Infant feeding practices in a high HIV prevalence rural district of KwaZulu-Natal, South Africa

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Abstract

Aim: To describe infant feeding practices at birth and at 14 weeks post-partum in the Ugu-North Health District, KwaZulu-Natal, South Africa.

Methods: A prospective, cohort study design was used. Mothers who delivered over a one-month period were interviewed at birth and 14 weeks later.

Results: Initially, 168 mothers were interviewed within 24 hours of delivery, of whom 117 (70%) were contactable at 14 weeks post-partum. The vast majority (96%) initiated breast-feeding at birth. At birth, less than one-third (55/168 [32.7%]) of mothers declared an intention to both breast and formula (mix) feed in the next 14 weeks, but by the 14th week post-partum over three-quarters (89/117 [76.1%]) actually practised mixed feeding. At 14 weeks, the prevalence of exclusive breast-feeding was 18%: 52% of infants were offered water and 73% solids. The majority (20/23 [87%]) of HIV infected mothers chose to breastfeed their infants at birth. Nevertheless, they were significantly more likely to formula feed their infants compared to HIV negative mothers (3/23 [13.0%] vs 2/145 [1.4%], OR 10.73, 95% CI 1.34 – 99.16, p = 0.02). By 14 weeks, only 11% of HIV positive mothers were still exclusively breast-feeding, while almost two-thirds (12/19 [63%]) practised mixed feeding. This change was mainly ascribed to their need to return to school (40%) or to work (20%).

Conclusions: Most infants were fed inappropriately by 14 weeks of age. The failure to maintain exclusive breast-feeding, despite high initiation rates, is of greatest concern. Routine prevention of mother-to-child transmission of HIV services was ineffective in influencing mothers to follow any feeding regimen exclusively.

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Introduction

For the past 25 years, appropriate infant feeding practice has been high on the agenda of international agencies such as the World Health Organization (WHO) and United Nations Children's Fund (UNICEF), as well as most national health departments.[1-3] The emergence of the HIV pandemic has fuelled further research and policy development around feeding practices that could best promote child survival, growth and development. There have been notable successes in the past decade in improving breast-feeding initiation globally, in maintaining exclusive breast-feeding for six months in some sub-Saharan African countries (such as Ghana and Benin), and continued partial breast-feeding at one year remains relatively high (76%) globally.[4] On the negative side, the risk of HIV transmission through breast-feeding has eroded many of the gains and, particularly in southern Africa, there has been a move towards the promotion of increased infant formula use.

In high HIV prevalence settings, even scientists have been embroiled in debates around ideal feeding practice. With 'individualised choice' being the prevalent dogma and no single public health message on ideal infant feeding practice being propagated in areas of high HIV prevalence, it is not surprising that mothers of newborn infants are somewhat bewildered by what constitutes best practice, and hence they are highly susceptible to the (ill) advice of individual health workers or family members. There is scant literature on how choices are made and what influences change.

This study seeks to describe infant feeding practices in the Ugu sub-district of KwaZulu-Natal (the epicentre of the South African HIV pandemic) by establishing mothers' predicted feeding behaviour at birth and comparing this with their actual practice 14 weeks later, and then documenting factors that might have influenced any change.

Methods

A prospective, cohort study was conducted in the Ugu-North Health District, 50 km south of Durban, in KwaZulu-Natal (KZN), South Africa. The resident population of 650 000 is Zulu speaking and predominantly rural.[5] The health infrastructure consists of a 300-bed community hospital (GJ Crookes Hospital) situated in Scottburgh, 18 government fixed clinics, four mobile and one private clinic. Almost all pregnant women deliver their infants at this hospital, which was declared Baby-Friendly in 1995. National anonymous antenatal surveillance showed that 37.5% of women attending antenatal services in KZN in 2003 were HIV infected.[6]

Mothers who delivered their babies at the GJ Crookes Hospital were interviewed within 24 hours of delivery and followed up at 14 weeks post-partum. Initial interviews were held in the postnatal ward and follow-up interviews at the participant's closest local clinic. The 14-week follow-up period was opportunistic as this corresponded to the last well-baby clinic visit (for immunisation) before the next scheduled visit at nine months. Mothers who missed follow-up interviews were sent letters with new appointment dates. Those who ignored or did not receive this request were visited at home, whenever possible.

Six field workers were involved in this study. These field workers were black, Zulu-speaking women aged 24–32 years, with an educational level of Grade 12. All were residents of the study area and literate in English and Zulu. Fieldworkers were trained at a three-day workshop. Study questionnaires, developed by the researchers, were available in English and Zulu.

For inclusion in the study, a mother had to reside within the boundaries of the Ugu-North Health District and have delivered a live-born infant weighing more than 1 500 g. The study excluded women whose pregnancies ended in stillbirths and those intending to move out of the study area before 14 weeks post-partum. Mothers who delivered between 22 August 2003 and 21 September 2003 were included in the study. The only indicator of HIV status of participants was documented evidence of nevirapine administration to their infants at birth. Socio-economic status was categorised as low, or not, based on whether the total household income was under or above R1 000 per month (including any wages, pension or child social support grants received by family members living in the same household).

Ethical clearance was obtained from the Committee for Research in Human Subjects at the University of the Witwatersrand. Participants provided written, informed consent. Permission was obtained from the Department of Health, KwaZulu-Natal, and the Hospital Manager of GJ Crookes Hospital, Scottburgh.

Epi Info version 3.2.2 (Centres for Disease Control and Prevention, Atlanta, Georgia, USA) was used for data entry. Thereafter, the database was converted to SPSS version 12.0.1 (SPSS Inc Chicago) for analysis. Categorical variables are described using proportions and parametric data using means and the standard deviations (SD). Bivariate associations between independent categorical variables were tested using a chi-square test or Fisher's exact test, where appropriate, and 95% confidence intervals estimated. Paired groups were compared with the Wilcoxon signed ranks tests. A p-value < 0.05 was considered statistically significant.

Results

Socio-demographic details

A total of 168 participants were enrolled. The mean age (standard deviation [SD]) of study participants was 24 ± 6.4 years. Most participants (87%) were single; few (12%) were legally married and living with their partner; and 70% had a Grade 7 or higher education. A third of participants were still at school when they fell pregnant and 39% of these indicated their intention to return to school. Other socio-demographic details are tabulated in Table I. Most participants accessed water from a borehole (53%), used pit latrines (83%) and preferred wood (29%) as their cooking energy source. Twenty-three infants received nevirapine at birth and their mothers were presumed to be HIV positive.

Table I: Maternal socio-demographic and perinatal characteristics of participants in a longitudinal breast-feeding study in rural KwaZulu-Natal (n = 168)

Characteristics	Number (%)
Age	
< 20 yrs	51 (31)
20–34 yrs	103 (61)
> 35 yrs	14 (8)
Education	
No education	25 (15)
Grade 1–6	25 (15)
Grade 7–12	116 (69)
Higher education	2 (1)
Monthly income	
Nobody working	19 (11)
< R 1 000	66 (39)
> R 1 000	28 (17)
Do not know	55 (33)
Sanitary facility	
Flush toilet	15 (9)
Pit latrine	140 (83)
None	13 (8)
Fuel source for cooking	
Electricity	30 (18)
Paraffin	43 (25)
Wood	50 (30)
Water source	
Tap	18 (11)
River	62 (37)
Pump (borehole)	89 (53)
Commodities owned	
TV	80 (48)
Refrigerator	60 (36)
Electricity	62 (37)
Radio	135 (80)
Telephone	42 (25)
Delivery	
Normal	102 (61)
Caesarean section	36 (21)
Episiotomy	26 (16)
Infant characteristics	
Female	76 (45)
Received nevirapine	23 (14)

Feeding practice at birth

The vast majority of babies (163 [97%]) received breast milk as their first feed; the rest (5 [3%]) were formula-fed. Two-thirds of babies were fed within half an hour of birth (a Baby-Friendly Hospital criterion). Most mothers (85%) offered colostrum to their babies while 23 (13%) said they threw it away – many of the latter (40%) claiming it was "dirty milk." Socio-economic and HIV status were associated with feeding choice. Mothers who were economically better off tended to formula feed their infants more often than those of poorer socio-

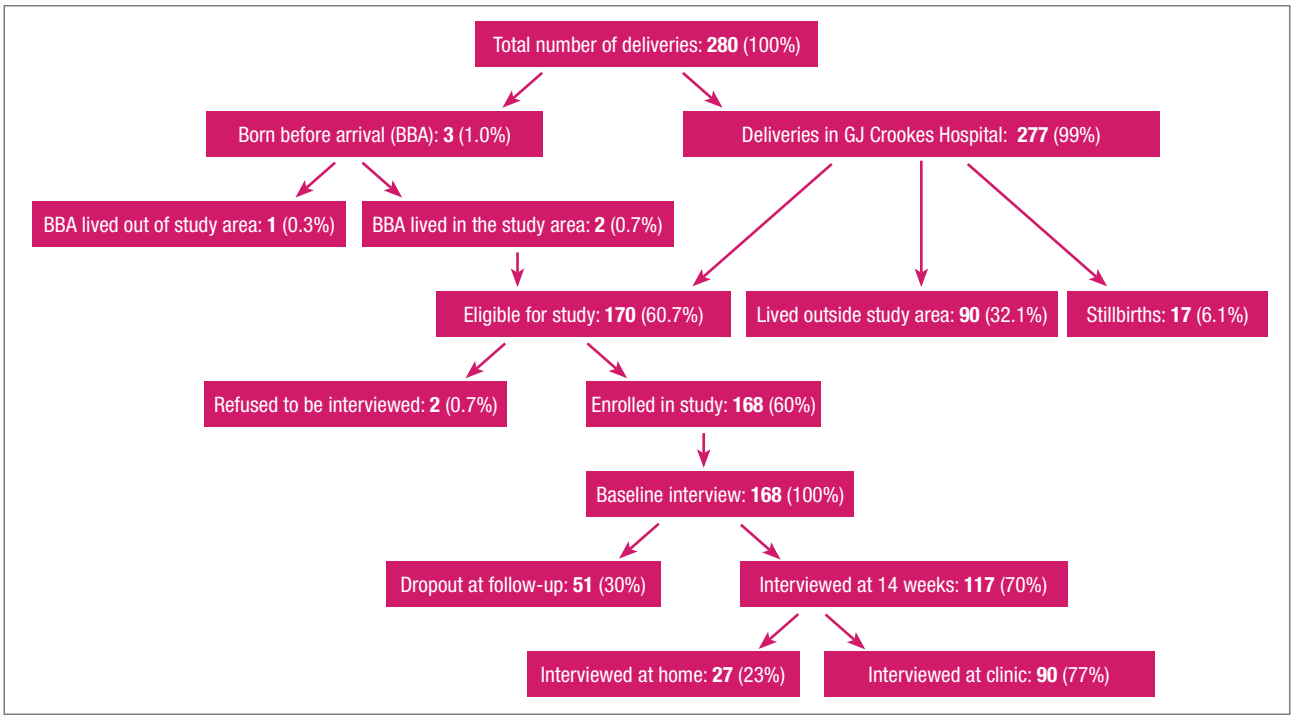


Figure 1: Flow of participants in this study

economic status (3/28 [10.7%] vs 2/85 [2.4%], OR 4.8, 95% CI 0.63 – 45.6, p = 0.03). Fifty five mothers did not know their monthly income and were not included in this analysis. Although formula feeding was infrequently started at birth, HIV-positive mothers were significantly more likely to make this choice compared to HIV-negative mothers (3/23 [13.0%] vs 2/145 [1.4%], OR 10.73, 95% CI 1.34 – 99.16, p = 0.02). Primiparous mothers were significantly more likely to offer colostrum to their baby than multiparous mothers (78/83 [94.0%] vs 65/85 [76.5%], OR 5.67, 95%CI 1.86 – 18.48, p < 0.001). Only 60% of the respondents believed that breast-feeding was the most accepted feeding method in the community.

Intended feeding practice

Mothers were asked at birth about what they intended feeding their babies for the next 14 weeks: the majority (104 [62%]) said breast-feeding, a third indicated mixed (breast and formula) feeding, while only nine (5%) opted for formula feeding – none mentioned solids. Participants who proposed to breast-feed exclusively offered a variety of reasons for this choice, but primarily (52%) for purposes of disease prevention. The most common reason for choosing mixed feeding pertained to its convenience for the mother (i.e. mother going to school or work).

Feeding practice at 14 weeks

Of the 168 participants, 87 (52%) returned to the clinics for an interview at 14 weeks. Mothers who failed to return were offered a second appointment through a posted letter, to which only three responded. Another 27 mothers were interviewed at their homes. Overall, there was a dropout of 51 participants (30%). Reasons for loss to follow-up included: wrong address given (12), mother migrated (10), inaccessibility (10), mother had no money to travel (8), withdrawal from study (5), and mother left child with grandmother (4). There was one maternal and one infant death. The flow of participants is shown in Figure 1.

Of the 117 mothers followed up at 14 weeks, most (95 [81%]) were still breast-feeding their infants; but only 21 (18%) were exclusively breast-feeding. Fifty-five infants (47%) were receiving formula (only 1% exclusively) and 73% of infants were fed solids (see Table II). Sixty-one infants (52%) had received water, with a median age of receipt of eight weeks. The median age for starting solids was also eight weeks (IQR 4 – 10.5 weeks). In many instances (37/86 [43%]), it was the mother's own decision to initiate solids, but grandmothers (33%) and nurses (6%) were also cited as sources of advice. The commonest reason (73%) offered for starting solids was that the baby was still hungry after completing milk feeds.

Figures 2 and 3 present a comparison of mothers' predictions (at birth) of their likely feeding mode at 14 weeks with their actual practice at 14 weeks. There was a statistically significant change (p = 0.03). The reasons offered for changing feeding practice are shown in Figure 4. No demographic or social factors significantly influenced feeding practices at follow-up.

Figure 2: Participants' feeding practices at birth (baseline), predicted practice at 14 weeks, and actual practice at 14 week follow-up (n = 117)

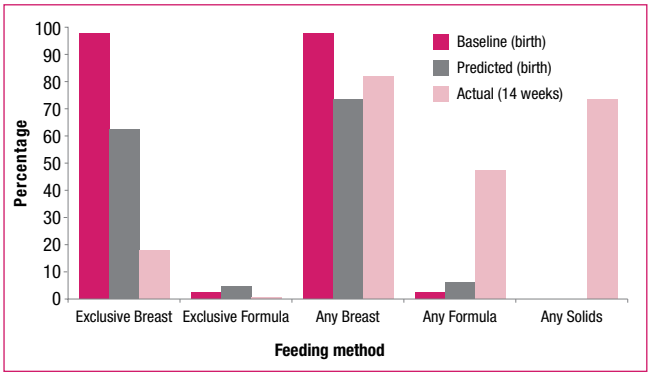


Figure 3: Comparison of predicted mode of milk feeding at 14 weeks (predicted at birth) with actual practice at 14 weeks (n = 117)

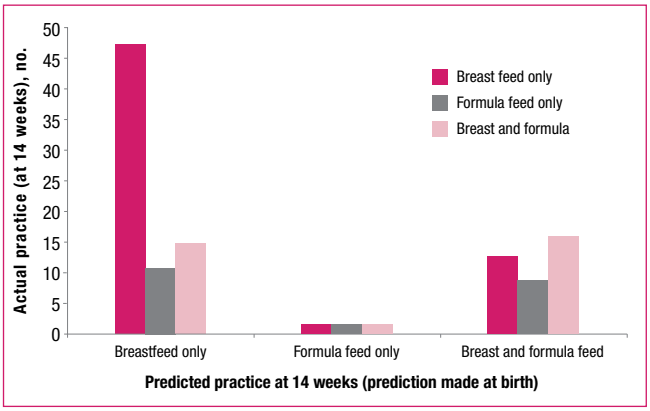
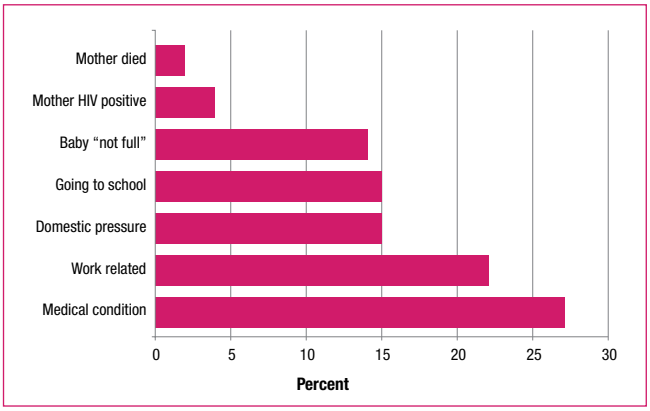


Figure 4: Caregivers reasons for changing feeding practice between birth and 14 weeks (n = 117)



HIV transmission

The vast majority of respondents (91%) knew that HIV could be transmitted sexually. Most (73%) mentioned one possible mode of Mother-to-Child transmission (MTCT) of HIV, but only 4% could name a second. None spontaneously mentioned breast-feeding as a route of transmission. Only 40% knew that the district's programme of Prevention of Mother-to-Child transmission (PMTCT) of HIV offered nevirapine, despite this being a routinely available service at the hospital.

HIV-positive mothers

Nineteen (83%) of the 23 mothers who were presumed to be HIV positive (based on administration of nevirapine to their infant) returned for follow-up. All but one had chosen to breast-feed at birth. At 14 weeks, only two (11%) were exclusively breast-feeding, five (26%) had stopped breast-feeding completely and started formula feeding (safe transition), while the rest were mixed feeding. No infant had been exclusively formula-fed. HIV infected mothers who changed from breast to formula feeding cited their HIV-positive status (2/6 [33%]) and medical reasons, such as mastitis and cracked nipples (2/6 [33%]), for this. Reasons cited for changing from breast to mixed feeding included a return to school (4/10 [40%]) or work (2/10 [20%]), and that the baby was 'not full' after breast-feeds (2/10 [20%]).

Discussion

This longitudinal study has highlighted some critical issues surrounding infant feeding requiring public health intervention. First and foremost is the alarmingly high mixed feeding rate with the widespread use of solids at 14 weeks in a high HIV-prevalence setting. The low levels of knowledge of PMTCT (and especially nevirapine) in women who had just delivered were disconcerting. The exceptionally high proportion of teenage pregnancies in the district was also disturbing. Finally, the discordance between mothers' feeding intentions at birth and their actual practices three months later, warrants intervention.

The high level of breast-feeding initiation (97%) correlates well with the 95% rates found in previous South African studies.[7,8] However, these studies were done in the 1980s, and it was expected that by now there would be greater selection of formula feeding, particularly by HIV-positive women, even in this relatively under-resourced, predominantly peri-urban and rural setting. It could be argued that the choice of breast-feeding at birth, even by HIV-positive mothers, is appropriate in this setting.[9]

However, most alarming is the low exclusive breast-feeding rate and exceptionally high administration of "supplementary" feeds to infants by 14 weeks of age. While the 17.9% exclusive breast-feeding rate exceeds the national average of 12% (at 16 weeks), as described by the South African Demographic and Household Survey in 2003,[6] and a 6% rate described in another rural KZN setting,[10] it is still unacceptably poor for a setting with such high rates of HIV. This indicates a major failure of public health communication about the risks of HIV transmission. The results demand a serious re-questioning of the appropriateness of recommendations strongly promoting exclusive breast-feeding as the best option for HIV-positive mothers in resource-poor settings in the absence of adequate support mechanisms to ensure adherence. A recently published study, also based in KZN province, reported 83% exclusive breast-feeding rates at three months of age,[11] but it required intensive home counselling and support on a scale that is clearly not easily replicable in other settings such as our study site, despite the intervention possibly being cost-effective.[12]

Despite a high awareness about HIV/AIDS in general, MTCT knowledge among mothers in the study area was low. Many mothers were unaware of the increased risk of HIV infection through breast-feeding. According to Oguta and Omwega[13] MTCT of HIV is a relatively new concept in rural populations and, despite the huge amount of work that has been done on HIV/AIDS, there still remains a dearth of information for mothers about MTCT. The South African health system's response to PMTCT has also been far from adequate, particularly in the early identification of HIV-positive mothers through Voluntary Counselling and Testing (VCT) and in antiretroviral delivery at birth.[14] As evidence of this, while 23 infants received nevirapine, the expected number of HIV-positive participants in this sample would be approximately 63 (based on a 37.5% provincial antenatal seroprevalence rate); thus, it is likely that only 37% of eligible infants received antiretroviral prophylaxis.

The fondness of South African mothers for administering solid foods to infants is not a new finding. In 2003 Kruger et al[15] found, in another rural South African setting, that 21% of mothers were

offering solids at two months of age and an additional two-thirds introduced solids by three months post-partum. Early introduction of supplementary and complementary foods seems to be the rule rather than the exception in South Africa.[16] Similar to our study, the most commonly cited reason identified globally for providing supplementary and complementary feeds is "not enough milk" and the belief that the baby is still hungry.[17] The validity of these claims has been inadequately explored, and evidence of successful interventions to discount these false notions is lacking.

It was gratifying to note that few mothers discarded their colostrum, especially since this practice is still believed to be promoted as part of Zulu culture. This may be the consequence of favourable messages promoting colostrum administration during antenatal visits. Primiparous mothers were significantly more likely to feed colostrum to their babies, which is congruent with a Bangladeshi study that describes the relationship between mothers of younger maternal age (20–24 years) and colostrum administration to infants.[18] Barros et al[19] found that multiparous women breast-fed according to previous experiences, irrespective of advice they received, while primiparae responded more to advice offered.

The trend for mothers who are economically better off to formula feed their infants is in keeping with the results of a meta-analysis involving 15 developing countries, which found that children in higher socio-economic status homes were significantly less likely to be breast-fed.[20] The explanation offered was that better educated mothers are more likely to be employed away from the home, consequently encouraging the use of formula milk.

Mothers reported that the decision to feed their infants something other than breast milk was mainly their own. A similar finding was reported by mothers in another rural KZN setting.[10] These findings contradict research done in the early 1980s, which reported that older women were highly influential in infant feeding decisions made in rural Zulu households.[21] Some successes of the Baby Friendly Hospital Initiative programme have been ascribed to health care workers' strong influence on mothers' choice of infant feeding practices. Our findings do not support this view. Indeed, the findings of this study cast serious doubts about the ability of a designated Baby-Friendly Hospital to influence breast-feeding practices following hospital discharge.

A disconcerting finding is that 31% of mothers were teenagers and still attending school when they fell pregnant. The 1998 South African Demographic Household Survey found that 35% of all teenagers had been pregnant or had had a child by the age of 19 years.[16] Teenage pregnancy rate is high despite a relatively high (64%) use of modern contraceptive methods by sexually active 15–19-year-olds.[16] While our study was not designed to explain this perturbing finding, it does highlight potential deficiencies in reproductive health (family planning) services in the region and the breakdown of traditional cultural values related to teenage sexual activity.

This study has several limitations. Enrolling participants at the hospital excluded an estimated 15% of total district deliveries as they occurred at home (M Whitfield, personal communication), thereby hindering generalisability. Assigning HIV status to participants by inference rather then through direct testing limits the validity of the sub-analyses involving participants' HIV status. For example, mothers whose infants received nevirapine may demonstrate particular traits, e.g. better education, more informed about health services, more assertive. However, this approach was necessitated by the poor VCT uptake in the region and it being deemed unethical to test all participants for HIV after birth. Finally, participants may have modified their responses about feeding practice to please fieldworkers, recognising that they originated from the health service. However, there is little reason to believe that this was the case.

What is the most appropriate response to the study findings? Clearly, the responsibility of reacting to these findings lies with a host of departments and agencies, including the health service, education department, water and sanitation services, local government, non-governmental organisations, international agencies, and local (community) health and development institutions, amongst others. Priority interventions include:

- Improved antenatal and mass media education related to appropriate infant feeding strategies, and the need for VCT during pregnancy.
- Provision of services to support exclusive breast-feeding such as antenatal counselling, individual counselling at birth and at well baby services, and the use of community health promoters. Community based peer counselling is highly effective in improving exclusive breast-feeding and infant health outcomes.[11,22]
- Strong national health promotion campaigns using the mass media to counteract the false notions that most babies are hungry after breast-feeding and that cereals fed to young infants offer important nutritional benefits over breast milk.
- Greater support for the provision of formula feeds to HIV-positive mothers in the district, who fulfil the WHO AFASS (acceptable, feasible, affordable, sustainable, safe) criteria.[9] This can be justified by the high proportion of mixed feeding occurring, the availability of free formula to all HIV-exposed infants as part of the health department's PMTCT programme, and the commitment of the South African government to provide safe water to all by 2008 and adequate sanitation by 2010.[23]
- Curbing high teenage pregnancy rates in the district through improved life skills education at schools and at youth centres; better access to family planning, emergency contraception and termination of pregnancy services; and ultimately addressing societal attitudes that condone teenage sex and pregnancy.
- Regular re-accreditation of hospitals designated as being baby-friendly, to ensure that staff maintain the required adherence to the ten key steps.

The high demand being made on these predominantly poor women when particular feeding strategies are advocated should be recognised by health workers, counsellors, and policy makers. A series of fundamental changes in women's behaviour, and ultimately self-identity, is required. For mothers to appropriately respond to advice on safer infant feeding practices (such as exclusive breast-feeding) requires more than information awareness and understanding. Successful accomplishment of the desired behaviours may require some of the most disadvantaged and disempowered members of any community to challenge spousal, family or societal authority, as well as traditional systems of belief and influence, while overcoming their own dependence and disempowerment.

Conclusion

In conclusion, the study confirms many disturbing suspicions, including the poor knowledge that pregnant women have about HIV transmission and its prevention; the limited capacity of health systems in low- and middle-income countries such as South Africa to prevent HIV transmission through either antiretroviral prophylaxis administration at birth or through adequate promotion of exclusive breast-feeding; and the pervasive practice of feeding solids to young infants. While few of these findings are completely surprising or new, the ability to adequately galvanise health and other systems (through research projects such as this, for example) presents the greatest challenge to public child health and nutrition practitioners.

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