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Attitudes about infant feeding in Samoa reveal a culture of breastfeeding protection and promotion: a cross-sectional, qualitative analysis among Samoan women.

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ABSTRACT:

Background: Globally, the majority of infants are not exclusively breastfed for the recommended six months; Samoa is an exception to the trend with almost universal initiation and greater than average duration of exclusive breastfeeding.

Aim: We aimed to examine Samoan women's attitudes and beliefs about infant feeding to identify factors contributing to Samoa's positive deviance.

Methods: Semi-structured interviews with n=97 mothers of 2-month old infants focused on beliefs about the healthfulness of breast- and formula-feeding. A thematic analysis was used to identify salient themes related to three levels of the social-ecological model: individual, societal, and environmental/structural.

Findings: We identified seven major themes, six were organised under the levels of the social-ecological model that best represented their role in breastfeeding promotion: perceived benefits to mother and infant (individual); family and public support and child-led weaning (societal); infant infection and chronic disease, natural disasters, and economic benefits (environmental/structural). The seventh theme described barriers to breastfeeding. Unanimously Samoan women believed breastfeeding was healthy, and all themes supported a culture of breastfeeding protection and promotion in Samoa. Where barriers to breastfeeding were described they related to maternal ill health, insufficient milk supply, return to work, or becoming pregnant again.

Conclusion: Samoan health institutions (hospitals, traditional healers, and the Ministry of Health) should focus on sustaining the high rates of adherence to exclusive breastfeeding guidelines. To maintain a culture that promotes breastfeeding, it is important to protect policies that prohibit formula marketing and strengthen those that support breastfeeding in the work place.

Key words: Samoa, breastfeeding, formula, social-ecological model, low-and middle-income countries

BACKGROUND

It is well established that exclusive breastfeeding for at least six months improves the health and survival of mothers and infants. If more women breastfed, it is estimated that 823,000 child deaths and 20,000 breast cancer deaths could be avoided globally each year.¹ Exclusive breastfeeding rates however, remain low worldwide.

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In global data from 2014-2020, just over half of infants (54%) were breastfed within an hour of birth, and only 44% of babies were exclusively breastfed for the first 5 months of life.²

A small number of countries, including the Pacific Island nation of Samoa, are positive deviants to the global trend. Almost all (94%) women in Samoa initiate breastfeeding and exclusively breastfeed at an estimated rate of 75% at 2 months and 55% at 5 months.^{3,4} Samoa remains high relative to the global average.

Many studies have taken a deficit-based approach and described risk factors associated with not breastfeeding.⁵⁻⁷ Comparatively fewer studies have considered factors that promote and protect exclusive breastfeeding in countries that are positive deviants to the global trend. Identifying the attitudes, behaviours, practices, or infrastructure that allows countries to maintain high adherence to exclusive breastfeeding recommendations despite sharing the same disadvantages or risk factors as other settings may provide important insight into strategies that could be adopted globally.

Given that Samoa is an exception to global breastfeeding trends, we aimed to examine the maternal attitudes and beliefs that contribute to relatively high nation-wide breastfeeding rates. We use a social ecological model (SEM) to examine themes at three levels, individual, societal and environmental/structural, allowing us to consider the complex and nuanced population-specific factors contributing to Samoa's breastfeeding success.

METHODS

Study Design

This qualitative study was embedded into a longitudinal, mixed-methods study designed to document determinants of infant growth from birth to 4 months in Samoa. Conducted between June 2017 and April 2018, the study recruited a convenience sample of pregnant women (n=160) from the antenatal care clinic of the Tupua Tamasese Meaole (TTM) hospital in Apia, the capital city. Women were eligible to participate if they were Samoan, at least 18 years old, pregnant with a single infant, experienced no pregnancy complications, and had no preexisting diabetes or gestational diabetes. As part of the larger study,

women and their infants were re-contacted via telephone on three further occasions: within a week of the infant's birth and when their infant was 2-, 4- and 18-24 months of age. For the purpose of this study, a qualitative thematic analysis was performed using data from n=97 women who completed semi-structured interviews conducted at the 2-month visit.

Semi-Structured Interview Procedures

Interviews were conducted privately in participants' homes, were audio recorded, and lasted from 30-60 minutes. Eight interviews were conducted in English (these participants' language of preference) by a female PhD student in Anthropology (KA) who had received training in interview techniques; the remainder were conducted in Samoan by a native Samoan-speaking female research assistant who had been trained to conduct the interviews by the first author. Content was compared between interviews conducted in English and Samoan and was deemed similar enough to be used in a single analysis. Attempts were made to ensure participant privacy; only the interviewee and the two interviewers were present during the interview, although many rooms/homes were small and sometimes other family members were within hearing distance.

Prior to the interview, interviewers explained to participants that their interest was in the interviewee's personal experiences of infant feeding and invited participants to use their own words to describe their experiences and opinions. Afterward, the Samoan research assistant transcribed the interviews and translated them into English as necessary. The interview guide is presented in **Table 1** (questions were not pilot-tested in this population, although similar interviews had been performed in American Samoa).⁸

Participant Consent and Ethical Approval

Written informed consent was obtained from all participants using a Samoan-language consent form that research assistants reviewed in detail with each participant. The study protocol was approved by both the Yale University Institutional Review Board (IRB) and the Samoa Ministry of Health's Health Research Committee (IRB equivalent). Funders of the study had no role in study design, data collection, analyses, or interpretation and were not given the right to approve the publication of study findings.

Table 1: Semi-Structured Interview Guide: Topic and Sample Sub-Questions

Intent Statement: To understand if Samoan mothers believe breastfeeding is healthy.

Sample questions:

1. Do you believe breastfeeding is healthy? Why or why not?
2. What are some reasons you might stop breastfeeding?
3. What are some reasons you might supplement with formula or food?
4. At what age do you think you will stop breastfeeding?

Each participant received a small incentive of phone credit equivalent to USD \$4 for participating.

Data Analysis

Transcripts were reviewed and coded by three of the authors (initials blinded for review), who met to reach consensus on coding decisions. An initial coding scheme was developed based on the interview agenda and emergent themes subsequently added as they arose. Coded interviews were entered into NVivo software (QSR International Ltd., Version 12.4; 2019) for analysis. We then performed a thematic analysis whereby individual codes were read in aggregate and a written summary of the code created.⁹ Forty-nine codes were identified and these were combined into seven themes. Saturation was reached for most themes based on the sample size and number of similar responses among the n=97 participants.¹⁰ Themes of natural disaster risk and family and public support had fewer responses and were not specifically targeted with our research questions—thus we deemed that saturation was not met for these themes, but we do present them below. The analysis aimed to achieve fair representation of the opinions and perceptions of study participants. Quotes presented in the main text were selected to illustrate the results and the participant’s colloquial language was retained in their presentation below. Additional quotes related to each theme are presented in **Table 3** to illustrate the depth and breadth of responses that fell under each theme.

RESULTS

Participants ranged from 19 to 44 years old and, while the average number of pregnancies reported was 1.9, represented a range of parenting experience from first time mothers to mothers of six. The majority of participants were exclusively breastfeeding at the time of the interview (**Table 2**).

Table 2: Characteristics of the Study Sample (n=97)

Infant age, days, mean ± std. dev	72.2 ± 10.3
Maternal age ^a , years, mean ± std. dev	27.3 ± 5.7
Gravidity ^a , mean ± std. dev	1.9 ± 1.7
Marital Status	
Married, n (%)	64 (66%)
Cohabiting, n (%)	25 (26%)
Never married, n (%)	8 (8%)
Education	
Less than primary school, n (%)	7 (7%)
Primary school completed, n (%)	12 (12%)
High school completed, n (%)	56 (58%)
College completed, n (%)	21 (22%)
Postgraduate training completed, n (%)	1 (1%)
Employed	
Yes, n (%)	35 (36%)
No, n (%)	62 (64%)
Infant feeding at time of interview	
Exclusively breastfeeding, n (%)	71 (73%)
Mixed-feeding ^b , n (%)	19 (20%)
Formula-feeding, n (%)	7 (7%)

^aData are missing for one participant. ^bMixed-feeding refers to a combination of formula and breast milk.

We identified seven major themes, six of which we organised under the three levels of the social-ecological model that best represented their role

in breastfeeding promotion. At the individual (mother-infant) level, we identified 1) perceived benefits to the mother and infant. At the societal level, we identified the themes of 2) family support and 3) child-led weaning. Under the environment and institutional level we identified 4) protection against infant disease, 5) risk for natural disasters, and 6) economic considerations. The final theme was 7) barriers to breastfeeding in Samoa, which were important to document as a means to guide further breastfeeding promotion efforts. Participants' thoughts about these topics are summarised here; further illustrative quotes can be found in **Table 3**.

Individual Level

Benefits to the Mother and Infant

I know I support breastfeeding 100% because it's easy to notice babies that were breastfed grow up healthy. They are easy to care for and have healthy bodies too. They are not affected by any kind of disease, and they look happy and laugh a lot. They have happy faces and are big. It is because they were breastfed only. Breastfeeding is better than formula feeding because babies get sick when they are fed formula. Participant 1 (36 years old, 6 prior children [before the study infant], currently breastfeeding).

There was unanimous agreement among participants in this sample that breastfeeding was healthy; the most frequently cited reason was because breastfeeding 'protected' their infants against illness. Women also repeatedly reported that breastfeeding makes their babies 'strong', supports the growth of their infant, and has a positive impact on their babies' development, making them 'smart' and 'wise'.

Many women also commented that breastmilk is 'pure' and 'a gift from God' because it is from the mother herself. This made breastmilk 'safer' and 'cleaner' for the infant in comparison to formula. The majority of participants contended breastfeeding was better than formula, often citing the difference between 'natural' breastmilk and 'processed' formula that contains 'chemicals' that make the baby sick.

Almost all women mentioned that they were aware their diet was 'passed' on to the infant through breastfeeding. One woman contrasted

passing along healthy nutrients from breastmilk with the unknown ingredients of formula:

I always eat fruits and vegetables so my baby also gets those when I breastfeed her. But I don't trust formula because I don't know what ingredients used to make it, and I do believe formula is not good for baby's health. Participant 43 (age unknown, 2 prior children, currently mixed-feeding).

Many women also commented on the time and energy benefits of breastfeeding compared to formula—that it is 'ready', 'convenient', and requires little 'preparation':

There is not much work to do [with breastfeeding]. No need to carry it in a bag, or need to warm it or put it in a cold water. If the baby cries, then mom breastfeeds right away. Participant 42 (35 years old, 4 prior children, currently breastfeeding)

A small proportion of women commented on the bond that breastfeeding creates between the mother and the infant.

Societal Level

Family and public support

Unexpectedly, very few women mentioned support from their family members as explicitly promoting their breastfeeding practices, nor did they mention lack of support as a barrier. A minority did say they were 'advised' by a family member to breastfeed, and some suggested their family was insistent about breastfeeding:

Um, my dad [laughs], my dad doesn't want babies to be fed using the formula so his idea is, 'No, I won't allow formula in my house.' Because he's like the babysitter. [laughs] We take all our babies to his house. So when my older sister had her baby and she came with the infant milk, the formula, my dad was like, 'No, no, I don't allow that in my house, and that goes for the rest of you.' Participant 89 (27 years old, 0 prior children, currently breastfeeding).

We also noted the general absence of comments associated with breastfeeding in public or in any other social area as reasons that someone would stop breastfeeding or use formula. Only three participants mentioned that some women were 'shy' when people saw them breastfeeding. One of three participants was among the youngest of the

participants and recalled that breastfeeding in public was an issue for some of her friends:

Um, I think some women using formula nowadays. Some of my friends, they have babies too, they're using formula right now because they don't want to breastfeed baby in public. [laughs] That's the worst thing about it. They don't want to breastfeed the baby when they go to church. But I'm okay with breastfeeding baby in public. I don't mind. I'm married [laughs]. Participant 78 (21 years old, no prior children, currently breastfeeding).

Child-led weaning

We asked women what the right age was to stop breastfeeding, or wean, their children. Notably, many women described a process of weaning that was child-led, meaning that they didn't impose a limit on how long they would breastfeed and would stop only when the child no longer 'liked breastmilk':

In my own opinion, since I have children of my own, there is no limit for breastfeeding them, except when the infant doesn't like breastmilk anymore, no matter how old they are. Participant 2 (24 years old, 3 prior children, currently mixed-feeding).

Women also stated that they would wean their children when they began school. Most did not provide detail about why school was the right time to wean, however one participant implied that the age children begin school was developmental marker:

I: At what age should you stop breastfeeding your child?

P: Five years old, [from] my own knowledge from the time I was in school. They are still young at five years, [so] when the baby is six years you should end breastfeeding because the kid knows how to go to school on her own and come back home. Participant 91 (22 years old, 3 prior children, currently breastfeeding).

Table 3: Examples of statements about infant feeding within the three social ecological levels, individual, societal and environmental/structural

Individual Level Statements	
Ppt.#	Breastfeeding Benefits to the Mother and Infant
	<i>Makes the baby smart/wise/strong</i>
32	I heard from others that breastfeeding makes the baby's body strong and wise.
91	It helps keep the infant's mind to be active all the time.
105	Breastfeeding is important for feeding babies for their development to grow in a healthy way, and it's good for the baby's mind.
	<i>Natural</i>
9	[Breastfeeding] makes the baby strong. Also, there is no chemical in it. Breast milk is from God, and it's natural.
5	Breastmilk is from God to feed the baby.
30	There is a really big different between formula and breastmilk, because formula is made by cow's milk, but mom's breastmilk is natural and comes from food that mom eat everyday...but formula is produced and put it in a tin and sold... I don't know what is used to produce it.
	<i>Passes on nutrients and maternal diet</i>
4	[Breastmilk is health] because there are no chemicals added to it, like formula. When a mom eats fruits and vegetables the baby will also get those healthy foods from mom's breastmilk.
61	When moms eat lots of good food, breastmilk contains all the vitamins that the baby needs and will help the baby's body grow in a healthy way.
94	Breastfeeding is healthy because the baby gets all the right nutrients from the mom...some of the nutrients in mother's milk makes them immune to some diseases that they can be exposed to.
24	All the food mom eats, the baby also take through breastmilk, so it is good for the baby's body.
23	The Ministry of Health always advertised that breastfeeding is healthy for babies because the baby will get the food that mom eats, which is healthy for the developing baby.

92	Because what I eat the baby drinks as well from me...so yeah when I'm feeding, I always think of eating healthy. I eat soup, or I eat fruits...Soup with heaps of vegetables...and fruits as well like apples, bananas, and others.
<i>Ready/Convenient</i>	
89	[Breastmilk] is not processed, like you don't have to boil any water...it's from inside you.
61	If the water is dirty, breastmilk is healthy so there's no need [for formula].
60	Formula can sometimes be measured wrong, but breast milk doesn't need to be measured.
91	[Breastmilk] tastes good every time for the baby and there is no expiration date for it.
81	With breastfeeding, there's no need to prepare it. Because with formula there are times there's not enough water or our pipe ran out. So in that case [with breastmilk] there's no need to buy it from a store.
58	Breastfeeding is good because you don't need hot water to make it.
<i>Creates bond</i>	
19	If the mom breastfeeds her baby, their relationship is warm, and they stick to each other.
74	[Breastfeeding is healthy because] the baby can feel the warmth of the mom's love, the baby will grow healthy, and also it makes the baby's body strong.
69	The more I breastfeed, the more my babies are very close to me.
35	Mom feels the love for her baby and their relationship as mom and a child [when she breastfeeds].
Societal Level Statements	
<i>Ppt.# Family support and Breastfeeding in Public</i>	
92	My mom is the one who advised me, if I breastfeed my baby she is going to be a healthy baby.
35	The reason [a mom might stop breastfeeding] is because she's going back to school, [busy] for the whole day. Other moms stop breastfeeding their babies because they're shy of people looking at them while they breastfeed.
<i>Child-led weaning</i>	
2	In my own opinion, there is no limit for breastfeeding babies, except when the baby doesn't like breastmilk anymore. It is because, I have heard, if moms breastfeed their babies for a long time, it builds a good relationship and love between a mom and her baby.
69	[I'll stop breastfeeding] when they go to school. That's the main reason for me for my kids.
19	In my own opinion, since I have children of my own, there is no limit for breastfeeding them, except the infant doesn't like the breastmilk anymore, no matter how old they are
89	I'm planning to breastfeed as long as she wants...until the baby doesn't want it anymore.
Environmental/Institutional Level Statements	
<i>Ppt.# Economic considerations</i>	
78	The only one working for my small family is my husband, and I don't think we can afford to buy the baby everything including the milk. So it's easier for us to just breastfeed him and buy him only diapers. Saving money.
93	Food helps the baby's body. There are some times that we don't have enough money to buy formula, but we usually have taro to make soup to feed the baby to make him or her strong and healthy.
77	[Breastfeeding], it's also free milk (laughs). You don't have to spend money on buying milk and all that.
<i>Infant infection and chronic disease</i>	
27	Mom's breastmilk is like a good medicine for baby's body, the baby will grow health and strong.
65	Doctors discussed the matter with us, that if the baby has diarrhea, the breastmilk helps. And it can cure it.
54	Bacteria affects the bottles, you know, when we used to prepare bottle. Not only diarrhea but my baby got many illnesses easily. Like whenever there was flu or any outbreak like dengue, they got affected easily because of the bottle feeding. Even when their teeth came in, they got sick easily all the time. Unlike the breastfeeding ones. They hardly got sick.
69	The baby is hardly sick. When I breastfeed my baby, he hardly goes to the hospital.

11	Breastfeeding protects babies from diseases, and it can cure babies when they are sick.
58	[Breastfeeding] is good because you don't need hot water to make it. It protects the baby from all disease.
54	The first one [who was bottle-feeding] was, he was fat. He was fat but he was sick. But when we took him to the hospital, the one doctor said, "Oh your child is sick." But you know the Samoan mentality, when you look at a fat baby you think, "Oh he's healthier. He's really healthy. He eats a lot." But when we took him to the hospital we found that he was sick. He could get a lot of illness easily because of bottle-feeding.
94	[A healthy baby is] not too fat, not too skinny. Just normal fat.
89	I think the perception and the mentality of people has changed nowadays. They're being educated. There's like programs about obesity. So when they see their babies, like 'Ohhh, no. There's a possibility you can grow up and become obese.'
23	...the Ministry of Health always advertise breastfeeding is healthy for babies, because the baby will get every food that mom takes, and those are healthy for the baby for developing of their bodies and for sure breastfeeding is always healthy.
<i>Natural disaster risk</i>	
96	During cyclones and storms, breast milk is always safe. There's no need to boil or prepare it. It always make the infant strong and protects them from diseases. If the baby feeds with formula, he or she will get sick very quickly.
60	Breastmilk protects the baby from diseases, and it's safe during cyclones because the power is off during cyclones so the water is not safe. That's why it's healthy.
57	In terms of disasters and cyclones, there is nothing much to prepare [if you are breastfeeding], compared to a can of milk (formula). Then also there is no power or electricity or clean water to make the formula or to clean bottles.
Barriers to Breastfeeding	
<i>Ppt. # Mother is sick</i>	
1	I might stop breastfeeding my baby if I know for sure that I am carrying a harmful disease like cancer or HIV/AIDS.
5	[I would always breastfeed] except when I am sick, I know for sure I can't breastfeed my baby, so I must try to feed her with formula.
65	If the mom carrying a serious disease like breast cancer, then she should stop breastfeeding to prevent the baby.
64	If the mom knows she is sick, she should use ripe papayas, boil it, and use the juice from it to feed the baby.
72	If the mom is sick with cancer or any Samoan sickness and she can't continue on breastfeeding her baby.
79	If the mom has flu or cold [she should stop breastfeeding].
81	If the mom has diarrhea she should stop breastfeeding her baby.
<i>Mother is pregnant again</i>	
68	If the mom gets pregnant again [she should stop breastfeeding], because I believe the breast milk is poison and not safe for the baby.
37	When a mom gets pregnant again, she should stop breastfeeding her baby and feed him or her with food and give them water.
41	If the mom is pregnant again, a mom should stop breastfeeding her baby because it is not good for the baby's health.
<i>Women's roles in the workplace and family</i>	
8	If there are some family issues, and then mom doesn't have much time with the baby, she might stop breastfeeding.
7	If the mother is so weak from her hard work [she might stop breastfeeding].
23	If the mom is working or if she travels somewhere and has to leave her baby behind, she might use formula to feed the baby.
54	The only reason why I'm thinking of substituting breastfeeding with a bottle is, you know, work commitments. Because sometimes we used to have programs outside of the island. We used to

travel to Savai'i and also maybe during the year I'd give a duty travel trip and I'd be away for one week...So that's the only reason I'd introduce a bottle to the baby. But, in fact, I do not want to introduce any other way of feeding, I just want my baby to have breastmilk up until she's one year old. It will be alright after one year old to have something else...because she'll be feeding with food. But for the first 6 months I still want her to have breast milk.

58 If the mom has lots of duties, not only in the family but also in the village, she doesn't have much time with the baby [so she might stop breastfeeding]. Or if the mom is working again.

Environmental/Structural Level

Infant infection and chronic disease

The most common answer among participants when asked if and why they believed breastfeeding was healthy was that it protected their infants against disease. Although often women did not specify which diseases they believed breastfeeding protected against, some answers included the flu and colds. Several participants even described breastmilk as having medicinal properties that could 'cure' or 'fight' infant diseases like diarrhea. Notably, almost every participant listed this reason as to why they believed breastfeeding was healthy, and many women had a salient personal experience with their infants being sick that they recalled to the interviewer:

I: Do you believe breastfeeding is healthy and why or why not?

P: Well I do believe in breastfeeding...the ones who were breastfed were more healthy, and they never got sick unlike the ones who were bottle-fed. They got sick most of the time, and it affected our budget because we had to take them to the hospital, even traditional medicine from the local traditional healers. Participant 54 (32 years old, 3 prior children, currently breastfeeding).

Because breastmilk protected from disease this also posed an economic benefit to women above and beyond the cost of formula illustrated in the quote above since the participant saved the expense of paying for hospital care for her child.

In addition to infection, attitudes about non-communicable diseases, like obesity, are changing in Samoa. A few women speculated that formula not only caused disease, but possibly made infants 'too fat' or 'too skinny', acknowledging how infant feeding practices may influence the baby's body. One participant

described a change in perceptions of healthy babies in Samoans that she had experienced:

I mean, Samoan people are starting to change their mentality now. They now know that some big babies are not healthy. They're big because they're sick and because they're not eating nutritious food from the family. Or maybe they're bottle fed. What I see in most of the babies is that they become big because they're bottle fed.'. Participant 54 (32 years old, 3 prior children, currently breastfeeding).

Risk for natural disaster

Several participants reported the risk of cyclones as a reason to breastfeed rather than formula feed. During cyclones and storms, women were worried they would not have clean water due to power outages related to the storm.

In terms of disasters and cyclones, [you cannot] prepare a can of milk, [you have no] power or electricity, or clean water for making the milk and for cleaning bottles. Participant 57 (35 years old, 5 prior children, currently breastfeeding).

Economic benefits

As described above, women often said they 'saved money' when they breastfed or referred to breast milk as 'free'. They frequently also referred to breastmilk as 'easy to get' and 'saved mom's time' whereas with formula-feeding, they needed to 'boil water', 'prepare the formula' and 'wash bottles'. Breastfeeding was often referred to as 'easy'.

Barriers to breastfeeding

When we asked women to describe reasons why they would stop breastfeeding, the most common response was maternal sickness or when experiencing problems with their breasts. If a woman was sick, with anything ranging from the flu, diarrhoea, or sores on her breast to more serious or chronic diseases like HIV, diabetes, or

breast cancer, many respondents asserted that they should cease breastfeeding or switch to the non-affected breast because the infant may become sick:

At the moment I only use one breast to feed my baby because my other breast is bleeding all the time, so I'm not using it to feed my baby. The other reason [to stop] is if the mom is carrying a disease like AIDS...because the baby will might get sick. Participant 43 (age unknown, 2 prior children, currently mixed-feeding).

When we asked women about reasons to supplement with formula, the most common answers were inadequate milk supply and returning to work. Inadequate milk was often cited as a cause of returning to work, which reduced the frequency of breastfeeding and, in turn, resulted in less milk production. Of our sample, around one third of women were working at the time of their pregnancy or were planning to work after they gave birth, so this was a concern for a subset of the population. Nonetheless, women cited certain 'duties' that may require the cessation of breastfeeding or supplementation with food or formula. Those included work, taking time away from the baby for a family problem, or going overseas:

If the mom has lots of duties, not only in the family but also in the village, she doesn't have much time with the baby [to breastfeed]. Or if the mom is working again. Participant 58 (25 years old, 0 prior children, formula feeding).

A significant proportion of women also said that being pregnant again was a reason to stop breastfeeding. They called breastmilk 'poisonous' and not safe for the infants if a woman is breastfeeding while pregnant.

If the mom is pregnant, she must not breastfeed her baby because her breastmilk is poison. Participant 8 (29 years old, 2 prior children, currently breastfeeding).

Finally, a minority of participants brought up drinking, smoking, or giving up the baby for adoption as reasons that women should not breastfeed.

DISCUSSION

The interviews illuminated what we deem 'a culture of breastfeeding' present in Samoa.

Seventy-three percent of participants were exclusively breastfeeding at the time of the interview, similar to the rate reported in the most recent nationally representative Samoan Demographic and Health Survey, suggesting that these participants views are likely to be representative of the wider population.³ We identified six themes at the levels of the individual (mother-infant), the society, and the environment (or structural influences). The themes included the belief that breastfeeding benefits the woman and infant, lack of shame of breastfeeding in public and inherent support of breastfeeding from families and Samoan institutions, and increased likelihood of breastfeeding because of economic, infectious, and climatic aspects of the Samoan environment.

Individual Level

In line with other breastfeeding studies globally,¹¹⁻¹⁴ Samoan women commonly referred to breastfeeding as 'natural'. Depending on the culture, the concept of breastmilk as natural may promote or discourage breastfeeding. For example, in Latina culture in the US the idea that breastmilk is natural encourages more women to breastfeed, including in public.¹³ In contrast, the idea of breastfeeding as natural can be prohibitive when women encounter difficulties.^{11,14,15} A metasynthesis from the UK, US, Australia, and Sweden revealed 'when breastfeeding is perceived as natural, the ability to breastfeed is taken for granted and this puts pressure on the mothers... if they can't breastfeed, they are made to feel like second class citizens (failures)'.¹⁴ We assert that Samoan use of the word 'natural' was breastfeeding-positive, as exemplified when Samoan women combined it with other descriptive terms like 'a gift from God', 'medicine' for the baby, 'healthy', and makes the baby 'smart and wise'.

The theme of diet and its role in milk quality also mirrors many prior studies.^{11,16,17} Samoan women valued breastfeeding for its nutritional benefits, especially in comparison to the unknown and 'chemical'-laden 'ingredients' in formula. Participants asserted that their diet, which was 'passed on' to their infants, was more nutritious than formula, which they tended to distrust, often saying it was 'processed', and they weren't sure what it was made of. In Samoa there are strict formula marketing protections in place through the International Code of Marketing of Breast Milk Substitutes, likely influencing knowledge

about formula as a synthetic, unhealthy product. In addition, the Samoan Ministry of Health prioritises conveying the nutritional value of breastmilk to the public through public awareness campaigns and a national breastfeeding celebration day.¹⁸ The combination of these efforts has likely prevented formula marketing. To continue to reap the benefits of these initiatives, it will be important to aggressively protect and strengthen the policy against future marketing efforts.

Samoans also described breastfeeding as 'convenient', not 'requiring preparation', and 'saving time', which was distinctly contradictory to other population's beliefs. Women of varying races and socioeconomic backgrounds in the US revealed they believed breastfeeding was a 'commitment', an 'investment,' and, opposite to Samoans, formula-feeding was 'more convenient', fit better with their 'schedules', was 'natural', 'workable' and 'simple' (notably, the data cited above from US samples had more working women than in our Samoan sample which may contribute to these beliefs).^{19,20} In Samoa, most women said that formula-feeding, not breastfeeding, was a greater time, energy and monetary investment. The idea that breastfeeding is 'limiting', 'restrictive' and leaves some women feeling 'trapped' or 'tied down', which was consistent throughout a meta-synthesis of qualitative work on breastfeeding predominantly from high-income countries, was not mentioned by Samoans.¹⁶ Instead, some women could think of no reasons that they should stop breastfeeding when we asked.

Societal Level

In a 2011 meta-synthesis of 31 qualitative studies of breastfeeding support conducted in the US, UK, and Australia an emergent theme was the type and amount of support directly affected women's 'personal confidence in breastfeeding'.²¹ On the contrary, Samoan women barely mentioned support or lack thereof for breastfeeding, which we interpreted as meaning that support for breastfeeding was so implicit among the community that it wasn't something that warranted comment. In the few comments about it, support was described as unanimously positive from family, health institutions like the hospital and Samoan Ministry of Health, and traditional healers.

Similarly, there was barely any mention of shame associated with breastfeeding in public, a common barrier to breastfeeding in other countries. Breastfeeding 'in public' and the disapproval of others has been frequently documented in other, mainly high income, populations.^{11,22,23} Some have attributed this lack of public breastfeeding shame to the primary Samoan cultural views of breasts as 'functional' for feeding babies and the resulting de-sexualisation of breasts.²⁴ The notion that breastfeeding is 'natural', a common response in our sample, has also been found to promote breastfeeding in public in other populations when women see it in that vein.^{13,25}

Finally, the decision to wean can often be difficult when there are competing interests of the mother, child, and other people in their life, yet women in Samoa did not mention conflict surrounding deciding to wean.²⁶ Many women provided no age at which weaning should occur and instead said they would let the child decide (which was between 1-5 years in our sample). This 'child-led weaning' approach promotes extended breastfeeding as infants will typically feed for longer if given the option, and is associated with positive impacts on later child weight and eating style.²⁷

Environmental/Structural Level

As the most common response to why breastfeeding is healthy, Samoan participants expressed the importance of breastfeeding in preventing disease. Breastfeeding's disease-protective effect is well-established in the scientific literature, particularly against infant gastrointestinal and respiratory tract infections, which are highly prevalent in Samoa.^{16,28} Some have argued that countries with high infectious disease burden have a greater propensity to breastfeed out of necessity compared to countries with lower infection.^{16,29} The women in our sample did not provide reasons why nor did they reference rates of infection in Samoa specifically, but it is clear from the almost unanimous mentions of protection against illness that this remains a key reason they breastfeed.

While 81% of the population have piped water into their dwellings, water insecurity/unsanitary conditions are still an issue in Samoa, especially during increasingly frequent climatic events.³ Lack of clean water is often a concern for all populations in times of natural disaster or

storms.^{30,31} Samoa, which has a prominent cyclone season, is at risk for periods where electricity and clean water are not available during and after natural disasters. This was a salient concern for participants and a reason why they chose to breastfeed over formula-feed. It should be noted here that a major cyclone passed through the country during data collection, which may have added to women's thoughts about this topic.

Natural disaster risk and breastfeeding was not targeted specifically in our survey; as such, saturation was not reached on this topic but we would argue that this theme will be important to examine in the future as climate change leads to more frequent natural disasters, which have particularly adverse short- and long-term health effects in low- and middle-income countries.³¹ While this aspect of the Samoan environment is unfortunate, potentially life-threatening, and certainly not replicable in other settings, the environmental uncertainty appears, for the time being at least, to be protecting exclusivity of breastfeeding in this setting.

Relatively newer to the region are chronic diseases, particularly the high and rising rates of adult obesity, which affected 60% of our sample (data not shown).³² While other studies have reported that maternal obesity has an adverse effect on breastfeeding rates because of inadequate milk supply or the physical challenge of feeding with larger breasts, only one woman in our sample raised this as a significant concern.^{33,34} Participants often argued that breastfeeding helps their infants 'grow well', is 'good for the baby's body', and doesn't make the infant 'too fat or too skinny'. Participants also reported being aware of adverse effects of bottle-feeding on infant health and, particularly, increased risk for obesity. Several stressed the importance of national campaigns through the Samoan Ministry of Health that publicised the benefits of breastfeeding both for the mother and infant in the context of risk for obesity. Women explicitly acknowledged a recent population-level change in attitude—from an earlier perception that 'big babies' were healthiest (a conception also found among women in American Samoa) to the current perception that 'big' was not always healthy and breastfeeding protected against babies growing too large.³⁵ This mirrors a change over time in adult body ideals, where in the past Samoans favored larger bodies compared to

current-day ideals, which are that people are neither too large nor too skinny.³⁶

Finally, at a structural level, Samoan women reported that buying formula was too expensive, touting breastmilk as 'free' and saving them hospital costs associated with treating infants who were sick because of formula-feeding. This economic limitation is also reported in women with lower incomes in a number of countries and regions.^{17,25,37} In Samoa, the view that the cost is not worth the product benefits this population and may further indicate how formula marketing has been, to date, unsuccessful. In places like the US and Europe where formula marketing strategies are pervasive and effective, more people hold beliefs that it is 'modern' and 'healthy', even in the face of the extra monetary cost.^{6,38}

Barriers to Breastfeeding

Many participants believed that being sick themselves, becoming pregnant again, or drinking and smoking while breastfeeding was reason to stop. There was a strong narrative throughout about illness, for both mother and infant. This was a major concern of the participants (discussed in the previous section), possibly influencing the belief that women should not breastfeed while they, themselves, are sick. Likewise, a 2017 study on breastfeeding in Samoa found that a small number of women were concerned about transmitting infections via breastmilk.³⁹ In the US, recent studies show women also held this belief, although it was not as commonly reported as in our sample.^{7,23} Similarly, some participants believed that milk is bad for the baby or 'poisonous' if she is breastfeeding while pregnant again, which has been reported before.⁴⁰ These topics could be targets for public health education since it is generally accepted that breastfeeding while pregnant or sick with common illnesses like the flu or diarrhea is safe and can even be protective as a result of immune system boosting properties, although breastfeeding is generally not advised if women have HIV or are undergoing treatment for breast cancer.⁴¹

Another common answer women gave for needing to supplement with formula was if she was not producing enough milk, which is among one of the most common reasons for cessation of breastfeeding across cultures.^{17,38,42} Interestingly, a very small minority of women in our sample

suggested this was a reason to entirely stop breastfeeding altogether. It was more likely a reason for Samoan women to supplement feeding, whereas as in other cultures it was main determinant of complete cessation of breastfeeding.⁴³

Finally, we identified changing economic dynamics, and women's roles with it, as affecting breastfeeding rates in Samoa. Nardi found more than 30 years ago that Samoan women were experiencing an increase in workload associated with increasing involvement in the cash economy leading to decreases in the population average of age at weaning, possibly indicating that women could not meet the feeding demands of the child due to other responsibilities.⁴⁴ Work is defined here and by Nardi to include formal employment but also village, familial, social, political or economic duties such as selling vegetables or fish in town, housework, attending funerals, weddings, Women's Committee meetings, and church meetings. In our sample women cited the conflict between breastfeeding and work, both formal employment and village or familial duties.⁴⁴ Similarly in a 2017 study on breastfeeding in Samoa, the most frequently cited barriers to breastfeeding were job-related, such as 'limited breaks to breastfeed at work'.³⁹

In other populations, across socioeconomic levels, working is one of the leading motives for weaning.³⁸ Although only a third of women in our sample were working, these numbers may increase.⁴⁴ The issue of maternity protection in employment is well recognised globally: millions of working women worldwide have no or inadequate maternity protection.³⁸ In Samoa, there is protection for government employees and a policy about maternity leave—however it requires better enforcement in private companies and the informal sector.¹⁸ In other countries it is well-established that supportive maternity leave policies increase exclusive breastfeeding rates.³⁸

Study Strengths and Limitations

While this study had considerable strengths, such as a large sample size, diversity of ages and experience with infants, and data saturation on most topics initially targeted by the researchers, we acknowledge certain limitations. Participants did not provide feedback on the findings, although we did discuss these findings and their interpretation with our Samoan research team,

research assistants, and the Samoan authors listed here.

In addition, this was a convenience sample of women who lived within the 30 minutes of the capital city, potentially biasing our sample with a greater number of women who held professional employment and had higher incomes than the general Samoan population. It should be noted, however, that the hospital where we recruited, TTM, handles the largest caseload of patients from all areas of the country, and upwards of 80% of women have been estimated to give birth there (personal communication with Dr. Ulai Tapa Fidow, Senior Registrar of Obstetrics & Gynecology).⁴⁵

Another limitation was the format for most of the interviews, which were conducted in Samoan. Nuanced elements may have been lost in the translation from Samoan to English, including some detail that would have provided greater insight into themes. However, we are confident in the generalisability of our findings due to the large sample and similarity of concepts that many women broached.

Finally we acknowledge the possibility of social desirability response bias that sometimes occurs when people are asked questions related to health.⁴⁶ Participants may have skewed their answers to suggest that they held more positive beliefs of breastfeeding if they knew those were the socially accepted behaviors deemed healthy. However, if this bias took place, it is further evidence that the 'culture' of breastfeeding is positive and supported by the general population.

CONCLUSION

The findings of this study revealed factors at the individual, societal and environment/structural level that protected and promoted breastfeeding. In order for Samoa to maintain a culture that promotes breastfeeding, it is important to protect policies that prohibit formula marketing and strengthen policies that support breastfeeding in the work place. Continued support by Samoan health institutions, like the hospitals, traditional healers, and the Samoan Ministry of Health, will also retain high rates of exclusive breastfeeding. Barriers to breastfeeding in Samoa could be reduced with public education about breastfeeding while sick or pregnant. Future work may identify the most influential individual and institutional sources of breastfeeding beliefs

as targets for improving the dissemination of knowledge in the community.

Participants in our study were cognizant that women's roles in Samoa are changing. It is a crucial moment in the economic transition where employment is not yet reportedly a widespread barrier to breastfeeding in our sample but will likely become a bigger issue as more women take on work over time. Practitioners and public health officials have the opportunity to protect and maintain the positive aspects of the Samoan culture of breastfeeding, by extending maternal leave policies and establishing breastfeeding-friendly work places. Further, our analysis provides a comprehensive picture of breastfeeding attitudes of Samoan women that can be used by midwives and health care practitioners in Samoa or in treating Samoan women throughout the diaspora. Although we acknowledge that some of the societal and environmental factors may not be possible to replicate in other settings, in addition to the Samoa-specific findings we highlight in this paper, aligning educational and support strategies for women with the beliefs expressed here may improve breastfeeding outcomes in other countries with high numbers of Samoan migrants.

ETHICAL STATEMENT

Informed consent was gained from all participants and ethical approval was granted by the Yale University Institutional Review Board (IRB) (Approval #2000021076, granted 6/29/17) and the Samoan Ministry of Health, Health Research Committee (granted 4/26/17 [no approval numbers assigned]).

AUTHOR CONTRIBUTIONS

KJA and NLH conceived the research question; KJA, TA, UTF and TN aided with data collection; KJA, VH, STM, CSU, and NLH assisted with writing the manuscript; KJA, VH and NLH performed the analysis; and KJA and NLH drafted the manuscript.

CONFLICTS OF INTEREST

All authors declare that there is no conflict of interest.

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