search page with results



FeedFinder Data Analytics x FeedFinder Data Analytics x FeedFinder Data Analytics x +

feed-finder.co.uk/venue/386

Overview Rating **Reviews** Neighbourhood Information

Take Action

30 Reviews ★★★★★ 4.4

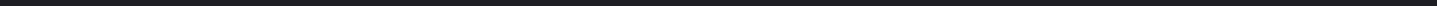
Submitted @ **4th Oct 2017 (2 years ago)**
Fed in cafe on 2nd floor.
★★★★★ ★★★★★ ★★★★★ ★★★★★

Submitted @ **15th Sep 2014 (5 years ago)**
This is a comfy, private and clean area to both change and feed your baby. Theres no stink and plenty of paper to change on. Water dispenser is a nice touch too!
★★★★★ ★★★★★ ★★★★★ ★★★★★

Submitted @ **5th Jul 2014 (5 years ago)**
Excellent parent room on 1st floor. Designated private feeding area with bottle warmers, big changing area with rolls of paper to put down and a separate toilet big enough to get your pram in. Clean and peaceful place to change and feed.
★★★★★ ★★★★★ ★★★★★ ★★★★★

Submitted @ **14th Jun 2014 (5 years ago)**
Used 2nd floor facilities within restaurant. Very comfortable surroundings, water available and chairs nice to feed in. Toilet to fit pram in for Mum needing loo!!
★★★★★ ★★★★★ ★★★★★ ★★★★★

Figure 19 Text reviews from John Lewis.



Neighbourhood

This is where the venue is located and the following public health data is available for this neighbourhood. Use this information, along with the data from FeedFinder to inform learning, make decisions and target support where needed.

Local Authority	Newcastle upon Tyne	E08000021
Ward	Monument	E05011453
Region	North East	E12000001
Country	England	E92000001
Postcode	NE1 7XR	NE1 7XR
Member of Parliament	Labour	Chi Onwurah

Ages

This table provides information about the age structure, mean and median ages of usual residents of England and Wales as at census day, 27 March 2011.

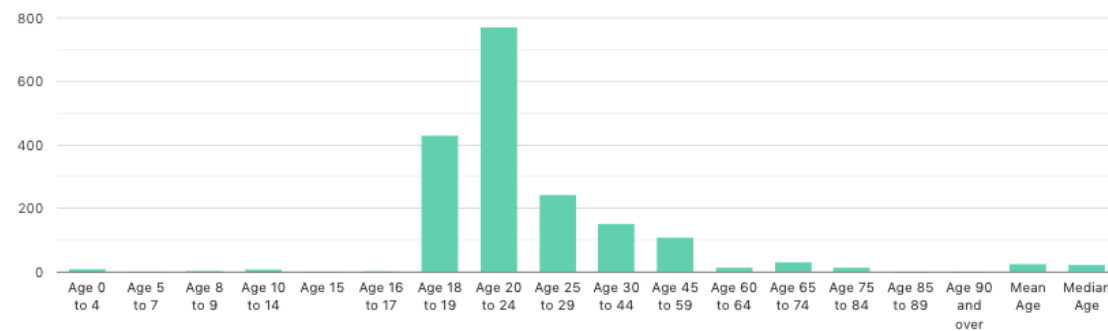


Figure 20 Data obtained from the Office for National Statistics on venue landing page.

6.5 Chapter Summary

This chapter has described the process of design and development of the FeedFinder website and community breastfeeding policy working alongside the public health improvement practitioners at Newcastle City Council, infant feeding coordinators, breastfeeding mothers and public facing organisations interested in supporting breastfeeding women. Building on the design requirements outlined in the previous Chapter 5, this current chapter has reported on an additional qualitative inquiry was conducted with breastfeeding women beyond the FeedFinder users to inform the design and development of the community breastfeeding policy, along with the perspective of public facing organisations. A scoping review was conducted to understand the current Breastfeeding Welcome schemes available across England which highlighted the lack of available resources for supporting breastfeeding women and the community. The following Chapter 7 provides an expert evaluation of the FeedFinder website, community breastfeeding policy, poster and video. The evaluation was conducted with multiple stakeholders including breastfeeding women, breastfeeding support workers, public health improvement practitioners and public facing organisations.

Chapter 7 Stakeholder Evaluation of the FeedFinder Website for Breastfeeding Support in the Community

7.1 Introduction

This chapter is a stakeholder evaluation of the resources developed in the previous Chapter 6; the FeedFinder website, community breastfeeding policy, poster and video. Involvement of breastfeeding peer support services in the second strand of research (Chapter 5) provided an understanding of how FeedFinder could be used in a supportive capacity but it was concluded that although the application was considered useful for meeting the needs of breastfeeding women, the mobile application as it is currently designed makes it difficult for support services to access the FeedFinder data in a way that would be beneficial. This then led to the development of key requirements for a FeedFinder website to open up access to the FeedFinder data and offer a service which would enable interested stakeholders track community support of breastfeeding in real time.

The findings from Chapter 4 described factors important for meeting breastfeeding needs of women (using FeedFinder) which were used to inform the initial development of the community breastfeeding policy. This was further developed through an iterative process involving breastfeeding mothers, breastfeeding support services and Tyne and Wear Archives and Museums in the North East (Chapter 5 and Chapter 6). To accompany the policy, a poster was designed to help organisations promote their breastfeeding friendly status and a video that would help staff within the organisations to contextualise the policy and to highlight the importance of supporting breastfeeding women.

This current chapter provides details of the stakeholder evaluation of the FeedFinder website, community breastfeeding policy and video. The evaluation was carried out as part of Fuse (Centre for Translational Research in Public Health) within the context of a specifically designed quarterly research meetings (QRM). Further online consultation with the breastfeeding women recruited in Chapter 5 was conducted to elicit feedback on the breastfeeding policy document and video separately to the event.

7.1.1 Background

There are various methods that designers and developers call upon throughout an iterative design cycle depending the stage of the cycle and the aim of the evaluation (Tomitsch *et al.*, 2018), from formative evaluation methods in the prototyping stage through to a summative evaluation of a fully working system. Evaluation is important to obtain feedback on designs and better understand how a system might be used in the future. Involving end-users in the process is important gather feedback on the relevance and usefulness of the system for the users' role or intended use. For this research, it was important to include the stakeholders involved in breastfeeding support role who may be in a position to adopt the resources as part of their service provision.

Formative work conducted as part of strand 2 with breastfeeding peer support services indicated that the group often worked as a collective and would draw on each other's experiences and opinions when completing tasks in their office-based environment. This also happened when the breastfeeding support service were unpicking the data within FeedFinder, as noted in Chapter 5. The way the group chose to work influenced the decision to undertake group-based activities as part of the evaluation and two particular methods were drawn upon to gather feedback in the Fuse QRM; user scenarios and card sorting described in detail below.

The aim of the evaluation was to determine if the FeedFinder website and community breastfeeding policy with supporting video could be used to support breastfeeding services and in doing so, explored how the data generated from FeedFinder has the potential to be used in public health service provision. There were two key research questions driving this evaluation:

- iii) Can the FeedFinder website and available data provide a useful resource for breastfeeding support services?
- iv) How can the data be shared to improve support for breastfeeding women?

7.2 Methods

Scenarios

Scenarios are short stories that describe a hypothetical character and/or situation in a particular context which is intended to provoke response from the interviewee/group/audience involved in user testing or evaluation (Bødker, 2000; Interaction Design Foundation, 2017). The method is commonly used across the design cycle and throughout the field of HCI depicting a story around users *motivations*, while documenting the *process* by which the user might use the technology (depending on the stage of design cycle, this may be a paper prototype) (Bødker, 2000, 2009; Interaction Design Foundation, 2017). When used to test a working prototype of a system, similar to the FeedFinder website, scenarios are not necessarily a description of user tasks and actions, but rather situate the user in the context of the *proposed* use of a system and promote reflection of issues or solutions which then facilitate action (Bødker, 2000). Scenarios can be constructs of future actions and reflection on the rich details can

trigger meaningful thoughts and opinions on a system. Scenarios were chosen as one of the key methods to gather feedback in the evaluation (activity 1), as described below.

Card sorting

Card sorting is a method used in the design or evaluation of digital systems. The cards are often representative of the information architecture of a system and help to better understand how a user thinks about the information provided in a system, how they might understand and categorise, and provide insight into how to refine new concepts or existing systems (Tomitsch *et al.*, 2018). Though a low fidelity method, card sorting can gather rich feedback depending on the research question, provoking discussion and action based on the information displayed on the cards and the chosen process (Usability. Gov, 2017). For example, cards can be sorted into pre-defined categories (closed sorting) or can be sorted into categories that make sense to those taking part in the activity (open sorting). In all cases, sorting the cards can promote and support a think-aloud process, encouraging users to talk through their reasons and captures the sense making process in more detail. Closed or open sorting can be used independently or combined into one activity, one on one or in groups depending on the goal of the overall task. The process of card sorting was used in the evaluation (activity 2), as described in further detail below.

7.3 The Evaluation Event

Fuse²⁵ is a Centre for Translational Research in Public Health in the North East bringing together the five institutions (University of Durham, Newcastle, Northumbria, Sunderland and Teesside) collaborating to improve health and wellbeing through public

²⁵ Fuse <http://www.fuse.ac.uk/>

health research. Fuse supports the research and evaluation of policy and practice, while strengthening partnerships and collaborations with other organisations in the community, e.g. local authorities, charities, non-governmental organisations (NGOs). The Quarterly Research Meetings (QRM) are a unique opportunity to bring together expertise from both research and practice to collaborate on tackling priority public health issues for particular groups. This research was situated as a topical subject within the Early Years and Adolescence programme²⁶ providing the opportunity to evaluate the FeedFinder application and website for use in breastfeeding support practice. Information sheets and consent forms were distributed and completed at the start of the day. Table discussions were captured through written notes and photographs of the finished artefacts from the activities. The table discussions were audio recorded and transcribed.

7.3.1 Recruitment for the event

Recruitment involved multiple strategies including an email invitation to register through known contacts signed up to the early years and adolescence programme of Fuse, emails sent by the researcher to stakeholders involved in the research through the different strands (outlines in Chapter 5-6), including the public health improvement practitioners, breastfeeding support and public facing organisations and parents.

7.3.2 Venue

The venue for the QRM was the Great North Museum, hosted by the TWAM partners. The venue location was an important decision to be inclusive for parents who may want

²⁶ <http://www.fuse.ac.uk/research/earlylifeandadolescence/>

to bring along their children with the added facilities of the children's centre staff at the museum should they be needed. The room at the venue had a maximum capacity of 40, which capped the number of attendees able to register for the QRM. However, it was important to keep the numbers attending manageable but also to have a good number of people to ensure breadth and depth to evaluate the FeedFinder website and policy as a resource for supporting breastfeeding women.

7.3.3 Agenda

Starting at 9am the QRM was introduced by the public health practitioner who had worked as a collaborator on this research. A presentation was delivered to set the context for the QRM, outlining the importance of improving the breastfeeding rates of the region, the current breastfeeding rates and the way in which the research and FeedFinder had been of benefit to the service thus far. This was followed by a presentation from the researcher (myself) to outline the strands of research that had contributed to the development of the FeedFinder website and community breastfeeding policy. A demonstration of the website was provided, and a video was shown to illustrate the core functionalities. Following a break, the two activities ran back to back with a short break in between and a group discussion at the end. Following the activities an evaluation form was used to capture feedback on the QRM. Lunch was provided, with extra time to network and the event finished at 2pm.

7.3.4 Accessing the website

As the evaluation was concerned with the working FeedFinder website, which had to be accessed on the day of the event. Google Chromebooks were used to run the website on the local network provided at the Great North Museum. Stakeholders at the event were

asked to work in groups of two to three, and each group was provided with their own Chromebook to work through the activities.

7.3.5 Activity 1

In the first activity, scenarios were used to provoke a discussion around the potential use of the website in breastfeeding support. In the groups, the task was to use the website to fulfil the goals of the scenarios. Different scenarios were provided that were informed through the formative work with the multiple stakeholders over the trajectory of the research, see Figure 23, with one scenario providing an open-ended question asking the person to reflect on their own potential use of the website. To further support the process of reflection, the stakeholders involved in the evaluation were asked to note particular aspects of the system that they liked and disliked, plus any bugs or issues that prevented them from performing any actions, see Figure 23.

Jess Jess is a new mum. She is very eager to breastfeed but not sure where to go. Jess is searching online for breastfeeding friendly locations and comes across the FeedFinder dashboard. Jess wants to know places in Newcastle that other women go to breastfeed and have been highly reviewed so she knows they are popular. Jess wants to let her friends know she has found some places.	Tony's Eatery Tony's is a new family run cafe in Newcastle. They have recently been told that they should advertise as being breastfeeding friendly to attract some new business. One of the customers tells the owner, Tony, that they could be reviewed on FeedFinder. Tony finds the website. He signs up to download the policy. How can Tony spread the word that they are breastfeeding friendly and attract breastfeeding families to review the cafe?
How might you use the FeedFinder website? How can the website be used in your role in breastfeeding support? How might you use the data? Can you think of any further data that would be useful?	Peer Support A new mum has come to a support group in Whitley Bay. Her baby is 3 weeks old and she has barely left the house because she is too nervous to breastfeed in public. Leigh, the group leader, reassures the mum that there are good places in her area that she can go. Leigh searches for the most recent venues with the highest rating. Leigh wants to share the information with the mum. She also thinks it might be useful for other mums in the area. How can Leigh use the dashboard?
We like this	Not sure about this

Figure 23 Activity 1 scenarios and worksheet where reflections posted.

7.3.6 Activity 2

Following the first activity, and assuming familiarity with some of the functions of the website, policy and prospect of using in breastfeeding support, activity 2 was used to provoke further discussion and acceptability from their own perspectives and roles within breastfeeding support.

Cards containing information that represented functionalities of the website, actions or types of data available were presented and then discussed and sorted onto a quadrant based on whether a person would be comfortable doing the 'action' and how useful it is for their role within breastfeeding support, see Figure 24.

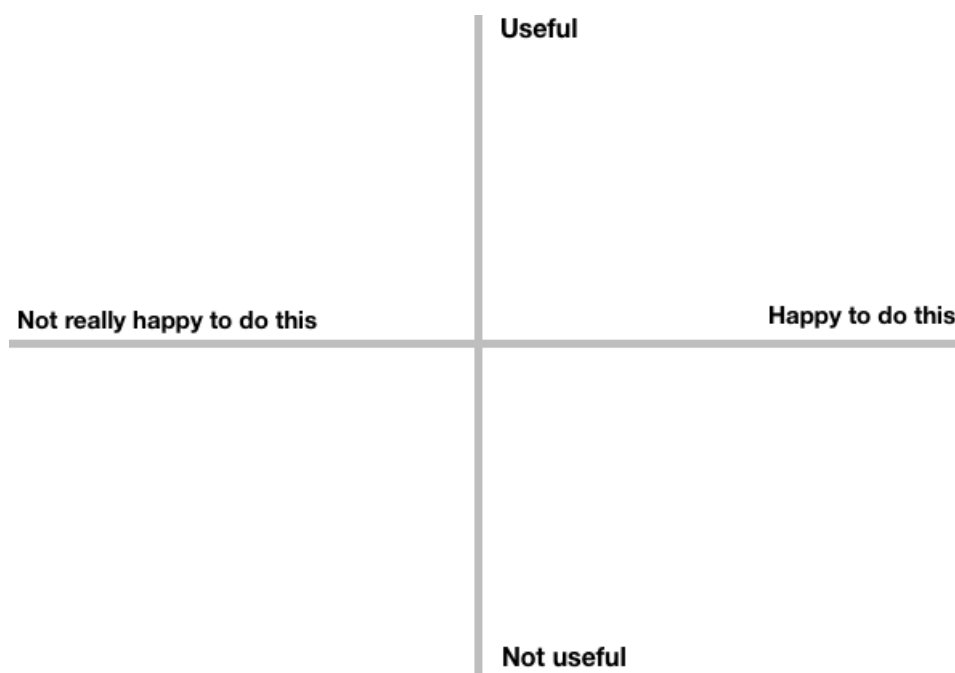


Figure 24 Quadrant for exploring how comfortable a user would be carrying out activities using the website and resource, and how useful it would be for their role.

7.3.7 Additional feedback from breastfeeding women

As there was only one parent present at the QRM, women who had consented to being contacted for research purposes (described in Chapter 5) were emailed the link to website, policy and the video and responses are included in the findings below.

The data collected throughout the day included the visual materials from each table, notes from observations and transcripts from the audio recordings. The data collected from the activities was transferred to word and all data were analysed thematically (Braun and Clarke, 2006) to identify any patterns and these were then grouped into constructed themes and are reported below in section 7.3.2.

7.3.8 Attendees

The QRM was attended by 31 individual stakeholders that represented research, public health improvement, breastfeeding support/infant feeding, public facing organisations and parents. Information collected on an evaluation form at the end of the event appendix 4 was used to determine which stakeholders were present and of these, 21 completed the form. The number of different stakeholders who completed the evaluation form is shown in Table 121. Most of the attendees were representatives of breastfeeding support services across the North East of England. There was only one parent, and two representatives from the local organisations however, it may be that the other attendees who did not complete the evaluation form were representatives of some of the stakeholders for who lower numbers are shown below.

Table 12 Number of stakeholders attended.

<i>Stakeholder</i>	<i>Number attended</i>
<i>Infant Feeding/ breastfeeding support</i>	9
<i>Research</i>	5
<i>Public Health improvement</i>	3
<i>Local Organisation</i>	2
<i>Parent</i>	1

7.4 Findings

The findings presented here are divided into two sections, first an overview and general feedback from the evaluation, provided from the responses on the evaluation form collected and a summary of the suggested improvements for the resources, (7.4.1) this is then followed by the thematic analysis of the data generated from the activities conducted which were aimed at gathering an understanding of the use of citizen-generated data in breastfeeding support (7.4.2).

7.4.1 General feedback

Feedback was gathered on the overall quality of the presentations, the table discussions, the environment (from poor through to excellent) and whether attendees had the opportunity to network (yes/no). The form also included space for general comments and feedback in the form of open-ended questions to capture qualitative data on 'what was learned from the day', the 'likelihood of using the FeedFinder website in the future' and 'any further comments'.

The feedback overall was extremely positive and no attendee who completed the evaluation form described anything as ‘Poor’ or ‘Fair’. Most of the attendees rated the presentations (from researcher and public health improvement collaborator) as ‘Excellent’ and ‘Very good’, see Table 13. The table discussions were rated as mostly ‘Very good’, ‘Excellent’ and ‘Good’ and the venue was rated in a similar way, see Table 13.

Table 13 Feedback on evaluation form.

<i>Questions</i>	<i>Responses (n=20)</i>				
	Excellent	Very Good	Good	Fair	Poor
<i>How would you rate the overall quality of the presentations?</i>	10	10	0	0	0
<i>How would you rate the overall quality of the table discussions?</i>	5	12	3	0	0
<i>How would you rate the event environment? (venue, parking, catering)</i>	6	13	1	0	0

The QRM provided the opportunity to network for all participants as all answered ‘Yes’ to this question on the evaluation form. Lunch was provided at the event to allow for networking opportunities to expand beyond the table discussion. However, two people who completed the form expressed their own networking needs had not been met as *‘the person they wanted to speak to had left before they had the opportunity’*.

Attendees at the event were asked 'What things have you learned today that will influence how you work?' All but one person completed this question with responses being overwhelmingly positive. Of those that responded, 7 had not heard of FeedFinder and responded they would be using it in their role going forward. For example, responses included, *"How best to use FeedFinder"*, *"Had not heard of FeedFinder before today. Extremely useful for future."*, *"The uses of FeedFinder and how to promote the app."* and more specifically describing the use of the website, one person responded, *"Part of my role is to deliver training to businesses for breastfeeding awareness so it will be useful to include this within this to encourage uptake."*

Other responses to the question on how they would use it in their work, also further supported the discussion that was raised about the challenges of targeting people living in more deprived areas where it was noted that different approaches might be needed to increase awareness of FeedFinder in these areas. Though no further explanation was provided, it is noted that this also came up in the table discussions as one of the representatives from breastfeeding support worked closely with younger, more deprived mothers than what was presented as the FeedFinder user demographic in the research presentation (results from Chapter 4).

The researchers who responded to the question did so by acknowledging the potential for the website to be used in research, for example, *'ideas for PhD studentship'* but the research potential was also identified in a different context as one stakeholder working in breastfeeding support responded, *"Very useful for student midwives - they can access data via the website and use within their studies."*

When asked whether they would be likely to use the FeedFinder data website in their work, a total of 17 out of 21 replied. Of the answers provided, 14 of the respondents agreed that they would be *"very likely"* or *"likely"* to use it in their work. Two

respondents said, “*not likely*”, and a further described “*Currently not really relevant but will promote among friends with babies.*”. Additional free text comments provided a positive response to the research and event overall and included comments such as “*Very interesting and informative mammy, thank you.*” and “*Thank you for a very thought-provoking and interesting morning, I wish you all the best in your future.*”.

Some images taken from the day are shown in Figure 25 including both activity 1 and activity 2.



Figure 25 Images taken from the event, showing activity 1 and activity 2.

Website Usability Feedback

As part of activity 1, the stakeholders were asked to provide feedback on the features and functionalities they tested. This section summarises the strengths and limitations of the website according to the different stakeholder's present.

The general feedback from the stakeholders was that the map view was very useful to provide an overview of venues, and the volume of places mapped was seen as a 'huge positive'. Some stakeholders described the website was easier to use than the FeedFinder app, and it was easy to navigate good reviews.

Searching for venues was also considered easy, and the different colour dots on the map was useful to distinguish venues that had (blue dots) or hadn't (red dots) been reviewed. However, in contrast to this, one stakeholder described how the *"dots showing venues very small/difficult to see"*. The size of the font was also noted as being too small for some of the stakeholders.

In relation to the use of the website in breastfeeding support, stakeholders *'liked ability to lobby'* and take action through the ability to contact local MP to advocate for better support of breastfeeding. A suggested improvement to this functionality within the website was to separate it from the venue page to a tab on the menu bar (calling it campaign or take action) so it was easier to find, and therefore more likely to be used and further information could be provided on what a user would be advocating for.

A noted limitation of the data was the duplication of venues and therefore not knowing which reviews to consider as most valid. This happens when a user drops a pin for a venue which might be slightly different to another pin that has been input for the same venue and therefore creates multiple entries.

Suggestions were made on how to improve the searching of venues and reviews which included adding profile information of users, e.g. age, how many children, which would help user navigate reviews better. For example, a parent might want to know all the places where it is easy to breastfeed twins. In addition, stakeholders at the event would like to see a *“Social aspect - so people can communicate and create peer network with local users.”* And this also ties in with enabling organisations to have a log in through the website as way to respond to reviews from breastfeeding women.

Stakeholders also suggested tagging the venues so they could be searched by category, e.g. cafes, restaurants, museums. In addition, they would like to add link to the venue page which would then take the user to the official website of the venue should they require any further information.

Community moderation was suggested as a way to manage the data and upkeep of the website. The referred to community were users of the website, but primarily this onus was put on parents mostly to do the moderation. Moderation in the context it was discussed during the evaluation referred to multiple hypothetical actions to make sure the data was useful for the different stakeholders including –

- a) Flagging the reviews if they were old and would need updating which would lead to Facebook users in the area being notified that places need updating.
- b) Flagging reviews that contained offensive language to the research team so they could be removed or flag to an automated removal system
- c) Flagging reviews that you perhaps don't agree with, this could be from an organisation perspective, which would notify FeedFinder users in the area to re-review
- d) Flagging multiple locations for the same venue to be combined into one location

At present, reviews can be flagged which creates a pop up to send information to the research team via email.

The data and statistics from public health and government sources were considered useful for some stakeholders in a professional breastfeeding support role but the feedback was that the inclusion of such data might not be useful for everyone, including parents or public facing organisations. A suggested improvement was to layer the statistics onto the map, similar to the layering of the IMD and population statistics on the choropleth map, rather than have them listed on the venue landing page. It was suggested that this would make it easier to get an overview of an area and would be consistent with the other data layers. At the time of the evaluation, the IMD rank was not working but this was not a bug with the website, but the Government website was down where this data are pulled from and therefore nothing can be done on the FeedFinder end.

7.4.2 Findings from the thematic analysis of evaluation

The following sections provide the findings from the thematic analysis of the data collected in the evaluation and are presented with regard to understanding the role of citizen-generated data in the context of public health and breastfeeding support.

The following themes are presented – *‘acceptability and usefulness of FeedFinder and the website’*, and *‘promoting the positives to counter the narrative’* and *‘What will the public say? Fear of sharing the data and ‘Trust and moderation of the data’*.

Each theme is supported with direct quotes from the data. The names of the stakeholders provided after the quotes identify their role; breastfeeding support worker = BSW, public health improvement = PHI, public facing organisation = PFO, parent = P, and researcher = R.

Acceptability and usefulness of FeedFinder and the website

The stakeholders were particularly positive towards the potential of using FeedFinder and the available data from the application. However, similar to the earlier findings from Chapter 4 and Chapter 5, some stakeholders at the event had not heard of FeedFinder at all prior to the event or had heard of FeedFinder but had not seen it or used it. This resulted in several people at the event downloading FeedFinder for the first time. First impressions of the mobile application FeedFinder were positive and the initial response from stakeholders working in breastfeeding support was how it might be useful for parents, with all of the stakeholders who were experiencing FeedFinder for the first time declaring that they and their staff would promote FeedFinder to parents who access their services. There was a lot of enthusiasm and excitement shared from those in breastfeeding support roles who had not heard of FeedFinder. As one of them noted:

“So it’s exciting to take it back. So, it’s really important to take it back, and I think the challenge is to try and sell it to our audience but definitely as a social media, so it was really quite exciting to have a go.” [BSW3]

Where others noted the value of the overall concept of the resource inclusive of all elements; the app, the website and the community policy information. As they described:

“I like the concept. I think the actual concept of it is really good. I think what they’re trying to do, and the potential is brilliant.” [BSW4]

Though the stakeholders identified some flaws to the design of the website, the overall concept of the resource and the fact that it is free of charge and openly available was appealing to the breastfeeding support stakeholders in particular. This was picked up a lot in the discussion around the cost of the National Childbirth Trust (NCT) service for breastfeeding support in the community as they charge local authorities £7000 to be part of their Breastfeeding Welcome scheme, yet the only real difference in comparison to the FeedFinder website and policy as a resource is the branded content that is provided from NCT. The resource required to recruit organisations to sign up to a Breastfeeding Welcome scheme is the responsibility of the local authority. This also adds in further complexities by charging a fee to the organisation to sign up to the scheme and counter the NCT fee. This might not always be an option for small, or publicly funded organisations (as has been the case with Tyne and Wear Archive and Museums). The maintenance and sustainability of such schemes, as presented in Chapter 5, is difficult with a lack of sufficient resource and funding. Providing an opportunity to use a free resource such as the FeedFinder website was considered promising for those working in breastfeeding support.

The stakeholders see the value of the FeedFinder users contributing to the map within the application to keep the review data up to date. This was seen as a huge benefit in contrast to the NCT programme which would require the public health representatives at the local authority to keep this information up to date, ensuring that the organisations were sustaining their 'Breastfeeding Welcome' status. Given the current economic climate for public services in the North East of England, the fact that FeedFinder could be provided for free was critical for breastfeeding support. However, this prompted a discussion about collective responsibility, where organisations would need to take on a more proactive role:

BSW2: But it also means that you need businesses in those areas rated to be proactive...

BSW1: That is the most important thing, yes.

BSW2: And you need those areas to be rated, and then you can look at, actually, by increasing the numbers of businesses rated, see do people actually use it?

BSW1: Yes.

The stakeholder's described how they considered the '*website is easier to use than the app*' and particularly in terms of the summary of venues shown beside the map (venue landing page, Figure 17, page 197). The website interface overall was described as easy to use, and the search functionalities returned what they expected. Having the opportunity to search and see multiple venues on one page was considered an important feature. They also described how when searching for venues was '*easy to*

navigate to the good reviews' which would enable parents and breastfeeding support workers to share with one another and other, first time breastfeeding mothers so they would have a good starting resource for breastfeeding in public. In addition, they discussed how they would promote FeedFinder before an infant is born. Given the findings presented in Chapter 4 which indicated that most women were already a parent by the time they downloaded FeedFinder, this suggestion would be welcomed for raising awareness of FeedFinder and continue to provide a resource through motherhood. As they described:

"It's making it more accessible in the antenatal period, make them aware that it's available to use... They can keep that record [of breastfeeding friendly places] for infinity. [BSW3]

When describing the use by parents and reflecting on the scenarios, the stakeholders liked the localised element to the information provided by the application and website, i.e. returning rated venues that were close in proximity to where the 'user' would be located. Some of the stakeholders further explored what questions could be answered with the resource, and it promoted the stakeholders to think about how they could motivate FeedFinder users to keep the information up to date. But they also acknowledged that they wouldn't want to burden a mother, and therefore thought about strategies to minimise the effort of involvement in the reviewing of venues. As they discussed:

BSW4: "Well, you can also answer questions like, if a map was densely populated or not as populated, what would motivate people more or less [to contribute]. So, if you only showed venues which have at least three reviews, for example."

BSW5: "You've also got to bear in mind that these people that are reviewing do have a tiny baby."

BSW6: Yes, exactly.

BSW5: it's probably not a massive amount of budget. If we had something, even, like, a secret shopper equivalent. So, they went into the areas where there were un-reviewed venues or, specifically, like you were saying, venues which are relevant to a certain demographic that might need something a little bit different. They just paid for their cup of tea, or whatever, and got them to leave the reviews.

BSW4: Yes, I get that, you know, because they might not have the money to go out and buy teas and coffee, and things, to rate places.

When focussing on the type of other types data available within the website (public health data) see previous Chapter 6 see Figure 20- Figure 22. One group discussed whether the inclusion of public health data was necessary for all suggested stakeholders that intended to use the website. For example, when discussing the implication of including this data for parents accessing the information through the website, considering that access to public health data might cause unnecessary angst among parents, supporting the notion of 'health anxiety' if a parent becomes obsessed with statistics on birth weight or obesity level data for children in their area. As the group discussed:

PHI1: I think what we felt was that it's a bit of a one-stop-shop and we were wondering whether it needed to be clearer as to who the website's for, what the

audience is and what the purpose is. So, if you want to have something that's for parents, businesses, researchers or campaigners, or policy development, or whatever, then have it as separate sections within it. We certainly didn't feel that businesses or parents needed to have access to any of the health data or demographic data without a very clear reason as to why they might want that. So, maybe to have a section with campaigning if you really wanted to direct people towards what they're campaigning for. But then, again, it's setting up that expectation of what kind of campaign would you be wanting to do. Is it a national one, a local one? What are you looking for there, and what's realistic about setting up expectations? So, I think in terms of for a business or a parent, we really didn't feel that that was necessary. Just focus on what they want and really signpost them clearly to what they needed to do to be able to promote their business or for women to be able to know how to find a café on Shields Road that's got good facilities.

BSW8: I think that's really beneficial because, especially, you might be a bit overwhelmed with how much information or jargon, essentially-

PHI1: Absolutely.

BSW8: They might not understand.

PHI1: and we don't want to set up health anxiety with parents. So, if you suddenly start putting in around, sort of, birth weights, and things like that, then, you know, when they're breastfeeding, they might be thinking, "Well, is my child putting on enough weight?" and I just think you need to be really careful with what you're giving them. And around things like the childhood obesity data, we

were discussing and say that, actually, these businesses are contributing to a much, much, much, much broader public health agenda, and it's one tiny, tiny cog, and they are not responsible for the childhood obesity data in their local areas, and things. So, again, I think it's that setting up the expectations of what it is that you want people to get from it.

Further conversations supported the idea that the resource can be used to support the normalisation of breastfeeding in public. Promoting a conversation around breastfeeding and increasing the number of women seen breastfeeding in public, especially in places where you might not usually see a woman breastfeed. This conversation was discussed in the context of intention to act around the data that was presented in the website, as they recalled:

R1: ...it may be that if you can encourage people to go out there and rate, or even your own teams to do some of that, and increase the number of ratings, we can increase the spread, particularly in those areas, perhaps, the areas that you want to target, the low-income areas, they do have the cafés, and so forth.

BSW8: Absolutely. That's where we're going to get the conversation changed around it being a normal thing that a mum can do, so we want to get them to those places to change the conversation.

BSW10: Absolutely, certainly, and to have people go in and actually then influence the owners of these cafés.

PHI2: Yes, and then if they join up to the policy and the website, and all the rest of it, then we can really start to make some changes, hopefully, in those areas.

I think when we first started talking, we were really keen and, actually, just right now, we could tell you from a Public Health perspective that we know where the areas of deprivation are, we know that there are low rates of breastfeeding in those areas, so we would say, anyway, just that's where it needs to be focused on. And so, actually, what we really need to be doing is to make sure that this, and the app, and everything, are as user-friendly for that population as possible, and really that's what we want to see.

Promoting the positives to counter the narrative

This theme was generated mostly through the response from parents, both online and from the workshop. Most often when stories about breastfeeding in public are accessed through media, it portrays a negative response which further instils fear in new parents who are perhaps wanting to breastfeed but are scared to do so because of the horror stories they hear (The Guardian, 2014; Thomson, Esbich-Burton and Flacking, 2014; Morris *et al.*, 2016). It was the positive messages that the video was portraying had inherent value as it promotes a counter narrative to the typically negative stories shared. Acknowledging there ought to be a shift in mind set when thinking about breastfeeding in public as a practice, one mother described:

"I really really like how the video simply piles on the benefits of breastfeeding and doesn't give any space to the complaints that people have about women doing it in public. It gives the message that it would be crazy to do anything other than breastfeed (if possible) and that any objections are not even worth consideration, because they're not included in the video. Which is exactly the mindset that staff should have in order to set mams at ease! I would have worried that had there been a section in the video saying 'these are some of the negative comments a breastfeeding mother might have to face' then it would

have planted a seed in a staff member where they think 'actually, they've got a point'...I just wanted to say how effective it is that you've chosen to focus on the positive benefits!" (P2)

Referencing the video in particular, another mother noted how the images are helpful to raise awareness of breastfeeding, where some people might never have seen this before and therefore don't know what to expect when seeing a woman breastfeed in public for the first time, for example *"The images of feeding are great- it's so important that people just see what it is and how it looks. It's not the terrifying, dramatic sight people sometimes expect."* And she goes on to describe how raising awareness of how a mother might feel can create empathy from members of an organisation, and by encouraging support, it can help mother feel more at ease in a sometimes challenging strand of motherhood, as she further describes *"I think the focus on how it feels to breastfeed in public and the anxieties it creates is really important- getting people to empathise with that is more likely to create better outcomes for those mothers. I don't think that lots of people realise that breastfeeding is a learning process for both mother and baby and that feeding in public has the added complication of not knowing how well the feed will go. I know so many mothers who chose to express and bottle feed for fear of judgment, which is really sad. Though it becomes second nature as time passes, the early months are challenging. Getting people to see that and asking for their help and support is such a great idea."* (P3)

What will the public say? Fear of sharing the data

The conversations covered different contexts in relation to sharing data but ultimately the overarching theme was related to sharing data on social media or in places that were opening available for the public to comment on. For example, the conversation steered toward the reservation of sharing public health data from the website to social

media for fear of the journalistic media taking it out of context and resulting in backlash for the professionals. In doing so, this then perpetuates a negative response from the general public amid being cast in a negative light. The following conversation highlights how this was connected to previous experience which influenced the feelings of those working in public health improvement. This is similar to the work by Corbett (2018), which highlights that historicizing experiences has a profound impact trust and relationship building between civic institutions and the citizens they serve.

Here, the discussion is around sharing the information on the website to social media, where the public are able to respond, or the media are able to pick it up:

PHI1: *"Then I think, hm, you've got to be really careful, I think you've got to be careful, yes. If the data's about the review, then that's fine, but if the data's about this data [public health data], you need to present it with its context and it depends what social media that is."*

BSW9: *"So, we'll share the review data on-"*

PHI1: *"Because that would really worry me that that's the kind of thing that the press can latch onto, you know, about breastfeeding rates, obesity rates, and what are we doing about it, and if it's taken out of context, I don't know. I just don't think that's..."*

BSW9: *"That could be a real can of worms, you're right."*

PHI1: *"It just could be, couldn't it, you know?"*

BSW9: "Yes."

PH2: *"I remember, in the press which was about breastfeeding, and, actually, it was misinformation on our breastfeeding rates, and they took two data points and said that we had a decrease in the number of women who were breastfeeding, but, actually, they took two data points where there was a slight decrease, but the overall picture was of a huge increase, and so they, you know... It was so frustrating because it was actually undoing all the positive that we were doing, but, in the end, there was nothing, really, that we could do about it...it's quite detrimental."*

The fear of sharing data or engaging in any social media activity was further echoed by conversations around the promotion of the work undertaken on sites such as Facebook. This was considered in the context of recruiting local organisations to sign up to the free community breastfeeding policy through the FeedFinder website by sharing on local council websites where organisations would typically engage. For example, Newcastle City Council have a Facebook page that would advertise and share information relating to different public services and announcements. This was seen as an open invitation for negativity towards the local authority and public services, and the stakeholders felt like this would be the case with sharing anything relating to breastfeeding, presenting additional challenges to the work but also further supporting the rationality that breastfeeding is a social issue that some members of the public might not agree with. When the breastfeeding support worker and public health improvement practitioner were discussing at length the challenges of putting information in the public domain, particularly on Facebook:

PHI1: It worries me it even worries me about, you know, putting things on there about FeedFinder or breastfeeding in general. I don't want people to have the opportunity of saying anything that I think is nasty. I don't know if people read the comments but I read them because I'm interested in this subject...You have to, and I suppose as well, and it's the very fact as well, and we've said this about breastfeeding is that it is protected by law...Actually, we should probably be more open about the law in general and say actually, this isn't allowed. You can't say things like this. I can tell you right now the backlash would be. [gestures widely with arms]

BSW1: Yeah.

PHI1: And that would be from just nasty members of the public out there who basically want to turn everything into a moan about the council and spending and yeah, they just turn everything on to the council....and you're going to get people as well, who maybe had a negative experience, yes, or couldn't breastfeed, who then wants a nice platform to be able to voice their concerns? I think I suppose the answer probably would be in those situations to do more for them.

The conversation shifted to discuss how to manage or control the response from the general public through moderation and private groups while the public health improvement practitioner for the local authority acknowledged that this was not in line with the transparency they wish to support around data.

PHI1: ...we're talking to the children centres, how do they manage it? So what they do is that they have closed, I don't know whether it's a closed group, whether it's open, but it's done through a moderator. So nobody's allowed to put

comments on that don't go through a moderator....which, presumably, is quite sort of time consuming. But it does mean that you know, you've removed all of those really horrible comments...to have the Facebook pages only, you're only allowed to put a comment on something once it's been moderated, then that's a completely different approach to having a freedom of, freedom sort of approach or a closed, "No, well we'll decide what you say" sort of approach which is what you're trying to really step away from in terms of open data and transparency, and maybe what they should have is a like a rules and regs type thing. And then every now and then if people step over the mark, those things that, you know, that maybe every now and then they could do a link to it to say, "please, can I remind people that, you know, we expect this sort of level of sort of behaviour", if you like, yeah. Kind of like an etiquette of being on [social media] I think, yeah.

Trust and moderation of citizen data

When discussing the data available on the website from FeedFinder users, there was some concerns shared about the legitimacy of the review scores for the criteria within the FeedFinder application (comfort, privacy, hygiene and baby facilities). The breastfeeding support workers questioned whether the review scores were true representations of the experience when breastfeeding, as the aggregated review scores didn't always align with the free text reviews that were present on the venues. For example, they felt like the aggregate of the criteria ratings were not useful in determining if a venue was supportive of breastfeeding, as one breastfeeding support worker described *"I think the thing we didn't like was the rating in the way that if... We found a venue that had six people reviewed it, and two people hadn't put a star rating, so it massively brought the star overall rating down. I don't know how you get around that, but it was a shame because the other four reviews were really, really good, but*

because they hadn't put a star rating on it". They further went on to question whether making it compulsory to provide a rating for the criteria would help, by not allowing users to leave any review if they hadn't completed the ratings as way to moderate and filter out the reviews with no star ratings.

While the response to the resources evaluated were largely positive from all stakeholders at the Fuse QRM, there was some reservations from TWAM in relation to the data that was available in FeedFinder that represented their organisations. This is the first instance where an organisation has reflected on the data within FeedFinder. In contrast to women, and breastfeeding support services, their interest was generally focussed on promoting a family-friendly environment. Receiving positive feedback was very important to the organisation, and hesitations were shared because of a fear of the FeedFinder reviews having a different impact on people being willing to visit. As they noted:

PFO1: we've done it from a business point of view. So, we've got nine venues in Tyne and Wear and we've got reviews for some of our venues on there and reviews for some of them aren't listed at all, and I guess we're interested in how it would work for us, and the best outcomes. We really want to promote our venues as being family-friendly. We have a lot of children visit here, and, generally, we have very, very positive outcomes.

In addition, there had been an incident which had included some trolling from a user on FeedFinder which had affected one of their venues. Even when this data had been removed, there was still reservations on the way in which the FeedFinder users had dropped a pin on their venue location which resulted in multiple locations for one or

more of their venues. During the workshop activities at the QRM, they shared their concerns:

PFO1: our biggest, kind of, concern over improvement [of FeedFinder, the website] was the information that was coming back [review data] and the duplication. So, for one of the venues, we've got five or six different places and, also, we'd want to be able to be confident on it was positively talked about, and be confident that the venue information is accurate and up-to-date and, from our point of view, in the same way that TripAdvisor, you can link to the venue, obviously, for us it would be great if there was a link from here. So, it's a good place to breastfeed, but what is it? Is it a museum, is it a gallery, is it a café, and where is it? So, that would be brilliant if there was a link back to the venue, as well, so we can publicise what we do, as well, and have that kind of mutual benefit.

Using the community breastfeeding policy across their venues was seen as a positive step forward for them in terms of supporting women breastfeeding. However, reservations were met when using the FeedFinder logo on any supporting promotional materials (posters) or the video, as they were not happy with the venue and review data (some from trolling) associated with their venues and were worried what impact it might have on them, and their reputation. As they went on to note:

We are still nervous about FeedFinder and advertising it due to the ongoing maintenance issue.

We are all v positive about the policy though and keen to start using this. I think from a signage point of view initially we might just use plain signs without FeedFinder on rather than hold off getting signs out.

I think the video is ok. Appreciate it has a link to FeedFinder on it though at the end so some venues may be reluctant to use it currently. Also I guess some staff who have struggled to breastfeed might not like the video - for us key message for staff is breastfeeding women should be made to feel welcome / as comfortable as possible and there are things we should do to help this rather than about promoting the benefits of breastfeeding first.

7.4.3 Summary of Findings

The presentation of the FeedFinder website and community breastfeeding policy yielded some valuable insights and useful feedback for further refinement as a resource for breastfeeding support in the North East of England. Parents and breastfeeding support workers were very positive towards the use of the website and policy to support breastfeeding. Breastfeeding support workers found the website easy to use and can see the potential of it being a useful resource for targeted interventions for breastfeeding.

Public health improvement practitioners were supportive of the website but were concerned about sharing information regarding breastfeeding in the public domain. The fear of the response from the general population could present a barrier to recruiting organisations to sign up to the community policy through Facebook, or other social media sites. Public facing organisations involved in the research were keen to adopt the policy but had reservations about promoting FeedFinder as they were concerned about

the accuracy of the citizen-generated data within the application and how it might impact their reputation.

7.5 Discussion

This chapter has presented the Fuse QRM evaluation event which was held to evaluate the FeedFinder website and community breastfeeding policy with key stakeholders involved in breastfeeding support in the North East of England.

As the research progressed, the development of a website to open up access to the FeedFinder data was considered necessary to be used in a supportive role for breastfeeding, therefore this particular strand was undertaken to assess the potential role of the FeedFinder website and the citizen-generated data in this supportive capacity. Stakeholders at the evaluation event were motivated to attend because of an interest in breastfeeding and desire to know more about FeedFinder and the research conducted. As the stakeholders hold different positions in relation to breastfeeding (e.g. professionally supporting women, being a parent themselves, and providing a space for women to breastfeed) this allowed for a range of perspectives to be included in the discussions around the newly developed FeedFinder website and community breastfeeding policy. A critical aspect of the evaluation event was to determine whether the developed website and community policy might be a useful addition to breastfeeding support services in the North East of England.

Overall, the stakeholders involved in the event were largely positive and enthusiastic about FeedFinder, the website and community breastfeeding policy. However, some flaws were noted on the design and presentation of the data.

The introduction of the FeedFinder website and community breastfeeding policy aligns with other recent HCI research to improve public services through the inclusion of

citizen-generated data (Dow, Comber and Vines, 2018) and bringing together diverse stakeholders to discuss digital data and local decision making (Johnson *et al.*, 2016; Corbett and Dantec, 2018; Puusaar *et al.*, 2018). However, this is the first research (to the best of knowledge) that aimed to integrate multiple data sources with experiential data from FeedFinder, i.e. including public health data (e.g. breastfeeding rates, birth data, obesity in children) and data from the Office for National Statistics (e.g. population data, IMD). This presents a novel approach to the use of data in the consideration of public health service provision and provides useful insights into the barriers that may inhibit the use of data in a public health context.

The following sections discuss the findings in relation to the research questions guiding the work in this chapter and provide an overview of the limitations and strengths.

Can the FeedFinder website and available data provide a useful resource for breastfeeding support services?

The findings indicate that the website and community breastfeeding policy would be welcomed by some breastfeeding support workers and public health improvement practitioners. Despite the design flaws of the website noted by some stakeholders, the overall concept of the FeedFinder resource has shown promising potential.

The themes generated from the data have demonstrated the potential of citizen-generated data to provide insight for local breastfeeding support services on the value of data obtained from FeedFinder in providing real time, up to date information of how a community responds to breastfeeding. The use of the FeedFinder data and data on IMD can help support services identify and target specific social groups to i) increase awareness of FeedFinder in specific areas and ii) encourage women to review places in these areas where there are little to no reviews and both instances were intended to

increase normalisation of breastfeeding in areas where you would least expect to see women breastfeeding in public.

However, it also provides further insights to the challenges of integrating data and digital systems into public health service provision. The importance of maintaining a good reputation and protecting oneself from public criticism was a concern shared by some public health practitioners. This was based on previous experiences of sharing information to social media and observing the backlash from the general public. Sharing the data from the FeedFinder website can be considered important for changing the narrative around breastfeeding in public, for example, sharing information on the positive experience's women have when breastfeeding in public but also to share data that can advocate for increased support for breastfeeding women. If the stakeholders are unwilling to share the data from FeedFinder, this limits the potential of the website and citizen-generated data to be fully realised as beneficial for supporting breastfeeding services within public health. One way in which this barrier could be reduced, is to have policies in place at the public institution level around data sharing practices and suggested measures for handling public criticism. Another way to overcome this barrier could be to include the communications officers from the local authority to be responsible for sharing and handling the data on behalf of the public health improvement practitioners, much like the current process of social media handling by the local authority. This may help to reduce anxieties around sharing of data to public online spaces.

There were further issues raised by some stakeholders relating to trust and moderation of the FeedFinder review data. This added a new perspective to reflecting on the data from FeedFinder from public facing organisations.

Some of the breastfeeding support workers noted how the inclusion of all data (from public health source and FeedFinder) might cause health anxiety for some parent who may think their child is feeding too much or not enough, for example. This in turn could have an impact on breastfeeding experience. Improvements suggested to the design of the website would have different pages for different stakeholders (i.e. a page for parents, one for organisations and one for public health/breastfeeding support) which would therefore have specific data available that was relevant for each stakeholder.

Though there were reservations from some stakeholders on the trustworthiness of the data, others were more enthusiastic about using the website and data in their role. As such, this highlighted the potential of the website leading to actionable insights that would target support for breastfeeding women in the local community. For example, through searching for the highest rated reviews and venues this would generate a list of suitable breastfeeding friendly places that could be shared with a first-time mum who is anxious about breastfeeding in public for the first time. This is not a feature that can be used in the FeedFinder mobile application. Another example is the lack of data available would prompt service providers to encourage mother, or even involve a mystery shopper style model to go out and review places so that women in those areas have access to places to breastfeed, e.g. places that were described as highly deprived – Shields Road, Byker for instance.

Limitations

Although the evaluation event was considered a success and was highly rated by the stakeholders who were present (evident by the evaluation forms), there are some limitations to note. Firstly, the stakeholders at the event were motivated to attend the QRM, which can mean that they have a vested interest in using alternative approaches to breastfeeding support but may not be representative of all stakeholders.

Recruiting parents to the event presented a challenge and resulted in feedback being gathered over email. A second evaluation workshop could have been planned to capture feedback from parents separately but the previous experience of recruitment in Chapter 6 and this current Chapter indicates the difficulty in recruiting parents with small infants. The use of group-based activities might not have captured the same results as would have been found if the evaluation was carried out by one-to-one interviews. Some members of the groups might have dominated the conversation and restricted input from others with more introverted personalities. The evaluation was restricted to the North East so might have yielded different results than if the website and FeedFinder are used elsewhere in the UK. As the city of origin, Newcastle has the most densely populated area of the UK in relation to venues and reviews mapped within FeedFinder which puts the research in a unique position to test it out, but also mean this differs significantly from other cities.

Strengths

The work undertaken in this Chapter provided a new and deeper understanding of the use of citizen-generated data in breastfeeding support. Running the event with Fuse increased the scope and reach of participant recruitment as breastfeeding support workers had travelled from across the region. The successful recruitment of 31 stakeholders demonstrates the value of the work in this network of early years and adolescent health and provided an opportunity to engage multiple perspectives at the same time. The discussions led to some fruitful insights and recommendations from stakeholders working in public health practice to improve the website. Overall the feedback was very positive for the use of FeedFinder, the website and community breastfeeding policy for supporting breastfeeding women in the north East of England and potentially beyond.

7.6 Chapter Summary

This chapter has described the evaluation event held as part of Fuse network for translational research in public health, bringing together multiple stakeholder across research and public health practice. The chapter began by providing background context of the chosen evaluation methods and approach undertaken. Following this, the evaluation event was described in detail. Thirty-one stakeholders were involved in the evaluation of the FeedFinder website and community breastfeeding policy, providing insight into the acceptance and usability of the website but also drawing on the implications of using and sharing data generated from the website in their role. The analysis of the qualitative data generated some key themes around the challenges of trust and moderation of the FeedFinder data and the fear of sharing data in the public domain.

The findings from this chapter contribute to the overall understanding of the role of citizen-generated data in public health and are further synthesised in Chapter 8. The subsequent and final chapter discusses the key findings of the research overall, situating it within the relevant research context, and concludes with some recommendations and future directions for the research.

Chapter 8 Discussion

This thesis has investigated the potential role of citizen-generated data in the context of breastfeeding support in public health. Through three strands of research, the findings have contributed an understanding of the data available within the application FeedFinder, the use of FeedFinder by breastfeeding support services and the development of a FeedFinder website, community breastfeeding policy, poster and video for supporting women who choose to breastfeed in public. The thesis began by discussing the relevant literature related to the importance of breastfeeding as a public health issue, the current response to breastfeeding in the UK and the drive for a collective responsibility to improve breastfeeding rates. The research was situated in the context of the current economic climate for public service provision, drawing particularly on the impact of austerity and funding cuts to breastfeeding services. Though increasing breastfeeding rates is considered a global public health priority, the ability to achieve optimum infant feeding to the recommended duration is hindered by the lack of capacity and resource to sustain breastfeeding support beyond the healthcare system and into the community.

The discussion of the literature further focussed on the use and challenges of using technology and social media in public health, and the potential adoption of a relational model of service design and delivery through inclusion of citizen-generated data. This provided a rich foundation to begin investigating the potential role of FeedFinder as a civic technology in the delivery of breastfeeding support in public health.

The three strands of research that contributed to the research were outlined in the methodology (Chapter 3) and described in detail in the proceeding data chapters 4, 5 and 6. Taking an action research approach and using mixed methods, the outcomes of

each strand of research informed the next but the strands of research overlapped with one another as the relationship with collaborators was continued throughout.

There are multiple contributions of this work;

- i) The work conducted in Chapter 4 provides detailed information on ‘what matters’ for women when breastfeeding in public, building on, and extending knowledge of the existing reports from Public Health England and the Infant Feeding Survey.
- ii) The research conducted in Chapter 6 complements existing literature and further supports the narrative that the general public are important in shaping a woman’s experience when breastfeeding in public and highlights the potential for targeted awareness campaigns aimed at different demographics of the population as a way to increase support for women
- iii) The research on policy development in Chapter 6 demonstrates the potential for citizen-generated data to be used to inform public health policy design
- iv) The development of the FeedFinder website presents a novel approach to using citizen-generated and other publicly available data in the provision of public health services.
- v) The work undertaken in this thesis contributes to an understanding of the challenges of integrating this type of data into service provision in public health.

The following sections of the discussion will synthesise the findings across the different strands of research according to the overall aim of the research and situate in relevance to the literature presented in Chapter 2.

8.1 Can citizen-generated data impact on service provision in public health?

Relational service design has been described as the integration of civic technologies and citizen data in the process of decision-making for public service delivery (Olivier and Wright, 2015). Over the last five or so years there has been an increased interest in designing technologies to support the engagement of citizens with their local public institutions to facilitate a dialogue around issues of concern in the community. The growing interest in Digital Civics as a way to scaffold relational models of service delivery is a way to reduce resource constraints on public services when budgets are decreasing annually. Thus far, HCI research has included designing technologies to support community consultation processes (Johnson *et al.*, 2016) planning and cycling infrastructure (Le Dantec *et al.*, 2015), political decision making and community consultations (Taylor, Marshall and Blum-Ross, 2012; Puusaar *et al.*, 2018). In addition, there is a growing interest among HCI researchers to design technologies that are self-sufficient and sustainable when concerned with civic engagement and addressing social problems. However, it is often rare that the technologies continue to be of use to the communities they were designed for once the researcher has left the field (Taylor *et al.*, 2013). However, FeedFinder is in a unique position to offer insight into a technology that has been in deployment 'in the wild' for over 6 years. The application has continued to be used even without any input from researchers (i.e. outside of the North East). The continued use of the application can be attributed to the need for additional support when women are choosing to breastfeed. Adding a unique contribution to the growing Digital Civics domain, FeedFinder provides a wealth of data that is input by breastfeeding women without any influence from researchers which is the case for most, if not all other civic engagement projects.

The data available within FeedFinder has provided a supportive role where resource constraints are limiting the support available for both breastfeeding women, and local

public facing organisations who want to provide a space for women to breastfeed. Though the mobile application is flawed for providing access to the data for breastfeeding services, this doesn't disregard the role of the data in helping to alleviate the pressure on public health services by providing a tool for women who choose to breastfeed. The information provided helps the breastfeeding support services to better understand what makes for a good public breastfeeding experience and is described in more detail in section 8.1.1.

The development of the website to integrate multiple data sources is a novel approach to using data in public health service delivery, which can be accessed for free for all interested stakeholders. The website is much less complex than the Fingertips website provided by Public Health England where a level of expertise is needed to navigate and understand the public health data. Designed with key stakeholders in breastfeeding support, the development of the website is a great starting point for understanding how technology can be developed that transfers power to a wider community, enabling the stakeholders to take ownership and use the newly developed data analytic tools for their own intents and purposes (Crabtree *et al.*, 2013; Balestrini, Rogers and Marshall, 2015; Balestrini *et al.*, 2017). However, there are barriers and challenges to integrating the data fully into public health service delivery plan.

There is a drive within healthcare services at present to digitalise all processes relating to decision making within the NHS. In doing so, NHS digital hope to develop a platform that integrates multiple data sources and provide an opportunity to share data between different stakeholders to make better informed decisions and actionable insights around health care provision (Friedman, Rubin and Sullivan, 2017; NHS Digital, 2019). This ideological stance is similar to what has been attempted in this research, however reservations were met on the sharing of citizen generated. The data from the

FeedFinder website (both citizen-generated data and publicly available data from ONS/PHE) has the potential to be used to make informed decisions around breastfeeding support in the community. However, some stakeholders did not feel comfortable sharing the FeedFinder data or breastfeeding related work to a public domain. This presents challenges to researcher and designers working to increase availability of data, but the challenges lie with the stakeholders involved. The roles and responsibilities of the stakeholders should be clearly defined, where some may be interested in working with the data in their role where others may not. Further work is needed to explore these challenges further with stakeholders and produce some

The following sections describe the findings of this research and how they satisfy the objectives to achieving the overall aim.

8.1.1 To gather an understanding of the type of data available within FeedFinder.

The first strand of research (Chapter 4) looked more closely at FeedFinder and the data that is available. Through a content analysis approach, the text review data was analysed.

This was considered the best approach to analyse the 1757 individual reviews given the volume of data and aim of the analysis and helped to capture what factors were considered important for meeting women's breastfeeding needs when in public. This approach also helped to identify the counter narrative to women experiencing stigma when breastfeeding in public, as the findings from the sentiment analysis indicated that women leave mostly positive reviews in FeedFinder. However, as was acknowledged it may be that the FeedFinder users choose to report on the positive experiences only, as a way to counter the negativity that is often expected of breastfeeding in public.

Social media technologies are gaining momentum within public health as a way to offer insight into health concerns and incidence of disease. For example, Twitter has been a

platform of interest as people are often open and candid in their tweets (Reddy, 2015). Data are available in real time and can provide large data sets which would typically be onerous to collect and manage. In a similar vein, FeedFinder provides wealth of data that has been used to inform public health practitioners about the experiences some women have when breastfeeding in public. This data has then been used to inform policy development for breastfeeding support in the local community.

The analysis of the text reviews provided a level of detail that can be used to develop information for the local community, public health services and public-facing organisations to support breastfeeding women. This contributes to public health research by providing further understanding to the type of facilities and services that women (who use FeedFinder) find useful when breastfeeding outside of the home. Further investigation into the use of FeedFinder in breastfeeding support services highlighted a contrast between breastfeeding support services and mothers on what type of information should be available. For example, mothers using FeedFinder provided information that catered to the whole experience of having a baby in a public place, from breastfeeding through to changing facilities as one mother who took part in the workshop noted, feeding and changing go hand in hand, and therefore they would look for places that catered for a good feeding and changing experience. Whereas some of the breastfeeding peer support workers were only concerned about the breastfeeding friendliness of the venue/organisation. In their opinion, if women chose to visit places that were less likely to provide additional facilities (e.g. bar/restaurant) then this should not impact on the reviews as to whether a place was accepting of breastfeeding. However, it is clear that women on the other hand, are concerned with a more nuanced experience of breastfeeding, with some women sharing as much detail as possible for others to see.

This finding builds on the Infant Feeding Survey (2010) results that described a 'lack of facilities' as a contributing factor for a poor breastfeeding experience in public, but there was little indication what these facilities consisted of. Women contributing to the research described in this thesis who used FeedFinder provided information on the type of facilities, which included changing facilities, bottle-warming facilities, plug sockets and Wi-Fi. In addition, further detail was captured from the FeedFinder review data on the service provided by staff in organisations when breastfeeding in public and hospitality received was reported most frequently after the type of facilities. To the best of found knowledge, the data available from the content analysis is the most up to date and comprehensive description of the factors considered important when meeting women's breastfeeding needs in public. However, it should be noted that this is only representative of a sample of FeedFinder users who contributed the data and may not be representative of all breastfeeding women in the UK. In the survey conducted by Public Health England (Public Health England, 2016), women report that they struggle to find places to breastfeed in public. FeedFinder provides a resource that women can use to help them find places to breastfeed that meet their desired needs, as rated by other women. Over 40% of the text reviews mentioned privacy, or discreet/discreetly. This was often in the context of sharing whether or not the venue offered a place that was considered private. This aligns with other literature that acknowledges that some women prefer to breastfeed in a private place and not in an open public space (Bellintxon *et al.*, 2011), and this is the case for younger mothers too (Grassley, 2010). Breastfeeding preference is bound by social and cultural factors, as well as previous experience (Roll and Cheater, 2016). Although this is not important for all women, it is important to provide opportunities to support women the best way possible if the aim is to increase breastfeeding initiation and duration. This information is useful for venues like those represented by Tyne and Wear Archive and Museums that have the facilities to provide a breastfeeding snug where women can go if they prefer, although all areas

within their venues are breastfeeding friendly, now supported by the policy that was developed in this thesis. However, not all organisations have the space to make a private area for women and therefore, within the policy, this was not a strict condition but flexible to accommodate smaller independent organisations who can support breastfeeding women in other ways.

8.1.2 To describe the FeedFinder users and motivations of use.

A survey was conducted with FeedFinder users which indicated that it is mostly mothers (95%) and only a very small percentage of users were professionals in breastfeeding support (1.5%). As this was only a small sample of the FeedFinder users overall, it indicated the untapped potential of FeedFinder to be adopted in breastfeeding support. Other mobile apps to support breastfeeding and adopted in a professional capacity are usually to provide 'breastfeeding solutions' and offer advice and information associated with the biological process of breastfeeding. No other applications exist like FeedFinder that provide a resource for locating up-to-date breastfeeding friendly places. There are websites, like those mentioned in Chapter 6, that contain lists of venues and organisations, but it is not clear how recently the list was compiled or how they are managed. FeedFinder on the other hand, offers a real time review.

The women using FeedFinder were predominantly white British, university educated, mean age 33 and living in primarily the least deprived areas of the UK as described in Chapter 4. Compared with other literature and reports on the demographics of breastfeeding women, the findings are very similar where breastfeeding initiation and duration increase with years in education, maternal age, income and professional/skilled occupation levels (Celi *et al.*, 2005; DiGirolamo *et al.*, 2005; Brown *et al.*, 2010). As noted in work by Brown (2016) on IMD as a predictor of breastfeeding initiation and duration, there is a need for more targeted support for women who are not within the 'expected'

demographic. This is also the case for the promotion of FeedFinder, the promotional materials should be developed in a way that reflects the diversity of society and be more inclusive, i.e. include more images of women who are ethnically diverse, and across different ages.

In addition, the findings on the analysis of FeedFinder users also supports the notion that there is socio-demographic inequality experienced on civic participation platforms and apps in general. For example, a recent study looking at FixMyStreet indicated that there is an overrepresentation of white, educated and high-income social groups participating in such platforms (Pak, Chua and Vande Moere, 2017). Other studies also indicated a strong bias in the representation of people with these reported demographic characteristics and civic participation (Helsper, 2008; Escher, 2011). A failure to support differing levels of digital literacy further contributes to the marginalisation of socio-economic groups who are not currently engaging in social issues. Breastfeeding is currently socio-demographically patterned with lower rates of breastfeeding in the most deprived areas and this was also observed with the FeedFinder demographic of users, which may be because of the socio-demographic user imbalance seen in the participation of such technologies.

8.1.3 To investigate if the data available within FeedFinder is of value in the context of breastfeeding support within public health

The work undertaken in strand 2 and strand 3 of the research aimed to investigate if FeedFinder can be used to support breastfeeding services and the wider community and therefore contribute to the public health imperative to increase the proportion of infants receiving optimum nutrition for longer. The FeedFinder application itself was considered of value by the breastfeeding support service in the context of promoting the application to new and expectant mothers and to offer additional support when

choosing to breastfeed in public. As such, promotion of FeedFinder became an integral part of their supportive role. However, when looking more closely at the data that FeedFinder can provide (rating and free text reviews), the breastfeeding peer support service involved in Chapter 5 noted several challenges. Firstly, the data in its current form at this stage (within the application) was not providing the necessary access, or filtering options that would be optimal. For the data to be of value, the support service were interested in obtaining an overview of the data, based on different metrics (high or low rated venues) and obtaining an overview of the geographic dispersal of review data which would enable them to decide whether they would take any actions as a result. Actions here are referring to any procedures or strategies they would undertake as a result of their investigation into the FeedFinder data. But moreover, when looking more closely at the individual review data, the peer support service became entangled in much more nuanced debates about the contextual factors that influenced the review data where issues around trust and legitimacy of the breastfeeding experience pertained, and therefore inhibit the intention to act. These findings are similar to other research looking at the trust and credibility of health information data online, either from a professional or lay person but ultimately trust correlated with the intention to act on advice (Sbaffi and Rowley, 2017; Sillence *et al.*, 2019). In addition, different variables are known to have an effect on the level of trust, and the research undertaken in Chapter 5 highlighted that the personal experience of the peer support workers impacted on their interpretation of the review data from women and whether it resonated with their own experience was taken as an indicator of the level of trust.

Trust is known to build on interpersonal relationships and familiarity, and it was suggested that adding profile information to the FeedFinder users may help to create a sense that the person leaving the review had things in common with the person reading the review (peer support worker or mother). This is also evident with commercial

platforms such as TripAdvisor, where people are more inclined to trust reviews if the profile is a similar match to themselves and their context, e.g. couple, travelling with a dog, and aged 30-40.

There are, however, clear contrasts between FeedFinder and that of comparison in the commercial sector. Where platforms such as TripAdvisor offer an opportunity for dialogue between businesses and the general public, platforms like the FeedFinder website are much more complex (Simpson *et al.*, 2017). For example, stakeholders interested in breastfeeding support would potentially want to act on damaging reviews (for the interest of maternal wellbeing) but are bound by contracts such as local authority service level agreements or legislations (Equality Act and Equality and Human Rights, 2010; Newcastle City Council, 2016).

Similar to this work, Corbett and Le Dantec (2018) worked with public institutions and led design inquiries into supporting trust in digital civics from a civic institutional perspective. The authors present four strategies that aim to provide insight into the design of technologies to support trust between civic institutions and the citizens they serve; historicizing engagement, focusing on experience, mediating expectations and preserving relationships (Corbett and Dantec, 2018). In this research, there were clear challenges noted on the relationship between citizens and public institutions. This was evident in the conversations around promotion the work on social media or sharing content to be in the public domain. The contentious relationship is built on years of funding cuts to services in towns and cities across the UK. From the local authority perspective, the negative reaction from the citizens on public forums such as Facebook posts would inhibit the intention to act by sharing the FeedFinder data in this space for fear of backlash. Reflecting on the work by Corbett and Le Dantec, conducting workshops in the early stages with multiple stakeholders involved from the outset would begin to unpick some of these inherent challenges and barriers relating to their four

strategies - historicizing engagement, focusing on experience, mediating expectations and preserving relationships in a UK context.

8.2 Challenges and limitations of the research

It is important to acknowledge the limitations of the research which set out to investigate the role of citizen-generated data for breastfeeding support in public health. Firstly, it must be recognised that the data may not be generalisable but contributes to an existing pool of knowledge on breastfeeding in public health, civic technologies and citizen data in the growing field within human computer interaction and helps to better understand the working relationships between research and practice and involving multiple stakeholders.

The findings presented in this thesis may not be generalisable to other areas of the UK, as the density of venues and reviews mapped in FeedFinder are unique to the North East of England. Further research is needed in other geographical areas where FeedFinder uptake is minimal and awareness is low. The artefacts and materials developed as part of this thesis could be used to raise awareness and uptake of FeedFinder for parents usage, health professionals monitoring and public-facing organisations can use the written policy and video as training material for staff. A long-term evaluation of the materials in areas where there is minimal usage would be welcomed. Evaluating the resources in this thesis is limited by the use of an expert review process and although positive feedback was received, little is known about the use of the developed resources in a real-world context and if they can be sustained over the long term, without the presence of a researcher driving activity.

The recruitment of public-facing organisations presented challenges to the research, as much time was spent exchanging emails which did not lead to fruition. Therefore, when Tyne and Wear Archives and Museums agreed to be part of the research, the decision to progress may have impacted the research in a particular way. If other organisations that were initially pursued (e.g. Greggs) were recruited, this may have presented different findings to the adoption of the policy and use of the website.

The use of the online survey to capture experiences from breastfeeding women is limited to those who are actively engaged on social media. An alternative approach would be to send out paper-based surveys to women at the breastfeeding social groups or via other digital means such as email or SMS. Responses to the survey may also have been limited by the text box on the survey form, and more in-depth answers may have been obtained through one to one interview though this would have increased burden of time.

The evaluation event included group-based activities which may have impacted on the findings, and in hindsight, if time had been available it would have been useful to also conduct some one on one cognitive walkthrough tasks to capture more in-depth responses to the usability of the website.

8.3 Strengths

To the best of knowledge, this is the first research that investigates the role of citizen-generated data and civic technologies in breastfeeding support within public health using an action research and mixed methods approach. The use of mixed methods is a notable strength of the research design, drawing on and playing to the strengths of individual methods helped to obtain a better understanding overall of FeedFinder and how it can be used in breastfeeding support.

Using an online survey to capture breastfeeding experiences from women helped to broaden the number of women who were able to participate. If individual interviews were conducted, time constraints and capacity would have restricted the number of women who could be involved, instead, 249 women were able to take part simultaneously and at a time and place convenient for themselves. The use of an online platform for conducting the survey also has the added advantage of reducing the impact of social desirability bias (Grimm, 2010) where study participants are known to give different answers that they think the researcher might be looking for if conducted in person. The survey identified key factors that contributes further understanding of women's experience when breastfeeding in public and helps to identify public health measures which may help to change the perception of breastfeeding for particular demographic groups, such as the need to develop specifically targeted awareness campaigns, e.g. targeting older male adults or younger adolescent males.

The content analysis of the FeedFinder review data contributed to a more detailed understanding of the factors considered important for meeting women's breastfeeding needs when in public. This contributed to existing knowledge on breastfeeding in public in the UK and provides useful information for stakeholders involved in breastfeeding support. The FeedFinder review data analysis influenced the development of a community breastfeeding policy that was adopted by Tyne and Wear Archives and Museums across the North East of England. The community breastfeeding policy has the potential to be used across multiple organisations interested in supporting breastfeeding women.

The research involved multiple stakeholders from the local authorities across the North East working in different positions relating to breastfeeding support but also included

parents and public facing organisations who have an important role to play in supporting breastfeeding women. This is important to diversify the perspectives involved in the research but supports the notion of collective responsibility for supporting breastfeeding women in our society.

Lastly, it is important to acknowledge that although FeedFinder continues to support women choosing to breastfeed, the website and the app could be supporting the narrative that breastfeeding should be done in certain places (that have been reviewed as breastfeeding friendly), rather than breastfeeding anywhere (as they are protected by law). A true cultural shift in the acceptance of breastfeeding in public would support the notion that such apps and lists were not needed, although the nuances of the data analysis in chapter 4 indicates that women leave much more detailed reviews on their breastfeeding experience rather than a simple 'yes you can breastfeed here'. The heterogeneity of women's breastfeeding preferences and comforts demonstrates the value in such applications for making women feel comfortable breastfeeding outside of the home when their needs are met.

8.4 Conclusion

This thesis has investigated the role of citizen-generated data in the context of breastfeeding support in public health. FeedFinder provides a useful resource for breastfeeding women, and the analysis of the FeedFinder text review data was helpful to determine what factors are considered important when meeting their breastfeeding needs. The use of FeedFinder as a mobile application in breastfeeding support was considered impractical to access the data for breastfeeding peer support services, and for it to be of any use, however the development of FeedFinder website opened up an opportunity to explore the FeedFinder data and consider how it could be useful in breastfeeding support, although challenges remain on the trust and legitimacy of the

data. Future work is needed to refine the website based on the feedback received in the evaluation. Following on from this, the website and community breastfeeding policy should be evaluated over the long term, encouraging women to review the organisations as a way to ensure the data are kept up to date and the organisations are maintaining their responsibility to provide a recommended place where women can breastfeed.

8.5 Recommendations

There are multiple recommendations that have arisen from conducting this research and are listed below. The recommendations provide information that will help support breastfeeding services and the wider community better meet the needs of breastfeeding women and therefore contribute to the public health imperative to increase the proportion of infants receiving optimum nutrition for longer.

Breastfeeding Support and Public Health Policy

- Breastfeeding peer support workers should promote and use FeedFinder in their supportive role. Pre-populating the FeedFinder map with known places to breastfeed in an area will help raise the profile of the application and increase likelihood of women using FeedFinder to find a place to breastfeed in public.
- Breastfeeding promotion campaigns should be targeted at specific demographic groups (e.g. older adult males, young adolescent males) in order to increase awareness and support for women who choose to breastfeed in public.

FeedFinder

- New promotional materials and strategies are needed to target specific social groups (e.g. Teenage mothers) to increase the awareness and uptake of FeedFinder.
- Further funding is needed to refine the website and support a longer-term evaluation of the website and policy in the wild.

Civic Technology

- Researchers looking to design civic technologies should include a more diverse group of participants in the formative design work in an attempt to reduce the

socio-demographic inequalities that are present in current civic participation platforms.

- Funding applications should include a funding model that supports sustainability of technologies over the long term.

8.6 Self-Reflection

This section of the discussion is written in first person to fully capture the learning experience from the perspective of the researcher.

I will start by saying how important it has been for me to self-reflect throughout the research journey, not only to acknowledge my development as a researcher but to reflect on how, through conducting this research, I have grown substantially as a person.

The reflective account acknowledges how my positioning may have affected the research process from beginning to end. From my upbringing to my university education, there is no doubt that my values as a person will have had an impact on the way the research was conducted and the way in which it has been interpreted and subsequently written up.

I think it is important to note that I do not have any children, therefore have never had a breastfeeding experience. I wasn't breastfed and I do not know anyone from my hometown back in County Durham, friends or family, who have breastfed. In a positive way, I think this influenced my drive and passion for the project but may have also had a different impact on the research, as I am not in a position to fully understand the experiences of women breastfeeding. It is critical in any researcher - participant relationship to dissipate any power imbalances from the outset, and throughout and I tried my utmost to do this.

I come at this from a public health research angle, and perhaps that has resulted in bias towards the research and more of a focus on the value of the research from a public health perspective, with less consideration for the value of the research for the field of Human Computer Interaction. Interdisciplinarity ascribes a symbiotic relationship

between the two disciplines where broadening of approaches can be a result of integration. I feel that I am only just at the beginning of an interdisciplinary research journey, but my experiences thus far have enlightened and inspired me to want to proceed.

Having worked in research previously to starting the thesis journey, I had some expectations of the research process with experience of both quantitative and qualitative methods. I felt equipped with a basic level of skills that I had exercised in my previous research posts. As it should, my identity as a researcher has certainly evolved throughout the PhD and I think this can be attributed to the process of undertaking an action research-oriented project. Where, much of the work that was invested in the methodological processes, was not necessarily for academic contribution, but to build and sustain a good working relationship with the stakeholders involved. Much of the literature describing action research notes how the process can take time, but there is little detail provided of the work that goes into the process that perhaps doesn't count as research per se but is invaluable for making the research happen. Circumstances where a lot of time and energy goes into relationships but then, those relationships can sometimes breakdown for a number of reasons are not acknowledged. Looking back, it was never considered a waste of time to invest in building relationships that didn't lead to fruition, because at the time it was considered valuable and would have increased visibility of FeedFinder and exposure of the research regardless, but I feel that other researchers would benefit from a better understanding of what this type of methodological process can entail and the challenges this can bring.

Beginning the stakeholder engaged research was a very daunting process initially, at such a junior level (which I still am) having to engage with service providers and senior personnel at the local authority level. As well as coping with a continuous process of

feeling inadequate and an imposter, the pressure to do good by the university and the digital civics initiative was a lot to bear. At the start of the research journey I would feel less inclined to be vocal about my ideas, whereas now I am much more confident to speak up. Upon reflection of the way the different strands of research panned out, I wish that I had been more vocal from the beginning, but also part of me felt that because this was an action research led project, my opinion was not as valid as the stakeholders I was working with. For example, I really wanted to run a workshop with multiple stakeholders at the start of the project, but my collaborators were convinced it would be impossible to recruit everyone to be at the same place at the same time. I didn't pursue the idea again. But given the success of the Fuse QRM, I feel this would have been an excellent way to capture thoughts together from the outset, while also setting some concrete expectations for the project. Whereas for the most part, I was attending meetings with different stakeholders separately and feeding back to the others (e.g. parents, local organisations, breastfeeding peer support, and public health improvement) which will inevitably mean some things may have got lost in translation. I did, however, reiterate my interpretation of the meetings and any action points going forward at end of meetings to ensure that the stakeholders I was working with agreed.

There were further limitations to the work, in that I worked very closely with one person at the local authority, and others joined in and out when it was suited to them. So, when my main contact was on sick leave for a substantial period, I was worried about moving forth without her or having to make decisions which would have usually been a more collective process. Moving forward, and learning from this, I would always try to engage with more than one stakeholder at a given institution from the outset.

At times, the PhD journey presented some of the most rewarding and enjoyable experiences but also some very challenging and difficult times, but I wouldn't change it

as I have gained so much as a person, and more importantly as a researcher to move forward with my career. What has become very apparent to me, is that no matter whether it has impacted one individual or a group of people, if that impact is positive then something has definitely gone right.

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Appendices

Appendix 1



12th February 2016

Faculty Ethics Committee
Faculty of Science, Agriculture and Engineering (SAGE)
Newcastle University
Devonshire Building
Newcastle upon Tyne
NE1 7RU
Email: sage.ethics@ncl.ac.uk

Project title: Breastfeeding Map App
Internal Reference: 12-BAL-26

Dear Sir or Madam,

I am writing to confirm that ethical approval was granted for the Breastfeeding Map App study on 6 December 2012.

The University of Newcastle has a rigorous ethics procedure which supports the standards required by legislative and regulatory frameworks. The Faculty Ethics Committee was satisfied that any risks associated with the use of human participants and their data were identified and managed appropriately by the project team during the study.

Please do not hesitate to contact me if you have any queries.

Yours sincerely,

A handwritten signature in black ink, appearing to read "W. Hofer".

pp Professor Werner Hofer

Dean of Research and Innovation / Faculty Ethics Committee Chair
Faculty of Science, Agriculture and Engineering (SAGE)
Newcastle University

From: "Policy & Information Team, Newcastle University" <noreply@limeservice.com>
Reply to: RES Policy & Information Team <res.policy@newcastle.ac.uk>
Date: Wednesday, 11 May 2016 at 09:56
To: Emma Simpson <emma.simpson@newcastle.ac.uk>
Subject: Ethics Form Completed for Project: FeedFinder Moving Forward

Ref: 6643/2016

Thank you for submitting the ethical approval form for the project 'FeedFinder Moving Forward' (Lead Investigator: Emma Simpson). Expected to run from 11/05/2016 to 11/09/2018.

Based on your answers the University Ethics Committee grants its approval for your project to progress. Please be aware that if you make any significant changes to your project then you should complete this form again as further review may be required. If you have any queries please contact res.policy@ncl.ac.uk

Best wishes

Policy & Information Team, Newcastle University Research Office

res.policy@ncl.ac.uk

Appendix 2 Codes assigned in content analysis

Facilities 1. Changing 2. Bottle 3. Feeding 4. Pram space 5. Microwave (food prep) 6. Wi-Fi 7. Plug 8. High chair	Furniture 9. Seating 10. Bench 11. Sofa 12. Booth	Qualities 13. Comfortable 14. Relaxing 15. Cleanliness 16. Temperature 17. Lighting 18. Music 19. Smell 20. Nice
Service 21. Hospitality 22. Welcoming 23. Staff	Entertainment 24. For Child (toys) 25. For Parent	Inclusivity 26. Baby-friendly 27. Family-friendly 28. Toddler-Friendly 29. Dog-friendly
Atmosphere 30. Quiet 31. Busy 32. Noisy	Food and Drink 33. Food 34. Drink 35. (Free) water	Support 36. Social group 37. Classes 38. Specialist 39. Popularity 40. Advice
Privacy 41. Designated_Area 42. Exclusion (Isolation)	Built environment 43. Spacious 44. Wayfinding 45. Access 46. Directions (to location) 47. Green_space 48. Outdoor 49. Cramped 50. Steps	Misc 51. Event 52. Activism 53. Brand awareness 54. DesignatedBFF 55. Male (Reviewer) 56. OtherRev (Reviewer) 57. (Discuss Business) Owner 58. Affordability 59. Security

Experiential 60. Stigma 61. Anecdote 62. New Mum/first time	Visit 63. Revisit (repeat visits) 64. Planning (planned trip) 65. Destination/venue 66. Pop-in (Convenient/On Demand)	
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Breastfeeding Community Support

We are developing a public breastfeeding policy for Newcastle. Please help us by completing the following questions.

Please note your answers will be anonymous, only the researchers will have access to the data. If we present the findings in publications or presentations, you will not be identifiable.

Ethical approval granted from Newcastle University Ref: 12218/2016.

If you have any questions about the research, please contact emma.simpson@ncl.ac.uk.

***Required**

I understand that my answers will be used anonymously in this research and I consent. *

Yes

No

Can you describe a positive experience you have had when breastfeeding in public?

Your answer

Can you describe a negative experience when breastfeeding in public?

Your answer

If you could give one piece of advice to a local business on how best to support women breastfeeding in their premises, what would it be?

Your answer

How do you decide where to breastfeed when out and about?

Your answer

Any further comments you would like to add?

Your answer

Thank you. We now have some questions to help us learn more about our respondents.

Have you heard of FeedFinder?

Yes

No

Not sure?

Have you used FeedFinder?

Yes

No

Can't remember

How many children do you have?

Your answer

How old are you?

Your answer

What is your occupation?

Your answer

What is your post code?

Your answer

Thank you so much for taking part.

If you would like to be involved in further research conducted on breastfeeding please leave your contact email or phone here:

Your answer

I understand that my answers will be used anonymously in this research and I consent. *

Yes

No

Can you describe a positive experience you have had when breastfeeding in public?

Your answer

Can you describe a negative experience when breastfeeding in public?

Your answer

If you could give one piece of advice to a local business on how best to support women breastfeeding in their premises, what would it be?

Your answer

How do you decide where to breastfeed when out and about?

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What is your occupation?

Your answer

What is your post code?

Your answer

Thank you so much for taking part.

If you would like to be involved in further research conducted on breastfeeding please leave your contact email or phone here:

Your answer

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_Forms

Evaluation form

A new approach to community breastfeeding support using data from FeedFinder

Tuesday 23 April 2019

Completed forms may be left on seating at the end of the meeting

A. Which type of organisation do you work for?

- ☐ University
☐ Local Authority – Public Health
☐ Local Authority - Other
☐ NHS Foundation Trust
☐ Voluntary and community sector
☐ Other (please specify)

B. Overall rating:

1. How would you rate the overall quality of the presentations?

Excellent	Very Good	Good	Fair	Poor

2. How would you rate the overall quality of the table discussions?

Excellent	Very Good	Good	Fair	Poor

3. How would you rate the event environment – venue, catering, parking?

Excellent	Very Good	Good	Fair	Poor

If you would like to expand on your answer please use this space:

C. Please comment

1. Did the meeting provide the opportunity for networking?

☐ Yes ☐ No

If you would like to expand on this question please use this space:

2. What are the things that you learned from today that will influence how you work?

3. How likely are you to use the FeedFinder Data dashboard in your work?

4. Any other comments?
