Psychosocial barriers and enablers of exclusive breastfeeding: lived experiences of mothers in low-income townships, North West Province, South Africa

CURRENT STATUS: UNDER REVISION

Chantell Beverley Witten
North-West University

Chantell.Witten@nwu.ac.za

ORCID: https://orcid.org/0000-0001-5172-279X

Nicole Claasen
North-West University

Herculina S Kruger
North-West University

Anna Coutsoudis
University of Kwazulu-Natal

Herman Grobler
North-West University

DOI: 10.21203/rs.2.19148/v2

SUBJECT AREAS
Maternal & Fetal Medicine Psychology

KEYWORDS
exclusive breastfeeding, psychosocial factors, perceptions, challengers, mixed methods
Abstract
Background

Despite national efforts to promote exclusive breastfeeding (EBF), South Africa’s EBF rate is only 32%. The aim of this study was to examine the rate of EBF discontinuation and the lived experiences of breastfeeding mothers at postnatal time points 3-14 days, 4-8 weeks, 10-14 weeks and 20-24 weeks.

Methods

This community-based mixed-methods study collected data within a prospective cohort study on socio-demographics, the Edinburgh Postnatal Depression Scale (EPDS) and the Breastfeeding Self-Efficacy Scale-Short Form (BSES-SF) at 6-8 weeks with infant feeding data collected at 4-8, 10-14 and 20-24 weeks from 159 mothers living in low income areas. Six focus groups with 32 mothers with infants aged 6-24 weeks were conducted. Descriptive statistics was used for the quantitative data and thematic analysis for qualitative data.

Results

The majority of mothers were unmarried (84.9%), living with family (69.2%) and unemployed (74.2%). EBF decreased from 34% at 4-8 weeks to 9.7% at 20-24 weeks. Mixed feeding with infant formula increased from 17.0% to 50.1% and food feeding from 3.1% to 54.2%. While there were no statistically significant associations between EBF and any of the quantitative socio-demographic variables, in the qualitative data, codes associated with barriers were more than enablers. The themes were Mothers’ attributes (wellbeing, experiences and relationships) with the code mother’s stress the strongest barrier, Mother’s knowledge, attitudes and practices of breastfeeding with the code conventional medicines the strongest barrier, Family environment with the code home setting the strongest barrier, Social environment with public spaces and places a barrier and in Baby cues the code baby stomach ailments the barrier. Within these same themes mother’s positive emotions, benefits of breastfeeding, support in the home, access to information and services from health professionals and baby’s health were strong enablers.

Conclusions

Low EBF, high mixed feeding and a high EPDS score were explained by the barriers identified in the
qualitative data. The data suggests that mothers from low-income households would be better supported through interventions that address food insecurity; family relationships and those that build confidence in mothers and resilience in confronting difficult and hostile breastfeeding environments.

**Background**

The World Health Organization (WHO) and UNICEF (1) have set as one of the Global Nutrition targets, an EBF rate of 50% at country-level by 2025; a global effort that undisputedly will contribute towards the achievement of the Sustainable Development Goals (SDGs) (2, 3). Until the industrial production of formula milk, human milk was needed for human survival. Despite the wide use of infant formula, recent scientific findings reaffirm and assert that no food is more nutritious for an infant than human milk. Human milk is a unique, biomedical product that is the best and most complete natural food that provides for all the infant's physiological needs during the first six months of life (4-7).

While the life-saving benefits of breastfeeding have been documented over many decades, the first-ever Lancet Series on Breastfeeding in 2016 reaffirmed and put forward a call for the scale up of breastfeeding interventions towards reducing infant morbidity and mortality (8). A number of systematic reviews on interventions in low- and middle-income countries have further shown positive outcomes for breastfeeding initiation and exclusivity to six months. Most of these interventions have focused on provision of breastfeeding information, peer support and breastfeeding problem-solving (9-11). While on the other hand, qualitative studies have identified barriers that are not related to insufficient or inaccurate information or the lack of mentoring support for breastfeeding. These barriers were mostly related to milk insufficiency beliefs, cultural beliefs and practices, health systems and gender and power-relations (12-14). A systematic review on studies from Brazil (15) reported maternal employment as the most frequently cited barrier to EBF followed by maternal perceptions of insufficient breast milk supply and medical barriers related to illness of mothers and/or infants, as well as breast problems. These barriers are unlikely to be responsive to interventions offering more breastfeeding information, or additional mentoring or peer support.

Since the 2014 global commitment by the United Nations to improve breastfeeding (16, 17), a
plethora of platforms to provide breastfeeding information and support have evolved to address aspects that may particularly undermine mothers’ successful breastfeeding practices, namely, mothers’ self-confidence and psychological disposition (18, 19); mother’s resilience to risks and threats (20, 21); and the socio-cultural practices (14, 22-24) that will require localized and tailored interventions to suit the mother’s needs and context. A systematic review identified that for low- and middle-income countries there were few intervention studies targeting mothers with infants aged 1 to 5 months that were conducted in the family or community setting and even fewer that used integrated media or social media to improve EBF outcomes (9). Even more concerning are the lack of large-scale interventions to address these particular barriers faced by the mother in her home and family setting (25, 26).

Psychosocial factors, defined as a combination of psychological and social factors include individual-level processes and meanings that influence an individual’s mental state while social factors are general factors at the level of human society concerned with social structure and social processes that impinge on the individual (27). Psychosocial also implies that the effect of social processes is sometimes mediated through psychological understanding. Since the breastfeeding policy shift in 2011, South Africa has made a concerted effort to improve the breastfeeding environment through policy reform (28, 29), information dissemination (30, 31) including the legislation of the International Code for the Marketing of Breast Milk Substitutes (32). In an effort to inform South Africa’s breastfeeding communication strategy (33), the motivation for this study was to identify the point-in-time psychosocial barriers and enablers of EBF from the lived experiences of mothers with infants aged 4-24 weeks in a low-income township in the North West Province of South Africa. In this study a barrier was defined as any factor that would hinder or make it difficult for a mother to EBF and an enabler would be a factor that would help or support her to EBF.

Methods
The aim of this mixed-methods study was to examine the rate of discontinuation of EBF at three specific postnatal time points, namely, 4-8 weeks, 10-14 weeks and 20-24 weeks and to explore the lived experiences of breastfeeding mothers in the sub-district of Tlokwe in the North West Province,
South Africa.

**Setting:** The study sites were two low-income townships, serviced by health clinics and district hospitals. These townships reflect the economic disparities of South Africa with wealthier suburbs juxtaposed against poor townships. Like most of South Africa, these townships are burdened with intersectional inequity. High unemployment, poor living conditions, high levels of violence and crime and low levels of social capital (34). The North West Province experienced higher unemployment than the national average of 27.6% (35). The major languages spoken are Setswana and Afrikaans with many people being bilingual (36). Data for the infant feeding cohort study was collected between May 2018 and March 2019 and for the qualitative data between July and December 2018.

**Design:** This was an exploratory descriptive study using a convergent parallel mixed methods design (37) to provide an in-depth understanding of infant feeding practices and experiences of a cohort of mothers followed prospectively from early breastfeeding period (day 3-14) through to the infant age of 20-24 weeks. The sample size of this study was calculated with the aim to have a minimum number of 12 (38) exclusively breastfeeding mothers at week 6-8 for the in-depth interviews. Based on the findings of previous studies in South Africa (39, 40), exclusive breastfeeding rates were reported to be approximately 8% and 1%, respectively, at weeks 6-8 and at week 24 therefore the sample size for this study was based on 178 participants at baseline, with an over-estimation of expected dropout rate of 10% for mortality and/or loss to follow up. We estimated to have 144 mothers at 4-8 weeks, 117 mothers at 10-14 weeks and 95 mothers at 20-24 weeks, with at least twelve, nine and one exclusively breastfeeding mother, respectively, at 4-8 weeks, 10-14 weeks and at 20-24 weeks. At all time-points, numbers of participants were close to the planned sample size, except at 20-24 weeks, where we interviewed only 72 mothers, compared to the planned sample size of 99, but this group still had more than the expected number of exclusively breastfeeding mothers.

In order to reach mothers with infants with similar ages to the cohort study participants and to avoid a biased sample from the Tlokwe sub-district, six focus groups were conducted with mothers with infants aged 6-24 weeks in the neighbouring sub-district. This neighbouring sub-district had a similar socio-demographic profile as the township in which the quantitative data was collected.
Quantitative data collection and analysis: The prospective cohort study applied survey questionnaires which were administered face-to-face at the participant’s home or at the routine clinic visit. The questionnaire included an infant feeding and food frequency questionnaire (IFFFQ) administered at each time point, the Edinburgh Postnatal Depression Scale (EPDS), Breastfeeding Self-Efficacy Scale (BSES-SF) and the socio-demographic questionnaire each only administered once at 4-8 weeks.

The infant feeding and food frequency questionnaire (IFFFQ): The IFFFQ food categories are based on the validated gold standard 24-hour recall infant feeding questionnaire prescribed by the World Health Organization (41). The IFFFQ is a 7-day recall on proposed food items given at three possible frequencies from once a week, 2 to 6 times a week to every day. This method allows for a longer recall period than the previous 24-hours and allows one to specifically ask about items mothers do not always consider food, such as teas; water; supplements; herbal medicines; and over-the-counter self-prescribed medicines. Goosen, McLachlan (42) used a similar categorization of foods in their study, which particularly also included a question on non-prescribed over-the-counter medicines. In a pilot study with six postpartum mothers, no semantic differences in language or understanding were detected and there was no difficulty in the reading and comprehension of the tool.

The Edinburgh Postnatal Depression Scale (EPDS): The EPDS is a 10-item questionnaire that was developed to identify women who have postpartum depression. Each item is scored 0 to 3. The overall assessment is done by total score, which is determined by adding together the scores for each of the 10 items. Scores could range from 0 to 30. Scores higher than 10 indicate presence of depressive symptoms (43). Mokwena and Shiba (44) had previously translated and tested a Setswana version of this tool for their study in a different part of South Africa. This version was tested for comprehension in a pilot study with six postpartum mothers from the study area but not part of the cohort study. Colloquial semantic differences were detected and adjusted for the translated version to improve reading and comprehension of the tool.

Breastfeeding Self-Efficacy Scale (BSES-SF): The BSES-SF is a 14-item self-reported instrument (42). All items are presented positively using a 5-point Likert-scale where 1 indicates ‘not at all
confident’ and 5 indicates ‘always confident’. A total summed score could range from 14-70 and the higher the score, the higher the level of breastfeeding self-efficacy. This tool was translated and validated for the study population by the research team. (Details included in a separate manuscript which has been submitted for publication).

**Sociodemographic Questionnaire:** A compilation of 25 questions previously asked in other studies conducted in the North West Province (46, 47). The questionnaire covered sociodemographic background information on living arrangements, education level, relationship status, employment status, source of income, access to health information.

All quantitative data were analysed using the IBM SPSS Statistics version 25. Data with a normal distribution were expressed as means ± standard deviation (SD) and data with a skew distribution were expressed as median (25th, 75th percentiles) values. Categorical values were expressed as percentages and frequencies. The chi-square test together with Cramer’s V was used to determine associations between socio-demographic variables (age, education, employment, living arrangements, relationship status, household income and access to mHealth) and EBF. A p-value of less than or equal to 0.05 was considered to be statistically significant.

**Qualitative data collection and analysis:** Focus Group Discussions (FGDs) were conducted with mixed groups of EBF and non-EBF mothers with infants aged 6-24 weeks. A focus group discussion guide was developed to explore two main questions, ‘What makes it difficult for a mother to only give her baby breastmilk?’ and ‘What helps a mother to only give her baby breastmilk?’ The FGDs were opened with participants’ reactions and discussion of two open source pictures depicting a happy breastfeeding mother and an anxious breastfeeding mother. Once the discussion on the pictures were exhausted, the discussion was focused specifically on the two questions to explore what are the barriers and what are the enablers of EBF. FGDs were conducted in English or in Setswana depending on the participants’ preference. All FGDs were voice-recorded, transcribed verbatim and translated into English. All identifiers were removed from the transcripts. Thematic analysis was applied by coding text and assigning codes, codes were further grouped into themes (37). Data reduction (selecting and sorting data systematically) followed by data display (organizing and coding
frequencies) using ATLAS.ti (version 8.4) was done.

Results

The flow diagram for the recruitment and enrolment of study participants for the prospective cohort infant feeding study is shown in Figure 1.

Table 1. Socio-demographic characteristics of cohort study participants at 4-8 weeks postpartum (n = 159)

| Socio-demographic factors                                | Median (interquartile range) or n (%) |
|----------------------------------------------------------|---------------------------------------|
| Mother’s age (years)                                     | 27 (24, 32)                           |
| Parity                                                   | 2 (1, 4)                              |
| Relationship status                                      |                                       |
| Married                                                  | 24 (15.3)                             |
| Unmarried, not cohabiting                                | 117 (73.9)                            |
| Living with a partner                                    | 18 (10.8)                             |
| Education                                                |                                       |
| Grade 0-7, primary school                                | 12 (7.5)                              |
| Grade 8-12, high school                                  | 128 (80.5)                            |
| Post high school training                                | 19 (12.0)                             |
| Living arrangements                                      |                                       |
| Living with family, not the father of the baby           | 110 (70.0)                            |
| Living with the father of the baby                       | 46 (28.7)                             |
| Living with a new partner                                | 3 (1.3)                               |
| Employment status                                        |                                       |
| Employed                                                 | 41 (25.8)                             |
| Unemployed                                               | 118 (74.2)                            |
| Household income per month                               |                                       |
| < R1000 (70 US dollar)                                   | 23 (14.5)                             |
| R1001-R3000 (70-200 US dollar)                           | 43 (27.0)                             |
| R3001-R6000 (200-400 US dollar)                          | 26 (16.4)                             |
>R6000 (>400 US dollar) 19 (12.0)

Do not know 48 (30.1)

Edinburgh Postnatal Depression Scale (EPDS) score

EPDS <10 74 (55.2)

EPDS ≥10 60 (44.8)

Breastfeeding Self-Efficacy Score- Short-Form

BSES <55 27 (14.4)

BSES ≥55 112 (85.6)

The cohort infant feeding patterns for infants aged 4-24 weeks are reported in Table 2.

Table 2. Infant feeding practices for the cohort of mothers with infants aged 4-24 weeks
(N = 159)

Feeding practices at N = 159

|                | 4-8 weeks (n = 159)% | 10-14 weeks (n = 109)% | 20-24 weeks (n = 72) |
|----------------|----------------------|------------------------|---------------------|
| Breastfeeding  | 150 (94.3)           | 94 (86.2)              | 58 (80)             |
| EBF\textsuperscript{a} | 54 (34.0)           | 32 (29.3)              | 13 (18)             |
| Breastfeeding + non-prescribed medicines\textsuperscript{b} | 83 (52.2)           | 42 (38.5)              | 48 (66)             |
| Breastfeeding + water | 57 (35.8)           | 40 (36.7)              | 35 (48)             |
| Breastfeeding + formula feeding (FF) | 27 (17.0)           | 22 (20.2)              | 22 (30)             |
| Breastfeeding + food | 5 (3.1)             | 17 (36.7)              | 39 (54)             |
| Formula feeding only (FF) | 34 (21.4)           | 37 (34.0)              | 36 (50)             |

\textsuperscript{a}Breastmilk + ORS + prescribed meds only (NDOH, 2013, 2018) and \textsuperscript{b}Breastmilk + all medicines (WHO, 2008)
A regression line for the decrease in EBF between time points 3-14 days to 20-24 weeks (p for trend < 0.0001) is shown in figure 2.

Associations of socio-demographic factors and EBF practices at 4-8 weeks are presented in Table 3. There were no statistically significant associations between any of the socio-demographic factors and EBF at 4-8 weeks.

Table 3: Association of sociodemographic factors and EBF practices at 4-8 weeks
| Variable                          | EBF (n)% | Non-EBF (n)% | p val |
|----------------------------------|----------|--------------|-------|
| Maternal age <30 years           | 8 (61.5) | 31 (52.5)    | .55†  |
| Maternal age ≥30 years           | 5 (38.5) | 28 (47.5)    |       |
| Parity ≤2                        | 18 (32.0)| 41 (38.5)    | .98†  |
| Parity ≥3                        | 36 (68.0)| 64 (61.5)    |       |
| Education ≤grade 12              | 29 (54.7)| 54 (51.0)    | .38‡  |
| Education >grade 12              | 23 (47.3)| 52 (49.0)    |       |
| In a relationship                | 46 (86.8)| 94 (90.4)    | .72‡  |
| Not in a relationship            | 7 (13.2) | 11 (9.6)     |       |
| Employed                         | 14 (26.4)| 28 (26.0)    | .95‡  |
| Unemployed                       | 40 (73.6)| 77 (74.0)    |       |
| Household income <R3000          | 38 (69.8)| 72 (69.2)    | .44‡  |
| Household income ≥R3000          | 16 (30.2)| 33 (30.8)    |       |
| Receiving mHealth messages       | 32 (58.9)| 57 (54.8)    | .66(   |
| Not receiving mHealth messages   | 23 (41.5)| 47 (45.2)    |       |
| EPDS <10                         | 8 (61.5) | 34 (61.8)    | .48‡  |
| EPDS ≥10                         | 5 (38.5) | 21 (38.2)    |       |
| BSES <55:                        | 10 (0.07)| 32 (23.0)    | .97‡  |
| BSES ≥55:                        | 17 (0.12)| 80 (57.5)    |       |

*No significant differences were found for any variables between EBF = Exclusive Breastfeeding; and non-EBF. #Numbers may vary due to missing data for some variables
Table 4 presents sociodemographic and infant feeding practices data for the cohort of mothers at 20-24 weeks (n=72) and the 32 mothers with infants aged 6-24 weeks in the FGDs. Their sociodemographic data are similar but the infant feeding practices are significantly different given the differences in the infants’ ages. While there was no statistically significant association between any of the socio-demographic factors maternal age, parity, education, relationship status, employment status, household income, access to mHealth, EPDS or BSES-SF scores with EBF at 4-8 weeks shown in Table 3, the qualitative data provided deeper understanding of and insights into the possible reasons for observed infant feeding practices.

Table 4. Characteristics of the mothers in the cohort study in Tlokwe sub-district and mothers in the FGDs from the neighbouring sub-district, Matlosana

| Characteristics                        | Cohort (n = 72)% | FGD women (n = 32)% |
|----------------------------------------|-----------------|---------------------|
| **Sociodemographic data**              |                 |                     |
| Mother age range (years)               | 22 – 42         | 20 – 41             |
| Mean age of mother (years)             | 28.0            | 30.6                |
| Infant age range (weeks)               | 20 – 24         | 6 – 24              |
| Unemployment status                    | 53 (74.2)       | 28 (87.5)           |
| **Infant feeding practices data**      |                 |                     |
| Breastfeeding                          | 58 (80.6)       | 26 (81.2)           |
| Exclusively breastfeeding              | 13 (18.0)       | 9 (28.1)*           |
| Water giving                           | 19 (54.2)       | 16 (50.0)*          |
| Food feeding                           | 43 (59.8)       | 7 (22.0)*           |

*More infants aged 6-8 weeks

The identified themes and codes from the FGDs are presented in Table 5 and are organized by frequency counts for barriers and enablers. In all themes, except Mother’s knowledge, attitudes &
practices of breastfeeding the barriers were more dominant discussion points than the enablers.

Table 6 presents a joint display showing the quantitative variables for EBF, mixed feeding, EPDS and BSES and the codes organized by frequency counts for barriers and enablers for each theme,

**Mothers’ attributes - physical and mental wellbeing, experiences and relationships.**

**Mother's knowledge, attitudes and practices of breastfeeding, Family environment, Social environment** and **Baby cues** to provide insights and explanations for the poor EBF pattern observed in this cohort of mothers as shown in Table 2 and Figure 2.

Table 5: Focus Group Discussion themes and codes arranged by frequency counts
| Theme and codes                                                                 | Barrier | Enabler |
|--------------------------------------------------------------------------------|---------|---------|
| **Mothers’ attributes: physical and mental wellbeing, experience and relationships** |         |         |
| Mother’s body image                                                           | +       | +       |
| Mother’s negative emotions (angry, unhappy)                                   | ++      | -       |
| *Mother’s positive emotions (happy, feels good)*                              | +       | ++E     |
| Mother’s perception of breastmilk supply                                       | ++++    | ++      |
| Mother’s experience (not first child)                                          | +       | +       |
| Mother’s first breastfeeding experience                                         | +       | +       |
| Mother’s health status or physical wellbeing                                    | +++     | ++      |
| Mother’s choice                                                                | +       | +       |
| Mother’s hunger & nutrition                                                    | ++      | ++      |
| Mother’s priorities                                                            | ++      | +       |
| Mother’s sexual relationships                                                  | +       | +       |
| *Mother’s stress*                                                              | ++++    | +       |
| **Mothers’ knowledge, attitudes & practices of breastfeeding**                 |         |         |
| *Benefits of breastfeeding*                                                    | -       | +++E    |
| Conventional medicines for babies                                              | +++     | ++      |
| Expressing breastmilk                                                          | +       | +       |
| Foods to make or increase breastmilk                                            | +       | ++      |
| Frequency and duration of breastfeeding                                         | +       | +       |
| Information on infant feeding                                                   | +       | +       |
| *Mixed feeding*                                                                | ++++    | +       |
| Positioning and latching                                                       | +       | +       |
| **Family environment**                                                         |         |         |
| Advice from elders                                                             | +       | +       |
| *Home setting*                                                                 | ++++    | +++E    |
| Food at home                                                                   | +       | +       |
| Relationship with the father of the child                                      | +       | +       |
| **Social environment**                                                         |         |         |
| *Health professionals*                                                         | ++      | +++E    |
| Breastfeeding seen as low social status                                        | +       | -       |
| Breastfeeding in public                                                        | +       | +       |
| *Public spaces & places (malls, taxis, other people)*                          | +++B    | +       |
| Traditional beliefs & practices                                                | +       | +       |
| Work environment                                                               | +       | +       |
| **Baby cues**                                                                  |         |         |
| Baby does not want to or struggles to breastfeed                               | +       | -       |
| Baby full                                                                      | +       | +       |
| *Baby’s health*                                                                | ++      | +++E    |
| Baby not full                                                                  | ++      | +       |
| Baby bonding & love                                                            | +       | +       |
| Baby crying                                                                    | +       | +       |
| Baby breastfeeding frequently                                                  | +       | -       |
| Baby’s growth & development                                                    | +       | +       |
| Baby sleeping longer or better                                                 | +       | +       |
| *Baby stomach ailments*                                                        | ++B     | +       |
| Baby upset or unsettled by mother’s emotions                                   | +       | -       |

*Frequency counts based on ATLAS.ti - Fq counts*: 0 = -, 1-20 = +; 21-40 = ++, 41-60 = ++++, >60 = +++++

B = Highest count for barrier and E = highest count for enabler
As seen in Table 1, the majority of mothers were unmarried (84.9%), living with family (69.2%) and unemployed (74.2%). This is supported by the barrier codes mother’s stress and home setting as illustrated by this focus group participant in response to what makes breastfeeding difficult? ‘Financial support. As sometimes the absence of the father, you delivered a baby who is fatherless. You think what am I going to eat so that I can breastfeed? How will I provide for the child? And that makes you stop breastfeeding to feed the baby some rooibos (tea).’ – unemployed, 29 year-old, first time mother.

A high percentage of mothers had high school education or post-high school training (93.9%), but were unemployed (74.2%) and the majority of mothers (80.6%) scored high on the BSES-SF (≥60), but also a higher than expected proportion of mothers (44.8%) had scores on the EPDS indicating possible presence of depression symptoms (≥10) as shown in Table 1. Mother’s stress, home setting and relationship with the father of the child are barrier codes as illustrated by this FGD participant, ‘Sometimes when it’s tough and you are full of stress, you think of going job hunting. I wasn’t interested in breastfeeding. I remember when the baby was newly born, I had nothing, not even baby’s nappies. I was even thinking of giving the baby to the baby’s father because I was stressed and had nothing. Even my mind was not committed to breastfeeding because I couldn’t cope anymore’ – unemployed 33 year-old mother with three children.

A third of mothers were not able to report on their household monthly income (30.2%), while only a little more than half of the cohort (55.3%) reported a household income of more than US$200/month. Financial demands are high and food is a major concern for mothers as explained by this participant, ‘I also think that it’s the support at home. Yes, especially regarding food, you can’t breastfeed while you are hungry. Then you have to make do with food like soft (maize) porridge’ – 24 year-old domestic worker with two children. This financial strain and focus on food is reflected in the barrier codes mother’s stress, mother’s health status and physical wellbeing, mother’s hunger and nutrition and food at home.

At 4-8 weeks, over two-thirds of the cohort used conventional non-prescribed medicines for their
infants (67.3%). These practices are supported and encouraged by the elders in the family as explained by this participant ‘We follow the rules and the culture as we are growing up and the grown-ups will say we were using those (medicines) on you, when you were a baby and as you were growing up. So why now should you want to follow the western ways? We just follow the wisdom of our grown-ups’. - 36 year old employed mother with three children. The codes *conventional medicines for babies, advice from elders* and *traditional beliefs and practices* were barriers to breastfeeding.

The decrease in EBF with infant age from 34.0% at 4-8 weeks to 18.0% at 20-24 weeks shown in Table 2 is eloquently explained by this mother: ‘Can I just be honest, the reasons why we don’t manage (to EBF), when they are still infants around 7-10 days they get full enough of just been breastfed. The bigger the baby gets the more the intestines grow so you won’t manage only with breastfeeding. They want something that will last longer in their stomach.’ - 34 years old, employed mother of three children. The codes *mother’s perception of breastmilk supply, foods to make or increase breastmilk supply and baby not full* were barriers to breastfeeding.

The main disrupter of EBF was providing water to the infants, with 39.4% of 4-8 week olds already receiving water. Of these infants 28.7% received water with added sugar. As explained by this mother, ‘When you breastfeed a baby and mix with some sugar-water, the baby becomes full and the baby doesn’t cry when you don’t have enough (breast) milk’. - 29 years old, with two children. The codes *mixed feeding, mother’s perception of breastmilk supply, advice from elders* and *baby stomach ailments* were barriers to breastfeeding.

By 20-24 weeks, 50% of infants were receiving infant formula. Reasons for mixed feeding with formula is explained by this mother. ‘Speaking for myself, I started with just breastfeeding but because I didn’t have much time and also to give the baby more attention as I am a working mom and I have an older kid then I came to a decision that I should give (formula) milk. I also couldn’t produce a lot of breastmilk which required me to always be close to him to breastfeed him, which I couldn’t do because I didn’t have enough (breast) milk’. - 24 year-old with two children. The codes *mixed feeding, mother’s perception of breastmilk supply* and *expressing breastmilk* supported the
formula feeding practice.

Food feeding was 3.1% at 4-8 weeks with a three-fold increase at 10-14 weeks (9.4%) which more than doubled by 20-24 weeks (20.0%). This pattern of mixed feeding is explained by this mother, ‘If the baby consumes more then you are able to produce milk. Then you know you can’t produce more (milk), it’s where now you reach a decision that you will end up giving those cereals so that the baby can get full’. - 24 years old, two children. The codes mixed feeding, mother’s perception of breastmilk supply and baby not full supported premature food feeding to infants aged 4-24 weeks.

Table 5 shows that in the theme of Mother’s knowledge, attitudes & practices of breastfeeding, the code mixed feeding had the highest frequency count and reflects in the dominant infant feeding practice of the cohort. The code mothers’ stress had the highest frequency count of all the codes highlighting Mother’s attributes (physical and mental wellbeing, experience and relationships) as the dominant theme. Sources of mother’s stress related to mother’s perception of breastmilk supply, access to food and regular meals in the home and difficult relationships in the home, highlighting the difficult lived experience of breastfeeding mother’s in low-income households.

Discussion
This cohort of mothers had low prevalence of EBF and high prevalence of mixed feeding which reflects the findings of many other studies in South Africa (47-49). There was a significant drop in EBF prevalence from 4-8 weeks to 20-24 weeks which corresponded with the increasing prevalence of formula milk and food feeding over time, with half of all infants respectively getting formula and/or food. This pattern of suboptimal breastfeeding of infants was reflected in mothers discussing more barriers than enablers of EBF during the FGDs. Furthermore, mixed feeding was a dominant code in the theme Mother’s knowledge, attitudes & practices of breastfeeding.

The findings of the qualitative data highlighted five main themes, Mothers’ attributes: physical and mental wellbeing, experience and relationships, Mothers’ knowledge, attitudes & practices of breastfeeding, Family environment, Social environment and Baby cues. These themes are in line with other research on the ecological framework of breastfeeding (50) which has been further expanded by the model for the determinants of breastfeeding (51) which recognizes the mother-infant dyad,
family and home setting and the broader social environment.

Of all the themes, the code *mothers stress* was the single highest scoring code and reflects the immense and difficult circumstances mothers from low-income households are faced with in general, but particularly as breastfeeding mothers. The intersectionality of inequity and poverty for mothers was expressed by mothers as experiences of stress and at times distress. The discussions revolved around the unsupportive home environment which was supported by the finding that the majority of mothers lived with their families rather than with their partners or spouses.

South Africa has a high number of single mothers with just over 60% of children born in 2017 not having a registered father (52). Furthermore, given the general high levels of poverty in South African townships and the high levels of unemployment amongst mothers in the cohort study, a major concern and source of stress for breastfeeding mothers was the lack of food in the home. In 2017, almost 20% of South African households had inadequate or severely inadequate access to food, with the North West province having the highest number of food insecure households at 63% (36).

Both family stress and the lack of food to support breastfeeding, affected mothers’ mental health. This negative mental disposition was reflected in the high EPDS scores compared to global norms. A meta-analysis showed that about 13% of mothers in developing countries experience clinical depression after childbirth (53). WHO further asserts that the global prevalence is much higher than this figure which was derived from research conducted mostly from developed countries (54). Mental disposition among breastfeeding women can be measured as postnatal depression (55). Women with high EPDS scores have been found to be more likely to stop breastfeeding within three months (56).

However, in the context of South Africa, because of financial constraints mothers are less likely to stop breastfeeding completely but are more likely to mix feed their infants as reflected in the most recent DHS (47). In the current study, EPDS scores at 4-8 weeks postpartum had no association with EBF or exclusive formula feeding.

Despite the evidence of limited maternal nutrition impact on breastmilk supply and quality (54), mothers perceived and internalized that the stress in the home and the lack of food negatively affected their mental disposition and in turn negatively impacted on their ability to produce sufficient
breastmilk of good quality for her infant (55). Public health interventions to support breastfeeding also counsel mothers on nutrition during pregnancy and lactation. In a study, 84% of mothers had knowledge that diet should be changed by increasing, adding or avoiding some special food items in the diet during pregnancy and lactation (56).

In our study, mothers were acutely aware that what they eat or do not eat will affect their ability to produce breastmilk and the quality of their breastmilk. They were also able to name foods that they believed or were told would improve breastmilk production. Nutrition during pregnancy and lactation has opened a multi-billion-dollar industry for nutrition supplements and supplemental feeds for pregnant and breastfeeding mothers. Mothers are also bombarded by food and nutrition guidance from family, relatives and health professionals as illustrated by this quote, ‘If after birth, you are under your mom’s care it becomes difficult because you get instructed, “you will drink coffee and eat your soft porridge” always, and they don’t give you fatty food before the umbilical cord is healed’.

Furthermore, aggressive marketing of infant formula has exploited this understanding that a mother’s nutrition affects her quality of breastmilk and what she is able to provide her breastfeeding baby, as graphically illustrated in a formula industry funded marketing campaign in Brazil on ‘Your child is what you eat. Your habits in the first thousand days of gestation can prevent your child from developing serious diseases’ (57). Mothers’ decisions to mix feed their infants are in response to a number of Baby cues that the mother interprets that the baby is not getting enough breastmilk.

Mothers interpret and internalize these Baby cues as signalling that their breastmilk is not good enough in quantity or quality and therefore an alternative solution is needed. This solution, more often than not, is to complement breastfeeding with infant formula and food.

Though EBF was low, there were enablers identified in each of the themes. Of all the themes, only the codes benefits of breastfeeding in the theme Mother’s knowledge, attitudes & practices of breastfeeding and access to and information and/or services from health professionals in the theme Social environment were stronger enablers compared to the barriers identified in those themes. With more than 75% of public health facilities accredited as baby-friendly (58), over 95% of mothers delivering in a health facility (47) and 90% registered on the national mHealth platform (59), mothers
knowledge, attitudes of breastfeeding should have been well established. The fact that mixed feeding is a norm reflects on the disempowering and hostile environments breastfeeding mothers are confronted with (60, 61). Hence the number of global and national initiatives to improve the breastfeeding environments with specific focus on addressing psychosocial barriers to breastfeeding (25, 62, 63)

Other enablers identified were the codes, mother’s positive emotion (happy, feels good) in the theme Mothers attributes, support in the home setting in the theme Family environment and baby’s health in the theme Baby cues. This was also supported in the relatively high BSES score of the cohort. BSES is influenced by four main sources of information: (1) performance accomplishments (e.g., past breastfeeding experiences); (2) vicarious experiences (e.g., watching other women breastfeed, seeing breastfeeding in public spaces); (3) verbal persuasion (e.g., encouragement from influential others such as friends, family, and health professionals); and (4) physiological responses (e.g., fatigue, stress, anxiety). In each of these domains, the cohort had positive features with trends of higher BSES scores with higher parity, with high breastfeeding practices, regular access to breastfeeding information and contact with breastfeeding promoting health professionals and their positive disposition towards breastfeeding.

While BSES has demonstrated to predict EBF in other settings (45, 67-71), this was not the case for this cohort. Unlike other settings this cohort displayed both high BSES scores and high EPDS scores, which may be explained by South African’s chronic stressful environments, but generally, mothers’ strong coping mechanisms and resilience to shocks and insults at the individual and societal level (52, 72, 73).

Mothers have mentioned both the Family and Social environment more often as barriers than as enablers of EBF. In the context of our research setting, the lived realities of low-income households are plagued with food insecurity, hardship and strife (36, 73, 80). EBF is an additional burden on an unsupported, unemployed breastfeeding mother who is physically the sole provider for the health and wellbeing of herself and her infant. In the Family environment the lack of support from family to assist the breastfeeding mother with household chores and family members’ negative interventions when
there are breastfeeding difficulties were reported. Furthermore, mothers experienced the social environment as hostile with negative judgements of breastfeeding, or high expectations of breastfeeding mothers from complete strangers or from society at large with no or few facilities to support breastfeeding mothers in public spaces and places like shopping malls, restaurants, and public institutions. This is supported by the efforts of civil society to normalize breastfeeding in public spaces (61, 75, 76).

With the majority of mothers being unemployed, the work setting did not emerge as a strong theme and is captured within the theme Social environment. While the health setting did emerge as an enabling factor, it was limited to the mother’s encounter with health professionals at the health clinic or hospital. This was not unexpected as South Africa has a high coverage of primary health care facilities and high utilization rates especially for antenatal care and child health services (47).

Additionally, South Africa has a very well established and a 25-year history of the Baby Friendly hospital initiative which has significantly scaled up in coverage since 2011 (58). In recent times, South Africa has implemented at scale mHealth services to pregnant women and mothers of infants through cell phone based health messaging (11, 74), increasing the reach and intensity of health service-driven breastfeeding messaging to mothers.

The lower emphasis on the theme Baby cues is supported by literature that responsive parenting skills and identification and appropriate response to baby needs is lacking (78). The South African National Department of Health has responded to this need with the revised road-to-health booklet which is in line with the nurturing care framework that focuses on five pillars namely, nutrition, love, protection, health care and extra care (79). Mothers interpret and internalize baby crying, baby breastfeeding frequently and baby stomach ailments like cramps, burps, and not passing stools as signals that their breastmilk is not enough or is not of good quality to satisfy their infants’ nutritional needs. While the mother’s decision to introduce other foods to her baby may silence the negative Baby cues and soothe the mother and the household, scientific research has established that infants who are mixed fed have poorer health and development outcomes than EBF infants (7). Literature has
correctly reported that there is a gap in proven effective interventions that are delivered at the household level (9). Furthermore, in the South African context, studies using breastfeeding education, peer support and counselling have not rendered the desired EBF outcomes (39, 78). This calls for a redesign of breastfeeding support programmes that will adequately and appropriately address the psychosocial barriers as articulated by mothers themselves.

Conclusions
The breastfeeding patterns of this cohort study are similar with other South African studies with low EBF rates and high rates of mixed feeding. Despite the EPDS data showing that a relatively high proportion of mothers experienced possible presence of postnatal depression symptoms, the majority of mothers’ displayed a high level of breastfeeding self-efficacy. This study sought to explore the barriers and enablers of EBF from the perspectives and lived experiences of mothers. The strong emphasis on Mothers’ attributes, rather than on Family environment, or the Social environment demonstrates that the objective to capture the mothers’ lived experiences was met. The low emphasis and the focus on the negative of Baby cues is worrisome as the healthy mother-infant dyad is imperative for optimal health outcomes of mothers and infants.

The qualitative data revealed that breastfeeding mothers from low-income households experience high levels of stress which they believed undermined their ability to produce enough breastmilk and to produce breastmilk of good quality for their infants. Mothers interpreted and internalized infant cues as negative responses to their breastmilk. Baby crying, baby breastfeeding frequently and not sleeping long periods were interpreted as signals of not enough breastmilk. These seem to be the main drivers for mothers’ decisions to mix feed their infants. If South Africa is to reach the global nutrition goal of 50% EBF by 2025 and reap the full benefits of EBF, interventions to support breastfeeding mothers to optimally EBF should be explored, designed and implemented. These interventions should address food insecurity and family relations as well as help build confidence and resilience in mothers who are confronted by difficult environments in the home and broader society.

List Of Abbreviations
Breastfeeding – BF
Breastfeeding Self-Efficacy Scale – Short Form – BSES-SF
Exclusive breastfeeding - EBF
Edinburgh Postnatal Depression Scale - EPDS
Focus Group Discussions - FGDs

Declarations

**Ethics approval and consent to participate**

The research was approved by the North-West University Health Faculty Research Ethics Committee (NWU-00030-17-S1) and the study was conducted in line with the Helsinki Declaration and the South African National Department of Health Ethics in Health Research guidelines (79). All eligible participants signed a written informed consent and data were collected in the preferred language of the participants. After written informed consent was given by the study participants, one of the researchers secured an appointment with the mother at the health clinic or at her home for a face-to-face interview for data collection. All data collection tools were completed by the researchers in the preferred language of the participants which most often was Setswana. Data were recorded on hard copy and entered into an electronic database.

**Consent for publication**

The manuscript does not have any images, videos or identifiable data of participants. During the informed consent process, a consent form in local language has been signed by all study participants which states that their stories may be published, but their names will not be mentioned. This form is available from the authors.

**Availability of data and material**

The dataset or transcripts are available from the corresponding author on reasonable request.

**Competing interests**

The authors declare no potential conflicts of interest with respect to the research, authorship and/ or publication of this article.

**Funding**
Funding for this research was received from the Department of Science and Technology (DST)/National Research Foundation (NRF) Centre of Excellence for Food Security Project: 160502

Authors’ contributions

CW, SK and HG conceptualized the study and designed data collection methods. CW collected data and conducted all the in-depth interviews. CW and NC designed focus group guide and performed qualitative analysis of the study. CW and SK performed statistical analysis of the data. CW and HG contributed to writing the first draft of the manuscript. NC, SK and AC contributed in reviewing the manuscript drafts. All authors critically reviewed and approved of the final manuscript.

Acknowledgements

We would like to thank the Tlokwe Sub-district Department of Health and the staff in the eight health clinics for the support in the study. In particular, we would like to thank all the mothers who agreed to take part in the study and so generously share their time and their experiences with us. We thank Mrs Noloyiso Matiwane, Miss Bakang Olifant and Mr Nkululeko Semenekane with their assistance in translating the data collection tools and collecting data. And a special word of thanks to Mrs Matiwane and Miss Olifant for moderating the focus groups and providing quality control of the transcripts.

Authors’ information (optional)

Chantell Witten, Centre of Excellence for Nutrition, North-West University

11 Hoffman Street, Building G16, Room 144, Potchefstroom, South Africa, 2531

Email: WittenCB@ufs.ac.za

References

1. World Health Organization, UNICEF. Global Nutrition Targets 2025: Breastfeeding policy brief. Geneva:WHO; 2014; 1-8.

   https://www.who.int/nutrition/publications/globaltargets2025_policybrief_breastfeeding/en/

2. World Health Organization, UNICEF. Breastfeeding Advocacy Initiative. Geneva:WHO; 2015.

   https://www.who.int/nutrition/publications/infantfeeding/breastfeeding_advocacy_initi
3. Kakietek J, Eberwein JD, Walters D, Shekar M. Unleashing Gains in Economic Productivity with Investments in Nutrition. Washington, D.C: World Bank Group; 2017. https://resourcecentre.savethechildren.net/node/13361/pdf/economic_benefits_web.pdf

4. Kramer MS, Kakuma R. Optimal duration of exclusive breastfeeding. Cochrane Database Syst Rev. 2012(8):1-139. DOI: 10.1002/14651858.CD003517.pub2

5. Victora CG, Bahl R, Barros AJD, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. The Lancet. 2016;387(10017):475-90. DOI: 10.1016/S0140-6736(15)01024-7

6. World Health Organization and UNICEF. Global strategy for infant and young child feeding. Geneva: World Health Organization; 2003. 1-37. https://apps.who.int/iris/bitstream/handle/10665/42590/9241562218.pdf;jsessionid=DACAD5ED8C92998318EFF6F809827862?sequence=1

7. Sankar MJ, Sinha B, Chowdhury R, Bhandari N, Taneja S, Martines J, et al. Optimal breastfeeding practices and infant and child mortality: a systematic review and meta-analysis. Acta Paediatrica. 2015;104(S467):3-13. DOI: 10.1111/apa.13147

8. Rollins NC, Bhandari N, Hajeebhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? The Lancet. 2016;387(10017):491-504. DOI: 10.1016/S0140-6736(15)01044-2

9. Sinha B, Chowdhury U, Taneja S, Jose M, Bahl R, Sankar MJ. Integrated Interventions Delivered in Health Systems, Home, and Community Have the Highest Impact on Breastfeeding Outcomes in Low- and Middle-Income Countries. Journal of Nutrition. 2017;147(11):2179S. DOI:10.3945/jn.116.242321

10. Oria MOB, Dodou HD, Chaves AFL, Santos L, Ximenes LB, Vasconcelos CTM.
Effectiveness of educational interventions conducted by telephone to promote breastfeeding: a systematic review of the literature. Revista da Escola de Enfermagem da U S P. 2018;52:e03333. DOI: 10.1590/s1980-220x2017024303333

11. Lee SH, Nurmatov UB, Nwaru BI, Mukherjee M, Grant L, Pagliari C. Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries: Systematic review and meta-analysis. Journal of Global Health. 2016;6(1):1-17. DOI: 10.7189/jogh.06.010401

12. Afoakwah G, Smyth R, Lavender DT. Women's experiences of breastfeeding: A narrative review of qualitative studies. African Journal of Midwifery & Women's Health. 2013;7(2):71-77. DOI: 10.12968/ajmw.2013.7.2.71

13. Bai YK, Middlestadt SE, Joanne Peng CY, Fly AD. Psychosocial factors underlying the mother’s decision to continue exclusive breastfeeding for 6 months: an elicitation study. Journal of Human Nutrition & Dietetics. 2009;22(2):134-40. DOI: 10.1111/j.1365-277X.2009.00950.x.

14. Raman S, Nicholls R, Ritchie J, Razee H, Shafiee S. Eating soup with nails of pig: thematic synthesis of the qualitative literature on cultural practices and beliefs influencing perinatal nutrition in low and middle income countries. BMC Pregnancy and Childbirth. 2016;16(1):1-13. DOI: 10.1186/s12884-016-0991-z

15. Balogun OO, Dagvadorj, A., Anigo, K.M., Ota, E., Satoshi, S. Factors influencing breastfeeding exclusivity during the first 6 months of life in developing countries: a quantitative and qualitative systematic review. Maternal & Child Nutrition. 2015;11(4):433-51. DOI: 10.1111/mcn.12180

16. UNICEF. Breastfeeding and the Sustainable Development Goals. New York: UNICEF, 2016. 1-4.

https://worldbreastfeedingweek.org/2016/pdf/BreastfeedingandSDGsMessaging%20W
17. World Health Organization, UNICEF. Tracking progress for breastfeeding policies and programmes: Global breastfeeding scorecard 2017. Geneva:WHO, 2017. 1-7. https://www.who.int/nutrition/publications/infantfeeding/global-bf-scorecard-2017/en/

18. Dias CC, Figueiredo B. Review: Breastfeeding and depression: A systematic review of the literature. Journal of Affective Disorders. 2015;171:142-54. DOI: 10.1016/j.jad.2014.09.022

19. Norhayati MN, Nik Hazlina NH, Asrenee AR, Wan Emilin WMA. Review: Magnitude and risk factors for postpartum symptoms: A literature review. Journal of Affective Disorders. 2015;175:34-52. DOI: 10.1016/j.jad.2014.12.041

20. McCarter-Spaulding D and Gore R. Breastfeeding Self-Efficacy in Women of African Descent. Journal of Obstetric, Gynecologic, & Neonatal Nursing. 2009;38(2):230-43. DOI: 10.1111/j.1552-6909.2009.01011.x

21. Otsuka K, Dennis C-L, Tatsuoka H, Jimba M. The Relationship Between Breastfeeding Self-Efficacy and Perceived Insufficient Milk Among Japanese Mothers. Journal of Obstetric, Gynecologic, & Neonatal Nursing. 2008;37(5):546-55. DOI: 10.1111/j.1552-6909.2008.00277.x

22. Risenga, Lebese. Lived Experience of First Time Mothers towards Breastfeeding at Muyexe Village in Mopane District, Limpopo Province. Journal of Medicine and Medical Research. 2014;2(4):51-8.

23. Naidoo K. Researching Reproduction: Reflections on Qualitative Methodology in a Transforming Society. 2008. 2008;9(1):1-19.

24. Goosen C, McLachlan M, Schubl C. Factors impeding exclusive breastfeeding in a low-income area of the Western Cape Province of South Africa. Africa Journal of Nursing
25. Menon P, Nguyen PH, Saha KK, Khaled A, Kennedy A, Tran LM, et al. Impacts on Breastfeeding Practices of At-Scale Strategies That Combine Intensive Interpersonal Counseling, Mass Media, and Community Mobilization: Results of Cluster-Randomized Program Evaluations in Bangladesh and Viet Nam. PLOS Medicine. 2016;13(10):1-28. DOI: 10.1371/journal.pmed.1002159

26. Cresswell JA, Ganaba R, Sarrassat S, Somé H, Diallo AH, Cousens S, et al. The effect of the Alive & Thrive initiative on exclusive breastfeeding in rural Burkina Faso: a repeated cross-sectional cluster randomised controlled trial. The Lancet Global Health. 2019;7(3):e357-e65. DOI: 10.1016/S2214-109X(18)30494-7

27. Upton J. Psychosocial Factors. In: Gellman MD, Turner JR, editors. Encyclopedia of Behavioral Medicine. New York, NY: Springer New York; 2013. 1580-1.

28. Department of Health. Infant and Young Child Feeding Policy. Pretoria: Department of Health; 2013. 1-78.

29. National Department of Health. Circular minute number 3 of 2017/18 HIV/AIDS, TB, MNCWH: Amendment of the 2013 infant and young child feeding (IYCF) policy. Pretoria: Department of Health; 2017. 1-3

30. Department of Health. National breastfeeding campaign overview South Africa (2016-2017). Pretoria:Department of Health, 2016. 1-11.

31. Department of Health. What you should know about breastfeeding. Pretoria:Department of Health, 2018. 1-11.

32. Republic of South Africa. Regulations Relating to Foodstuff for Infants and Young Child Feeding,. Pretoria: Government Gazette; 35941, 2012. 3-32.

33. Department of Health. Implementation plan for breastfeeding promotion in South Africa. Pretoria: Department of Health; 2011. 1-35
34. Kapilashrami A, Hill S, Meer N. What can health inequalities researchers learn from an intersectionality perspective? Understanding social dynamics with an intercategorical approach? Social Theory & Health. 2015;13(3):288-307. DOI:10.1057/sth.2015.16

35. Statistics South Africa. Quarterly Labour Force Survey. Pretoria: Statistics South Africa; 2019. 1-131. http://www.statssa.gov.za/publications/P0211/P02113rdQuarter2019.pdf

36. Statistics South Africa. General Household Survey, 2017. Pretoria: Statistics South Africa; 2018. 1-188. http://www.statssa.gov.za/publications/P0318/P03182017.pdf

37. Creswell JW, Plano Clark VL. Choosing mixed methods research design. Designing and Conducting Mixed Methods Research: SAGE; 2011. 1-107. https://us.sagepub.com/en-us/nam/designing-and-conducting-mixed-methods-research/book241842

38. Guest, G., Bunce, A. & Johnson, L. 2006. How Many Interviews Are Enough?: An Experiment with Data Saturation and Variability. Field methods, 18(1):59-82. DOI: 10.1177/1525822x05279903

39. Tylleskar T, Jackson D, Meda N, Engebretsen IM, Chopra M, Diallo AH, et al. Exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): a cluster-randomised trial. Lancet. 2011;378(9789):420-7. DOI: 10.1016/S0140-6736(11)60738-1

40. Human Science Research Council. 2013. The South African National Health And Nutrition Examination Survey (SANHANES-1). Data analysis on infant feeding practices and anthropometry in children under five years of age: South Africa 2012. Pretoria. http://www.hsrc.ac.za/uploads/pageNews/72/SANHANES-launch%20edition%20(online%20version).pdf

41. World Health Organization. Indicators for assessing infant and young child feeding
practices: conclusions of a consensus meeting held 6-8 November 2007 in Washington D.C., USA. Geneva: World Health Organization; 2008. 1-26.
https://www.who.int/maternal_child_adolescent/documents/9789241596664/en/

42. Goosen C, McLachlan M, Schubl C. Infant feeding practices during the first 6 months of life in a low-income area of the Western Cape Province. South african Journal of Child Health. 2014;8(2):1-5. DOI: 10.7196/SAJCH.675

43. Cox JL, Holden JM, Sagovsky R. Detection of Postnatal Depression: Development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry. 1987;150(6):782-86. DOI: a href="https://doi.org/10.1192/bjp.150.6.782">10.1192/bjp.150.6.782</a

44. Mokwena K, Shiba D. Prevalence of postnatal depression symptoms in a primary health care clinic in Pretoria, South Africa: management of health care services. African Journal for Physical Health Education, Recreation and Dance. 2014;20(Supplement 1):116-27. https://hdl.handle.net/10520/EJC162286

45. Dennis C-L. The Breastfeeding Self-Efficacy Scale: Psychometric Assessment of the Short Form. Journal of Obstetric, Gynecologic, & Neonatal Nursing. 2003;32(6):734-44. DOI: 10.1177/0884217503258459

46. Rothman M, Berti C, Smuts CM, Faber M, Covic N. Acceptability of Novel Small-Quantity Lipid-Based Nutrient Supplements for Complementary Feeding in a Peri-Urban South African Community. Food and Nutrition Bulletin. 2015;36(4):455-66. DOI: 10.1177/0379572115616057

47. National Department of Health, Statistics South Africa (Stats SA), South African Medical Council (SAMRC), ICF. South Africa Demographic and Health Survey, 2017: Key Indicators. Pretoria: NDoH, Stats SA, SAMRC and ICF; 2017. 1-75.
48. Budree S, Goddard E, Brittain K, Cader S, Myer L, Zar HJ. Infant feeding practices in a South African birth cohort—A longitudinal study. Maternal & Child Nutrition. 2016;1-9. DOI: 10.1111/mcn.12371

49. Horwood C, Haskins L, Engebretsen IM, Phakathi S, Connolly C, Coutsoudis A, et al. Improved rates of exclusive breastfeeding at 14 weeks of age in KwaZulu Natal, South Africa: what are the challenges now? BMC Public Health. 2018;18:1-11. DOI: 10.1186/s12889-018-5657-5

50. Tiedje LB, Schiffman, R., Omar, M., Wright, J., Buzzitta, C., McCann, A., Metzger, S. An ecological approach to breastfeeding. MCN: The American Journal of Maternal Child Nursing. 2002;27(3):154-62. DOI: 10.1097/00005721-200205000-00005

51. Rollins NC, Bhandari N, Hajeebhoy N, Horton S, Lutter CK, Martines JC, et al. Why invest, and what it will take to improve breastfeeding practices? The Lancet. 2016;387(10017):491-504. DOI: 10.1016/S0140-6736(15)01044-2

52. Hall K, Richter L, Mokomane Z, Lake L. South African Child Gauge 2018. Cape Town: Children’s Institute, University of Cape Town; 2018. 1-168

53. O’Hara MW, Swain AM. Rates and risk of postpartum depression—a meta-analysis. International Review of Psychiatry. 1996;8(1):37-54. DOI: 10.3109/09540269609037816

54. World Health Organization (WHO). Mental health aspects of women’s reproductive health: A global review of the literature. Switzerland: . Geneva: World Health Organization; 2009. 1-181.

https://apps.who.int/iris/bitstream/handle/10665/43846/9789241563567_eng.pdf?sequence=1
55. O’Brien M, Buikstra E, Hegney D. The influence of psychological factors on breastfeeding duration. Journal of Advanced Nursing. 2008;63(4):397-40

56. DOI: 10.1111/j.1365-2648.2008.04722.x

56. Bick DE, MacArthur C, Lancashire RJ. What influences the uptake and early cessation of breast feeding? Midwifery. 1998;14(4):242-7. DOI: 10.1016/s0266-6138(98)90096-1

57. Innis SM. Impact of maternal diet on human milk composition and neurological development of infants. The American Journal of Clinical Nutrition. 2014;99(3):734S-41S. DOI: 10.3945/ajcn.113.072595

58. Hutchinson AD, Charters M, Prichard I, Fletcher C, Wilson C. Understanding maternal dietary choices during pregnancy: The role of social norms and mindful eating. Appetite. 2017;112:227-34. DOI: 10.1016/j.appet.2017.02.004

59. Mahmood S AM, Mujeeb SS, Bano N, Mubasher H Assessment of nutritional beliefs and practices in pregnant and lactating mothers in an urban and rural area of Pakistan. The Journal of the Pakistan Medical Association 1997;47(2):60-2.

60. UK BMA. Nestle-sponsored paediatric society shocks breastfeeding mothers with Brazilian first 1000 days campaign according to report in the Daily Mail 2015 [Available from: http://www.babymilkaction.org/archives/6899.

61. Martin-Wiesner, Patricia. 2018. A Policy-Friendly Environment for Breastfeeding: A review of South Africa’s progress in systematising its international and national responsibilities to protect, promote and support breastfeeding. Johannesburg: DST-NRF Centre of Excellence in HumanDevelopment. https://www.wits.ac.za/media/wits-university/research/coe-human/documents/Breastfeeding%20policy%20review.pdf

62. Seebregts C, Dane P, Parsons AN, Fogwill T, Rogers D, Bekker M, et al. Designing for scale: optimising the health information system architecture for mobile maternal
health messaging in South Africa (MomConnect). BMJ Global Health. 2018;3(Suppl 2):e000563.
DOI:10.1136/bmjgh-2017-000563

63. Brown A. Breastfeeding is not ‘easy’ – stop telling new mothers that it is. The Conversation UK. 2019. Available from: https://theconversation.com/breastfeeding-is-not-easy-stop-telling-new-mothers-that-it-is-98026.

64. Ramani S, Shaikh N, Das S, Pantvaidya S, Fernandez A, Jayaraman A. "Everybody breastfeeds if they have milk": factors that shape exclusive breastfeeding practices in informal settlements of Mumbai, India. International breastfeeding journal. 2019;14:1-10. DOI: 10.1186/s13006-019-0204-2

65. Gilmore B, McAuliffe E. Effectiveness of community health workers delivering preventive interventions for maternal and child health in low- and middle-income countries: a systematic review. BMC Public Health. 2013;13(1):1-14. DOI: 10.1186/1471-2458-13-847

66. Mohd Shukri NH, Wells J, Eaton S, Mukhtar F, Petelin A, Jenko-Pražnikar Z, et al. Randomized controlled trial investigating the effects of a breastfeeding relaxation intervention on maternal psychological state, breast milk outcomes, and infant behavior and growth. The American Journal of Clinical Nutrition. 2019;110(1):121-30. DOI: 10.1093/ajcn/nqz033

67. Aluş Tokat M, Okumuş H, Dennis C-L. Translation and psychometric assessment of the Breast-feeding Self-Efficacy Scale—Short Form among pregnant and postnatal women in Turkey. Midwifery. 2010;26(1):101-8. DOI: 10.1016/j.midw.2008.04.002

68. Oliver-Roig A, d’Anglade-González M-L, García-García B, Silva-Tubio J-R, Richart-Martínez M, Dennis C-L. The Spanish version of the Breastfeeding Self-Efficacy Scale-Short Form: Reliability and validity assessment. International Journal of Nursing
69. Wutke K, Dennis C-L. The reliability and validity of the Polish version of the Breastfeeding Self-Efficacy Scale-Short Form: Translation and psychometric assessment. International Journal of Nursing Studies. 2007;44(8):1439-46. DOI: 10.1016/j.ijnurstu.2006.08.001

70. Zubaran C, Foresti K, Schumacher M, Thorell MR, Amoretti A, Müller L, et al. The Portuguese Version of the Breastfeeding Self-Efficacy Scale—Short Form. Journal of Human Lactation. 2010;26(3):297-303. DOI: 10.1177/0890334409359916

71. McCarter-Spaulding DE, Dennis C-L. Psychometric testing of the breastfeeding self-efficacy scale-short form in a sample of Black women in the United States. Research in Nursing & Health. 2010;33(2):111-9. DOI: 10.1002/nur.20368

72. Tomlinson M, Swartz L, Cooper P, Molteno C. Social factors and postpartum depression in Khayelitsha, Cape Town. S Afr J Psychol. 2004;34. 409-20. DOI: 10.1177/008124630403400305

73. Nor B, Ahlberg BM, Doherty T, Zembe Y, Jackson D, Ekstrom EC, et al. Mother's perceptions and experiences of infant feeding within a community-based peer counselling intervention in South Africa. Matern Child Nutr. 2012;8(4):448-58. DOI: 10.1111/j.1740-8709.2011.00332.x

74. Statistics South Africa. Social profile of vulnerable groups. 2002 - 2012. Pretoria: Statistics South Africa; 2013. 1-70. https://www.statssa.gov.za/publications/Report-03-19-00/Report-03-19-002012.pdf

75. Richter LM. Why breastfeeding in South Africa still needs champions. The Conversation. 2016. https://theconversation.com/why-breastfeeding-in-south-africa-still-needs-champions-63309.

76. Witten CB. South Africa has made giant strides in breastfeeding. But it’s still taboo in
public places. The Conservation. 2017. https://theconversation.com/south-africa-has-made-giant-strides-in-breastfeeding-but-its-still-taboo-in-public-places-80694

77. Chen H, Chai Y, Dong L, Niu W, Zhang P. Effectiveness and Appropriateness of mHealth Interventions for Maternal and Child Health: Systematic Review. JMIR mHealth and uHealth. 2018;6(1):e7. 1-12. DOI: 10.2196/11836

78. Savage JS, Hohman EE, Marini ME, Shelly A, Paul IM, Birch LL. INSIGHT responsive parenting intervention and infant feeding practices: randomized clinical trial. International Journal of Behavioral Nutrition and Physical Activity. 2018;15(1):64. 1-12. DOI: 10.1186/s12966-018-0700-6

79. Bamford L, Martin P, Slemming W, Richter, L. The new Road to Health Booklet demands a paradigm shift. In: Moeti T, Padarath A, editors. South African Health Review 2019. Durban: Health Systems Trust; 2019. https://www.hst.org.za/publications/South%20African%20Health%20Reviews/13%20S AHR_2019_Improving%20the%20early%20development%20of%20children.pdf

80. Reimers P, Israel-Ballard K, Craig M, Spies L, Thior I, Tanser F, et al. A Cluster Randomised Trial to Determine the Efficacy of the "Feeding Buddies" Programme in Improving Exclusive Breastfeeding Rates Among HIV-Infected Women in Rural KwaZulu-Natal, South Africa. AIDS and behavior. 2018;22(1):212-23. DOI: 10.1007/s10461-017-1865-8

Figures
178 interviewed at 3-14 days
- Consent forms
- Sociodemographic data
- Infant feeding data

Excluded
10 no response to follow-up telephone calls
9 reached after infant age of 8 weeks

159 interviewed at 4-8 weeks
- Infant feeding data (159)
- EPDS data (134)
- BSES data (139)

Excluded
38 no response to follow-up telephone calls
12 reached after infant age of 14 weeks

109 interviewed at 10-14 weeks
- Infant feeding data (109)

Excluded
27 no response to follow-up telephone calls
10 reached after infant age of 24 weeks

72 interviewed at 20-24 weeks
- Infant feeding data (72)

Figure 1
Flow diagram for the enrolment of study participants for the prospective cohort infant feeding study.
Figure 2
Decrease in EBFa between each time point from 3-4 days to 20-24 weeks