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The Evaluation of a Mass Media Campaign to Promote Exclusive Breastfeeding in Vietnam

Abstract

This dissertation explores whether a mass media campaign, comprised of two television spots promoting exclusive breastfeeding (EBF), was successful in changing EBF behavior when implemented alone and when implemented in conjunction with other media materials, the training of service providers, and the establishment of a franchise network of infant and young child feeding counseling centers.

The data were collected at five waves in four provinces of Vietnam through a three-stage cluster sampling methodology for a total of 11,277 face-to-face interviews with mothers of infants under the age of six months. Although the same individuals were not interviewed over time, the same 118 communes were sampled at each wave. The core analyses explore the longitudinal effects of commune level exposure on commune level EBF.

Commune level EBF rates never differed significantly from baseline in mass media only communes. In franchise communes, however, EBF rates improved sharply (from 24% before to 55% after). Further longitudinal analyses indicate that communes that were going to be high in exposure after the campaign began experienced significantly greater overtime increases in EBF than communes that were going to be low in exposure.

Mediation analyses suggest that, in franchise communes, the mass media campaign had an effect by driving women to franchise centers to seek additional IYCF support and that appears to have had an effect on EBF behavior.

Moderation analyses suggest that exposure to the mass media campaign did not, for the most part, have differential effects on EBF behavior among mothers of younger infants compared to mothers of older infants, first-time mothers as compared to experienced mothers, and mothers with more versus less education.

From the studies that comprise this dissertation, we can conclude that: 1) Mass media alone, in the format of two 30-second spots, was not effective in changing EBF behavior in Vietnam; 2) Where other intervention strategies were implemented alongside mass media, the mass media campaign led to greater EBF behavior change; 3) In geographic areas where the intervention was comprised of multiple components, the mass media campaign had effects through a process of social diffusion.

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THE EVALUATION OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE
BREASTFEEDING IN VIETNAM

Danielle Amani Naugle

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THE EVALUATION OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE
BREASTFEEDING IN VIETNAM

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In loving memory of my grandmother, Mildred Brandner Naugle. I feel your uplifting presence in everything I do.

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ABSTRACT

THE EVALUATION OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE BREASTFEEDING IN VIETNAM

Danielle Amani Naugle

Robert C. Hornik

This dissertation explores whether a mass media campaign, comprised of two television spots promoting exclusive breastfeeding (EBF), was successful in changing EBF behavior when implemented alone and when implemented in conjunction with other media materials, the training of service providers, and the establishment of a franchise network of infant and young child feeding counseling centers.

The data were collected at five waves in four provinces of Vietnam through a three-stage cluster sampling methodology for a total of 11,277 face-to-face interviews with mothers of infants under the age of six months. Although the same individuals were not interviewed over time, the same 118 communes were sampled at each wave. The core analyses explore the longitudinal effects of commune level exposure on commune level EBF.

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INTRODUCTION

In the field of health communications broadly, and communication for development more specifically, the evaluation of the effectiveness of mass media campaigns involves a variety of analyses that attempt to link the campaign to changes in cognitive or behavioral outcomes. Establishing the effectiveness of a mass media campaign is often difficult because of the contexts in which such campaigns are implemented. Mass media campaigns are usually national in scope (eliminating the possibility of intervention and control areas, much less randomly assigned intervention and control areas) and implemented alongside other program components like the provision of new products and services, the training of service providers, and community mobilization. These multiple program components are ideal from an intervention best-practices perspective, but they complicate the evaluation of the relative effectiveness of the various program components.

A unique opportunity to explore the effectiveness of mass media in changing behavior arose when the Alive & Thrive project at FHI 360 was awarded funding from the Bill and Melinda Gates Foundation to implement and evaluate an infant and young child feeding (IYCF) intervention in Vietnam. Like most interventions, the Alive & Thrive project is comprised of multiple program components including the development of a franchise network of quality IYCF counseling and care, advocacy and policy change, and a national mass media campaign. However, unlike most interventions which focus data collection only on program intensive areas, Alive & Thrive designed their evaluation to survey in equal parts districts with and without the franchise component. In addition, the evaluation includes self-reported measures of exposure to the Alive & Thrive television spots, exposure to the franchise, intermediate outcomes like knowledge, attitudes, social norms, and self-efficacy, and the primary behavioral outcome, exclusive breastfeeding. This structure makes it possible to investigate the effects of the mass media campaign on exclusive breastfeeding separately from the effects of mass media plus the franchise. Furthermore, the same communes were sampled across the five measurement

waves, providing a unique opportunity to explore the longitudinal effects of the campaign via social diffusion at the commune level in addition to the cross-sectional effects of direct exposure at the individual level.

Research Questions

This dissertation uses data from the evaluation of Alive & Thrive's mass media campaign to promote exclusive breastfeeding in Vietnam to explore four broad sets of questions: 1) whether a mass media intervention alone can increase population-level exclusive breastfeeding rates; 2) the relative contributions of individual and social routes of effects; 3) the strength of mediation pathways from exposure through knowledge, attitudes, social norms, and self-efficacy to exclusive breastfeeding behavior; and 4) the extent to which there are differential effects of the intervention by population subgroups. These types of questions, which correspond to main effects analyses (1 & 2), mediation analyses (3), and moderation analyses (4), form the core of campaign evaluation theory and practice.

Significance

The three studies that comprise my dissertation will make a number of contributions to the fields of health communications and communication for development. The main effects analyses will contribute to the literature on the effectiveness of mass mediated health communication campaigns in general and to the understanding of the potential for mass media campaigns to change a complex behavior like exclusive breastfeeding in a lower-middle income country like Vietnam. In addition, the comparison between mass media only areas and franchise areas will contribute to our understanding of the value-added of multiple intervention components. Finally, the main effects analyses will also contribute to the understanding of individual and social routes of effects of communications campaigns. The mediation analyses will contribute to the growing body of literature on the role of knowledge, attitudes, social norms, and self-efficacy as

important mediators of real-world communication campaigns. The moderation analyses will begin to address whether a mass media campaign like the Alive & Thrive campaign to promote exclusive breastfeeding has differential effects by population subgroups and, if so, who is advantaged and who is disadvantaged.

The effectiveness of a mass media campaign refers to whether or not the campaign met its stated objectives. With health communication campaigns, those objectives are often behavioral. Numerous mass media campaigns have been undertaken in high-income countries to influence behaviors like tobacco and other drug use, alcohol consumption, seat belt habits, cancer prevention and screening, and safer sex. In low- and middle-income countries mass media campaigns have been implemented to influence behaviors like immunization, infant and child feeding practices, family planning, and the prevention and treatment of diseases like diarrhea, malaria, tuberculosis, and HIV.

Alive & Thrive's mass media campaign in Vietnam was designed to increase exclusive breastfeeding (EBF) which is defined as giving an infant only breastmilk and no other food, water, or infant formula for the first six months of life. EBF behavior is the primary outcome of this evaluation. There are currently no rigorous evaluations that show that mass media can have an effect on EBF independently from other program components. EBF is a complex behavior that requires sustained commitment on the part of the mother and close others. Many actors in the field of international development doubt that mass media alone can impact such a complex behavior. This is an opportunity to explore that question empirically.

In addition, mass media campaigns can have effects through individual routes reflecting direct exposure to content producing changes in cognitions and behavior and through social routes in which campaign messages, through a process of social diffusion, influence the information available in the environment and, consequently, the cognitions and behavior of individuals (regardless of whether or not they were directly exposed to campaign messages). Understanding which processes of effects are mobilized by a given campaign and which

processes are associated with changes in behavior will help inform future campaign design and evaluation.

Closely related to effectiveness and integral to evaluation research is the question of how a given program achieved its objectives or the mechanisms of effect. Understanding the mechanisms of effect is crucial to building a body of knowledge about mass media campaigns and improving future campaign effectiveness. Research on mechanisms of effect is usually based on a theory of behavior change like the health belief model (Rosenstock, 1974), stages of change model (Prochaska & DiClemente, 1984), diffusion theory (Katz & Lazarsfeld, 1955; Rogers, 1962), ideation theory (Kincaid, 2000), social cognitive theory (Bandura, 1986), McGuire's hierarchy of effects model (1989), or the reasoned action model (Fishbein & Ajzen, 2010; known as the theory of reasoned action in prior iterations). Alive & Thrive's mass media campaign in Vietnam was designed based on the reasoned action model which states that changes in attitudes, perceived social norms, and perceived behavioral control (self-efficacy) lead to changes in intentions which lead to changes in behavior. Because Alive & Thrive's evaluation measured knowledge, attitudes, perceived social norms, and self-efficacy as related to exclusive breastfeeding, we have a unique opportunity to explore their respective roles in mediating the relationship between exposure to the campaign and EBF behavior.

Equally important to a nuanced understanding of campaign effects is the answer to the question: for whom was the campaign effective? One of the advantages of a mass media campaign is that it has the potential to reach a broader audience than interpersonal communication. One of the disadvantages is that it is more difficult than interpersonal communication, for example, to tailor messages to the needs of a particular target audience or individual. Understanding whether a specific mass media campaign had differential effects on population subgroups is essential for understanding the broader implications of the campaign. Although there are many more potential moderators, this study explores the infant's age, primipara status (whether or not the respondent is a first-time mother), and education level as moderators. These analyses will contribute to the discussion of whether such campaigns need to

be designed to be more inclusive and how campaigns should be evaluated so as to best capture effects.

Together, these three studies will paint a complex picture of whether the Alive & Thrive mass media campaign to promote exclusive breastfeeding had an effect, how it had an effect, and for whom it had an effect. Although specific to the intervention and context, insights from this evaluation added to insights from other rigorous evaluations can help build a body of knowledge to inform future health communication campaigns within the context of communication for development.

Outline

The Introduction briefly describes the topic of the dissertation, the research questions that drive the three main studies, and the significance of the work. Chapter 1 draws on a review of the literature of the effectiveness of mass media campaigns for child survival to highlight the gaps in the literature and delve more deeply into the important questions that this dissertation will strive to address. The implementation and evaluation design is the topic of Chapter 2.

Chapter 3 explores the evidence for the effectiveness of Alive & Thrive's mass media campaign in Vietnam in changing EBF behavior by exploring main effects at the individual and social level. The primary questions driving the individual effects analyses include: Did the campaign generate high enough levels of exposure to expect changes in breastfeeding behavior? Is there a positive cross-sectional association between self-reported exposure to the television spots and EBF at the individual level? Is there a positive dose-response relationship between exposure and EBF? Do these associations remain after controlling for potential confounders and accounting for the multi-level structure of the data? The primary questions driving the social effects analyses include: Is there evidence of effects via social diffusion? Did rates of EBF increase while the campaign was on the air? Do communes (geographic areas comprised of several villages and 5,000-7,000 people) that were going to be high in exposure after the campaign launched experience greater before-after changes in EBF than communes that were

going to be low in exposure? This longitudinal analysis overcomes the concerns of self-selection and reverse causal order inherent in cross-sectional analyses and captures social processes that are lost when focusing uniquely on individual differences in exposure.

Through mediation analyses, Chapter 4 explores causal pathways between commune level exposure to the Alive & Thrive television spots and EBF rates. Specifically, do knowledge, attitudes, social norms, and self-efficacy mediate the relationship between exposure and EBF? Do different cognitions mediate effects in franchise areas as compared to mass media only areas? Does franchise attendance mediate the relationship between exposure and EBF in franchise communes?

Chapter 5 investigates whether the Alive & Thrive mass media campaign had differential effects on population subgroups, specifically mothers of infants aged 0-2 months compared to mothers of infants aged 3-5 months, first-time mothers compared to experienced mothers, and women with lower levels of education compared to women with higher levels of education.

Finally, Chapter 6 presents a summary of the results, a discussion of the strengths and limitations of the evaluation of this mass media campaign to promote exclusive breastfeeding in Vietnam, and concluding remarks.

Chapter 1 REVIEW OF THE LITERATURE

In this Chapter, I provided a brief review of the existing literature in the area of mass media interventions for child survival in low- and middle-income countries. Drawing on that literature review, I discuss several interesting questions and gaps in the literature that my dissertation will explore including: 1) whether a mass media intervention alone can increase population-level EBF rates; 2) the relative contributions of individual and social routes of effects; 3) the strength of mediation pathways from exposure through knowledge, attitudes, social norms, and self-efficacy to EBF behavior; and 4) the extent to which there are differential effects of the intervention by population subgroups. In addition, my dissertation will contribute to the literature on the effectiveness of mass media interventions to promote exclusive breastfeeding in particular and child survival more generally.

Review of the intervention literature

In the summer of 2013, I conducted a systematic review of mass media interventions for child survival in low- and middle-income countries as part of an initiative organized by USAID and UNICEF to refocus international attention on ending preventable child deaths by 2035 (*Child Survival Call to Action*). The review was published in a special edition of the *Journal of Health Communication* (Naugle & Hornik, 2014). The pertinent findings relevant to this dissertation are summarized below.

To be included in the review, studies had to 1) describe a mass media intervention; 2) address a child survival health topic; 3) present quantitative data from a lower- or middle-income country; 4) employ an evaluation design that compared outcomes using (i) pre- and post-intervention data, (ii) treatment versus comparison groups or (iii) post-intervention data across levels of exposure; and 5) report a behavioral or health outcome. Included in the review are 111 evaluations, published between 1960 and May 2013, of campaigns addressing diarrheal disease

(15), immunization (8), malaria (2), nutrition (14), preventing mother-to-child transmission of HIV (1), respiratory disease (4), and reproductive health (67).

The fourteen nutrition campaigns are of particular interest here given that the primary behavioral outcome in my dissertation is exclusive breastfeeding (EBF). The interventions addressed a wide variety of nutrition topics including breastfeeding, complementary feeding, and/or adequate nutritional intake. Breastfeeding campaigns focus on the importance of early initiation, giving colostrum, breastfeeding exclusively for the first six months, continued breastfeeding for two years, and the timely introduction of complementary foods (Ferreira Rea & Berquo, 1990; Gueri, Jutsum, & White, 1978; Gupta, Katende, & Bessinger, 2004; Hornik et al., 2002; Huffman, Panagides, Rosenbaum, & Parlato, 1991; Monterrosa et al., 2013). Interventions addressing complementary feeding of children between 6 and 24 months of age emphasize not giving food and water until six months of age, continued breastfeeding, hands-on feeding practices, meal frequency, and meal diversity (Bonvecchio et al., 2007; Huffman et al., 1991; Monterrosa et al., 2013; Sun et al., 2011). Adequate nutritional intake interventions promote the consumption of supplements/fortified foods (Bonvecchio et al., 2007; Sun et al., 2011; Sun, Guo, Wang, & Sun, 2007; Warnick et al., 2004) or foods naturally rich in essential nutrients like vitamin A (De Pee et al., 1998; Hornik et al., 2002; Monterrosa et al., 2013; Parvanta, Gottert, Anthony, & Parlato, 1997) or iron (Baizhumanova et al., 2010; Monterrosa et al., 2013; Sun et al., 2007).

Although there is evidence for the effectiveness of mass media interventions on early initiation of breastfeeding (McDivitt, Zimicki, Hornik, & Abulaban, 1993; Sun et al., 2011), minimum dietary diversity (Monterrosa et al., 2013; Sun et al., 2011), consumption of iron-rich foods (Sun et al., 2011) and vitamin A-rich foods (De Pee et al., 1998; Monterrosa et al., 2013), the one study that evaluated EBF as an outcome found no evidence for effects on behavior (Gupta, Katende, & Bessinger, 2004). It is possible that this evaluation (of a mass media campaign to promote exclusive breastfeeding in Uganda) did not find effects on EBF because the evaluation was conducted prematurely, only two months after the campaign began. The evaluation found effects on breastfeeding knowledge so it is possible that evaluators would have

found more positive results had they waited six or more months after the launch of the campaign to evaluate the effectiveness on behavior.

Two additional evaluations of nutrition interventions with a mass media component suggest that changes in EBF rates are possible. The evaluation of an Integrated Management of Childhood Illnesses intervention in Armenia documented a before-after increase of 31.4% in EBF (Thompson & Harutyunyan, 2009) and a nutrition intervention in Madagascar reported a before-after increase of 28% in EBF (Guyon et al., 2009). As with most mass media interventions, however, these two interventions also included other program components like the training of service providers, interpersonal communication, and community mobilization. In the evaluations, the effects of the mass media component were not investigated separately from the other program components.

Therefore, there is currently no evidence as to whether mass media alone can positively impact population-level EBF rates and relatively little evidence that mass media in combination with other intervention components can successfully increase EBF. One of the primary purposes of my dissertation is to explore whether a mass media intervention alone can increase population-level EBF rates and how the effects of a mass media only intervention differ from the effects of an intervention comprised of multiple forms of mass media plus training of service providers, interpersonal counseling, and the development of a franchise network of health professionals providing quality infant and young child feeding (IYCF) services.

In addition to responding to the gap in the literature about the potential effectiveness of mass media alone in improving EBF rates, several important gaps identified by the review are addressed in my dissertation. First, as mentioned above, only one moderate or stronger evaluation studied the effects of a mass media-centric intervention on EBF. This is, perhaps, because EBF is a complex behavior that might be particularly difficult to influence. My dissertation will add specifically to the literature on the effectiveness of mass media for promoting a complex behavior like EBF, but also to the child nutrition and child survival literature.

Second, existing campaign evaluations reflect two models of media effects: individual and social. The evaluations that explore individual routes of effect examine the associations between individual levels of exposure and the outcome behavior with the expectation that individuals who have had more exposure to campaign messages will be higher on the target behavior. These evaluations assume that effects take place through direct individual exposure to campaign messages. The evaluations that explore social routes of effect examine the associations at the aggregate level, expecting that effects on the outcome behavior will be higher after the campaign than before and/or in communities with more exposure compared to communities with less exposure. These evaluations assume that effects also take place through a process of social diffusion in which the campaign leads to changes in the social environment which lead to changes in individual behavior and that the effects are not limited to those directly exposed to campaign messages. My dissertation will explore both individual and social routes of effects.

Third, and relatedly, only three of the moderate and stronger evaluations of mass media campaigns for child survival explored mediation pathways: one from exposure to knowledge to vaccination coverage (Hornik et al., 2002) and the other from exposure to ideation to current use of modern contraceptives (Kincaid, 2000). In my dissertation, I will explore mediation pathways from exposure through knowledge, attitudes, social norms, and self-efficacy to EBF behavior to try to better understand how the campaign had an effect where there is evidence for effects and why the campaign did not have an effect where there is no evidence for effects.

Fourth, less than twenty percent of the campaign evaluations explore differential effects by population subgroups. The moderators considered by the evaluations reviewed include education and socioeconomic status (Warnick et al. 2004), area of residence (rural/urban (Baizhumanova et al., 2010; Huffman et al., 1991; Sun et al., 2007); slum/non-slum (Quaiyum et al., 1997), type of birth facility (McDivitt et al., 1993), and gender (Agha, 2002; Blake & Babalola, 2002; Gupta et al., 2004; Hindin et al., 1994; Kane et al., 1998; Meekers et al., 2007; Storey & Boulay, 2000; Van Rossem & Meekers, 2000; Yassa & Farah, 2003). Many of these evaluations

found significant differences in effects by population subgroups. My dissertation studies will add to this literature by exploring whether the effects of the campaign differ by the infant's age, primipara status (whether the respondent is a first-time mother or not), and the mother's education level.

Finally, there is a methodological gap in the literature. Many of the evaluations of mass media campaigns in low- and middle-income countries are weak, meaning that they did not convincingly address threats to inference of mass media effects. Thirty-three of the 111 evaluations included in the systematic review were categorized as weak because they made no attempt to address threats to inference (88%), did not report the sampling methodology (30%), or used a biased sample (21%). My dissertation will provide an example of a strong campaign evaluation that explicitly addresses threats to inference through the use of a representative sample, multiple comparison groups, and statistical controls. In addition, it will provide enough detailed information about the campaign, exposure, and the evaluation to permit meta-analyses as the literature base grows.

Mass media alone versus mass media plus

There is a tension in the literature and in the field of communication about the effectiveness of mass media alone versus the effectiveness of mass media in combination with other programmatic interventions. Funders want to know the cost-effectiveness of each of the program components so that, in the future, they can fund only the most effective components. Methodologically, these are challenging questions to answer because it is difficult to parse out the effects of each program component when several components are implemented simultaneously and each interacts with and depends on the other to generate the overall effect. To try to better understand the effects of distinct program components, randomized controlled trials have been undertaken, but the results have been underwhelming. Perhaps evaluations of the constrained effects of communications campaigns through RCTs inadvertently also constrain exposure and the larger social processes at work during a comprehensive intervention (Hornik, 2002).

Program components work very differently in isolation than they do in synergy and it is not evident that a mass media campaign that was effective when implemented simultaneously with the training of service providers and development of interpersonal counseling services would be effective alone (and vice versa). In an intervention with multiple program components, individuals have more opportunities to be exposed repeatedly to parallel messages from various sources. In addition, the program can work through multiple pathways including individual, social, and institutional. The literature suggests that comprehensive interventions that simultaneously address individual beliefs, social norms, and environmental constraints are most likely to be successful at changing behavior (Wakefield, Loken, & Hornik, 2010).

And yet, the question about the effectiveness of mass media alone is tempting due to considerations of cost-effectiveness and scale. Mass media can reach more people more frequently than many other intervention components and is relatively more cost-effective to bring to scale. Changing policy, training health professionals, delivering interpersonal counseling, and developing or revitalizing services are slow and expensive processes that are difficult to scale.

In response to this tension, teams of interventionists and scientists at Development Media International (DMI) and the London School of Hygiene and Tropical Medicine are tackling the question “Can mass media interventions reduce child mortality?” through a five year cluster-randomized controlled trial of a high intensity radio and television campaign addressing multiple life-saving behaviors in Burkina Faso (Head et al., 2015). Using the Lives Saved Tool (LiST), they predict that DMI’s Saturation+ approach (broadcasting messages 6-12 times per day on market-leading radio stations and at least three times per day on market-leading TV stations) could reduce under 5 mortality by between 16% and 23% during the third and subsequent years of a campaign. They add that, if these predictions are correct, mass media campaigns, at \$1-10 per disability-adjusted life year (DALY) averted, would be among the most cost-effective of all currently available health interventions (the most cost-effective being childhood immunizations at \$1-8 per DALY averted).

My dissertation will contribute to this literature by providing a unique opportunity to explore the effectiveness of mass media alone compared to mass media plus the training of health workers and the development of a branded franchise network providing quality IYCF counseling and care. I hypothesize that mass media plus will be more effective than mass media alone, but the question is: How much more effective? If a high-quality theory-based mass media campaign comprised of two television spots can impact a complex behavior like exclusive breastfeeding, then it might provide a more cost-effective strategy for saving infant lives than mass media plus other program components. If mass media alone is not effective in changing EBF behavior where mass media plus is effective, then this evaluation will provide some evidence in support of multiple component interventions rather than single component interventions.

It is important to note, however, that even if mass media alone proves unsuccessful in changing EBF behavior in this evaluation, we cannot conclude that mass media alone cannot be effective in changing behavior for a number of reasons. First, this evaluation examines only one specific campaign in one context and with respect to one behavior. Furthermore, the campaign in mass media only areas was comprised of two television spots promoting EBF and therefore only explores the effectiveness of one, relatively limited, mass media format. It says nothing about mass media campaigns across multiple channels and formats (including more interactive and entertaining formats). Secondly, all campaign spots were aired on both national and regional television stations, meaning that franchise promotion spots were aired in places where there were no franchise centers. And, finally, EBF, as the next section elaborates, is likely to be a difficult behavior to change.

The behavior: Exclusive breastfeeding

Exclusive breastfeeding (EBF) is defined by the World Health Organization as feeding an infant only breastmilk and no other food, water, or infant formula for the first six months. The World Health Organization recommends EBF for the first six months of life to achieve “optimal

growth, development and health” (*Global Strategy for Infant and Young Child Feeding*, 2003, p. 7). The evidence suggests that infants who are exclusively breastfed for six months experience less morbidity from gastrointestinal infection than those who are fed a mixture of breastmilk and other foods as of three or four months (Kramer & Kakuma, 2009).

In Vietnam, as in many other low- and middle-income countries, the challenge of EBF lies in its exclusivity. Most women in Vietnam initiate breastfeeding and continue breastfeeding through the first six months, but most women do not breastfeed exclusively. It is common to give infant formula or other prelacteals in the first three days after birth and it is also common to give water and formula in addition to breastmilk thereafter. At baseline, 69% of women with 0-6 month old children reported giving prelacteals in the first three days after birth and, in the 24 hours preceding the interview, 29% gave formula and 65% gave water.

As the primary outcome of a behavior change intervention, in general, and of a mass media intervention, in particular, EBF presents a unique set of challenges and opportunities. As the target of a behavior change intervention, EBF is likely to be a difficult behavior to change. Drawing on Rogers’ *Diffusion of innovations* (2010), the characteristics of behaviors that might make them more readily adopted include: 1) Relative advantage: the recommended behavior has substantially greater benefits than the alternative behavior; 2) Compatibility: the recommended behavior does not greatly disrupt established routines; 3) Complexity: the recommended behavior requires only a few steps; 4) Trialability: it is possible to test out the recommended behavior and still return to the prior behavior; and 5) Visibility: the benefits of the recommended behavior are evident in the short run. In addition, other sources argue that behaviors more easily adopted include those which limit 6) Resource demands: the recommended behavior does not require new or reallocated resources; 7) Frequency/duration: the recommended behavior is one-off or episodic; and 8) Locus of control: the recommended behavior is an individual decision that is not constrained by other people or institutions.¹

¹ Characteristics 1-5 come from Rogers’ *Diffusion of Innovations*; characteristics 6-8 are supplemental.

Table 1.1 summarizes the evaluation of EBF on these criteria as compared to the current behavior that is most prevalent in Vietnam: a mixed feeding method in which the infant receives occasional water and formula in addition to breastmilk. A score of 1 means that the behavior is likely to be difficult to change based on that criteria and a score of 3 means that the behavior is likely to be feasible to change based on that criteria.

Table 1.1 Evaluation of EBF as the target of a behavior change intervention

Behavioral characteristic	1-3	Observations
Perceived relative advantage	1	The perceived relative advantage of EBF as compared to mixed feeding is currently low; one of the tasks of a mass media campaign would be to increase the perceived relative advantage.
Compatibility	1	EBF is more disruptive to a mother's routines than mixed feeding as the mother must be available to feed the infant on demand and no one else can feed the infant.
Complexity	1	EBF is a complex behavior that can be particularly difficult to learn at the beginning and can present ongoing challenges that vary from person to person and may discourage continued EBF.
Trialability	3	EBF is trialable; a mother can start EBF and then switch to formula feeding or a combination of feeding practices if desired.
Visibility	2	The visible benefits of EBF are mixed. Compared to infants that are given water or poor quality complimentary foods, exclusively breastfed babies might appear healthier, more alert, and might get sick less often. However, properly formula-fed babies sometimes appear fatter and therefore "healthier" than breastfed babies.
Resource demands	2	EBF does not require new or reallocated material resources; however, it requires reallocated maternal time and energy.
Frequency/duration	1	EBF requires a six-month commitment to feeding the infant 6 to 12 times in a 24-hour period during both day and night. It is a high frequency, long duration behavior.
Locus of control	1	EBF depends on the support of medical professionals, especially in the immediate post-partum period, and of close family members in the first six months. For working mothers, it also depends on a six-month maternity leave policy.

* A score of 1 means that the behavior is likely to be difficult to change based on that criteria and a score of 3 means that the behavior is likely to be feasible to change based on that criteria.

The characteristics that make EBF a difficult behavior to change via a behavior change intervention include its lack of perceived relative advantage, its low compatibility, its high complexity, its high frequency and long duration, and its partially external locus of control. EBF has low perceived relative advantage because the benefits of EBF compared to mixed feeding

are not tangible or easily visible in the short- or long-term. The negative effects of giving water or formula are not well understood; mothers may not believe that diarrhea and other dangerous illnesses are related to not exclusively breastfeeding. In addition, aggressive marketing of formula may negatively affect the perceived advantages of breastfeeding. One of the objectives of a mass media campaign would be to increase the perceived advantages of exclusive breastfeeding. EBF is considered low compatibility as it is particularly disruptive of the mother's routines, requiring her to be available to breastfeed several times during the day and night and making it difficult for other family members to help with feedings. EBF is a complex behavior; it can be difficult to learn in the beginning and can present numerous ongoing challenges that vary from person to person and may discourage the mother from continuing EBF. In addition, EBF requires a six-month-long commitment and frequent daily decisions to breastfeed the baby instead of giving formula or another replacement food. Furthermore, the locus of control is partially external; EBF does not only depend on the mother's desire to exclusively breastfeed, but on the health of mother and child and the support of health professionals, close family members, and maternal leave policies. Immediately after birth, EBF requires hospital policies and practices that are favorable to early initiation of breastfeeding and EBF. It also requires the support and adherence of core family members who might otherwise feed the child in the mother's absence and who must liberate the mother from household chores so that she has adequate time and energy to exclusively breastfeed. Especially in low- and middle-income countries where pumping and storing breastmilk is not practical, EBF requires that the mother be available to breastfeed her infant every 4-6 hours for the first six months. Therefore, maternity leaves that are shorter than six months can limit women's ability to breastfeed.

The characteristics that make EBF a somewhat more feasible behavior to change via a behavior change intervention include the trialability, the low material resource demands, and, possibly, visibility. Mothers can begin exclusive breastfeeding and switch to a mixed feeding method at any time; however, in doing so, they lose the ongoing benefits of exclusive breastfeeding. In terms of resource requirements, on the one hand, EBF does not require new or

reallocated material resources (as does formula feeding with the purchase of formula and baby bottles); on the other hand, it requires substantial reallocated maternal time and energy resources. Finally, the visible benefits of EBF are variable – exclusively breastfed babies can appear fatter, more alert, and get sick less often than babies who are fed with a mixed feeding method. However, it would be up to the communications campaign to reinforce awareness of the association between exclusive breastfeeding and babies’ mental and physical growth and health.

As the primary outcome of a mass media intervention, EBF also presents interesting challenges and opportunities. The challenges lie mostly in that, as we have just established, EBF is likely to be a difficult behavior to change via any sort of behavior change intervention.

However, one of the great advantages of using mass media to promote EBF is that mass media can reach a wider audience than is typically reached through interpersonal counseling by health workers. If carefully crafted, mass media messaging can simultaneously reach pregnant women, nursing mothers, mothers-in-laws and other influential women, fathers, and health professionals. Also, mass media can help change social norms more broadly and shape the environment regarding the target behavior (for example, create a more favorable environment towards EBF). Another advantage of a mass mediated strategy for promoting EBF is that women already have everything they need to exclusively breastfeed. In theory, there are no services that need to be organized (as with vaccinations) or products that need to be distributed (as with anti-malaria bed nets); this contributes to making mass media an appropriate strategy for promoting EBF. In addition, mass media can be particularly effective in reaching new and changing target audiences on a regular basis with repeated messages. This is especially important for EBF because the primary target audience (pregnant and lactating mothers) is constantly changing.

One disadvantage of a mass mediated behavior change strategy that may be particularly relevant where EBF is the target behavior is that mass media is not easily tailored to respond to individual women’s concerns about breastfeeding. Personal questions like “is my baby getting enough breastmilk?” and “why am I experiencing pain while breastfeeding?” are difficult to adequately address through mass media. Although some questions could be answered via call-

in radio show formats, for some women, EBF behavior change might be most facilitated by interpersonal counseling in which trained health professionals provide hands-on support.

To be successful, a mass media campaign to promote EBF should address the individual, social, and institutional barriers to EBF. The campaign should try to change the pivotal attitude, social norm, and self-efficacy beliefs that formative quantitative research links to EBF behavior. In addition to the mass media campaign, it is possible that the intervention would need to include other program components that address the structural barriers to EBF (including the training of service providers to improve hospital policies and practices that influence early initiation and EBF and advocacy for policy change to address the prevalence of contradictory messaging promoting breastmilk substitutes and the duration of maternity leave).

Individual effects and social effects

In his 2002 book, *Public health communication: Evidence for behavior change*, Hornik outlines three models of effects of health communication campaigns: individual, social, and institutional (p. 14). The individual model focuses on changes in individual cognitions and behavior as a result of direct exposure to mass media messages. The social model explores an indirect process of social diffusion in which individuals may be influenced by the shifting norms of their environment with or without direct exposure to media messages. The institutional model investigates the relationship between mass media content and changes in the opinions of the institutional elite who influence institutional policies which then affect individual behavior.

These models are not mutually exclusive and most communication campaigns could be evaluated at all three levels if the evaluations were appropriately designed to capture effects at all three levels. In my dissertation, I have a unique opportunity to examine both individual level effects and social level effects. I have measures typically associated with individual effects analyses like self-reported exposure to the campaign, cognitions, and behavior. Unfortunately, the same individuals were not measured over time and so the individual level analyses are cross-sectional and threatened by causal order and self-selection. Although we cannot definitively sort

out causal order at the individual level, the same communes were measured over time, allowing us to perform longitudinal analyses at the commune level.² After aggregating self-reported exposure, cognitions, and behavior to the commune level, we can explore the effects, via individual exposure and social diffusion, of the campaign by looking at the association between being in a high exposure commune versus a low exposure commune in addition to the individual effects resulting from direct exposure to the mass media messages. In this way, we can try to better understand whether campaign effects are taking place through both individual and social processes or one or the other.

Mechanisms of effect

The mass media campaign to promote exclusive breastfeeding in Vietnam was based on the reasoned action model (RAM; Fishbein & Ajzen, 2010) which states that attitudes, perceived social norms, and perceived behavioral control (self-efficacy) lead to intentions which lead to behavior. Attitudes reflect individuals' beliefs about the positive and negative consequences of performing a given behavior. Perceived social norms include injunctive norms, or beliefs about how important others think you should behave, and descriptive norms, or beliefs about how others like you behave. Perceived self-efficacy refers to the individual's beliefs about their ability to overcome obstacles to performing the behavior.

Models of behavior change like the RAM suggest that changes in beliefs lead to changes in intentions which lead to changes in behavior. Which particular beliefs or constructs (attitudes, social norms, or self-efficacy) will be most important depends on the behavior and the target population. Qualitative research is often performed first to identify context-specific beliefs and then quantitative research is performed to identify which beliefs or constructs might be the most promising targets for a behavior change communication campaign. In order to achieve population-level behavior change, Hornik and Woolf (1999) suggest targeting beliefs that are 1)

² Communes, in Vietnam, are geographical units comprised of a few villages that share a community health center and have a total population of about 5,000-7,000.

strongly associated with the behavior of interest (also known as a doer/non-doer analysis), 2) not 'correctly' held by a large proportion of the target population (percent-to-move), and 3) amenable to change through a communications campaign.

The qualitative research that informed the development of Alive & Thrive's mass media campaign to promote EBF in Vietnam pointed to attitudinal beliefs about the positive and negative consequences of giving water – that water is necessary to quench an infant's thirst, especially in the hotter months, and to avoid thrush – and to self-efficacy beliefs about the mother's ability to adequately nourish her infant through breastmilk alone, specifically, concerns that she does not have sufficient quality and quantity breastmilk to meet the nutritional needs of her infant and therefore should supplement with formula or complementary foods (Formative research: Phase I).

Two television spots were developed around these concepts and formed the core of Alive & Thrive's mass media campaign to promote EBF in Vietnam. The development of the spots was well under way by the time quantitative analyses of the baseline data shed light on whether attitudinal beliefs about giving the infant water and self-efficacy beliefs about the adequacy of mother's breastmilk supply were, in fact, promising message strategies. Table 1.2 shows the percent-to-gain of the belief items at baseline. Percent-to-gain is a summary statistic that combines the strength of the association between the belief and the behavior and the percent-to-move (percent of the population that does not hold the desired belief). It is calculated by subtracting the total percent of respondents who performed the preferred behavior (exclusively breastfed) from the percent of the respondents who performed the preferred behavior and held the preferred belief. This difference indicates how much change could potentially occur if (a) all the people with undesirable beliefs adopted the desirable belief and (b) the belief is strongly associated with the behavior of interest. While neither of these assumptions are likely to be completely true, the statistic provides a common metric to assess the upper limit of effects that might be achieved if a communications campaign were able to change that belief.

Table 1.2 Percent-to-gain for beliefs at baseline

Belief Items	%-to-gain	Confidence Interval
Attitudes		
N=2,237		
*If I am breastfeeding, but do not give my infant water until s/he completes 6 months, my infant will be thirsty.	12.18	9.89, 13.97
If I feed my infant only breast milk and no other food, water or infant formula, until s/he completes 6 months, I am giving my infant all the nutrients s/he needs to be healthy.	15.23	13.33, 17.06
*If I feed my infant a combination of breast milk and infant formula until s/he completes 6 months, I am giving him/her the best possible nutrition.	9.03	6.93, 11.02
* If do not clean my infant's mouth out with water after breastfeeding, my infant will get thrush.	10.99	9.18, 13.01
*If I am breastfeeding my 5 month old infant, but do not give my infant water, s/he will be too hot.	14.19	12.06, 16.19
*If I feed my infant a combination of breast milk and other foods when s/he is between 4 and 6 months of age, I am giving my infant the best possible nutrition.	9.75	7.33, 12.14
If I feed my infant only breast milk and no other food, water, or infant formula until he completes 6 months, I am giving my infant all the nutrients s/he needs for optimal brain development.	14.40	12.62, 16.27
Self-efficacy		
*My body can produce enough colostrum to feed my newborn within one hour an infant after birth.	2.02	0.95, 3.15
*My body can produce enough breast milk to feed my newborn only breast milk and no water or infant formula in the first 24 hours.	6.31	4.98, 7.67
*The "first milk" produced by my body is all my newborn needs in the 24 hours after birth.	0.26	-0.39, 0.81
My breast milk is of good enough quality to nourish my infant so that the infant does not need any other food, water, or infant formula until s/he has completed 6 months.	10.76	9.30, 12.38
The more I breastfeed my infant, the more breast milk my body will produce.	0.17	-0.48, 0.73
Norms		
Most people who are important to me (e.g. family members, friends...) think that I should feed my infant only breast milk, and no other food, water, or infant formula for the first 6 months	16.85	14.56, 19.27
Most women who have infants like me feed their infant only breast milk, and no other food, water or infant formula for the first 6 months	16.83	14.51, 19.38
Knowledge		
Which is better for an infant under 6 months, breast milk alone or a combination of breast milk and infant formula?	2.08	1.42, 2.76
Until what month should a mother give her infant only breast milk and no other foods, water or infant formula?	13.17	10.70, 15.58
In what month do you think an infant should start receiving plain water in addition to breast milk?	29.23	26.24, 32.41
In what month do you think an infant should first start to receive liquids other than water in addition to breast milk?	3.76	2.35, 5.03
After completing what month should an infant first start to receive semi-solid foods?	-0.61	-2.46, 1.57

* The items preceded by an (*) are reverse coded.

The shaded items in Table 1.2 are the belief items directly related to attitudes about giving water and self-efficacy beliefs about the adequacy of the mother's breastmilk supply. The attitudinal items related to giving water all have a percent-to-gain of greater than 10%. In fact, all of the attitudinal belief items have a relatively high percent-to-gain, suggesting that if the campaign could change women's attitudes towards not giving water, in particular, and towards EBF, in general, then it might be possible to increase population-level EBF rates.

The self-efficacy items, on the other hand, have a relatively low percent-to-gain, meaning that much of the target population already holds the desired beliefs and/or that they are not strongly associated with the behavior. There is one exception. The belief item: "My breast milk is of good enough quality to nourish my infant so that the infant does not need any other food, water, or infant formula until s/he has completed 6 months" has a percent-to-gain of 10%. This particular self-efficacy belief item has a relatively high percent-to-move compared to the other self-efficacy items (meaning that a lower percentage of the target population already holds this belief) and it is significantly associated with EBF. Overall, however, the self-efficacy belief items measured at baseline do not suggest that trying to change these self-efficacy beliefs would be a promising strategy for achieving population-level increases in EBF (for this target population in Vietnam).

The two social norms items both have a high percent-to-gain at 16%, suggesting that a communications campaign could increase population-level EBF substantially if it could persuade mothers that important others think that they should exclusively breastfeed and that other women like them exclusively breastfeed. One advantage of a mass media campaign is that, even if it does not address social norms explicitly, people may interpret behaviors they see on television as reflecting descriptive and injunctive social norms (Mead, Rimal, Ferrence, & Cohen, 2014). So spots that show breastfeeding mothers and supportive family members may change mothers' (and others') perceptions about what other mothers like them do and what important others think they should do.

Finally, the percent-to-gain of the knowledge items varies widely from 0 to 29%. Increasing knowledge about the appropriate time to start giving an infant water and about the recommended duration of EBF could have an impact on population-level EBF rates, but specific knowledge items regarding supplementation with formula and the timely introduction of liquids other than water and semi-solid foods do not seem like promising message strategies for a communications campaign in this context.

A logistic regression of knowledge, attitude, social norm, and self-efficacy scales on EBF at baseline also suggests that attitudes and norms are the most promising constructs through which to try to influence EBF behavior among the target audience (Table 1.3). Baseline attitudes and norms are significantly associated with baseline EBF behavior at $p < .001$. Self-efficacy is significantly associated with EBF behavior at $p = .019$ and knowledge is not significantly associated with EBF behavior at all.

Table 1.3 Logistic regression of knowledge, attitudes, norms, and self-efficacy scales on EBF behavior at baseline

	EBF	
	OR	95% CI
knowledge	1.408	[0.769,2.577]
attitudes	2.298***	[1.904,2.773]
norms	1.240***	[1.132,1.359]
self-efficacy	1.215*	[1.002,1.473]
<i>N</i>	1988	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

After taking into consideration the percent-to-gain analyses, the logistic regression, and the content of the spots that formed the core of Alive & Thrive’s mass media campaign, I hypothesize that attitudes and norms will be important mediators of the effectiveness of Alive & Thrive’s mass media campaign, but that knowledge and self-efficacy will not. These analyses will contribute to our understanding of which cognitive mediators are important for changing EBF behavior in Vietnam and will help explain how the campaign had an effect where there is evidence for effects and why it did not have an effect where there is no evidence for effects.

Differential effects among subgroups

As several of the evaluations included in the systematic review of mass media campaigns for child survival demonstrate, it is important to investigate the differential effects of a mass media campaign on population subgroups because it is possible that the campaign was not equally effective for all members of the target population. Examining effects only at the level of the general population restricts our understanding of for whom the campaign was effective and may obscure interesting results that can contribute to the overall evaluation of the campaign's effectiveness and inform future campaign development. In my dissertation, I will investigate three moderators of the effectiveness of Alive & Thrive's campaign to promote EBF in Vietnam: infant's age, primipara status (whether or not the respondent is a first-time mother), and education level.

In the literature from other countries, mother's education, primipara status, prior breastfeeding behavior, and the infant's age have been found to be associated with breastfeeding behavior (Bolling, 2007). However, no studies have examined whether these variables interact with a communications campaign or other behavior change intervention promoting EBF.

Two of the moderators that I will investigate in my dissertation, primipara status and the age of the infant (0-2 months as compared to 3-5 months), are of particular interest due to particularities of exclusive breastfeeding as the target behavior.

Prior behavior is often a good predictor of subsequent behavior. Given that breastfeeding is a complex learned behavior, it is likely that women's prior breastfeeding experience will influence subsequent breastfeeding intentions and behaviors. Indeed, my data suggest that Vietnamese women who are currently exclusively breastfeeding are almost nine times more likely to agree or strongly agree to a six-item scale measuring intentions to exclusively breastfeed a future child, than women who are not currently exclusively breastfeeding (OR = 8.77; $p \leq 0.001$).

It is possible, then, that a woman who followed a mixed feeding method (supplementing breastmilk with water, formula, and/or complementary foods) with her prior children would be less

likely than a first-time mother to be persuaded by mass media messages to exclusively breastfeed. In addition, it is possible that women who did not exclusively breastfeed prior children will have more difficulty convincing close others (father, mothers-in-law, etc.) to adhere to the breastmilk only rule for the most recent child. Furthermore, first-time mothers are likely to be particularly receptive to breastfeeding information and recommendations given that it is a new and necessary behavior (the baby must be fed one way or another) related to a very important outcome: their infant's health.

I will use a measure of primipara status to explore the hypothesis that first-time mothers will be easier to persuade to exclusively breastfeed based on their lack of prior breastfeeding experience. This hypothesis rests, in part, on the assumption that the large majority of mothers in Vietnam will not have exclusively breastfed children born prior to the campaign launch (at baseline, only 11% of women were still exclusively breastfeeding, even in the previous 24 hours, in the fifth month after birth).

If the mass media campaign were more effective among first-time mothers than among experienced mothers, this would have important implications for evaluating the effectiveness of the present campaign and also for the design of future campaigns promoting EBF. Given that prior behavior is a strong predictor of subsequent behavior, persuading a first-time mother to exclusively breastfeed is relatively more valuable than persuading mothers who already have several of their total children because, provided that the mother also exclusively breastfeeds her subsequent children, it will generate a greater long-term public health impact. In addition, future campaigns promoting EBF could be more narrowly targeted to be more effective among first-time mothers and evaluated in such a way as to better measure the effects.

Infant's age could also be an important moderator of campaign effects because EBF is largely an age-dependent behavior. At baseline, the population-level pattern of EBF follows a linear pattern of decline from about 46% in the first month after the infant's birth to about 11% in the fifth month. Confusion (in Vietnam and elsewhere) about the appropriate duration of EBF can exacerbate the drop-off in months 3-5. Furthermore, once EBF is abandoned, it can be difficult to

resume because, depending on how much supplementation has taken place, a woman's breastmilk supply may be reduced. I expect the mass media campaign to have had greater effects among 0-2 month-olds than among 3-5 month-olds, perhaps by increasing the initiation of EBF and/or by extending the duration of EBF.

These analyses are important for accurately representing the effects of this campaign and for designing future campaigns to maximize effectiveness. Perhaps distinct message strategies are necessary to persuade mothers of newborns to exclusively breastfeed and continue EBF through the first three months than are necessary to persuade the mothers of infants aged 3-5 months to continue breastfeeding through the end of the fifth month.

In addition to contributing to a better understanding of for whom a given campaign was effective, subgroup effects research has important public health and social justice implications. It is possible that mass media campaigns are less accessible to population subgroups who are already socially disadvantaged, thereby exacerbating inequality. As demonstrated by the systematic review of mass media interventions for child survival that I conducted and the broader health communication literature, one common class of moderation analyses examines differential effects by demographic characteristics like gender, race/ethnicity, socioeconomic status, place of residence, and education level to better understand unintended negative consequences.

In my dissertation, I will investigate education level as a moderator of the effectiveness of Alive & Thrive's mass media campaign to promote EBF. The use of education here is meant to be a proxy for overall and health literacy.³ According to the WHO, "health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (Nutbeam, 2008, p. 2074). The skills required for high health literacy are most often developed through formal education. These skills include functional literacy (the ability to read, write, and calculate well-enough to navigate everyday life), interactive literacy (the ability to apply new information to

³ In some cases, education is used as a proxy for socioeconomic status, but in these analyses it is not meant to be considered as a proxy for SES, but rather as an indicator of health literacy.

changing circumstances), and critical literacy (the ability to critically analyze information and use it to exert greater control over life events and situations).

Specifically, I will explore whether the mass media campaign was less effective in increasing EBF behavior among mothers with lower educational levels. Although health information presented via mass media messages may be more accessible than other forms of health information that are written, translating television spots about EBF into EBF behavior nevertheless requires high levels of interactive and critical literacy. Ideally, there would be no differential effects by education level of Alive & Thrive's mass media campaign to promote EBF. However, if there are differential effects, I hypothesize that exposure to the mass media campaign will have a greater association with EBF behavior among women who are more educated. If this is the case, it would have important implications for designing more accessible communication messages and/or reaching less educated women through other communication strategies including interpersonal counseling.

Contribution of a strong evaluation to the literature base

In addition to addressing several interesting questions about whether mass media alone can affect a complex behavior like EBF and at what level (individual and/or social), through what processes, and for whom, my dissertation will also contribute to the literature of strong campaign evaluations for EBF in particular and child survival in low- and middle-income countries more generally.

Based on how thoroughly each of the 111 campaign evaluations that were included in the systematic review addressed threats to inference of mass media effects, 33 of the evaluations were categorized as weak, 32 as moderate, and 46 as stronger. The criteria for assessing the primary components of the evaluation included: sampling method, timing of data collection, and use of statistical controls or advanced statistical methods to address threats to inference. Evaluators' decisions about each of these components affect confidence in the inferences regarding campaign effectiveness.

All of the evaluations that draw conclusions from a substantially biased sample (or that do not report the sampling methodology) were classified as weak because their findings are not generalizable to the target population. In addition, studies with only one comparison group (before/after, low versus high exposure, or non-randomly assigned treatment versus control) that do not use statistical controls to adjust for potential a priori differences between the treatment and comparison groups were considered weak because no effort was made to address those threats to inference. The evaluations classified as moderate used an unbiased sample and made some effort to address threats to inference either by employing two comparison group approaches (a combination of before/after, low versus high exposure, and/or treatment versus control), or one comparison group and basic statistical controls. Stronger evaluations are those that have an unbiased sample and make a substantial effort to address threats to inference through a combination of multiple comparison groups, statistical controls, and, in some cases, advanced statistical methods.

In terms of sampling method, at baseline, the data were collected via a three-stage sampling methodology in which mass media only and franchise districts were purposively selected to be representative of the province (in terms of socioeconomic status, EBF rates, and minimum acceptable diet rates). Within each district, average-sized villages (the primary sampling unit) were selected based on population-proportionate-to-size, and mothers-child pairs were selected via systematic random sampling. At the subsequent 4 waves, a similar sampling strategy was employed with attempts to revisit the same communes at each wave.

Regarding the timing of data collection, data were collected at five different waves (one before and four after the campaign aired) in the same 118 communes. This design allows us to compare outcomes 1) across time, 2) post-intervention across levels of exposure at the individual level, and 3) across communes with higher levels of aggregate exposure as compared to communes with lower levels of aggregate exposure. In addition, because we have both communes where the intervention consisted of mass media only and communes where the intervention consisted of mass media in addition to the training of service providers and the

development of a franchise network of quality IYCF counseling and care, we can compare outcomes across mass media only and franchise communes. Although each of these analysis strategies suffers from specific threats to inference, together they can strengthen claims of effectiveness.

Finally, regarding the use of statistical controls, all individual level analyses include controls for potential confounders that are related to both exposure and exclusive breastfeeding. In addition, all analyses use a robust variance estimator to adjust for having the same communes across time.

My dissertation will contribute to the growing literature base of strong evaluations of the effectiveness of mass media by explicitly addressing threats to inference through a variety of analytic strategies with representative data collected at multiple time points.

Summary

In summary, through a series of studies, my dissertation aims to address several important questions and gaps in the literature related to the effectiveness of mass media campaigns. These include 1) whether a mass media intervention alone can increase population-level EBF rates and how the effects of a mass media only intervention differ from the effects of an intervention comprised of mass media plus other program components; 2) exploring individual and social routes of effects; 3) tracing mediation pathways from exposure through knowledge, attitudes, social norms, and self-efficacy to EBF behavior; and 4) investigating differential effects by population subgroups including infant's age, and mother's primipara status, and education level. Finally, my dissertation will also contribute to the literature by providing a strong evaluation of the effectiveness of a mass media intervention for exclusive breastfeeding in particular and child survival in general.

Chapter 2 METHODS

The data I will use in my dissertation come from the evaluation of a mass media campaign to promote exclusive breastfeeding in Vietnam. The campaign and evaluation were funded by the Bill and Melinda Gates Foundation and implemented by Alive & Thrive at FHI 360. The data are well suited for the proposed analyses for a number of reasons. First, the data are from a real-world campaign accompanied by a rigorous evaluation. Second, the data were collected in such a way as to allow us to analyze the effects of mass media alone and mass media plus the training of service providers and the creation of a franchise network of infant and young child feeding (IYCF) counseling and care services. Third, the structure of the data collection permits us to explore both an individual route of effects through direct exposure to campaign messages and a social route of effects via diffusion. Fourth, the main effects analyses, as reported in Chapter 3, suggest that the campaign did have an effect on the target behavior: exclusive breastfeeding. Fifth, the campaign and evaluation were designed based on the reasoned action model and four theoretical mediators including knowledge, attitudes, perceived social norms, and self-efficacy were carefully measured in the evaluation, allowing us to explore how the campaign had an effect. And, finally, information on key moderators was also collected, making it possible for us to investigate differential effects by population subgroups. The data allow me to address each of the major research questions outlined in Chapter 1.

Intervention

The Alive & Thrive project in Vietnam employed multiple program components including 1) the development of a franchise network of quality IYCF counseling and care; 2) advocacy and policy change; and 3) a national mass media campaign.

The franchise network involved the training of service providers at 800 public and 5 private facilities in 15 provinces and the creation of branded “Little Sun” counseling centers (FAQ on the social franchise model for infant and young child feeding counseling in Vietnam, 2013; see

Figure 2.1 for mock-up of counseling centers and logo). Qualitative formative research suggested that many service providers were misinformed about best IYCF practices and that mothers did not receive IYCF counseling at standard pre-natal visits (Formative research: Phase I). Designed to respond to these needs, the franchises offer free interpersonal counseling and/or group sessions beginning in the third trimester of pregnancy and continuing through the first two years of life.

Figure 2.1 Branded “Little Sun” counseling centers



Community outreach by trained village health workers, nutrition collaborators, and members of the Vietnam Women’s Union supported the counseling centers and clients by identifying potential clients, encouraging them to use the counseling services, and providing follow-up visits. The “Little Sun” centers also distributed branded posters, leaflets, and baby diaries.

The advocacy and policy change component of the project focused efforts on extending maternity leave, encouraging policy makers to revise and enforce the Code of Marketing of Breastmilk Substitutes (Decree 21), and generating support at all levels of the medical system for EBF. In the formative research, mothers frequently cited their return to work after four months as a barrier to EBF. Extending the maternity leave to six months not only facilitates EBF, but makes a clear statement about the recommended duration of EBF (Expanding Vietnam’s maternity leave policy to six months: An investment today in a stronger, healthier tomorrow, 2012). The formative

research also identified formula ads as a source of confusion about whether breast milk or formula milk was, in fact, best for the infant (Formative research: Phase I). By restricting and monitoring the advertisement of breastmilk substitutes, the government of Vietnam can minimize conflicting messages about breastfeeding in the media and eliminate the widespread promotion of formula in hospitals (Legislation to protect breastfeeding in Vietnam: A stronger Decree 21 can improve child nutrition and reduce stunting).

The first two policy goals were accomplished through a series of advocacy workshops with members of the Vietnam National Assembly. On June 18, 2012, 90% of the National Assembly voted in favor of extending paid maternity leave from 4 to 6 months, taking effect on May 1, 2013 (Alive & Thrive Partner Update #39, July 2012). On June 22, 2012, the Assembly approved a ban on the advertisement of breastmilk substitutes for children under 12 months of age (Alive & Thrive Partner Update #39, July 2012). In addition, members of the Women's Union were trained to identify and report marketing violations.

The mass media campaign involved the airing of 4 spots on national and regional television stations throughout the 63 provinces of Vietnam: "Nurse More," "No Water," "Iron-rich Foods," and "Little Sun Franchise Promotion" (Table 2.1). Two of these spots specifically advocate EBF for the first six months of the infant's life. From the qualitative formative research, two beliefs in particular stood out as barriers to exclusive breastfeeding, namely the belief that mothers have insufficient milk, both in terms of quantity and quality, to meet their baby's needs and the belief that water is needed to quench the baby's thirst, prevent over-heating, and to wash out the baby's mouth to prevent thrush (Formative research: Phase I). These beliefs reflect important self-efficacy beliefs (beliefs in one's ability to overcome obstacles related to performing a behavior) and attitudinal beliefs (beliefs in the positive and negative consequences of performing a behavior) and formed the basis for the "Nurse More" and "No Water" spots. The third spot, "Iron-rich Foods," was inspired by the finding, also from the formative research, that although most children in Vietnam are fed the recommended number of meals and have adequate energy intake, they are often deficient in iron (Formative research: Phase I). The "Little

Sun Franchise Promotion” spot was intended to raise awareness of the existence of IYCF counseling services and to drive uptake of those services.

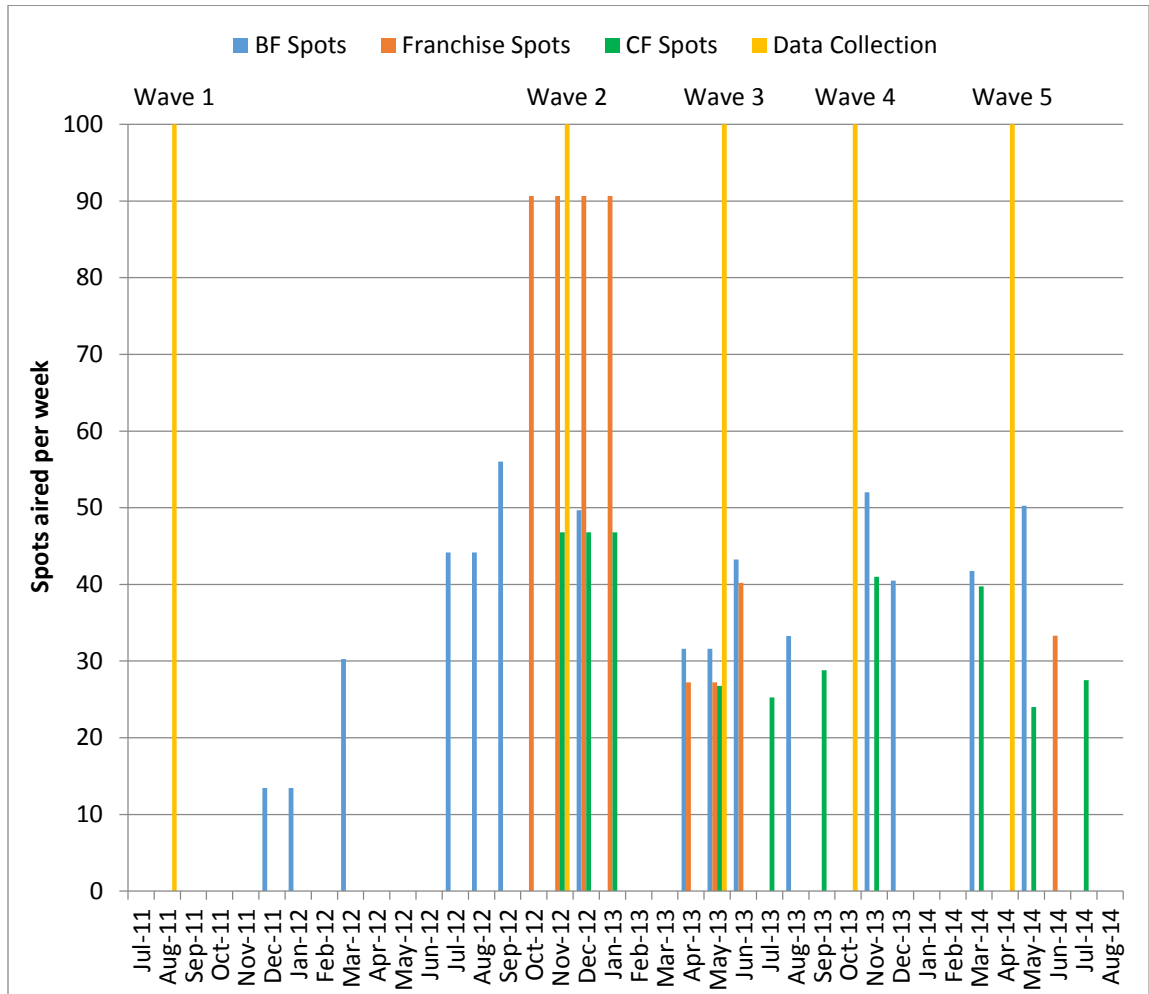
Table 2.1 Scripts of Alive & Thrive television spots

BF: Nurse More	BF: No Water
<p>30 second TV spot: https://www.youtube.com/watch?v=uRFFTGhUEf4</p> <p>Breast milk tastes so good! Yes, but my mom’s afraid she doesn’t have enough breast milk for me. Don’t worry. Breast milk is produced like magic. When you suckle, your mom’s body receives signals to produce more milk. The more you suckle, the more breast milk will be produced. <i>[written on screen breast feeding -> signals -> production]</i> Great! Mom, don’t be afraid that you will run out of breast milk You just need to keep breastfeeding me. Leading health organizations recommend . . . <i>[includes logos of Ministry of Health, World Health Organization, and Unicef]</i> . . . that you feed me only breastmilk for the first 6 months. Breastmilk has enough water and nutrients for me to grow up healthy and smart. Breastmilk – the best for us, proven globally. <i>[Last frame includes this slogan written out and the Măt tròi bé thơ logo and website]</i></p>	<p>30 second TV spot: https://www.youtube.com/watch?v=-wIWFlr3xNE</p> <p>I just finished breastfeeding. So yummy. Did you drink some water to rinse your mouth? Oh no, I don’t even drink a little bit of water. Just a few drops of water can make us sick. Really? Breast milk has enough water and all the nutrients you need. <i>[written on screen: breast milk = enough water + rich nutrients]</i> Mom, I don’t need water. Don’t worry that I’m thirsty or need to rinse my mouth. Leading health organizations recommend . . . <i>[includes logos of Ministry of Health, World Health Organization, and Unicef]</i> . . .that you feed me only breast milk for the first 6 months. Breast milk has enough water and nutrientsfor me to grow up healthy and smart. Breast milk – the best for us, proven globally. <i>[Last frame includes this slogan written out and the Măt tròi bé thơ logo and website]</i></p>
CF: Iron-rich Foods	Little Sun Franchise Promotion
<p>30 second TV spot: https://www.youtube.com/watch?v=fPbmmkbRBa0</p> <p>You are already 6 months old! Yes, along with other nutrients, I need to eat foods rich in iron. Iron helps the brain develop and prevents anemia. Mom, please feed me these foods. <i>[Child points to a picture book with labeled images of animal source foods (including pork, beef, organ meats, and eggs) and green leafy vegetables].</i> Yummy! Ah yes, my dear! The leading health organizations advise that once you are 6 months old, along with breastmilk, I should give you foods rich in nutrients, especially iron, every day. Along with mother’s milk, eating iron rich foods makes children healthy and smart.</p>	<p>15 second TV spot: https://www.youtube.com/watch?v=KZzC3jP9oco</p> <p>Mom, let’s go to Mat Troi Be Tho. Mat Troi Be Tho? At Mat Troi Be Tho counseling centers, we can receive trusted advice about our children’s nutrition. For kids to grow healthy and smart, visit your local health center. <i>[Last frame includes the text, “Child nutrition counseling,” the Măt tròi bé thơ logo and slogan “Nutrition today, health tomorrow,” and the text “The program is being implemented in 15 provinces, more detailed information is available at www.mattroibetho.vn”]</i></p>

According to baseline data, 70% of the target population watches television daily, making television an appropriate channel for the campaign (Nguyen et al., 2011). The breastfeeding spots were 30 seconds long and were aired over the course of twelve media bursts of, on

average, 40.5 spots a week across four and a half weeks for a total of 53 weeks on the air between 2011 and 2014. The media bursts varied from 13 to 56 spots per week and from 3 to 7 weeks in duration (Figure 2.2).

Figure 2.2 Timing of media bursts and data collection



In addition to the televised spots, in the franchise areas, the campaign delivered audio messages over outdoor loudspeakers and employed a variety of out-of-home marketing strategies including bus wraps, billboards, posters in health centers, and the airing of the spots on LCD screens in hospitals, health centers, and supermarkets (Strategic design of mass media: promoting breastfeeding in Vietnam, 2014). Finally, there was an online component to the campaign including a website, <http://mattroibetho.vn/en/home.h6.bic>, with interactive online

counseling and a discussion forum, a Facebook fan page, and a mobile app to connect young mothers, allow them to track their infant's milestones, share photos, and access information about best practices for infant feeding.

Data

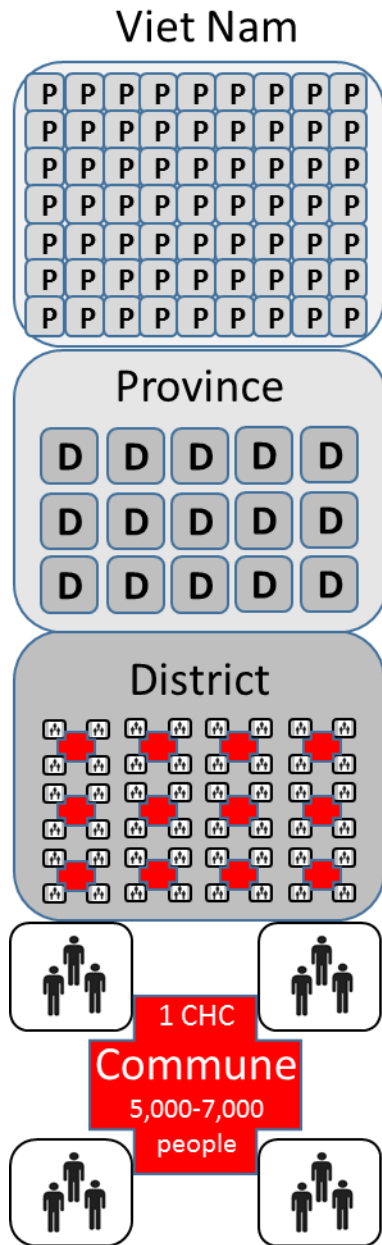
Data collection

The data I use in my dissertation were collected at five time points in four of the sixty-three provinces of Vietnam between August 2011 and April 2014.⁴ The provinces include Hai Phong, Quang Nam, Dak Lak, and Tien Giang (Appendix 1).⁵ Each province is made up of districts which are made up of communes (see Figure 2.3 for an illustration of the Administrative divisions of Vietnam). Each commune contains several villages that share a community health center (CHC). The CHC is generally staffed by a physician and four other medical personnel and provides primary healthcare services to a population of 5,000 to 7,000 people (Nguyen et al., 2011). Hai Phong Province is made up of 15 districts and 148 communes, Quang Nam Province is made up of 15 districts and 213 communes, Dak Lak Province is made up of 15 districts and 152 communes, and Tien Giang Province is made up of 8 districts and 144 communes. As the mass media campaign was aired on national and regional television stations, the spots were aired in all sixty-three provinces.

⁴ The survey and procedures were reviewed and approved by the Institutional Review Board of the Institute of Social and Medical Studies of Vietnam. Data was collected in private via structured interviews administered orally by trained Vietnamese university students. Informed consent was collected from all participants. Respondents were free to withdraw from the interview at any time without penalty and received a small remuneration of VND 40,000 (the equivalent of US\$2). The data have been stripped of all identifying information.

⁵ In the baseline and wave 5, data were collected from 11 provinces including Hà Nội, Hải Phòng, Quảng Trị, Đắk Lak, Đắk Nông, Tiền Giang, Quảng Nam, Khánh Hòa, Đà Nẵng, Quảng Bình, and Cà Mau. For the purpose of these analyses, however, we will only consider the four provinces where data were collected at each of the five time points.

Figure 2.3 Administrative divisions of Vietnam



For data collection, a three-stage cluster sampling methodology was used. Within each province, two districts scheduled to receive the Little Sun franchise were selected based on their representativeness of the province as a whole in terms of socioeconomic status, EBF rates, and minimum acceptable diet rates. Two comparable mass media only districts were also selected.

Within each district, the primary sampling unit, villages, were selected based on population-proportionate-to-size. Mothers were then sampled via systematic random sampling.⁶ At each wave, approximately 2,200 mothers with children under the age of six months were surveyed via face-to-face structured interviews. For the most part, the same communes were sampled at all five waves.

Variables and measurement

The large majority of the questionnaire came directly from annual surveys conducted by the National Institute of Nutrition and an extensive survey on breastfeeding behavior conducted by the International Food Policy Research Institute (IFPRI) in four provinces of Vietnam in June-August, 2010. The measures used by IFPRI are, in turn, based on the Demographic and Health Surveys (for a copy of the survey instrument see Appendix 2).

Measures associated with the components of the reasoned action model (RAM) were not included in either the NIN or the IFPRI survey instruments and so were developed by a team of communication specialists drawing on the extensive qualitative research conducted in Vietnam by Huemanitas in 2010.⁷ Working closely with Ann Jimerson, a Behavior Change Specialist at FHI 360, and Carol Baume, an independent consultant in communication research and evaluation, I helped to develop the knowledge, attitude, social norm and self-efficacy questionnaire items

⁶ At the baseline and wave 5, separate lists were generated for children under 6 months of age, children between 6 and 23.9 months, and children between 24 months and 59.9 months. To select households within each age group, a sampling interval (k) was obtained by dividing the total households in the sampling frame by the desired sample size. A random number (x) between one and the sampling interval (k) was chosen as the starting point using random number tables, and the sampling interval was added cumulatively. The households to be surveyed were those with the $(x+k)^{\text{th}}$ household, the $(x + 2k)^{\text{th}}$ household, $(x + 3k)^{\text{th}}$ household, and so on until enough households were selected to meet the required sample size for each age group (Nguyen et al., 2011). In the under 6 months age group, the sample size was calculated in order to be able to have 80% power to detect an 8% change in EBF rates at the provincial level (over the duration of the project) with a significance of .05 and a 7% change in EBF rates by monthly age-groups at the full sample level with a significance of .05. Calculations were based on current rates of EBF from the 2010 National Institute of Nutrition survey and included a correction for intra-cluster correlations estimated based on a 2010 survey by the International Food and Policy Research Institute (IFPRI). Each cluster consisted of a group of villages that form a commune. These calculations resulted in a sample size of approximately 2,000 mothers of children under the age of six months at each wave (wave 1: 2,237; wave 2: 2,012; wave 3: 2,260; wave 4: 2,534; wave 5: 2,234).

⁷ Huemanitas is a cultural marketing firm based in Denver, Colorado.

during the summer of 2011. In June 2011, we traveled to Vietnam to participate in the pretesting of the questionnaire.

The sections of the survey devoted to measurement of the components of the RAM were carefully translated and back-translated and then reviewed by four native speakers of Vietnamese to be sure that the translation would be understood by respondents in the manner intended by researchers. Face validity of the measures was established through expert evaluation and pretesting with the population of interest. During pretesting, the questionnaire was administered to fifteen women with children under the age of six months using a partial cognitive interviewing technique. When a woman exhibited difficulty responding to a question, she was asked to explain how she understood the question. Statements that respondents found difficult or confusing were modified to facilitate understanding and improve the validity of the measures.

Exclusive breastfeeding. The main dependent variable is exclusive breastfeeding which is defined by the World Health Organization (WHO) as giving only breast milk to a baby under 6 months of age. Oral rehydration salts and medicinal drops and syrups are permitted, but no other water, infant formula, or food is allowed. The EBF rate is computed from a set of 24-hour recall questions: "Thinking about the time period from when (NAME of infant) woke up yesterday morning until the time s/he woke up this morning, was s/he given any plain water [infant formula, other liquids or semi-solid or solid foods]?" Women who are still breastfeeding and responded negatively to each of these questions were classified as exclusive breastfeeders.

An advantage of this measure is that it asks mothers specifically about each category of food rather than directly asking "do you exclusively breastfeed?" thereby skirting some concerns of social desirability bias or women answering questions "correctly" rather than "truthfully." A concern related to this measure is the assumption that feeding patterns in the past 24 hours reflect feeding patterns since birth. A study in Vietnam asked mothers of four-month-olds and six-month-olds to recall feeding patterns in the past 24 hours, the past week, and the past month and found responses to be classified as exclusive breastfeeding for 26.1%, 18.4%, and 16% respectively for four-month olds and 10%, 5.1%, and 3.8% for six-month-olds (Bich, Hoa, &

Malquist, 2014). A study in Sweden compared EBF rates based on a diary since birth and 24-hour recall at 2, 4, and 6 months and found responses to be 92% and 51% at two-months, 73% and 30% at four months, and 11 and 1.8% at 6 months (Aarts et al., 2000). These findings suggest that the 24-hour recall measure of exclusive breastfeeding may substantially overestimate the true population rates of exclusive breastfeeding and also misclassify individual respondents who might have been in the opposite category if the interview had taken place on another day.

Chapter 3 reports both individual level and commune level analyses. The EBF overestimation will affect the commune level analyses in a limited way if the overestimation is consistent across communes so that their relative order in level of EBF remains unchanged. In contrast, the individual misclassification will have sharper effects, since it will contribute to error of measurement and thus cause systematic underestimation of associations of EBF with exposure and other variables.

Exposure. Exposure to the campaign was measured by an aided recall measure in which all respondents were shown images from the Alive & Thrive spots and asked: “Have you ever seen a video clip with these snapshots below?” (The images are reproduced in Appendix 3). Aided recall measures may lead to over-reporting because respondents may have been exposed to similar messages and may mistakenly report having seen the Alive & Thrive spots when, in fact, they saw other breastfeeding spots. By showing images of the Alive & Thrive spots, rather than simply describing the spots verbally, we tried to reduce this type of over-reporting.

Alternatively, acquiescence bias may lead respondents to report having seen the spot when they have not. To get a sense of the magnitude of this problem, we included a foil measure in the baseline which asked respondents: “In the past 30 days, have you seen a television ad about breastfeeding in which a mother describes how excited she was for her first ultrasound and how she is going to feed her infant so that her infant can grow up to be a strong and successful adult?” Of the 889 baseline respondents asked this question, 17% responded affirmatively (the rest of the 2,237 baseline respondents were skipped out of the question because they answered

no to a previous question about having seen any information about breastfeeding on television).

We did not continue to ask this foil measure in subsequent rounds of data collection.

Nevertheless, in wave 2, after the Alive & Thrive spots began to air, self-reported ever exposure levels jumped to 72%. It is likely that this jump reflects exposure to the Alive & Thrive spots as no other intensive television campaigns about EBF were on the air at that time. Furthermore, although over-reporting of individual exposure will affect estimates of campaign effectiveness, it likely leads to an under-estimation rather than an over-estimation of effects.

Unfortunately, this measure of aided recall does not give any indication of recency or frequency of exposure. Ideally, we would have followed the aided recall question with a question on frequency of exposure: "How often have you seen these ads in the past 30 days?" The measurement points did not always follow the media bursts closely enough to ask about frequency of exposure in the past 30 days. As a result, the aided recall measure reflects only whether the respondent was ever exposed to the Alive & Thrive television spots.

The aided recall question was followed by a confirmed recall question in which respondents were asked, "What are the key messages you could recall after watching the video clips?" If they gave any of the following answers they were considered to have seen the Alive & Thrive breastfeeding spots: "nursing more leads to more breast milk;" "breastfeeding signals the production of more breast milk;" "exclusive breastfeeding for children under 6 months;" "continue breastfeeding even if you worry you don't have enough milk;" "breast milk has enough water;" "no water for children under 6 months;" "no rinsing mouth with water for children under 6 months;" "a few drops of water can make your baby sick;" "breast milk has enough nutrients;" "no formula for children under 6 months;" "breast milk makes baby smart;" "breast milk makes baby healthy;" or "leading organizations recommend breastfeeding for the first 6 months."

In an attempt to create an exposure measure with more fineness of distinction so as to permit dose-response analyses, we created an ordinal measure that combines aided recall and confirmed recall into a four-point scale: 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages. This

measure of exposure is likely to be confounded with prior interest and knowledge (a concern with all self-reported exposure measures, but even more of a concern in this particular case).

Knowledge, attitudes, perceived social norms, and self-efficacy. The measures corresponding to the RAM include statements evaluating respondents' EBF knowledge, attitudes, perceived social norms, and perceived self-efficacy. Researchers decided to omit a neutral response category and so the statements are evaluated on a 6-point scale: *strongly disagree, disagree, disagree somewhat, agree somewhat, agree, strongly agree* or, in the case of self-efficacy: *very unconfident, unconfident, somewhat unconfident, somewhat confident, confident, very confident*.

Scales were constructed from the knowledge, attitude, perceived social norm, and self-efficacy items based on the theoretical grouping of items that were 1) addressed by the campaign messages and 2) expected to hang together. Confirmatory factor analysis was used to calculate Cronbach's alpha and examine the factor loadings for the entire dataset (all five waves). All of the scales load on one factor and have Cronbach's alphas of between 0.65 and 0.84.

Knowledge. The knowledge scale is constructed from five items including:

- Which is better for an infant under 6 months, breast milk alone or a combination of breast milk and infant formula?
- Until what month should a mother give her infant only breast milk and no other foods, water or infant formula?
- In what month do you think an infant should start receiving plain water in addition to breast milk?
- In what month do you think an infant should first start to receive liquids other than water in addition to breast milk?
- After completing what month should an infant first start to receive semi-solid foods?

Responses were dichotomized as either correct or incorrect. The items load on a single factor in a principal component analysis and have an alpha of 0.65.

Attitudes. Attitudes reflect individuals' beliefs about the positive and negative consequences of performing a given behavior, in this case, exclusive breastfeeding. Following the recommendations of the RAM, the attitude items are personal (using "I" and "my baby") and take the form of "If (behavior), then (consequence)" statements. The attitude scale is constructed from seven items including:

- *If I am breastfeeding, but do not give my infant water until s/he completes 6 months, my infant will be thirsty.
- If I feed my infant only breast milk and no other food, water or infant formula, until s/he completes 6 months, I am giving my infant all the nutrients s/he needs to be healthy.
- *If I feed my infant a combination of breast milk and infant formula until s/he completes 6 months, I am giving him/her the best possible nutrition.
- * If do not clean my infant's mouth out with water after breastfeeding, my infant will get thrush.
- *If I am breastfeeding my 5 month old infant, but do not give my infant water, s/he will be too hot.
- *If I feed my infant a combination of breast milk and other foods when s/he is between 4 and 6 months of age, I am giving my infant the best possible nutrition.
- If I feed my infant only breast milk and no other food, water, or infant formula until s/he completes 6 months, I am giving my infant all the nutrients s/he needs for optimal brain development.

The items preceded by an (*) are reverse coded. All seven attitude items load on a single factor in a principal component analysis and have an alpha of 0.84.

Perceived social norms. The measure of perceived social norms is the combination of a measure of injunctive social norms (Most people who are important to me (e.g. family members, friends...) think that I should feed my infant only breast milk, and no other food, water, or infant formula for the first 6 months) and descriptive social norms (Most women who have infants like

me feed their infant only breast milk, and no other food, water or infant formula for the first 6 months). The two measures are correlated at 0.72.

Perceived self-efficacy. Perceived self-efficacy reflects respondents' beliefs in their ability to overcome obstacles that might impede them from carrying out the desired behavior, exclusively breastfeeding for the first six months. The self-efficacy scale is constructed from five items including:

- My breast milk is of good enough quality to nourish my infant so that the infant does not need any other food, water, or infant formula until s/he has completed 6 months.
- The more I breastfeed my infant, the more breast milk my body will produce.
- My body can produce enough colostrum to feed my newborn within one hour after birth.
- My body can produce enough breast milk to feed my newborn only breast milk and no water or infant formula in the first 24 hours.
- The "first milk" produced by my body is all my newborn needs in the 24 hours after birth.

The items load on a single factor in a principal component analysis and have an alpha of 0.69.

Control variables

The literature on the determinants of breastfeeding is extensive. Demographic and environmental factors that are not easily modified, but should be taken into account because they have been found to affect breastfeeding outcomes and may also be related to beliefs, include maternal race/ethnicity, age, education, marital status, parity, whether or not the mother had a cesarean section, place of residence (urban/rural), season, developed or developing country setting, employment status, income, location of work, availability of childcare inside or outside the home, availability of breast milk substitutes, whether the mother herself was breastfed, and previous breastfeeding behavior (Bolling, 2007; Huffman, 1984; Wilmoth & Elder, 1995).

Control variables considered in this study are: mother's ethnicity, mother's age, level of education, mother's main occupation, whether the index child is her first child (primipara),

whether the mother had a cesarean section, the age of the index child (in months), and whether the mother is currently working. These variables are significantly associated with exposure to Alive & Thrive's mass media campaign, exclusive breastfeeding, and wave (Table 2.2).

Table 2.2 Associations between control variables and exposure, EBF, and wave

	Exposure	EBF	Wave
	Reg. Coeff.	OR	Reg. Coeff.
ethnicity (kinh vs. other)	0.300***	-0.201	-0.345***
mother's age (years)	-0.015***	0.027***	0.014***
no school (vs. > 12 years)	-0.596***	-0.447*	-0.215*
1-5 years (vs. > 12 years)	-0.444***	-0.500***	-0.245***
6-9 years (vs. > 12 years)	-0.218***	-0.155*	-0.349***
10-12 years (vs. > 12 years)	-0.061	-0.040	-0.208***
farmer (vs. housewife)	0.027	0.276***	-0.116*
government (vs. housewife)	0.131*	0.062	-0.004
salaried (vs. housewife)	0.007	0.327***	0.488***
self-employed (vs. housewife)	0.011	0.063	0.130*
primipara	-0.152***	-0.139**	-0.088**
cesarean	0.002	-0.301***	0.174***
month 0 (vs. month 5)	-0.345***	1.293***	-0.138*
month 1 (vs. month 5)	-0.285***	1.183***	-0.221***
month 2 (vs. month 5)	-0.137**	1.136***	-0.152***
month 3 (vs. month 5)	-0.086	0.841***	-0.109**
month 4 (vs. month 5)	0.005	0.453***	-0.044
back to work	-0.099*	-0.375***	-0.089
_cons	2.201***	-1.534***	3.210***
<i>N</i>	9009	11211	11211

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It is particularly important to control for any of the variables that are associated with both the independent and dependent variables: exposure and EBF, respectively. These variables are potential confounders and could distort the magnitude of the relationship between exposure and EBF if we do not control for them, particularly in the individual level analyses. These include mother's age, education, primipara status, infant's age, and back to work. I have also highlighted the variables that differ significantly from one measurement wave to another because they should be controlled for to make the repeated random samples as comparable as possible. These include ethnicity, mother's age, education, occupation, primipara, cesarean, and infant's age.

For the sake of simplicity and because my sample is quite large, I will control for the set of potential confounders in all individual level analyses rather than controlling for a subset in some analyses and a different subset in other analyses. These include mother's ethnicity, age,

education, occupation, whether she is a first-time mother, whether she had a cesarean section, the infant's age, and whether or not the mother has gone back to work.

Chapter 3 EFFECTIVENESS OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE BREASTFEEDING IN VIETNAM

This chapter explores the evidence for the effectiveness of Alive & Thrive's mass media campaign in changing EBF behavior in Vietnam. Rigorous evaluations of mass media campaigns to promote EBF are few and far between. Green (1989, 1999) reviewed breastfeeding interventions with a mass media component and concluded that, although many of the interventions were associated with improved breastfeeding behaviors, the intervention and evaluation designs did not permit causal inferences; other program components may have been responsible for some or all of the observed effect. In a review of reviews and notable studies, Wakefield, Loken, and Hornik (2010) concluded that the evidence for the effectiveness of mass mediated breastfeeding interventions is weak. Of the evaluations included in the systematic review of mass media interventions for child survival (Naugle & Hornik, 2014), none showed an effect on EBF. Although half of the evaluations of nutrition campaigns (7:14) included key messages on breastfeeding, only one study evaluated EBF as an outcome (Gupta, Katende, & Bessinger, 2004). They found no evidence for effects on EBF (perhaps because they evaluated the campaign prematurely, after only two months on the air). Nevertheless, some evaluations found evidence for the effectiveness of IYCF interventions with a mass media component on related outcomes like early initiation of breastfeeding (McDivitt, Zimicki, Hornik, & Abulaban, 1993; Sun et al., 2011), EBF knowledge (Gupta et al., 2004), breastfeeding frequency (Monterrosa et al., 2013), and incidence and duration of breastfeeding (Huffman, Panagides, Rosenbaum, & Parlato, 1991).

Two additional evaluations of nutrition interventions with a mass media component suggest that changes in population-level EBF rates are possible. The evaluation of an Integrated Management of Childhood Illnesses intervention in Armenia documented a before-after increase of 31% in EBF (Thompson & Harutyunyan, 2009) and a nutrition intervention in Madagascar reported a before-after increase of 28% in EBF (Guyon et al., 2009). However, as with most nutrition interventions, these two interventions also included other program components like the

training of service providers, interpersonal communication, and community mobilization. In the evaluation, the effects of the mass media component were not investigated separately from the other program components.

And so the question remains: can mass media alone impact EBF behavior? I will use a variety of approaches to explore the effectiveness of Alive & Thrive's mass media campaign in changing EBF behavior in Vietnam through both individual and social routes of effect. The primary questions driving the individual effects analyses include: Did the campaign generate high enough levels of exposure to expect changes in breastfeeding behavior? Is there a positive cross-sectional association between self-reported exposure to the television spots and EBF at the individual level? Is there a positive dose-response relationship between exposure and EBF? Do these associations remain after controlling for potential confounders and accounting for the multi-level structure of the data?

The primary questions driving the social effects analyses include: Is there evidence of effects via social diffusion? Did rates of EBF increase while the campaign was on the air? Do communes that were going to be high in exposure after the campaign launched experience greater before-after changes in EBF than communes that were going to be low in exposure? This longitudinal analysis overcomes the concerns of self-selection and reverse causal order inherent in cross-sectional analyses and captures social processes that are lost when focusing uniquely on individual differences in exposure.

Analyses

The first step in the analyses was to merge the five rounds of data collection. I dropped communes that did not have observations at each measurement wave, leaving a total of 118 communes and 11,277 participants.

I then transformed certain variables and created new variables for EBF, the primary dependent variable, and exposure, the primary independent variable.

First, I performed descriptive analysis on the dataset and identified key variables that differ across waves so that I might control for those variables in my analyses.

I then explored whether there were secular changes in EBF rates over the course of the campaign and whether EBF rates changed at different rates in mass media only communes as compared to franchise communes. In these analyses, I was effectively using time (the four waves of data collected after the launch of the campaign compared to baseline) as an indicator of exposure. I conducted multivariate regression at the commune level using a robust variance estimator to adjust for having the same communes across time. I also controlled for a number of demographic variables including mother's ethnicity, age, education, occupation, whether she is a first-time mother, whether she had a cesarean section, the infant's age, whether or not the mother has gone back to work, and the presence of the franchise.

The second question I explored was whether the campaign generated high enough levels of exposure to expect changes in breastfeeding behavior. Once that basic requirement was met (enough people have to have been exposed to the campaign to expect changes in behavioral outcomes), I moved on to the primary individual level analyses: Is exposure associated with EBF at the cross-sectional level? Is there a dose-response relationship between exposure and EBF? Does that relationship remain when we control for potential confounders and the multi-level structure of the data?

I conducted cross-sectional multivariate logistic regression with a robust variance estimator collapsing across waves 2-5. The baseline drops out of these analyses as there is no interpretable individual level exposure measure at baseline, before the campaign was on the air. I controlled for the same set of demographic variables listed above.

One advantage of an individual self-reported measure of exposure is that it captures individual variation in exposure and permits analyses of the association between self-reported exposure and behavior. However, self-reported measures of exposure also have some disadvantages. First, self-reported measures of exposure do not capture the social diffusion of the campaign because they do not take into account the fact that people may be affected by

campaign messages indirectly through interpersonal conversation with exposed others or because of other normative changes in their social environment as a result of the campaign. In addition, with self-reported measures of exposure it is unclear to what extent causal interpretation of the association of exposure measures with outcomes is confounded with other characteristics of the respondents. Also, even without concern about confounders, an observed association between exposure and an outcome might reflect either the influence of exposure on the outcome or the influence of the outcome on recall of exposure. As a result, causal order and self-selection are of particular concern especially in a case like this where there is no control group and where the data are repeated cross-sectional instead of panel data.

To address concerns of self-selection and causal order and to explore effects via social diffusion in addition to direct individual effects, I created a dataset of commune level variables for each wave by aggregating individual level data by wave and by commune. Each commune was assigned its average EBF rate at each wave. For exposure, each commune was assigned the average ordinal exposure rate collapsed across waves 2-5 at each wave. This allows us to effectively rank communes by their eventual exposure level even at baseline before the campaign was on the air. Because there is no evidence that the mass media campaign got stronger over time, I decided to conduct simple before-after analyses, rather than treating each wave as if it were distinct. I assigned wave 1 to “before” (N=118) and waves 2-5 to “after” (N=472).

I conducted a series of multivariate regression analyses with robust variance estimators (to account for having the same communes across time) to explore the following questions: Is there evidence that the mass media campaign had an effect on EBF behavior via social diffusion? Did commune level EBF rates change over time? Does the overtime change differ by mass media only communes and franchise communes? Is there a larger before-after change in EBF rates in the high exposure communes than in the low exposure communes? Did high exposure communes experience greater before-after increases in EBF in both mass media only and franchise communes?

Results

The respondents were primarily of Kinh ethnicity (90%) and averaged 27.8 years of age (Table 3.1). Seventy percent of the women had between 6 and 12 years of education. One third were farmers, one-third were salaried non-government employees, and one-third were either housewives, self-employed, or salaried government employees. Sixty-eight percent were first-time mothers and all but 2% gave birth in a medical facility. An average of 25% of the respondents had a cesarean section, but that number increased over the course of the evaluation period from 21% at wave 1 to 30% at wave 5. An average of 10% of women had returned to work at the time of the interview.

Table 3.1 Descriptive analyses by wave

	Wave 1 July '11	Wave 2 Oct '12	Wave 3 Apr '13	Wave 4 Oct '13	Wave 5 Apr '14	Total
	N=2,237	N=2,012	N=2,260	N=2,534	N=2,234	N=11,277
Ethnicity (Kinh)	N=2,210	N=2,011	N=2,260	N=2,532	N=2,225	N=11,238
	90%	91%	90%	89%	89%	90%
Age (mean)*	N=2,236	N=2,012	N=2,260	N=2,534	N=2,232	N=11,274
	27.5	27.8	28.1	27.7	27.8	27.8
Education*	N=2,237	N=2,010	N=2,259	N=2,531	N=2,229	N=11,266
Never attended school	2%	2%	2%	2%	2%	2%
1-5 years*	9%	12%	9%	10%	9%	10%
6-9 years*	51%	48%	46%	44%	40%	46%
10-12 years*	25%	22%	23%	24%	27%	24%
> 12 years*	13%	16%	20%	21%	22%	19%
Occupation*	N=2,234	N=2,012	N=2,260	N=2,534	N=2,231	N=11,271
Farmer*	40%	31%	29%	27%	24%	30%
Government employee	9%	9%	9%	10%	10%	9%
Salaried employee*	16%	33%	33%	34%	40%	31%
Self-employed*	16%	18%	16%	18%	14%	17%
Housewife*	18%	9%	13%	11%	12%	12%
Primipara*	N=2,237	N=2,011	N=2,258	N=2,534	N=2,230	N=11,270
	71%	68%	67%	66%	69%	68%
Homebirth	N=2,236	N=2,012	N=2,260	N=2,534	N=2,233	N=11,275
	3%	2%	2%	2%	2%	2%
Cesarean*	N=2,237	N=2,012	N=2,260	N=2,534	N=2,234	N=11,277
	21%	24%	25%	26%	30%	25%
Gender (female)	N=2,237	N=2,011	N=2,260	N=2,534	N=2,234	N=11,276
	47%	49%	48%	47%	46%	47%

Age of infant*	N=2,237	N=2,012	N=2,260	N=2,534	N=2,234	N=11,277
0 – 0.9 months*	8%	13%	10%	11%	9%	10%
1 – 1.9 months*	16%	15%	12%	17%	11%	14%
2 – 2.9 months	19%	18%	17%	19%	17%	18%
3 – 3.9 months	19%	20%	19%	18%	20%	19%
4 – 4.9 months*	20%	18%	22%	20%	22%	21%
5 – 5.9 months*	18%	16%	19%	16%	21%	18%
Back to work*	N=2,233	N=2,012	N=2,260	N=2,534	N=2,234	N=11,273
	7%	12%	14%	7%	9%	10%

*Significantly associated with wave. Significance of Chi2 \leq .05.

It is important to note that there are small differences across waves for most variables except for occupation where there is a large difference between baseline and subsequent measurement waves. In an attempt to account for differences in the samples across waves, I will control for these variables when exploring secular changes across time.

Secular Changes

The first question I explored was whether commune level EBF changed during the period in which the Alive & Thrive television campaign aired (Table 3.2, Model 1) and whether EBF changed at different rates in the mass media only communes compared to the franchise communes (Table 3.2, Model 2). I conducted multivariate linear regression at the commune level controlling for demographic variables to adjust for differences in the samples at each wave and used a robust variance estimator to account for having the same communes across time.

Table 3.2 Secular changes in EBF at the commune level

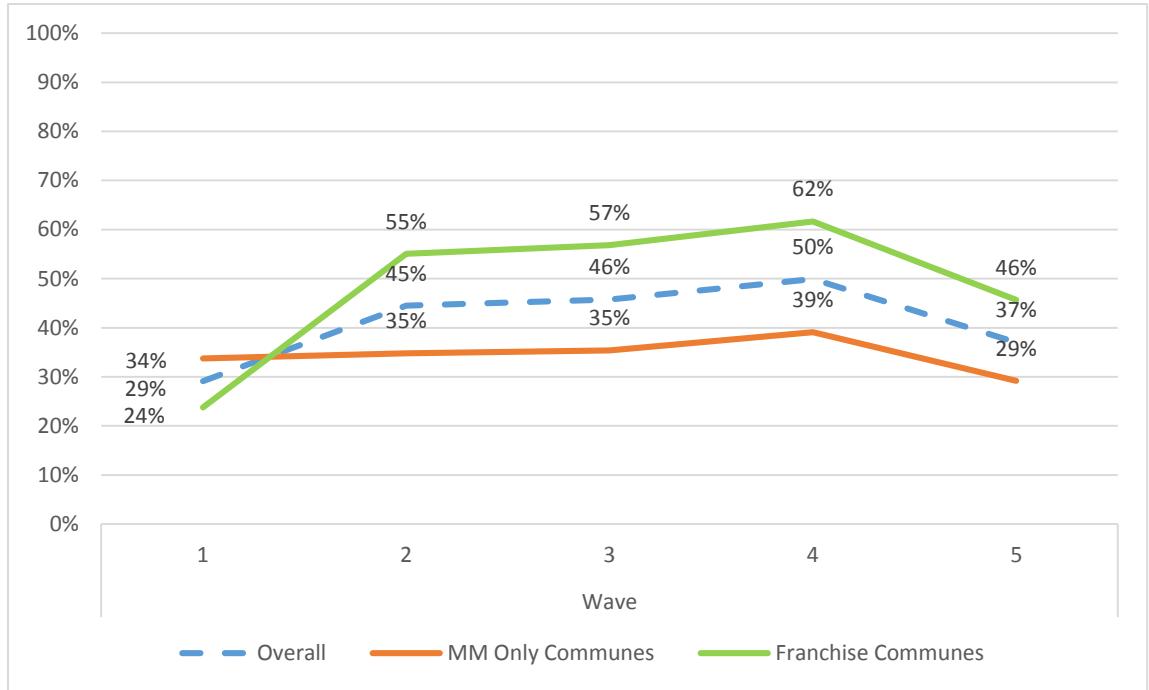
	Model 1		Model 2	
	EBF	95% CI	EBF	95% CI
wave 2 (vs. wave 1)	0.154***	[0.093,0.214]	0.011	[-0.048,0.070]
wave 3 (vs. wave 1)	0.166***	[0.114,0.218]	0.016	[-0.045,0.078]
wave 4 (vs. wave 1)	0.208***	[0.149,0.267]	0.054	[-0.013,0.121]
wave 5 (vs. wave 1)	0.079**	[0.020,0.137]	-0.046	[-0.114,0.023]
franchise	0.141***	[0.095,0.187]	-0.100**	[-0.162,-0.037]
ethnicity (kinh vs. other)	-0.138**	[-0.242,-0.034]	-0.141**	[-0.239,-0.043]
mother's age (years)	0.021***	[0.010,0.033]	0.019***	[0.008,0.030]
no school (vs. > 12 years)	-0.209	[-0.585,0.167]	-0.172	[-0.562,0.218]
1-5 years (vs. > 12 years)	-0.114	[-0.369,0.140]	-0.158	[-0.405,0.089]
6-9 years (vs > 12 years)	0.226*	[0.026,0.426]	0.233*	[0.030,0.436]
10-12 years (vs. > 12 years)	0.120	[-0.088,0.328]	0.083	[-0.124,0.290]
farmer (vs. housewife)	0.276*	[0.042,0.511]	0.260*	[0.049,0.470]
government (vs. housewife)	0.253	[-0.089,0.594]	0.233	[-0.093,0.559]
salaried (vs. housewife)	0.372**	[0.135,0.609]	0.349**	[0.128,0.570]
self-employed (vs. housewife)	-0.042	[-0.314,0.230]	-0.039	[-0.290,0.212]
primipara	-0.126*	[-0.250,-0.002]	-0.129*	[-0.252,-0.006]
cesarean	0.063	[-0.093,0.218]	0.068	[-0.085,0.220]
month 0 (vs. month 5)	0.302*	[0.029,0.576]	0.299*	[0.042,0.556]
month 1 (vs. month 5)	0.223*	[0.003,0.443]	0.215*	[0.005,0.425]
month 2 (vs. month 5)	0.352**	[0.136,0.568]	0.335***	[0.140,0.531]
month 3 (vs. month 5)	0.193	[-0.013,0.399]	0.181	[-0.011,0.372]
month 4 (vs. month 5)	0.160	[-0.031,0.352]	0.163	[-0.015,0.342]
back to work	-0.146	[-0.360,0.069]	-0.151	[-0.366,0.064]
wave 2#franchise (vs. wave 1#franchise)			0.303***	[0.216,0.389]
wave 3#franchise (vs. wave 1#franchise)			0.315***	[0.233,0.397]
wave 4#franchise (vs. wave 1#franchise)			0.326***	[0.237,0.414]
wave 5#franchise (vs. wave 1#franchise)			0.265***	[0.174,0.355]
_cons	-0.674**	[-1.082,-0.266]	-0.461*	[-0.863,-0.060]
<i>N</i>	590		590	
adj. <i>R</i> ²	.351		.410	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Overall, EBF rates are changing over time (Table 3.2, Model 1). EBF rates at all four waves are significantly higher than baseline EBF rates. However, when we explore an interaction between wave and whether the respondent lives in a mass media only commune or a franchise commune we see that the positive effect of time on EBF is significantly greater in franchise communes than in mass media only communes (Table 3.2, Model 2). This means that, at each wave, the difference between EBF rates at that wave and baseline is significantly greater in franchise communes than in mass media only communes. This does not necessarily mean that

there is no effect of time on EBF in mass media only communes, only that the effect is greater in franchise communes.

Figure 3.1 Trends in commune level EBF rates over time



By graphing the interaction, we can better understand the results. Looking at Figure 3.1, we see that, in franchise communes, the EBF rate spiked sharply between waves 1 and 2 and then remained significantly different from baseline at all subsequent waves (albeit dropping significantly in wave 5). However, the EBF rate in mass media only communes remained flat over time, never differing significantly from baseline. These initial analyses suggest that the overall increase in EBF was largely driven by changes in EBF rates in the franchise communes and not in the mass media only communes.

Over time analyses are threatened by history or other interventions, events or natural (secular) changes that occur simultaneously with the intervention and may be responsible for the observed effects. In addition, over time analyses are threatened by the possibility of non-equivalent samples. Here we have controlled for demographic and other characteristics that vary by wave to make the samples as comparable as possible. The threat of history can be somewhat

reduced by also showing that levels on the outcome variable vary across levels of exposure post-intervention, thereby linking observed effects to the mass media campaign.

If, in the following section, we show that individual level campaign exposure is associated with EBF at waves 2-5, it will strengthen our claims of effects in the franchise communes where we also see overtime changes in EBF. However, for the mass media only communes (where there is no evidence for overtime changes in EBF), even if the individual level analyses show an association between exposure and EBF, we will not be confident that it is exposure driving EBF (and not EBF behavior driving recall of exposure). Unless multiple analysis strategies support claims of campaign effectiveness, we will be unable to convincingly address threats to inference and we will not be confident in the conclusion that the campaign had an effect on EBF behavior.

Exposure

The second question I explored was whether the campaign generated high enough levels of exposure to expect changes in breastfeeding behavior. Exposure to the campaign is a necessary, but not sufficient, indicator of campaign success. If there was no or very low levels of exposure to the campaign, we cannot expect the campaign to have had an effect on behavioral outcomes.

Table 3.3 shows levels of exposure based on an ordinal measure combining aided recall and confirmed recall. Exposure levels were quite high. In mass media only communes, 58% of respondents reported exposure to the Alive & Thrive television spots and could recall at least one message. In franchise communes, 69% of respondents reported exposure and could recall at least one message. These levels of exposure should be sufficient to expect changes in EBF behavior.

Overall, more respondents reported never being exposed to the Alive & Thrive television spots in the mass media only communes than in the franchise communes. And, at all five waves, respondents in the franchise communes recalled more breastfeeding messages than respondents in the mass media only communes.

Table 3.3 Exposure across waves

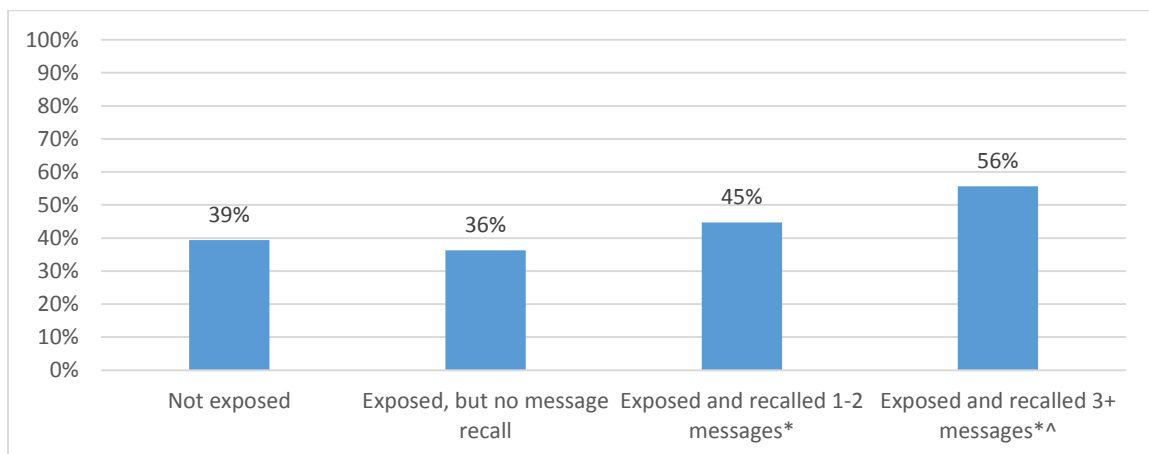
	Wave 2*	Wave 3*	Wave 4*	Wave 5*	Total*
MM Only Communes	N=1,004	N=1,124	N=1,233	N=1,148	N=4,509
Not exposed	33%	25%	28%	26%	28%
Exposed, but no message recall	15%	18%	15%	11%	15%
Exposed and recalled 1-2	32%	36%	31%	32%	33%
Exposed and recalled 3+	20%	22%	25%	32%	25%
Franchise Communes	N=1,008	N=1,136	N=1,301	N=1,086	N=4,531
Not exposed	23%	18%	19%	24%	21%
Exposed, but no message recall	11%	13%	11%	8%	11%
Exposed and recalled 1-2	36%	36%	34%	31%	34%
Exposed and recalled 3+	30%	33%	37%	37%	35%
Combined	N=2,012	N=2,260	N=2,534	N=2,234	N=9,040
Not exposed	28%	21%	24%	25%	24%
Exposed, but no message recall	13%	15%	13%	9%	13%
Exposed and recalled 1-2	34%	36%	32%	31%	33%
Exposed and recalled 3+	25%	28%	31%	34%	30%

*Self-reported exposure differs significantly between mass media only and franchise communes ($p \leq .05$).

After determining that the campaign generated high enough exposure levels to reasonably expect effects, I moved on to the primary main effects analyses at the individual level: the cross-sectional association between self-reported exposure and EBF.

Overall, exposure is significantly and positively associated with EBF and there is a significant and positive dose-response relationship such that those who were exposed and recalled more messages were more likely to be categorized as having exclusively breastfed their infant in the past 24 hours (Figure 3.2).

Figure 3.2 Association between individual level exposure and EBF



*Significantly different from not exposed and exposed, but no message recall.

^Significantly different from exposed and recalled 1-2 messages

Exposure with no message recall was not significantly different from no exposure (Table 3.4, Model 1). However, recalling 1-2 messages was significantly different from both no exposure and exposure with no message recall. And those who recalled three or more messages were significantly more likely to report exclusive breastfeeding than those who recalled 1-2 messages.

The pattern of results did not change when controlling for whether the respondent lives in a mass media only commune or a franchise commune and other demographic variables (Table 3.4, Model 2). And, in an additional analysis, I included an interaction between level of exposure and whether the respondent lives in a mass media only commune or a franchise commune to explore whether the relationship between exposure and EBF differs by that characteristic (Table 3.4, Model 3). The interactions were not significant, meaning that higher levels of self-reported exposure were associated with higher levels of EBF in both mass media only communes and franchise communes.

Table 3.4 Association between self-reported exposure and EBF (waves 2-5)

	Model 1 EBF OR [95% CI]	Model 2 EBF OR [95% CI]	Model 3 EBF OR [95% CI]
exposed, but no recall (vs. no exposure)	0.878 [0.744,1.035]	0.924 [0.779,1.097]	1.034 [0.811,1.319]
exposed and recalled 1-2 messages (vs. no exposure)	1.244** [1.086,1.425]	1.280*** [1.118,1.464]	1.282* [1.044,1.576]
exposed and recalled 3+ messages (vs. no exposure)	1.934*** [1.665,2.246]	2.107*** [1.803,2.463]	2.011*** [1.611,2.510]
ethnicity (kinh vs. other)		0.749** [0.618,0.909]	0.750** [0.618,0.910]
mother's age (years)		1.032*** [1.023,1.042]	1.032*** [1.023,1.042]
no school (vs. > 12 years)		0.751 [0.510,1.107]	0.751 [0.513,1.100]
1-5 years (vs. 6-9 years)		0.674** [0.511,0.890]	0.674** [0.511,0.888]
6-9 years (vs. > 12 years)		0.976 [0.810,1.176]	0.975 [0.809,1.174]
10-12 years (vs. > 12 years)		1.017 [0.845,1.225]	1.017 [0.845,1.225]
farmer (vs. housewife)		1.240* [1.029,1.495]	1.242* [1.032,1.496]
government (vs. housewife)		0.995 [0.799,1.239]	1.000 [0.802,1.246]
salaried (vs. housewife)		1.167 [0.987,1.381]	1.169 [0.987,1.385]
self-employed (vs. housewife)		0.945	0.946

		[0.795,1.123]	[0.796,1.124]
primipara		0.900*	0.901*
		[0.812,0.997]	[0.812,0.998]
cesarean		0.701***	0.702***
		[0.619,0.795]	[0.619,0.796]
month 0 (vs. month 5)		3.876***	3.869***
		[3.216,4.672]	[3.210,4.663]
month 1 (vs. month 5)		3.633***	3.642***
		[3.064,4.308]	[3.072,4.317]
month 2 (vs. month 5)		3.477***	3.470***
		[2.966,4.075]	[2.961,4.065]
month 3 (vs. month 5)		2.401***	2.408***
		[2.087,2.762]	[2.094,2.770]
month 4 (vs. month 5)		1.587***	1.590***
		[1.392,1.810]	[1.395,1.813]
back to work		0.684***	0.681***
		[0.575,0.814]	[0.572,0.812]
franchise (vs. mass media only)		2.286***	2.305***
		[1.772,2.949]	[1.650,3.220]
exposed, but no recall#franchise (vs. no exposure#franchise)			0.781
			[0.561,1.088]
exposed and recalled 1-2 messages#franchise (vs. no exposure#franchise)			0.995
			[0.758,1.305]
exposed and recalled 3+ messages#franchise (vs. no exposure#franchise)			1.083
			[0.802,1.462]
<i>N</i>	9040	9009	9009

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Individual level cross-sectional analyses are threatened by self-selection. Self-selection (in contrast to random assignment to condition) is a concern because exposure to mass media messages is rarely the only difference between exposed and unexposed groups. Therefore, observed effects may not be due to exposure, but rather to confounding variables that affect both exposure and the outcome of interest. This threat can be reduced by controlling statistically for as many known potential determinants of exposure and the outcome behavior as possible, as we have done here. Nevertheless, unmeasured confounders could still pose a threat.

Individual level cross-sectional analyses are also threatened by causal order. It could be that exposure to Alive & Thrive's mass media campaign is driving breastfeeding behavior, but it could also be that those women who are already exclusively breastfeeding remember the Alive & Thrive spots better (because they align with their pre-existing beliefs about the importance of breastfeeding) or have higher breastfeeding knowledge and therefore score higher on our exposure measure.

If the secular analyses from the previous section showed significant effects in both mass media only and franchise communes, we would be more confident in the concluding that exposure to the mass media campaign drove changes in EBF behavior. The fact that only the franchise communes show significant over time changes in EBF makes us much less confident. Given that the cross-sectional association between exposure and EBF does not differ between mass media only communes and franchise communes, we would expect to observe similar overtime increases in EBF in the mass media only areas as we observe in the franchise areas if exposure were driving EBF (rather than vice versa). As the evidence does not support claims of overtime effects in both mass media only and franchise communes, we cannot be confident about the causal process underpinning the association of the exposure measure with EBF behavior. As a result, with the available measures and data, we cannot confidently claim that Alive & Thrive's mass media campaign had an effect at the individual level.

However, we can also explore the effects of Alive & Thrive's mass media campaign through commune level analyses. Mass media campaigns can have effects through direct individual exposure to the campaign via a model of effects that posits that individual exposure leads to changes in cognitions which lead to changes in behavior. Mass media campaigns can also have effects through a process of social diffusion in which individuals may be influenced by the shifting norms of their environment with or without direct exposure to media messages. In addition, they can have effects through institutional processes in which mass media influences the opinions of the institutional elite who influence institutional policies which then affect individual behavior.

Individual, social, and institutional processes of effects can, and likely do, operate simultaneously. The individual level analyses exploring the direct effects of individual exposure on individual cognitions and behavior only capture individual effects, but the commune level analyses capture individual, social, and institutional processes of effects. As we cannot be confident in the individual level analyses, we will now focus our attention primarily on the commune level analyses. It is important to note, however, that it may be more difficult to detect

effects at the aggregate level than via direct effects at the individual level because the effects will be somewhat diluted.

In what follows, I focus on the rates of change at the commune level comparing places that were going to get more exposure with those that were going to get less exposure. Because this analysis permits us to control for the association between the pre-campaign tendency for (eventual) exposure and EBF, it lessens threats of self-selection. If it were true that EBF was driving recall of exposure to messages the association should already be present before the campaign began. The same 118 communes were sampled across the five measurement waves, allowing us examine before-after changes in the same communes and thereby strengthen causal claims. If a process of social diffusion is at work at the commune level, we would expect to find that communes that were going to be high on exposure changed at a faster rate than communes that were going to be low on exposure.

Commune level analyses

To explore campaign effects at the commune level (via individual, social, and institutional processes of effects) and to overcome concerns of causal order and self-selection that threaten the cross-sectional individual level associations between exposure and EBF, I conducted a series of multivariate regression analyses on aggregated commune level variables with robust variance estimators.

The essential analysis focuses on whether there is a larger before-after change in EBF rates in the high exposure communes than in the low exposure communes.⁸ Consistent with a

⁸ To explore which variables should be included in the commune level analyses as confounders, I conducted a series of regressions of each of the potential confounders on an interaction between time and commune level exposure correcting for commune level clustering (ethnicity, mother's age, mother's education, mother's occupation, whether the mother has given birth to more than one child, whether the mother had a cesarean section delivery, the age of the infant in months, and whether the mother had returned to work at the time of the interview; see Appendix 5). I also conducted a series of regressions of EBF on an interaction between time and each of the potential confounders. If both interactions were significant, it would mean that, at the commune level, change over time in that particular variable depends on commune level exposure and that the change over time in that variable is associated with the change over time in EBF. If both of those are true, then the variable could account for some of the observed effect of exposure on EBF and it should be controlled for in the final model. I conducted these analyses separately for franchise communes and mass media only communes. In franchise communes, only overtime changes in the percentage of respondents in the commune that were salaried employees significantly depended on commune level exposure. However, the change over time in the

social diffusion model of effects, if communes that were going to be high in exposure experience greater before-after changes in EBF than communes that were going to be low in exposure, then we can be somewhat confident that commune level exposure is influencing commune level EBF. This result would suggest that, independent of direct individual exposure to campaign messages, being in a high exposure commune has an effect on EBF behavior.

Given the prior finding that population-level EBF rates changed significantly across the course of the campaign in franchise communes but not in mass media only communes, I will continue to carefully explore differences between franchise communes and mass media only communes. I do not focus uniquely on franchise communes, where we have thus far found evidence of effects, because I believe the contrast between franchise and mass media only communes can be illuminating and help us to understand how and why the campaign seems to have had effects on EBF behavior in the franchise communes, but not in the mass media only communes.

As we already saw earlier in this chapter, commune level EBF rates increased significantly over time, even when controlling for whether the commune was a mass media only or franchise commune (Table 3.5, Models 1 and 2). The before-after increase in commune level EBF rates was significantly greater in franchise communes than in mass media only communes (Table 3.5, Model 3). Consistent with these findings, additional analyses show that, across all communes, there is no evidence that commune level exposure is associated with before-after increases in EBF above and beyond the effect of being a franchise commune; the interaction between time and exposure is not significant when an interaction between time and franchise is included in the model (Table 3.5, Model 4).⁹ The significant main effect of exposure in Model 4

percentage of respondents in the commune that were salaried employees does not significantly determine changes in EBF over time. In mass media only communes, the percentage of respondents in the commune that were self-employed or housewives and the percentage of mothers of 2-month-olds were significantly predicted by an interaction between time and commune level exposure. Only the percent of respondents in the commune that were self-employed also significantly predicted over time changes in EBF. When I controlled for the percent of the respondents in the commune that were self-employed in mass media only communes in the final model, it did not change the substantive conclusions and so, for the sake of simplicity, I returned to a model without confounders.

⁹ In the commune level analyses, anywhere there is an interaction between exposure and time ($after\#exposure$) the model suffers from high multicollinearity. To reduce the multicollinearity, I considered mean centering the variables in the model, but as I am only interested in the interaction term and do not interpret the main effects in the models with an interaction term, I have decided not to mean center. Mean centering has no effect on the hypothesis test for the interaction term and

suggests that the advantage in EBF for high exposure communes was already present before the launch of the media campaign and that EBF did not increase after the campaign aired. This finding reinforces our prior concern that the observed correlation between exposure and EBF may be an artefact of reverse causation. However, the significant interaction between time, exposure, and franchise in Model 5 suggests that being in a high exposure commune (as compared to a low exposure commune) is significantly associated with greater before-after changes in EBF in franchise communes, but not in mass media only communes.

Table 3.5 Before-after EBF by commune level exposure

	Model 1 EBF [95% CI]	Model 2 EBF [95% CI]	Model 3 EBF [95% CI]	Model 4 EBF [95% CI]	Model 5 EBF [95% CI]
after	0.188*** [0.144,0.232]	0.188*** [0.144,0.232]	0.036 [-0.009,0.081]	-0.004 [-0.165,0.158]	0.172 [-0.029,0.374]
franchise		0.150*** [0.092,0.209]	-0.101** [-0.167,-0.034]	-0.137*** [-0.209,-0.065]	0.232 [-0.157,0.622]
after#franchise			0.314*** [0.248,0.380]	0.307*** [0.226,0.387]	-0.172 [-0.583,0.240]
exposure				0.129* [0.015,0.244]	0.217* [0.045,0.389]
after#exposure				0.026 [-0.082,0.133]	-0.088 [-0.222,0.048]
franchise#exposure					-0.215 [-0.447,0.017]
after#franchise#exposure					0.278* [0.048,0.508]
_cons	0.263*** [0.228,0.297]	0.190*** [0.139,0.241]	0.311*** [0.260,0.362]	0.111 [-0.069,0.290]	-0.025 [-0.295,0.244]
N	590	590	590	590	590
adj. R ²	0.091	0.183	0.247	0.275	0.277

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To better understand the results, I split the three-way interaction into separate models for franchise communes (Table 3.6, Models 1A & 1B) and mass media only communes (Table 3.6, Models 2A & 2B).

according to Hayes (2005), the only reason to mean center is in complicated models with so many predictors and interactions that the mathematics of multiple regression fail to compute.

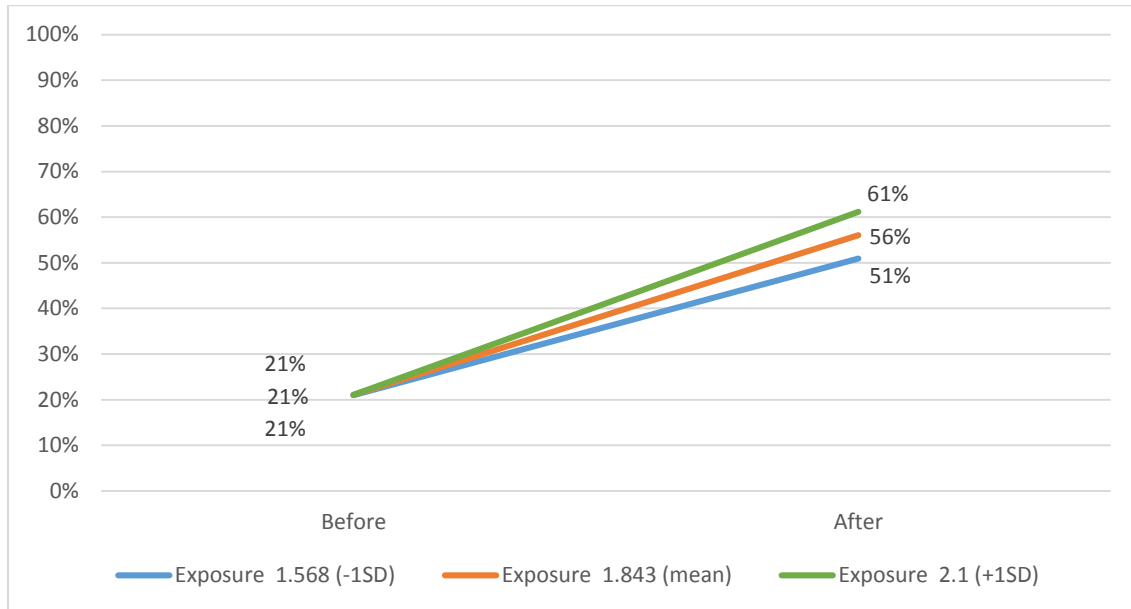
Table 3.6 Before-after EBF by commune level exposure in franchise and mass media only communes

	Franchise communes		Mass media only communes	
	Model 1A EBF [95% CI]	Model 1B EBF [95% CI]	Model 2A EBF [95% CI]	Model 2B EBF [95% CI]
after (vs. before)	0.350*** [0.301,0.400]	0.0004 [-0.364,0.365]	0.036 [-0.009,0.082]	0.172 [-0.032,0.376]
exposure		0.002 [-0.157,0.160]		0.217* [0.043,0.391]
after#exposure		0.191* [0.002,0.379]		-0.088 [-0.224,0.049]
_cons	0.210*** [0.168,0.253]	0.207 [-0.078,0.492]	0.311*** [0.259,0.363]	-0.025 [-0.298,0.248]
<i>N</i>	285	285	305	305
adj. <i>R</i> ²	0.278	0.303	0.002	0.049

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

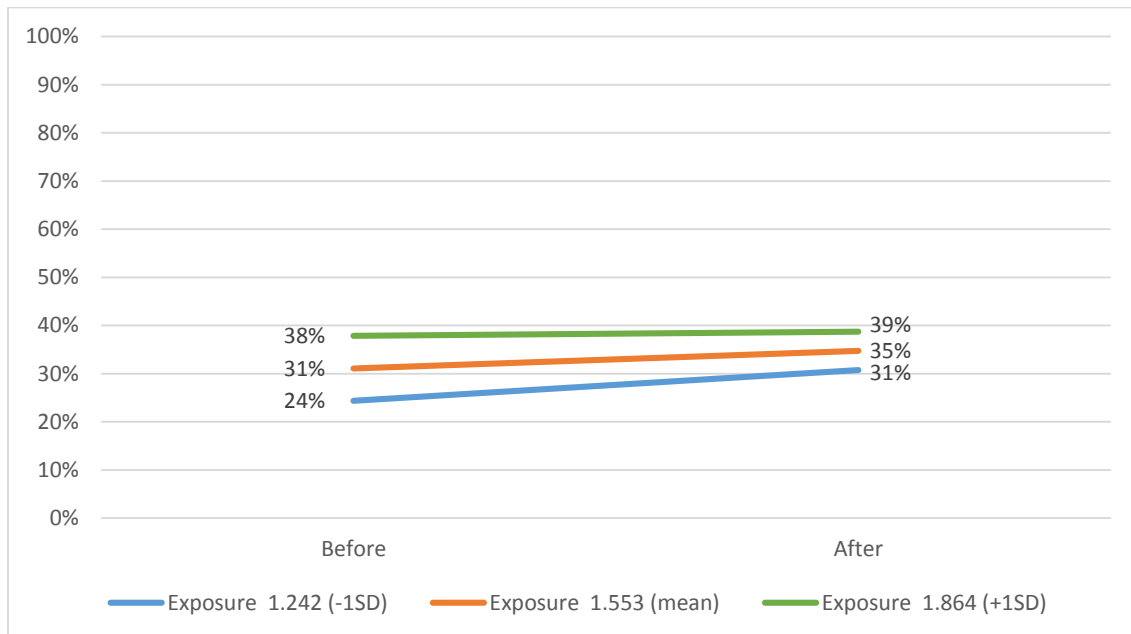
If we break the interaction down and graph the change over time in EBF at three levels of exposure, we see that, in the franchise areas, communes that were going to be high in exposure after the campaign began were not different in EBF at baseline (Figure 3.3). And although even low exposure communes experienced increases in EBF, high exposure communes experienced significantly greater before-after increases in EBF than low exposure communes. For the mass media only areas, the communes that were going to be high in exposure after the campaign began already had a higher EBF rate at baseline and did not improve at a faster rate than low exposure communes (Figure 3.4).

Figure 3.3 Before-after EBF by commune level exposure: Franchise communes



*The colored lines reflect changes over time in commune level EBF at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

Figure 3.4 Before-after EBF by commune level exposure: Mass media only communes



*The colored lines reflect changes over time in commune level EBF at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.242), one standard deviation below the mean (1.553), and one standard deviation above the mean (1.864) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

There is evidence, then, for an overtime effect of commune level exposure in franchise communes. But there are additional challenges to this claim. One might be concerned that it was not the media campaign, per se, that produced this effect, but other components of the campaign in the franchise communes that were somewhat correlated with level of exposure to the television spots (.42) and that might be responsible for the observed effects. To address this concern, we explored the role of additional exposure to the mass media campaign that individuals in franchise communes received from seeing the spots on television screens at health facilities and images from the spots on posters, billboards, and in books/magazines. We found that, in franchise areas, the overtime relationship between being in a high mass media exposure commune and EBF remains when we control for the additional exposure (Table 3.7, Model 1B). This suggests that the relationship between exposure and EBF in franchise communes was not due uniquely to the additional exposure they received, which was associated with the media exposure.

As further evidence that exposure in the franchise communes correlated with media exposure, we also examined only those mothers who reported not having gone to the franchise centers at all. The overtime effect between commune level exposure and EBF is still marginally significant ($p=.052$) even when we drop all the individuals who attended the franchise out of the sample (Table 3.7, Model 2A). The average commune level exposure (and additional exposure) in Model 2 is the same as in Model 1; however, the outcome variable, commune level EBF, is constructed only from people who did not attend the franchise. In communes with higher exposure to the mass media campaign, we see a similar overtime increase in commune level EBF even among those who did not attend the franchise (effect size of .18 compared to .19).

Table 3.7 Exploring before-after EBF by commune level exposure in franchise communes

	Model 1A EBF [95% CI]	Model 1B EBF [95% CI]	Model 2A EBF [95% CI]	Model 2B EBF [95% CI]
after (vs. before)	0.0004 [-0.364,0.365]	0.0004 [-0.365,0.366]	-0.013 [-0.361,0.336]	-0.013 [-0.362,0.336]
exposure	0.002 [-0.157,0.160]	-0.136 [-0.289,0.016]	0.007 [-0.151,0.165]	-0.141 [-0.294,0.012]
after#exposure	0.191* [0.002,0.379] p=.048	0.191* [0.001,0.380] p=.048	0.180 [-0.002,0.361] p=.052	0.180 [-0.002,0.362] p=.052
additional exposure		0.484*** [0.311,0.657]		0.518*** [0.325,0.711]
_cons	0.207 [-0.0778,0.492]	0.102 [-0.168,0.373]	0.196 [-0.090,0.481]	0.084 [-0.190,0.357]
N	285	285	284	284
adj. R ²	0.303	0.391	0.238	0.334

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Wave 4 of commune 108 drops out entirely when you remove franchise attendance. There were 6 respondents in commune 108 at wave 4 and all 6 of them reported attending the franchise.

Therefore, the effect in franchise communes is not limited to those who attended the franchise or to those who were exposed to Alive & Thrive's campaign through other channels in addition to mass media.

Conclusion

The analyses suggest that, at least regarding this particular intervention, mass media alone was not successful in improving population-level rates of EBF either through an individual effects model or through a social diffusion model of effects.¹⁰ Although self-reported exposure to the television spots was high (58% of respondents in mass media only communes and 69% of respondents in franchise communes reported exposure and could recall at least one message) and higher individual exposure was associated with higher exclusive breastfeeding behavior at the cross-sectional level, EBF rates did not improve over time in mass media only communes. In addition, high exposure communes did not experience greater before-after increases in EBF than

¹⁰ I also explored whether the Alive & Thrive mass media campaign was successful in changing a different outcome behavior: not giving water. One of the two EBF spots directly addressed not giving water to infants under 6 months of age so I thought that perhaps the mass media campaign might have had significant effects even in mass media only areas if I looked at a more narrowly-focused behavior. However, the pattern of effects was the same: there was evidence for effects in the franchise areas, but not in the mass media only areas (see Appendix 5 for more on the component behaviors of EBF and not giving water as the outcome behavior).

low exposure communes in mass media only areas. Taken together, these analyses provide no evidence for the effectiveness of the mass media campaign in changing EBF behavior in mass media only communes.

However, in franchise communes, there is evidence that mass media played a part in improving population-level rates of EBF. Exclusive breastfeeding rates jumped between waves 1 and 2 and then remained significantly higher than at baseline at all subsequent waves. Although we do not feel confident in the individual effects analyses due to the likely confounding of the exposure measure with knowledge and behavior, there is strong evidence for effects via social diffusion in the franchise communes. High exposure franchise communes experienced greater before-after increases in EBF than low exposure franchise communes, suggesting that the mass media campaign was at least partly responsible for the observed increases in EBF. This process of effects took place independently of direct individual exposure, likely through a process of social diffusion and changing social norms.

In the next chapter, I will explore the mechanisms of effect. Why was the mass media campaign successful in increasing population-level EBF rates in franchise communes and not in mass media only communes? What mechanisms of effect were at work in franchise communes and not in mass media only communes? What were the relative roles of knowledge, attitudes, social norms, and self-efficacy as mediators? If we can better understand why the mass media campaign worked in franchise communes, but not in mass media only communes, perhaps we can improve future campaigns to promote EBF.

Chapter 4 MECHANISMS OF EFFECT OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE BREASTFEEDING IN VIETNAM

In Chapter 3, we explored whether Alive & Thrive's mass media campaign to promote exclusive breastfeeding had an effect on population-level EBF rates in four provinces of Vietnam. We only found evidence for effects in the franchise communes where service providers had received training and support to create "Little Sun" nutrition counseling centers and where the mass media campaign was more intensive and diversified (including billboards, posters, broadcasts via village loudspeakers, and screening of TV spots at the franchise centers). In franchise areas, population-level EBF rates increased over time and the greatest increases in EBF were observed in communes where the average exposure to the mass media campaign was greatest over the course of the 2.5 year campaign. In the mass media only communes, there was no evidence of effect of the mass media campaign: population-level EBF rates did not increase over time and communes that were going to be high in exposure did not experience greater increases in EBF than communes that were going to be low in exposure.

In Chapter 4, I explore the mechanisms of effect and mechanisms of failure. Mediation analyses are important because they help researchers understand the processes through which communications campaigns succeed or fail. Understanding why campaigns fail is just as important as understanding why they succeed. Contributing to the body of mediation research across a range of contexts and behaviors can help communications campaigns become more effective in the future.

In the franchise communes, I will explore how the mass media campaign had an effect. Did it change knowledge, attitudes, social norms or self-efficacy directly? Did it drive women to the "Little Sun" franchise centers where they received IYCF counseling and care from trained service providers? Did that counseling then encourage more women to exclusively breastfeed?

I will also explore why the campaign was not effective in changing population-level EBF in the mass media only communes. From Chapter 3, we know that exposure did not have an overall effect on EBF in mass media only communes, but did exposure have an effect on

knowledge, attitudes, social norms, or self-efficacy (even if those cognitions did not influence EBF behavior in the absence of franchise support)? And what role did infant and young child feeding advice from medical professionals play in the mass media only communes?

Theory of Effects

Alive & Thrive's mass media campaign was designed using the reasoned action model (RAM) as a model of effects. Developed by Fishbein and Ajzen (2010), the RAM posits that changes in attitudes, perceived social norms, and perceived behavioral control (self-efficacy) lead to changes in intentions which lead to changes in behavior. Attitudes, perceived social norms, and perceived self-efficacy were measured at all five waves of data collection. In addition, knowledge was measured. Although knowledge is considered causally prior to attitudes, perceived social norms, and perceived self-efficacy in the RAM, I include it in my analyses.

Mediation analyses through knowledge, attitudes, social norms, and self-efficacy in the tradition of the RAM are typically associated with individual level processes. However, in the analyses that follow, I will explore these theoretical mediators at the commune level as mediators of a process of social diffusion. A process of social diffusion of a communications campaign posits that individuals do not have to be directly exposed to mass media messages in order to be affected by the campaign. Indirect exposure through interpersonal discussion or changes in the larger social environment can also lead to changes in behavior. Some of these changes in the larger social environment could be reflected in changes in commune level knowledge, attitudes, social norms, and self-efficacy. By exploring the relationship between commune level exposure and commune level cognitions, we can better understand how processes of social diffusion work.

In Chapter 1, I calculated the baseline percent-to-gain of belief items corresponding to knowledge, attitudes, social norms, and self-efficacy and hypothesized that, if Alive & Thrive's mass media campaign had an effect, it would be through changes in EBF attitudes and social norms because these constructs had the highest percent-to-gain. In other words, the attitude and social norm belief items were more strongly associated with EBF behavior and had more room-to-

move (meaning that lower proportions of the target population already held the desired belief), than the self-efficacy and knowledge belief items. The percent-to-gain analyses presented in Chapter 1 suggest that even if the campaign succeeded in changing most of the self-efficacy and knowledge belief items those changes would not improve population-level EBF rates.

With the available data, we can explore whether the mass media campaign was associated with changes over time in knowledge, attitudes, social norms, and/or self-efficacy and, if so, whether changes in these cognitions were associated with changes in behavior. Although we expect any changes in population-level EBF to have occurred through changes in attitudes and social norms (rather than through knowledge and self-efficacy), we will investigate pathways of effect through all four cognitions.

Mass Media Campaign

During Alive & Thrive's mass media campaign to promote exclusive breastfeeding, 4 spots aired on national and regional television stations throughout the 63 provinces of Vietnam. More details on the campaign and the scripts for the spots are provided in Chapter 2 along with the construction of the knowledge, attitude, social norm, and self-efficacy scales.

In the analyses, I focus on the "Nurse More" and "No Water" television spots because these were the spots designed to change women's knowledge, attitudes, perceived social norms, and self-efficacy regarding exclusive breastfeeding, the primary outcome behavior. The "No Water" spot was designed primarily around an attitudinal belief about the positive and negative consequences of giving an infant water and the "Nurse More" spot was designed primarily around a self-efficacy belief about the mother's ability to adequately nourish her infant through breastmilk alone; however, both spots contain messages related to knowledge, attitudes, social norms, and self-efficacy.

With regards to knowledge, both spots inform audiences that the recommended duration of EBF (feeding only breastmilk) is 6 months. The "No Water" spot further emphasizes that infants do not need water in the first 6 months; breast milk alone is sufficient and, in fact, ideal.

With regards to attitudes, both spots contain the message “Breastmilk has enough water and nutrients for me to grow up healthy and smart.” This taps into the aspirations for health and intelligence expressed in response to qualitative interviews and reiterates that breastmilk alone is sufficient to meet an infant’s nutritional needs. The “No Water” spot digs a little deeper and addresses the positive and negative consequences of giving water to babies to rinse out their mouths and to assuage thirst. Qualitative formative research found that many mothers felt they needed to rinse out their babies’ mouths after breastfeeding to prevent thrush and that babies need to drink water, in addition to breast milk, to quench their thirst, especially during the hotter months of the year. In the “No Water” spot, one talking baby asks the other who just finished breastfeeding: “Did you drink some water to rinse your mouth?” “Oh no,” replies the second infant, “I don’t drink even a little bit of water. Just a few drops of water can make us sick.” “Really?” “Breast milk has enough water and all the nutrients you need.” Sharing what he just learned with his mother, the first infant tells her: “Mom, I don’t need water. Don’t worry that I’m thirsty or need to rinse out my mouth.”

With regards to social norms, the spots contain both injunctive and descriptive social norm appeals. Both spots point out that “Leading health organizations recommend that you feed me only breast milk for the first six months” and end with the tagline “Breastmilk – the best for us, proven globally,” which suggest an injunctive norm. Qualitative formative research found that people respect the recommendations of medical experts like the Ministry of Health, World Health Organization, and UNICEF whose logos are displayed in the spot. The spot indicates that these health experts believe that women should exclusively breastfeed their infants for the first six months and that breast milk is the best possible food for their infant. In both spots, young mothers also model breastfeeding, perhaps suggesting, albeit somewhat implicitly, that “mothers like us breastfeed their infants,” reinforcing a descriptive norm that favors exclusive breastfeeding.

With regards to self-efficacy, both spots address common barriers to exclusive breastfeeding expressed by mothers and other key informants in the qualitative formative

research: “Mom, don’t be afraid that you will run out of breast milk; you just need to keep breastfeeding me” and “Mom, I don’t need water. Don’t worry that I’m thirsty or need to rinse out my mouth.” The “Nurse More” spot was specifically designed to address the belief that Vietnamese women do not produce sufficient quality or quantity of breast milk to adequately nourish their infants. And so, through a discussion between two talking babies and their mothers, the “Nurse More” spot reassures mothers: “Don’t worry. Breast milk is produced like magic. When you suckle, your mom’s body receives signals to produce more milk. The more you suckle, the more breast milk will be produced” and that “breastmilk has enough water and nutrients for me to grow up healthy and smart.” The “No Water” spot serves the same purpose by reassuring mothers that “Breast milk has enough water and all the nutrients you need.” In effect, the spots seek to convince mothers that they do not need to supplement breast milk with water, formula, or complementary foods in the first six months.

Given that the “No Water” and “Nurse More” spots address knowledge, attitude, social norm, and self-efficacy belief items, it is possible that communes that were more exposed to the mass media campaign experienced greater before-after improvements on these cognitions.

Franchise communes

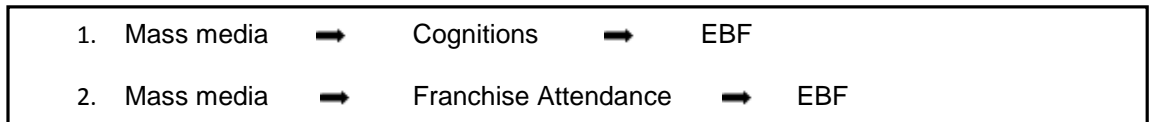
The franchise communes are located in districts where Alive & Thrive’s primary intervention was the creation of “Little Sun” franchise centers in addition to the mass media campaign which was aired nationally. “Little Sun” franchise centers are branded units at pre-existing health facilities where the service providers were trained by Alive & Thrive to provide quality infant and young child nutrition counseling and care. In Chapter 3, we found that Alive & Thrive’s mass media campaign to promote exclusive breastfeeding was effective in increasing population-level rates of EBF in franchise communes. The campaign consisted of four television spots, two spots promoting EBF, one spot promoting iron-rich foods, and one spot promoting the “Little Sun” franchise. In addition to the television spots, the mass media campaign was more

intensive in franchise areas, including billboards, pamphlets, broadcasts via loudspeakers, and airing of the spots on televisions in franchise centers.

“Little Sun” franchise centers were established in select districts in the four provinces where data was collected for these analyses. In each province, two franchise districts and two mass media only districts were surveyed. In the survey, franchise attendance was measured by asking respondents: “Have you ever been to the “Little Sun” counseling service?” Respondents answered either yes or no.

In the following analyses, we explore two complementary pathways of effect at the commune level in order to identify the mechanisms of effect of the mass media campaign in the franchise communes. Summarized in Figure 4.1, the first hypothesis we test is that exposure influenced cognitions (knowledge, attitudes, social norms, and self-efficacy) and that changes in cognitions had a positive impact on EBF behavior. This pathway of effect is derived from the reasoned action model, our model of effects. The second hypothesis posits that exposure to the mass media campaign drove franchise attendance which drove EBF behavior.

Figure 4.1 Franchise communes: Proposed pathways of effects



These pathways of effect are not mutually exclusive; they are simply the pathways that we set out to test given our model of effects (based on the reasoned action model) and the expectation that exposure to the mass media campaign would have an effect on EBF through changes in cognitions and, perhaps, through franchise attendance.

Franchise communes: Analyses

All the analyses were conducted using commune level exposure to the mass media campaign so as to reflect changes over time and explore mechanisms of effect via social

diffusion. By exploring effects at the commune level, we capture both the effects that are the result of direct individual exposure to campaign messages and the effects that are the result of indirect exposure to exposed others. This allows us to explore social level processes in a way in which we are unable to do if we focus uniquely on the individual level pathways of effects.

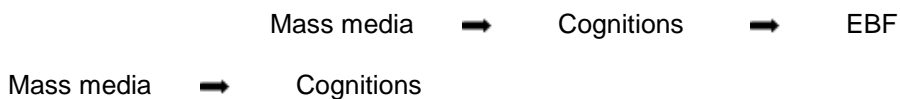
The first analysis set out to explore the relationships between commune level exposure and knowledge, attitudes, social norms, and self-efficacy and between each of those cognitions and EBF (mass media → cognitions → EBF). Each commune was assigned the average exposure rate, collapsed across waves 2-5, and each commune was assigned its average on each cognition at each wave. To address the first half of the pathway (mass media → cognitions), I regressed cognitions on an interaction between time and commune level exposure to see whether communes that were going to be high in mass media exposure experienced greater increases over time on commune level knowledge, attitudes, social norms, and self-efficacy. Although I intended to also explore the second half of the pathway (cognitions → EBF), because the first half of the pathway did not provide any evidence for an effect of commune level exposure to the mass media campaign on cognitions, I did not further analyze the relationship between cognitions and EBF.

The second set of analyses explore the pathway of effects between commune level exposure to the mass media campaign, franchise attendance, and EBF (mass media → franchise attendance → EBF). Each commune was assigned the average exposure rate, collapsed across waves 2-5. In the analyses corresponding to the first half of the pathway (mass media → franchise attendance), franchise attendance is the average commune level franchise attendance at each wave. I first regress franchise attendance on an interaction between time and commune level exposure. However, because franchise attendance was so low at baseline (before the campaign began and before the franchise centers were fully established), this analysis is essentially cross-sectional and therefore threatened by the possibility that communes were different on some other characteristic related to both exposure and franchise attendance.

In order to address threats to the inference that campaign exposure drove franchise attendance, I created a new franchise attendance variable that substitutes predicted franchise attendance (based on a number of demographic and other characteristics) for observed franchise attendance at wave 1. This analysis compares predicted franchise attendance at wave 1 with observed franchise attendance at waves 2-5 to partially address the concern that high exposure communes may have been different than low exposure communes on other important characteristics before the campaign began and that these may be responsible for the observed differences in franchise attendance between high and low exposure communes.

In the analyses corresponding to the second half of the pathway, which explore the relationship between commune level franchise attendance and commune level EBF (franchise attendance → EBF), each commune was assigned the average franchise attendance, collapsed across waves 2-5 and each commune was assigned its average EBF rate at each wave. I regressed EBF on an interaction between time and franchise attendance to better understand whether communes that were going to be high in franchise attendance after the launch of the “Little Sun” intervention differ on EBF behavior compared to communes that were going to be low in franchise attendance.

Franchise communes: Results



To explore the effects of exposure to Alive & Thrive’s mass media campaign on knowledge, attitudes, social norms, and self-efficacy, I conducted commune level analyses exploring whether communes that were going to be high in exposure experienced greater changes over time on commune level cognitions than communes that were going to be low in exposure. In other words, did exposure to the mass media campaign have an effect on

knowledge, attitudes, social norms, and/or self-efficacy (mass media → cognitions)? If so, what was the relationship between those cognitions and EBF (cognitions → EBF)?

I found that all commune level cognitions significantly and substantially increased across time in franchise communes (Table 4.1) and that all commune level cognitions were significantly associated with commune level exposure (Table 4.2). However, when I explored an interaction between time and commune level exposure, there were no significant overtime effects of being in a high exposure commune on knowledge, attitudes, social norms or self-efficacy (Table 4.3).

Table 4.1 Before-after changes in commune level cognitions in franchise communes

	Model 1 Knowledge M=.72, SD=.15 [95% CI]	Model 2 attitudes M=4.30, SD=.69 [95% CI]	Model 3 norms M=4.18, SD=.87 [95% CI]	Model 4 self-efficacy M=4.95, SD=.45 [95% CI]
after (vs. before)	0.250*** [0.227,0.273]	1.232*** [1.126,1.337]	1.514*** [1.364,1.664]	0.661*** [0.572,0.750]
_cons	0.515*** [0.487,0.543]	3.318*** [3.179,3.456]	2.974*** [2.814,3.133]	4.424*** [4.321,4.527]
N	285	285	285	285
adj. R ²	0.461	0.504	0.483	0.341

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.2 Cross-sectional association between commune level exposure and cognitions in franchise communes

	Model 1 Knowledge M=.72, SD=.15 [95% CI]	Model 2 attitudes M=4.30, SD=.69 [95% CI]	Model 3 norms M=4.18, SD=.87 [95% CI]	Model 4 self-efficacy M=4.95, SD=.45 [95% CI]
exposure	0.140*** [0.0974,0.183]	0.666*** [0.386,0.946]	0.857*** [0.526,1.189]	0.438*** [0.199,0.678]
_cons	0.457*** [0.378,0.536]	3.081*** [2.558,3.604]	2.612*** [1.990,3.234]	4.149*** [3.699,4.598]
N	285	285	285	285
adj. R ²	0.061	0.062	0.065	0.063

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.3 Before-after cognitions by commune level exposure in franchise communes

	Model 1 knowledge M=.72, SD=.15	Model 2 attitudes M=4.30, SD=.69	Model 3 norms M=4.18, SD=.87	Model 4 self-efficacy M=4.95, SD=.45
	[95% CI]	[95% CI]	[95% CI]	[95% CI]
after	0.129	0.798	0.537	0.795*
	[-0.015,0.272]	[-0.028,1.625]	[-0.749,1.824]	[0.120,1.469]
exposure	0.087*	0.477*	0.432	0.497**
	[0.013,0.161]	[0.018,0.936]	[-0.185,1.048]	[0.157,0.836]
after#exp	0.066	0.236	0.532	-0.073
	[-0.008,0.141]	[-0.211,0.683]	[-0.140,1.205]	[-0.425,0.280]
_cons	0.354***	2.442***	2.182***	3.513***
	[0.216,0.493]	[1.622,3.263]	[1.033,3.331]	[2.900,4.126]
N	285	285	285	285
adj. R ²	0.524	0.568	0.553	0.404

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The analyses displayed in Table 4.3 do not support the conclusion that commune level exposure to the mass media campaign was associated with a change over time in commune level knowledge, attitudes, social norms or self-efficacy. These results contrast with the parallel analyses reported in Chapter 3 which found a strong effect for media exposure on EBF itself.

To explore these results further, I examined whether commune level exposure was associated with greater overtime increases in each of the knowledge and belief items that make up the knowledge, attitude, social norm, and self-efficacy scales. Perhaps exposure to the mass media campaign did not affect attitudes overall, but it might have affected the attitude belief items that were directly addressed by messages in the television spots and not those that were not specifically addressed by messages in the spots. For example, messages about not giving water to infants under the age of six months were emphasized in the television spots more than messages about not giving other liquids, infant formula, or complementary foods. Perhaps there was movement on underlying belief items even if there was not movement on the attitudes construct as a whole. This hypothesis, however, was not supported by the data (see Appendix 6).

I then explored the overtime changes in individual level knowledge, attitudes, social norms, and self-efficacy (rather than aggregated commune level knowledge, attitudes, social norms, and self-efficacy) by commune level exposure (see Appendix 6, Table A 20). This

analysis tests essentially the same hypothesis (that communes that were going to be high in exposure would demonstrate greater before-after changes in knowledge, attitudes, social norms, and self-efficacy), but the use of individual level cognition scales provides greater power to the analyses than use of commune level cognition scales. I still adjust for intraclass correlations within communes.

In the franchise areas, communes that were going to be high in exposure experienced greater before-after increases in individual level social norms than communes that were going to be low in exposure, but there was no significant effect of exposure on individual level knowledge, attitudes, or self-efficacy (Table 4.4).

Table 4.4 Overtime changes in individual level cognitions by commune level exposure in franchise communes

	Model 1 knowledge [95%CI]	Model 2 attitudes [95%CI]	Model 3 norms [95%CI]	Model 4 self-efficacy [95%CI]
after (vs. before)	0.114 [-0.020,0.248]	0.598 [-0.200,1.396]	-0.158 [-1.310,0.995]	0.453 [-0.161,1.067]
commune_exp	0.091* [0.018,0.163]	0.537* [0.0864,0.988]	0.277 [-0.346,0.901]	0.471** [0.166,0.776]
after#commune_exp	0.068 [-0.003,0.139]	0.297 [-0.144,0.738]	0.815* [0.191,1.440]	0.071 [-0.254,0.396]
_cons	0.357*** [0.225,0.490]	2.387*** [1.582,3.193]	2.594*** [1.453,3.734]	3.610*** [3.049,4.170]
N	5604	5534	5580	5595
adj. R ²	0.134	0.193	0.155	0.100

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: These results remain substantively the same even when controlling for confounders including ethnicity, mother's age, education, occupation, primipara status, whether or not she had a cesarean section, the age of the infant, and whether or not the mother had returned to work at the time of the interview. With confounders, coefficient of the interaction between time and commune level exposure on social norms is reduced slightly to .77 and the significance is .018 (as compared with .82 and $p = .011$). The interactions between time and commune level exposure on knowledge, attitudes, and self-efficacy remain insignificant with confounders.

This positive result on social norms was upheld when I examined the effect of commune level exposure on individual level belief items (as opposed to scales). Communes that were going to be high in exposure to the mass media campaign experienced significantly greater before-after increases in subjective and descriptive norms favoring EBF than communes that were going to be low in exposure. Influencing social norms is one of the particular strengths of a mass media campaign and one of the ways in which we expected the mass media campaign to have an effect.

In conclusion, there is little evidence that communes that were going to be high in exposure experienced greater before-after improvements in commune level cognitions (either as scales or as individual belief items) than communes that were going to be low in exposure. There is some evidence that commune level exposure had an effect on individual level social norms, but as this result was not evident at the commune level, I am somewhat reluctant to claim it; it could be a chance result reflecting the many tests of the hypothesis. Because there is little evidence that the mass media campaign had an effect on commune level knowledge, attitudes, social norms or self-efficacy, there is no need to test the final link in the causal model between cognitions and EBF behavior (cognitions → EBF).

The first hypothesized pathway of effects based on the reasoned action model was not supported by the data. I turn now to the second hypothesized pathway of effect: that communes that were going to be high in media exposure experienced greater franchise attendance and that franchise attendance had an effect on EBF.

Media ➡ Franchise Attendance ➡ EBF

Media ➡ Franchise Attendance

I first explored whether exposure drove attendance at “Little Sun” franchise centers (media → franchise attendance). I found that there is a positive and significant interaction between time and exposure on attendance at the “Little Sun” franchise centers meaning that attendance increased at a faster rate in high exposure communes than in low exposure communes (Table 4.5, Model 5B).

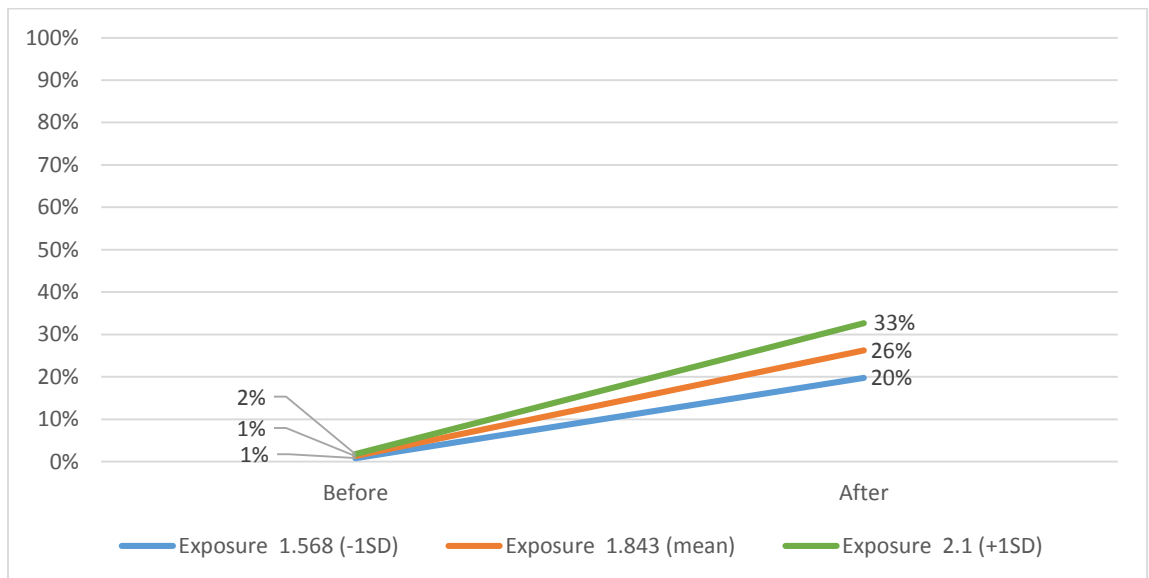
Table 4.5 Association between commune level and franchise attendance

	Model 5A Franchise Attendance [95% CI]	Model 5B Franchise Attendance [95% CI]
after (vs. before)	0.249*** [0.206,0.293]	-0.165 [-0.418,0.088]
exposure	0.198*** [0.087,0.310]	0.018 [-0.015,0.050]
after#exposure		0.226** [0.085,0.367]
_cons	-0.351** [-0.554,-0.147]	-0.0195 [-0.074,0.035]
N	285	285
adj. R ²	0.239	0.248

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

By graphing the interaction between time and commune level exposure from Model 5B, we can see the pattern of results more clearly (Figure 4.2). The communes that were going to be higher exposure communes once the campaign was on the air experienced greater before-after increases in attendance at the “Little Sun” franchise centers than communes that were going to be low in exposure.

Figure 4.2 Association between commune level exposure and franchise attendance



*The colored lines reflect changes over time in commune level EBF at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

Problematically, only a few franchise centers had been established at baseline and so there was very little franchise attendance before the campaign began as is evident in Figure 4.2. This makes it impossible to do a true before-after analysis (like we did with EBF) with franchise attendance as the outcome. The analysis becomes essentially a cross-sectional association between exposure and franchise attendance and the inference that exposure drove franchise attendance is threatened by the possibility that high and low exposure communes differ on other characteristics that may account for the observed association.

To address the threat that high exposure communes were different than low exposure communes on other characteristics, I estimated predicted levels of franchise attendance for each commune using information that was measured both at wave 1, before the franchise centers were fully established, and at subsequent waves after the franchise centers were fully established. These include ethnicity, mother's age, education, occupation, whether she is a first time mother, whether she had a cesarean section, whether she had gone back to work at the time of the interview, whether or not she had a home birth, and infant's age and gender. Together, they account for 17% of the variance in franchise attendance at waves 2-5.

I used these demographic and other characteristics and their relationship with franchise attendance at waves 2-5 to create estimates, based on information from wave 1, of what franchise attendance would have been after the franchise centers were fully established. I then substituted the predicted values for the observed wave 1 values and reran the analyses to see whether high exposure communes still experience greater franchise attendance than low exposure communes (Table 4.6, Model 6B).

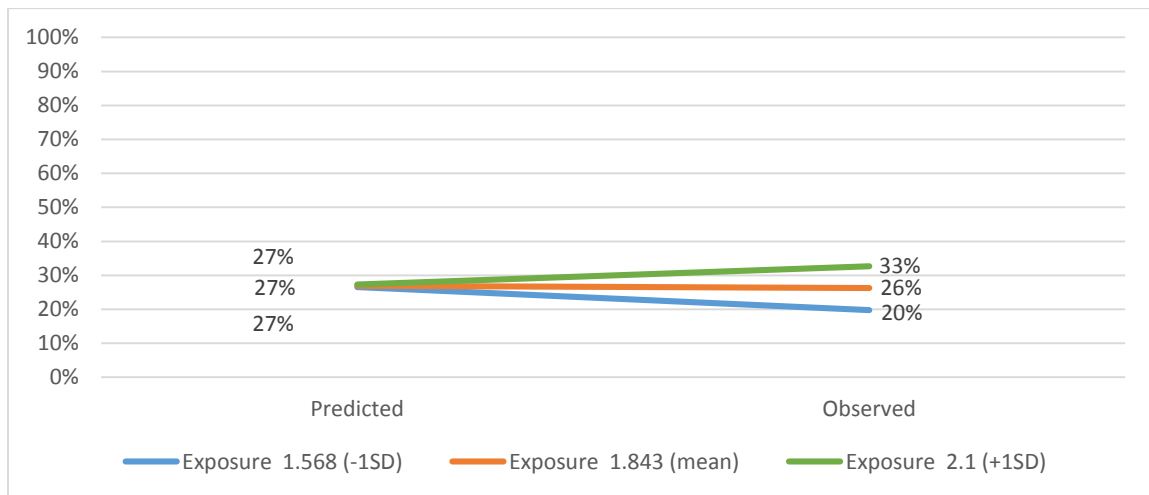
Table 4.6 Predicted and observed franchise attendance by commune level exposure

	Model 6A Franchise Attendance [95% CI]	Model 6B Franchise Attendance [95% CI]
after (vs. before)	-0.007 [-0.050,0.036]	[-0.713,-0.143] 0.229**
Exposure	0.198** [0.078,0.317]	0.014 [-0.102,0.131]
after#exposure		0.229** [0.075,0.384]
_cons	-0.093 [-0.311,0.125]	0.243* [0.025,0.462]
N	285	285
adj. R ²	0.057	0.067

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

As we see in Table 4.6 and in Figure 4.3, high exposure communes experienced significantly more observed franchise attendance than predicted using the demographic and other characteristics listed above. In contrast, mean exposure communes experienced essentially the same amount of franchise attendance as predicted and low exposure communes experienced significantly less franchise attendance than predicted. This analysis supports the conclusion that mass media was an important driver of franchise attendance. However, we can only control for measured confounders; unmeasured confounders remain a threat to inference.

Figure 4.3 Predicted and observed franchise attendance by commune level exposure



*The colored lines reflect changes over time in commune level EBF at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

In addition to the threat of unmeasured confounders, there are a few other concerns that threaten the conclusion that exposure drove franchise attendance. These include the fact that the Alive & Thrive spots were shown on television sets at the franchise centers and the possible confounding role of receiving invitation cards to the “Little Sun” franchise. Fortunately, exposure to the Alive & Thrive spots on television screens at health facilities and receipt of invitation cards were measured at all waves of data collection, allowing us to further explore these particular threats to inference.

To address the concern that it was not exposure to the mass media campaign that drove franchise attendance, but rather exposure to Alive & Thrive spots at the franchise centers that gives the appearance of a strong association between exposure and franchise attendance, I dropped the 297 individuals who reported exposure to the Alive & Thrive spots on a television screen at a health facility out of the construction of the dataset and repeated the analyses. The results remain substantively the same. The coefficient of the interaction between time and exposure on franchise attendance is .23 and is significant at .001 (compared to a coefficient of .23 with a significance of .002 in Model 6B).

Another possible concern is the influence of invitation cards that were distributed to the mothers of infants to encourage franchise attendance. Overall, 1,165 individuals reported receiving invitations to the “Little Sun” franchise and, of those, 915 or 82% reported attending the franchise. The percent of individuals in a commune who received invitation cards is unlikely to account for the observed association between commune level exposure and franchise attendance. Nevertheless, I controlled for commune level receipt of invitation cards and found that its inclusion in the model did not alter the overtime effect of exposure on franchise attendance. However, invitation cards have a strong independent effect on franchise attendance

($b = .64$, $p = .002$) and the variance in franchise attendance explained by the model when invitation cards is included is 47% compared to 25% when it is not included.

After addressing these threats to the inference that exposure drove franchise attendance in franchise communes, I feel fairly confident that the data support the conclusion that being in a high exposure commune led to higher levels of franchise attendance than being in a low exposure commune. Nevertheless, unmeasured confounders remain a threat and causal order cannot be completely sorted out as franchise attendance before the campaign began was effectively zero.

Franchise Attendance → EBF

I then explored whether attendance at “Little Sun” franchise centers drove EBF (franchise attendance → EBF). I found that there is a positive and significant relationship between time and franchise attendance on EBF suggesting that EBF increased at a faster rate in high franchise attendance communes than in low franchise attendance communes (Table 4.7, Model 7B). This relationship remains the same even when controlling for additional commune level exposure to the spots on televisions in health facilities and to campaign messages via pamphlets, billboards, and books/magazines (Model 7C).

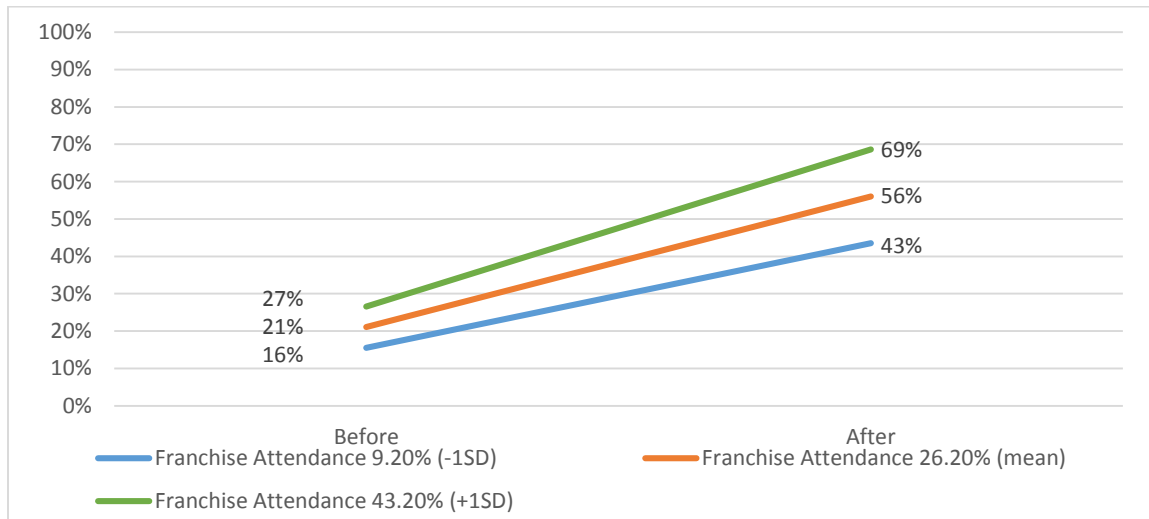
Table 4.7 Overtime changes in EBF by commune level franchise attendance

	Model 7A EBF [95% CI]	Model 7B EBF [95% CI]	Model 7C EBF [95% CI]
after (vs. before)	0.350*** [0.300,0.400]	0.242*** [0.158,0.325]	0.242*** [0.158,0.326]
franchise attendance	0.656*** [0.482,0.829]	0.326** [0.105,0.546]	0.201 [-0.054,0.457]
after#franchise attendance		0.412** [0.171,0.653]	0.412** [0.171,0.654]
additional exposure			0.201* [0.046,0.355]
_cons	0.0386 [-0.025,0.102]	0.125*** [0.059,0.191]	0.00 [-0.080,0.099]
<i>N</i>	285	285	285
adj. R^2	0.454	0.464	0.474

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

When graphing the interaction from Model 7B, we see that all franchise communes experienced before-after increases in EBF (Figure 4.4). However, EBF increased at a faster rate in communes that were going to be high in franchise attendance once all the “Little Sun” franchise centers were established as compared to communes that were going to be low in franchise attendance.

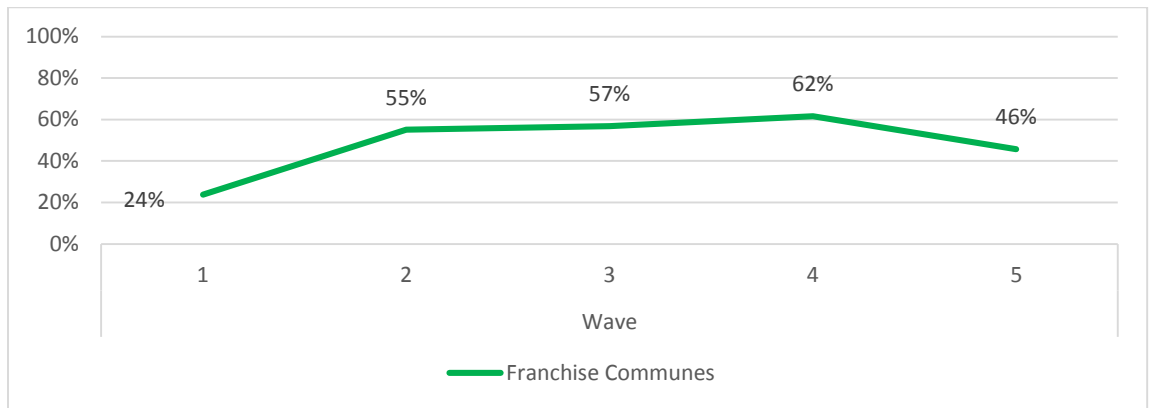
Figure 4.4 Before-after increases in EBF by levels of attendance at “Little Sun” franchise



*The colored lines reflect three different intensities of commune level attendance at the “Little Sun”: the mean commune level attendance (26.20%), one standard deviation below the mean (9.20%), and one standard deviation above the mean (43.20%).

These analyses suggest that exposure drove attendance at the “Little Sun” franchise centers and attendance drove increases in EBF. This may explain a result reported previously, that EBF rates rose at the start of the campaign but dropped sharply at wave 5 even in franchise communes (Figure 4.5).

Figure 4.5 Trends in commune level EBF rates over time



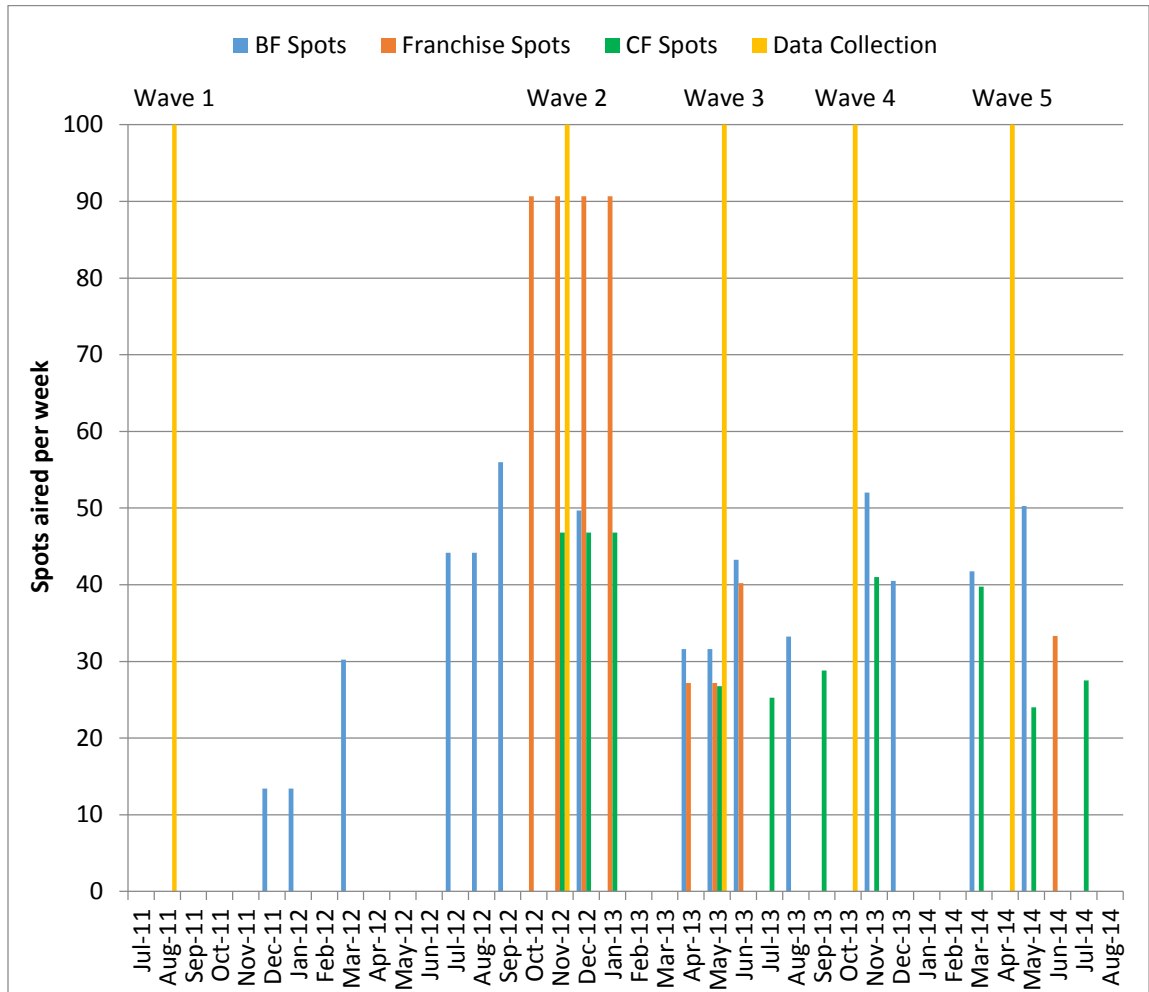
Could a drop in franchise attendance itself have occasioned such a drastic drop in EBF between October 2013 and April 2014? If we look at commune level franchise attendance across measurement waves, we indeed see that commune level attendance at the “Little Sun” franchise centers decreased by 10 percentage points between waves 4 and 5 (Table 4.8).

Table 4.8 Commune level attendance at “Little Sun” franchise

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Franchise Attendance	1%	26%	29%	30%	20%
N	57	57	57	57	57

That decrease in franchise attendance could be due, in part, to the fact that no franchise promotion spots aired between waves 4 and 5 (Figure 4.6).

Figure 4.6 Timing of media bursts and data collection



The last burst of franchise promotion spots aired a full 9 months before data collection at wave 5. Given that there are new cohorts of mothers all the time, it seems important to continue raising awareness about the existence of the “Little Sun” franchise centers and the services they provide. Without the mass media to drive mothers to the franchise to receive quality nutrition counseling, attendance drops off and so does EBF. This analysis supports both the importance of franchise attendance and the argument that the mass media campaign had a major influence on franchise attendance.

Based on these results, we conclude that the Alive & Thrive mass media campaign produced an effect on population-level EBF rates in franchise areas in part because exposure to the mass media campaign drove attendance at the “Little Sun” franchise centers and attendance drove increases in EBF rates. When the franchise promotion spots did not air, we observed marked declines in the percentage of women who sought nutrition counseling at the franchise and, consequently, in EBF rates.

In conclusion, the evidence does not support the first hypothesized pathways of effects: that mass media changed cognitions which influenced EBF behavior (mass media → cognitions → EBF). However, the evidence does support the second hypothesized pathway of effects: that mass media drove franchise attendance which increased EBF behavior (mass media → franchise attendance → EBF). This begs the question: Were all of the effects of the mass media campaign mediated by franchise attendance or were there some effects of the mass media campaign on EBF in franchise areas over and above its effects on franchise attendance?

In exploring this question, I found some evidence for a residual effect of commune level exposure on EBF even when we drop all the individuals who attended the “Little Sun” franchise centers out of the construction of the commune level EBF variable. Whereas with the inclusion of the individuals who attended the “Little Sun” franchise centers the coefficient of the interaction between time and exposure on EBF was 0.191 ($p = 0.048$), when the individuals who attended the franchise centers were dropped from the model, the coefficient of the interaction between time and exposure on EBF was 0.180 ($p = 0.052$). This means that, in franchise areas, franchise attendance does not account for all of the effect of commune level exposure on EBF.

Even though we did not find an effect of commune level exposure on cognitions as we expected, it is possible that commune level exposure had an effect on EBF through other pathways. For example, it is possible that the multiple intervention components in the franchise communes (including a more intensive and diversified mass media campaign and the establishment of the “Little Sun” franchise centers) echoed each other in such a way as to create an environment that was more favorable to EBF than that of the mass media only communes.

Indeed, there is evidence to suggest that the Alive & Thrive spots were rated (on a four-point scale) significantly more attractive, more credible, more understandable, easier to remember, and more doable in franchise communes than in mass media only communes (Table 4.9).

Table 4.9 Evaluations of spots in mass media only and franchise communes

	Attractiveness		Credibility		Understandable		Remember		Doable	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
MM (N=676)	3.36	.73	3.22	.82	3.07	.75	2.50	.83	2.64	.91
F (N=774)	3.47	.67	3.40	.72	3.24	.74	2.68	.84	2.85	.91
Sig.	0.0047		0.0001		0.0001		0.0001		0.0001	

*Significance based on a paired t-test

Note: Only measured at wave 2

In conclusion, in franchise communes, the mass media campaign appears to have had an effect on EBF behavior through two routes of effect. Commune level exposure to the mass media campaign was associated with greater overtime franchise attendance which was associated with greater overtime increases in EBF behavior. Additionally, there is evidence for the effectiveness of the mass media campaign in franchise communes even when we remove those individuals who attended the franchise from the construction of the commune level EBF variable. At the commune level, there is no evidence to suggest that this additional effect took place through changes in knowledge, attitudes, social norms, or self-efficacy. However, it is possible that the mass media campaign had an effect on EBF through unmeasured mediators and that, in franchise communes, the combined effect of the mass media campaign and the presence of the franchise created an environment favorable to EBF which supported changes in EBF behavior even among those who did not directly attend the franchise and/or were not directly exposed to campaign messages. In addition, it is possible that some of this effect may have taken place through increases in perceived injunctive and descriptive social norms favoring EBF.

Mass media only communes

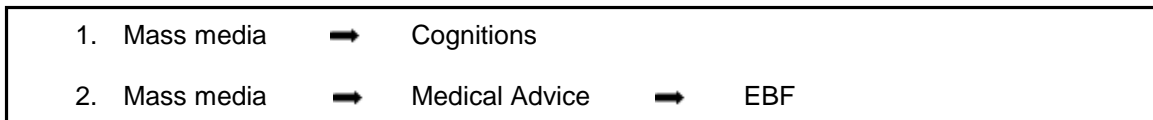
In Chapter 3, we found that Alive & Thrive's mass media campaign to promote exclusive breastfeeding was not effective in increasing population-level rates of EBF in mass media only

communes. We concluded that, in this particular case, mass media alone was not sufficient to change EBF behavior. However, mass media in combination with a franchise network of quality nutrition counseling centers generated large population-level increases in EBF. In the previous section, we explored how the mass media campaign had an effect in franchise communes and found that exposure to the television spots drove women to the “Little Sun” franchise centers which increased commune level EBF behavior.

Although we could abandon the mass media only communes and focus entirely on the franchise communes where we found evidence for effects, understanding why a particular campaign failed to achieve the desired results is just as important to future campaign science as understanding why a particular campaign succeeded. In this section, I will try to better understand why the campaign failed to change EBF behavior in mass media only communes by exploring two pathways of effects that are parallel to those we explored in the franchise communes.

As summarized in Figure 4.7, I first explore whether communes that were going to be higher in mass media exposure experienced greater overtime improvements in knowledge, attitudes, social norms, and self-efficacy. Even though we did not see shifts in EBF behavior in mass media communes, it is possible that high exposure communes experienced greater increases in cognitions related to EBF than low exposure communes. This hypothesis seems unlikely given the lack of effects of commune level exposure on cognitions in franchise communes, nevertheless, I explore it in mass media communes to see if the pattern of results is similar.

Figure 4.7 Mass media communes: Proposed pathways of effects



Next, I explore the role of receiving medical advice from health practitioners outside of the “Little Sun” network. In the previous section, we found that in franchise communes the mass media campaign had an effect by driving women to the “Little Sun” franchise to seek nutrition counseling and care and that attendance at the franchise drove increases in EBF. In communes where “Little Sun” franchises were not established, did exposure to the mass media campaign encourage mothers to seek nutrition counseling at their local health-care facility? Or, alternatively, did health workers proffer more infant and young child feeding advice in communes that were going to be high in mass media exposure? If so, how did that advice affect exclusive breastfeeding behavior?

It is possible that the advice mothers received at unsupported health centers contradicted the recommendations in the mass media messages because service providers outside the “Little Sun” franchise were not trained in the most up-to-date infant and young child feeding guidelines. If that were the case, it could counteract any potential effectiveness of the mass media campaign in the non-franchise areas.

Mass media only communes: Analyses

I first explore the effect of mass media on knowledge, attitudes, social norms, and self-efficacy (mass media → cognitions). As in franchise communes, all analyses were conducted at the commune level. Each commune was assigned the average exposure rate, collapsed across waves 2-5, and each commune was assigned its average on each cognition at each wave. I regressed each of the cognitions on an interaction between time and commune level exposure to see whether communes that were going to be high in mass media exposure experienced greater overtime increases in commune level knowledge, attitudes, social norms, and self-efficacy.

I then explore the role of receiving medical advice from health practitioners outside the “Little Sun” network in mass media only areas. In all five waves of data collection, mothers were asked: “In the past 3 months, has a doctor or a nurse in a health facility [besides the “Little Sun”

franchise] given you advice about feeding (name)?" Importantly, this question only reflects respondents' recall of receiving IYCF medical advice. It is unclear whether it represents patients seeking IYCF advice or providers spontaneously offering IYCF advice. This is in contrast to attendance at the "Little Sun" franchise which likely reflects patients seeking IYCF advice.

Nevertheless, I use responses to this question to try to understand how Alive & Thrive's mass media campaign interacted with health centers and health workers in communes that did not have access to a "Little Sun" franchise center. I regressed medical advice on an interaction between time and commune level exposure to see whether communes that were going to be high in mass media exposure experienced greater increases overtime in reported receipt of medical advice.

Mass media only communes: Results

Mass media → Cognitions

Like in the franchise communes, commune level knowledge, attitudes, social norms, and self-efficacy increased significantly across time (Table 4.10) and commune level exposure is significantly and positively associated with commune level cognitions (Table 4.11). However, communes that were high in exposure did not experience greater before-after changes in knowledge, attitudes, social norms, and self-efficacy than communes that were low in exposure (Table 4.12). There is, in fact, a significant negative interaction between commune level exposure and time on self-efficacy (Table 4.12, Model 4; Figure 4.8), suggesting that high exposure communes experienced smaller before-after increases in self-efficacy than low exposure communes.

Table 4.10 Before-after changes in commune level theoretical mediators in mass media only communes

	Model 1 knowledge M=.64; SD=.12 [95% CI]	Model 2 Attitudes M=3.89; SD=.54 [95% CI]	Model 3 norms M=3.71; SD=.68 [95% CI]	Model 4 self-efficacy M=4.69; SD=.37 [95% CI]
after (vs. before)	0.110*** [0.0812,0.138]	0.459*** [0.348,0.570]	0.507*** [0.365,0.649]	0.253*** [0.171,0.336]
_cons	0.547*** [0.515,0.580]	3.525*** [3.379,3.672]	3.309*** [3.147,3.471]	4.493*** [4.384,4.602]
N	305	305	305	305
adj. R ²	0.121	0.112	0.086	0.072

p < 0.05, ** *p* < 0.01, *** *p* < 0.001

Table 4.11 Cross-sectional association between commune level exposure and theoretical mediators in mass media only communes

	Model 1 knowledge M=.64; SD=.12 [95% CI]	Model 2 attitudes M=3.89; SD=.54 [95% CI]	Model 3 norms M=3.71; SD=.68 [95% CI]	Model 4 self-efficacy M=4.69; SD=.37 [95% CI]
Exposure	0.138** [0.047,0.228]	0.628** [0.197,1.058]	0.724** [0.244,1.204]	0.339* [0.0739,0.604]
_cons	0.421*** [0.275,0.568]	2.918*** [2.222,3.614]	2.590*** [1.822,3.359]	4.169*** [3.734,4.605]
N	305	305	305	305
adj. R ²	0.115	0.126	0.107	0.078

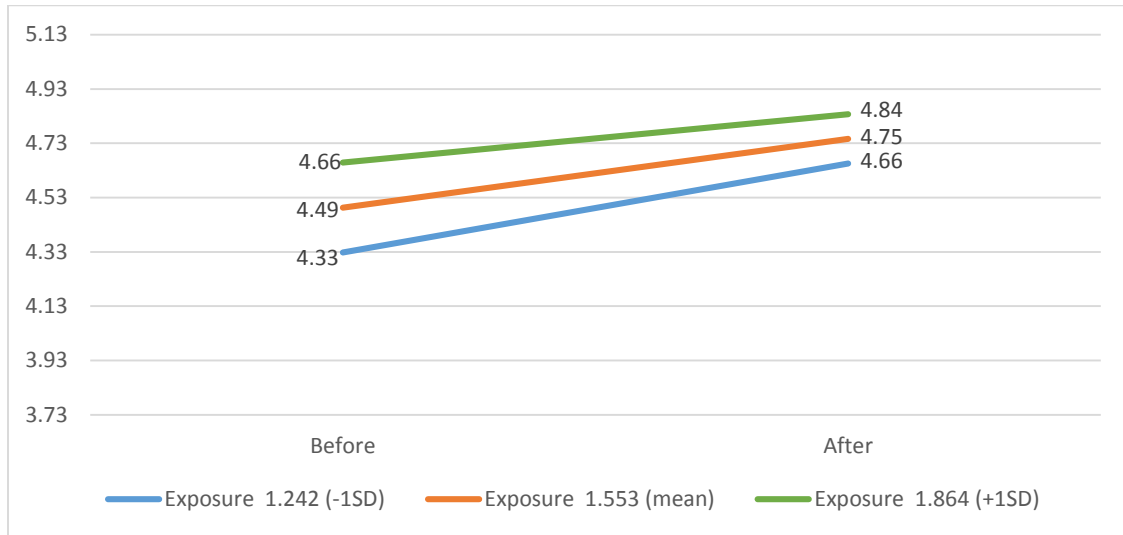
p < 0.05, ** *p* < 0.01, *** *p* < 0.001

Table 4.12 Before-after theoretical mediators by commune level exposure in mass media only communes

	Model 1 knowledge M=.64; SD=.12 [95% CI]	Model 2 attitudes M=3.89; SD=.54 [95% CI]	Model 3 norms M=3.71; SD=.68 [95% CI]	Model 4 self-efficacy M=4.69; SD=.37 [95% CI]
after (vs. before)	0.077 [-0.028,0.182]	0.759** [0.287,1.232]	0.308 [-0.310,0.927]	0.628*** [0.296,0.960]
exposure	0.121* [0.007,0.235]	0.782** [0.209,1.355]	0.622* [0.020,1.223]	0.532** [0.207,0.858]
after#exposure	0.021 [-0.048,0.090]	-0.193 [-0.524,0.137]	0.128 [-0.287,0.543]	-0.241* [-0.448,-0.035]
_cons	0.360*** [0.177,0.543]	2.311*** [1.409,3.212]	2.344*** [1.382,3.305]	3.667*** [3.136,4.197]
N	305	305	305	305
adj. R ²	0.234	0.238	0.192	0.154

p < 0.05, ** *p* < 0.01, *** *p* < 0.001

Figure 4.8 Before-after self-efficacy by commune level exposure in mass media only communes



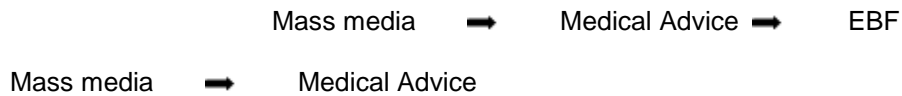
*The colored lines reflect changes over time in commune level self-efficacy at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.242), one standard deviation below the mean (1.553), and one standard deviation above the mean (1.864) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

*The y-axis is from -2SD to +2SD. It is a 6-point response scale with a mean of 4.69 and a SD of .37.

Similarly to the franchise communes, in mass media only communes, the evidence does not support the conclusion that high exposure communes experienced greater before-after increases in knowledge, attitudes, social norms, and self-efficacy than low exposure communes.

To explore these results further, I examined whether commune level exposure was associated with greater overtime increases in each of the knowledge and belief items that make up the knowledge, attitude, social norm, and self-efficacy scales based on the possibility of movement on underlying belief items even if there was not movement on the scales as a whole. Again, this hypothesis was not supported by the data (see Appendix 6).

I also explored the overtime change in individual level knowledge, attitudes, social norms, and self-efficacy by commune level exposure and in individual level belief items by commune level exposure (Appendix 6). The analyses mirror the commune level analyses in that higher exposure communes experienced significantly smaller before-after increases in self-efficacy (as a scale and in 4 out of the 6 belief items), but there was no significant effect of exposure on individual level knowledge, attitudes, or social norms in the mass media only areas.



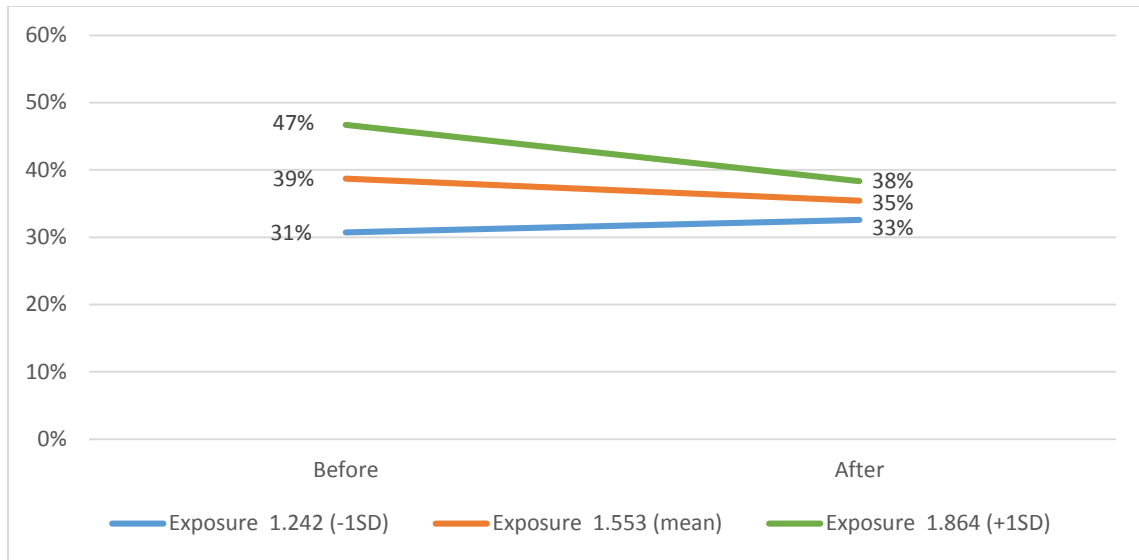
I then explored the relationship between exposure to Alive & Thrive’s mass media campaign and receiving medical advice from health practitioners outside the “Little Sun” network. Commune level response rates to the question, “In the past 3 months, has a doctor or a nurse in a health facility [besides the “Little Sun” franchise] given you advice about feeding (name)?” do not differ significantly after the campaign aired compared to before; commune level IYCF medical advice neither increased nor decreased over the time of the campaign (Table 4.13, Model 1). Although commune level exposure is significantly and positively associated with receiving medical advice (Table 4.13, Model 2), the interaction between time and exposure on reported IYCF medical advice is significantly negative (Table 4.13, Model 3; Figure 4.9). This result suggests that communes that were going to be high in exposure to the mass media campaign experienced smaller before-after increases in receiving medical advice than communes that were going to be low in exposure. As depicted in Figure 4.9, communes that were going to be high in exposure were also significantly higher in reported receipt of IYCF medical advice before the campaign began. After the campaign, high exposure communes and low exposure communes no longer differed significantly on reported receipt of IYCF medical advice.

Table 4.13 Before-after IYCF medical advice by levels of exposure in mass media only communes

	Model 1 medical advice [95% CI]	Model 2 medical advice [95% CI]	Model 3 medical advice [95% CI]
after (vs. before)	-0.0325 [-0.083,0.017]		0.222 [-0.005,0.449]
exposure		0.126* [0.014,0.238]	0.257*** [0.134,0.381]
after#exposure			-0.164* [-0.310,-0.018]
_cons	0.387*** [0.335,0.439]	0.165 [-0.017,0.348]	-0.0125 [-0.196,0.171]
<i>N</i>	305	305	305
adj. <i>R</i> ²	0.002	0.044	0.056

* *p* < 0.05, ** *p* < 0.01, *** *p* < 0.001

Figure 4.9 Before-after IYCF medical advice by commune level exposure: Mass media only communes



*The colored lines reflect changes over time in commune level IYCF medical advice at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.242), one standard deviation below the mean (1.553), and one standard deviation above the mean (1.864) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

Medical Advice → EBF

The association between medical advice and EBF behavior at the commune level is significant and positive (Table 4.14, Model 1) and remains positive when controlling for time (Table 4.14, Model 2). However, based on the preceding analysis, reported receipt of IYCF medical advice decreased significantly in high exposure communes and increased slightly in low exposure communes. Therefore, we cannot expect to see a positive interaction between time and receiving medical advice on commune level EBF and indeed we do not (Table 4.14, Model 3). Furthermore, contrary to the hypothesis that in mass media only communes medical advice might be negatively interacting with exposure across time in its impact on EBF, the three-way interaction between time, medical advice, and commune level exposure is not significant (Table 4.14, Model 4).

Table 4.14 Before-after EBF by levels of medical advice in mass media only communes

	Model 1 EBF [95% CI]	Model 2 EBF [95% CI]	Model 3 EBF [95% CI]	Model 4 EBF [95% CI]
medical advice	0.349*** [0.160,0.538]	0.356*** [0.168,0.545]	0.420*** [0.183,0.657]	-0.891 [-2.155,0.372]
after (vs. before)		0.0478* [0.004,0.092]	0.080 [-0.028,0.187]	-0.0697 [-0.687,0.547]
after#medical advice			-0.085 [-0.377,0.207]	0.548 [-0.996,2.092]
exposure				-0.125 [-0.456,0.206]
medical advice#exposure				0.741 [-0.011,1.493]
after#exposure				0.071 [-0.332,0.474]
after#medical advice#exposure				-0.319 [-1.268,0.631]
_cons	0.214*** [0.147,0.282]	0.173*** [0.100,0.247]	0.149** [0.062,0.236]	0.386 [-0.120,0.893]
<i>N</i>	305	305	305	305
adj. <i>R</i> ²	0.092	0.098	0.096	0.129

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The analyses of respondents' reports of receiving IYCF medical advice in mass media only communes indicate that being in a high IYCF medical advice commune is consistently associated with higher commune level EBF. This result does not support the hypothesis that untrained service providers outside the "Little Sun" franchise provided advice that contradicted the recommendations in the mass media messages and thereby counteracted the potential effectiveness of the mass media campaign in the non-franchise areas.

If anything, exposure to the mass media campaign is associated with a decrease in reported receipt of IYCF medical advice in mass media only communes. At baseline, communes that were going to be high in exposure reported significantly higher receipt of IYCF medical advice than communes that were going to be low in exposure, but that difference disappears after the mass media campaign aired. Over the period of the campaign, high exposure communes reported significant decreases in receipt of IYCF medical advice whereas low exposure communes reported slight increases.

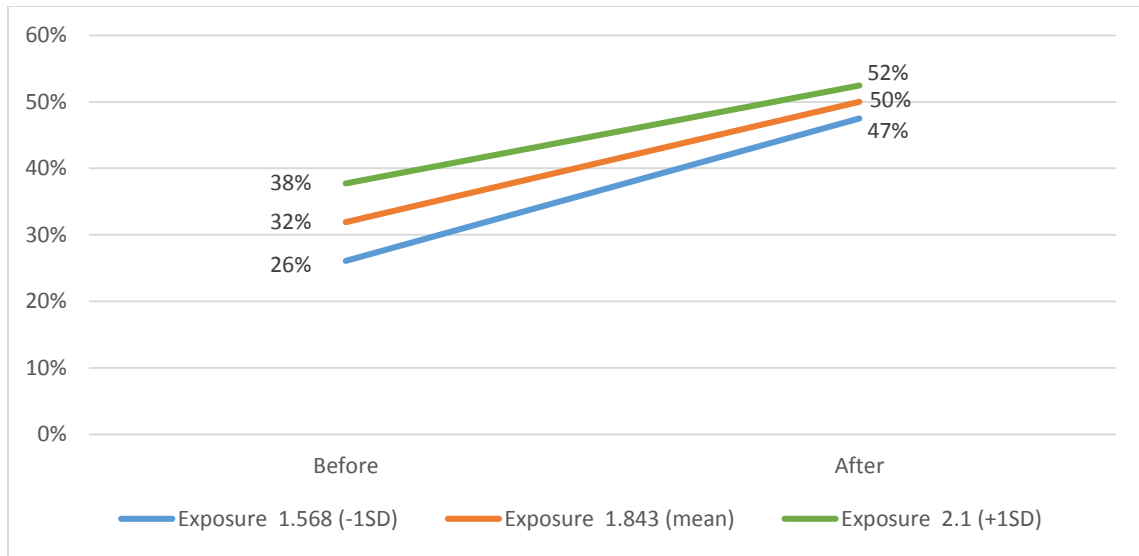
To understand whether there was a similar pattern of results in franchise areas, I explored the role of reported receipt of IYCF medical advice (from a service provider in a health facility outside of the “Little Sun” franchise) in franchise communes after dropping those who attended the franchise centers from the dataset. In franchise areas, there was a significant over time increase in reported receipt of IYCF medical advice (Table 4.16, Model 1). In addition, there is a significant association between being in a high exposure commune and reported receipt of IYCF medical advice. However, the interaction between time and exposure on IYCF medical advice is negative and marginally significant ($p=.058$). Similarly to mass media only communes, in franchise communes, high exposure communes were higher on reported receipt of IYCF medical advice before the launch of the campaign and increased at a lesser rate over time than low exposure communes (Figure 4.10).

Table 4.15 Before-after IYCF medical advice by levels of exposure in franchise communes

	Model 1 medical advice [95% CI]	Model 2 medical advice [95% CI]	Model 3 medical advice [95% CI]
after (vs. before)	0.181*** [0.134,0.227]		0.410*** [0.188,0.632]
exposure		0.119* [0.0250,0.212]	0.219*** [0.100,0.338]
after#exposure			-0.125 [-0.255,0.00436]
_cons	0.319*** [0.276,0.362]	0.246** [0.0728,0.419]	-0.0828 [-0.296,0.130]
<i>N</i>	284	284	284
adj. R^2	0.098	0.016	0.115

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Figure 4.10 Before-after IYCF medical advice by commune level exposure: Franchise communes with no franchise attendance



*The colored lines reflect changes over time in commune level IYCF medical advice at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

Greater commune level exposure to the mass media campaign did not lead to overtime increases in reported receipt of IYCF medical advice in either mass media only communes or franchise communes. However, higher commune level exposure did lead to greater franchise attendance in franchise communes. And this may be one of the differences between how the mass media campaign worked in franchise communes and how it failed to work in mass media only communes. Where there were “Little Sun” franchise centers, the mass media campaign drove attendance at those franchise centers. However, it does not appear to have inspired either increased IYCF information seeking with medical professionals outside the “Little Sun” network or increased proffering of IYCF advice by medical professionals outside the “Little Sun” network in either franchise or mass media only communes.

Conclusion

In franchise areas, the evidence suggests that the mass media campaign had an effect on EBF in part by driving attendance at the “Little Sun” franchise centers which led to increases in commune level EBF. However, the analyses also suggest that not all of the effects of exposure on EBF in the franchise areas are the result of direct franchise attendance; the positive overtime effect of exposure on EBF remains even when we drop individuals who attended the franchise out of the construction of the commune level EBF variable. Higher commune level exposure to the mass media campaign is associated with greater overtime increases in commune level EBF even among those respondents who did not attend the franchise. This effect may be attributable, in part, to increases in descriptive and injunctive norms related to EBF in the franchise communes. Although not apparent in the commune level analyses, the analyses examining the effect of commune level exposure on individual level social norms and individual level descriptive and injunctive social norm belief items indicate a large positive and significant effect of being in a high exposure commune on individual normative beliefs. The combination of a more intensive mass media campaign and a branded network of trained service providers offering quality infant and young child feeding counseling and care may have created a general environment more supportive of EBF thereby reducing barriers to translating the mass media messages into EBF behavior.

In the mass media only communes, the evidence suggests that the mass media campaign did not have the expected effect on knowledge, attitudes, social norms and self-efficacy. In fact, the only significant result suggests that higher commune level exposure was associated with smaller (not larger) overtime increases in commune level self-efficacy.

Finally, greater commune level exposure to the mass media campaign was also not associated with greater overtime increases in reported receipt of IYCF medical advice (from outside the “Little Sun” franchise) in either mass media only or franchise communes. While exposure to the mass media campaign does not appear to have inspired either increased IYCF information seeking with medical professionals outside the “Little Sun” network or increased

proffering of IYCF advice by medical professionals outside the “Little Sun” network, the receipt of IYCF advice from non-“Little Sun” medical professionals also does not help to explain the lack of effectiveness of the mass media campaign in mass media only communes.

The failure of the mass media campaign to produce effects on EBF behavior in the mass media only communes can be attributed, in part, to the fact that exposure to the TV spots did not shift knowledge and beliefs in the desired directions. I speculate that this failure is primarily due to two weaknesses of the mass media campaign: 1) One of the two television spots addressed a belief that, although highlighted by qualitative formative research, was found in quantitative baseline analyses to have a low percent-to-gain. The majority of mothers already believed that the more they breastfeed their infant, the more milk their bodies will produce and that belief was not associated with EBF behavior. So, from the outset, roughly half of the campaign exposures were unlikely to be effective in changing population-level EBF behavior. 2) The mass media campaign in mass media only communes relied solely on one channel and format: television spots. The spots were theory-based, high production quality, and aired frequently during media bursts, nevertheless, there is only so much one 30-second spot can accomplish alone.

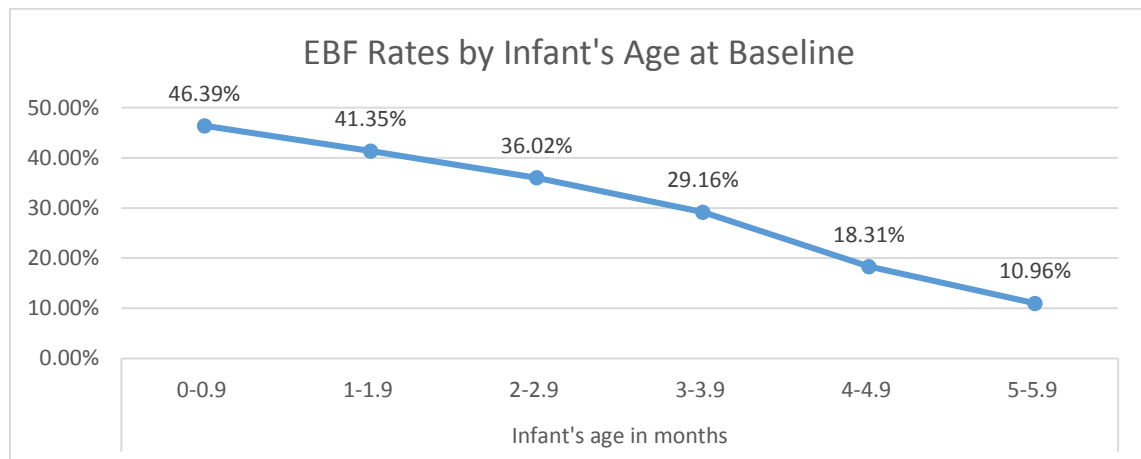
The success of the mass media campaign in producing effects on EBF in franchise communes can be attributed to greater attendance at the “Little Sun” counseling centers in high exposure communes than in low exposure communes and, possibly, to shifts in perceived social norms. I believe that this success is due to the multiple intervention components echoing each other, reaching the target audience through multiple channels and formats, and through the creation of a more favorable environment towards EBF.

Chapter 5 SELECT MODERATORS OF THE EFFECTIVENESS OF A MASS MEDIA CAMPAIGN TO PROMOTE EXCLUSIVE BREASTFEEDING IN VIETNAM

This chapter will explore whether the campaign had differential effects on population subgroups, specifically mothers of younger infants compared to mothers of older infants, first-time mothers as compared to experienced mothers, and mothers with more versus less education. It is important to investigate the differential effects of a mass media campaign on population subgroups because it is possible that the campaign was not equally effective for all members of the target population. Only examining effects on the general population restricts our understanding of for whom the campaign was effective and may obscure interesting results that can contribute to the overall evaluation of the campaign's effectiveness and inform future campaign development.

Exclusive breastfeeding is a behavior directly tied to the age of the infant. Figure 5.1 depicts EBF rates by infant's age at baseline (controlling for mother's ethnicity, age, education, occupation, whether she is a first-time mother, whether she had a cesarean section, and whether she had returned to work at the time of the interview).

Figure 5.1 EBF rates by infant's age at baseline



About 46% of the population was exclusively breastfeeding in the first month (based on 24-hour recall) and then EBF rates drop off steadily until only 11% are still breastfeeding five-month-olds. In the past, global EBF recommendations focused on the first four months of the

infant's life (as opposed to the first six months as they do now). Confusion about the appropriate duration of EBF can exacerbate the drop-off in months 3-5. Furthermore, once EBF is abandoned, it can be difficult to resume because a woman's breastmilk supply may be reduced. Therefore, it is possible that the mass media campaign had greater effects among 0-2 month olds than among 3-5 month olds by increasing initiation and/or extending the duration of exclusive breastfeeding.

It is also possible that a mass media campaign to promote EBF would be effective in encouraging first-time mothers to breastfeed exclusively, but that it would not be effective for seasoned mothers whose own prior experience with breastfeeding is likely to over-ride anything seen and heard on the television. Prior behavior is often a good predictor of subsequent behavior and, given that breastfeeding is a complex learned behavior, it is likely that women's prior breastfeeding experience will influence subsequent breastfeeding intentions and behaviors. Indeed, my data suggest that Vietnamese women who are currently exclusively breastfeeding are almost nine times more likely to agree or strongly agree to a six-item scale measuring intentions to exclusively breastfeed a future child, than women who are not currently exclusively breastfeeding (OR = 8.77; $p \leq 0.001$).

It is possible, then, that a woman who followed a mixed feeding method (supplementing breastmilk with water, formula, and/or complementary foods) with her prior children would be less likely than a first-time mother to be persuaded by mass media messages to exclusively breastfeed. In addition, it is possible that women who did not exclusively breastfeed prior children will have more difficulty convincing close others (father, mothers-in-law, etc.) to adhere to the breastmilk only rule for the most recent child. Furthermore, first-time mothers are likely to be particularly receptive to breastfeeding information and recommendations given that it is a new and necessary behavior (the baby must be fed one way or another) related to a very important outcome: their infant's health.

I will use a measure of primipara status to explore the hypothesis that first-time mothers will be easier to persuade to exclusively breastfeed based on their lack of prior breastfeeding

experience.¹¹ This hypothesis rests, in part, on the assumption that the large majority of mothers in Vietnam will not have exclusively breastfed children born prior to the campaign launch (as mentioned above, at baseline, only 11% of women were still exclusively breastfeeding in the fifth month after birth).

Finally, it is possible that women with higher educational levels might be more able to change their behavior as a result of exposure to the breastfeeding recommendations in the mass media than women with lower educational levels. Education is often used as a proxy for socioeconomic status, but the use of education here is primarily meant to be a proxy for overall and health literacy which, according to the WHO, “represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health” (Nutbeam, 2008, p. 2074).

The skills required for high health literacy are most often developed through formal education. These skills include functional literacy (the ability to read, write, and calculate well-enough to navigate everyday life), interactive literacy (the ability to apply new information to changing circumstances), and critical literacy (the ability to critically analyze information and use it to exert greater control over life events and situations). Although health information presented via mass media messages may be more accessible than other forms of health information that are written, translating television spots about EBF into EBF behavior still requires high levels of interactive and critical literacy.

A complex behavior like EBF might require higher levels of schooling to translate mass media messaging into sustained behavior. To explore whether the campaign had differential effects among women with low versus high education levels, I will split the sample into four categories: mothers with five or fewer years of education, mothers with 6-9 years of education, mothers with 10-12 years of education, and mothers with more than 12 years of education.

¹¹ It is important to note that the measure of primipara status is constructed from the questions: “How many children from 2 to 5 years do you have?” and “How many infants under 24 months do you have?” This construction of primipara could incorrectly classify mothers of twins as not primipara and mothers of children spaced more than 5 years apart as primipara when they are, in fact, multipara.

These moderation analyses are important for accurately representing the effects of this particular campaign and for designing future campaigns to maximize effectiveness. Perhaps distinct message strategies are necessary to persuade mothers of newborns to exclusively breastfeed and continue EBF through the first three months than are necessary to persuade the mothers of infants aged 3-5 months to continue breastfeeding through the end of the fifth month. Alternatively, if the mass media campaign were more effective among first time mothers than among experienced mothers, future campaigns promoting EBF could be more narrowly targeted so as to be more effective among first-time mothers and evaluated in such a way as to better capture the effects.

Finally, in addition to contributing to a better understanding of for whom a given campaign was effective, subgroup effects research has important public health and social justice implications. It is possible that mass media campaigns are less accessible to population subgroups that are already socially disadvantaged, thereby exacerbating inequality. If the campaign was less effective for women with lower educational levels, it would have important implications for designing more accessible communication messages and/or reaching less-educated women through other communication formats including interpersonal counseling.

Analyses

For each of these potential moderators, I created separate commune level datasets for each subgroup within franchise and mass media only areas: one with mothers of children aged 0-2 months and one with mothers of children aged 3-5 months, one with first-time mothers and one with experienced mothers, and one each with women with five or fewer years of education, 6-9 years of education, 10-12 years of education, and more than 12 years of education. I did this by restricting the sample to members of each subgroup and then aggregating by commune and by wave. I then merged the subgroup datasets into two combined datasets (one for franchise communes and one for mass media only communes) for each of the three potential moderators: infant's age, primipara status, and mother's education. The exposure variable reflected the

average commune level exposure from the overall sample, collapsed across waves 2-5. I explored whether being in a high exposure commune had differential subgroup effects by regressing EBF on a three-way interaction between time, commune level exposure, and the potential moderator.

Results

The three-way interaction exploring whether being in a high exposure commune resulted in greater overtime changes in EBF behavior for mothers of infants aged 0 to 2 months than for mothers of infants aged 3 to 5 months was not significant in either franchise or mass media only communes (Table 5.1).

Table 5.1 Exploring infant's age as a moderator of the effect of commune level exposure on EBF

	Franchise EBF [95% CI]	Mass media only EBF [95% CI]
after (vs. before)	-0.155 [-0.663,0.353]	0.240* [0.022,0.459]
Exposure	-0.097 [-0.325,0.131]	0.254** [0.063,0.445]
after#exposure	0.281* [0.013,0.550]	-0.141 [-0.287,0.005]
infant_age	-0.538** [-0.887,-0.189]	-0.137 [-0.507,0.234]
after#infant_age	0.292 [-0.130,0.714]	-0.075 [-0.408,0.258]
infant_age#exposure	0.215* [0.029,0.400]	-0.051 [-0.277,0.175]
after#infant_age#exposure	-0.169 [-0.400,0.062]	0.065 [-0.138,0.268]
_cons	0.471* [0.049,0.892]	0.040 [-0.265,0.344]
<i>N</i>	568	604
adj. <i>R</i> ²	0.306	0.152

Infant age: 0 = 0-2 months; 1 = 3-5 months

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

This suggests that the concern that the mass media campaign may have been more effective among mothers of infants aged 0-2 months than among infants aged 3-5 months was not supported by the data.

The three-way interaction exploring whether being in a high exposure commune resulted in greater overtime changes in EBF behavior among first-time mothers than among experienced mothers was also not significant in either franchise or mass media only communes (Table 5.2).

Table 5.2 Exploring primipara status as a moderator of the effect of commune level exposure on EBF

	Franchise EBF [95% CI]	Mass media only EBF [95% CI]
after (vs. before)	0.153 [-0.258,0.565]	0.042 [-0.262,0.345]
Exposure	0.052 [-0.150,0.254]	0.199 [-0.014,0.412]
after#exposure	0.109 [-0.114,0.333]	-0.023 [-0.226,0.180]
Primipara	0.093 [-0.191,0.376]	-0.172 [-0.418,0.075]
after#primipara	-0.202 [-0.539,0.134]	0.274 [-0.013,0.560]
primipara#exposure	-0.064 [-0.222,0.094]	0.068 [-0.099,0.234]
after#primipara#exposure	0.108 [-0.083,0.299]	-0.156 [-0.345,0.034]
_cons	0.132 [-0.226,0.491]	0.054 [-0.267,0.376]
<i>N</i>	562	601
adj. <i>R</i> ²	0.234	0.037

Primipara: 0 = multipara; 1 = primipara
^{*} *p* < 0.05, ^{**} *p* < 0.01, ^{***} *p* < 0.001

Therefore, the hypothesis that the mass media campaign would be more persuasive among first-time mothers given that they had not already established a past pattern of infant feeding was not supported by the data.

For education, I started with four subgroups (five or fewer years of education, 6-9 years of education, 10-12 years of education, and more than 12 years of education). I conducted three sets of comparisons in franchise and mass media only communes each for a total of six comparisons: five or fewer years of education versus everyone else, more than 12 years of education versus everyone else, and less than 10 years of education versus 10 or more years of education.

In franchise communes, none of the three-way interactions between time, levels of exposure, and education were significant, suggesting that there were not differential overtime effects of exposure to the mass media campaign on EBF behavior for women with five or fewer years of education compared to women with more education (Table 5.3, Model 1), for women with more than 12 years of education compared to women with less education (Table 5.3, Model 2), or for women with less than 10 years of education compared to women with 10 or more years of education (Table 5.3, Model 3).

Table 5.3 Exploring education as a moderator of the effect of commune level exposure on EBF in franchise communes

	Model 1 EBF [95% CI]	Model 2 EBF [95% CI]	Model 3 EBF [95% CI]
after (vs. before)	0.019 [-0.411,0.449]	-0.008 [-0.381,0.365]	0.039 [-0.435,0.514]
Exposure	0.025 [-0.164,0.214]	-0.060 [-0.230,0.110]	0.021 [-0.193,0.235]
after#exposure	0.179 [-0.049,0.406]	0.206* [0.010,0.402]	0.164 [-0.092,0.419]
≤5 years education (vs. everyone else)	0.384 [-0.294,1.062]		
after# ≤5 years education	0.041 [-0.688,0.769]		
≤5 years education#exposure	-0.231 [-0.599,0.137]		
after# ≤5 years education#exposure	-0.028 [-0.418,0.362]		
>12 years education (vs. everyone else)		-0.200 [-0.545,0.144]	
after# >12 years education		0.147 [-0.387,0.680]	
>12 years education#exposure		0.160 [-0.037,0.357]	
after# >12 years education#exposure		-0.141 [-0.437,0.154]	
<10 years education			0.128 [-0.243,0.499]
after# <10 years education			-0.015 [-0.426,0.396]
<10 years education#exposure			-0.085 [-0.284,0.114]
after# <10 years education#exposure			0.012 [-0.210,0.234]
_cons	0.176 [-0.169,0.522]	0.303 [-0.016,0.623]	0.189 [-0.202,0.580]
N	1010	1010	1010

adj. R^2	0.164	0.158	0.156
$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$			

In mass media only communes, only one three-way interaction was significant, pointing to differential overtime effects of exposure to the mass media campaign on EBF behavior for women with less than 10 years of education compared to women with 10 or more years of education (Table 5.4, Model 3). There were no differential overtime effects of exposure on EBF for women with five or fewer years of education compared to women with more education (Table 5.4, Model 1) or for women with more than 12 years of education compared to women with less education.

Table 5.4 Exploring education as a moderator of the effect of commune level exposure on EBF in mass media only communes

	Model 1 EBF [95% CI]	Model 2 EBF [95% CI]	Model 3 EBF [95% CI]
after (vs. before)	0.039 [-0.261,0.340]	0.009 [-0.278,0.295]	-0.149 [-0.649,0.352]
Exposure	0.181 [-0.034,0.397]	0.144 [-0.071,0.358]	0.120 [-0.188,0.428]
after#exposure	0.0185 [-0.169,0.206]	-0.004 [-0.190,0.181]	0.148 [-0.160,0.456]
≤5 years education (vs. everyone else)	0.027 [-0.387,0.440]		
after# ≤5 years education	0.202 [-0.161,0.565]		
≤5 years education#exposure	0.023 [-0.246,0.292]		
after# ≤5 years education#exposure	-0.236 [-0.480,0.009]		
>12 years education (vs. everyone else)		-0.563* [-1.065,-0.061]	
after# >12 years education		0.484 [-0.064,1.031]	
>12 years education#exposure		0.294 [-0.025,0.613]	
after# >12 years education#exposure		-0.208 [-0.559,0.144]	
<10 years education			-0.146 [-0.577,0.286]
after# <10 years education			0.422 [-0.016,0.860]
<10 years education#exposure			0.121 [-0.145,0.386]
after# <10 years education#exposure			-0.334* [-0.604,-0.064]
_cons	0.006	0.099	0.096

	[-0.338,0.351]	[-0.237,0.436]	[-0.403,0.594]
<i>N</i>	1046	1046	1046
adj. <i>R</i> ²	0.042	0.035	0.040

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Because the three-way interactions between time, levels of exposure, and education only suggest differential effects of education for one of the six comparisons, I decided to limit the analyses to two subgroups rather than four. I reconstructed the commune level datasets from the individual data so as to have only two education subgroups (less than 10 years and 10 or more years of education) and repeated the analyses in franchise communes and mass media only communes.

Table 5.5 displays the results which suggest that education moderates the overtime effect of being in a high exposure commune on EBF behavior in mass media only communes, but not in franchise communes. In mass media only communes, being in a high exposure commune had a greater effect on EBF among those who had 10 or more years of education than among those who had less than 10 years of education.

Table 5.5 Exploring education as a moderator of the effect of commune level exposure on EBF: <10 years of education vs. ≥10 years

	Franchise EBF [95% CI]	Mass media only EBF [95% CI]
after (vs. before)	-0.051 [-0.436,0.333]	0.220* [0.020,0.420]
Exposure	-0.023 [-0.187,0.140]	0.213* [0.042,0.385]
after#exposure	0.221* [0.023,0.419]	-0.133 [-0.271,0.004]
Education	-0.024 [-0.334,0.286]	0.342 [-0.196,0.880]
after#education	0.0769 [-0.257,0.410]	-0.624* [-1.222,-0.027]
education#exposure	0.016 [-0.144,0.177]	-0.241 [-0.574,0.092]
after#education#exposure	-0.042 [-0.223,0.139]	0.433* [0.060,0.806]
_cons	0.253 [-0.045,0.551]	-0.005 [-0.272,0.262]
<i>N</i>	561	597
adj. <i>R</i> ²	0.233	0.047

Education: 0 = 0-9 years; 1 = 10 or more years

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Given the fact that EBF rates did not increase over the period of the campaign in mass media only communes, in order for the mass media campaign to have improved EBF among more educated women, EBF would have had to decrease among less education women. This is improbable. It is more likely that the observed moderation effect of education in mass media only communes is a chance result as multiple tests were performed and there was only one significant result.

Nevertheless, this result is in line with our expectation that there might be some threshold level of education that facilitates the translation of exposure to a mass media campaign into the recommended behavior, in this case, EBF. It suggests that, in mass media only areas, mothers with ten or more years of education might have been better able act on mass media messages promoting exclusive breastfeeding than mothers with less than ten years of education.

It is unclear, however, why exposure would have had differential effects among educational subgroups in mass media only communes and not in franchise communes. As it is conceivable that, in franchise communes, mothers with lower educational levels sought additional assistance at the franchise centers thereby attenuating the differential effects of the mass media campaign by education level in franchise areas, I explored whether education moderates the effect of exposure on franchise attendance in franchise communes. For the sake of simplicity, and because we do not have real observed baseline levels of franchise attendance because the franchises were not yet established at baseline, I regressed franchise attendance on a two-way interaction between commune level exposure and education level (less than 10 years or 10 years or more; Table 5.6).

Table 5.6 Exploring education as a moderator of the effect of commune level exposure on franchise attendance

	Model 1 Franchise Attendance [95% CI]	Model 2 Franchise Attendance [95% CI]
exposure	0.197*** [0.088,0.307]	0.204** [0.085,0.323]
education	0.031* [0.005,0.057]	0.056 [-0.112,0.223]
education#exposure		-0.014 [-0.104,0.077]
_cons	-0.164 [-0.356,0.029]	-0.176 [-0.386,0.035]
<i>N</i>	561	561
adj. <i>R</i> ²	0.042	0.041

Education: 0 = 0-9 years; 1 = 10 or more years
 * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The interaction is not significant suggesting that being in a high exposure commune did not have differential effects on franchise attendance among mothers with more versus less education. Nevertheless, the presence of the franchise and the more diversified mass media formats employed in franchise communes could have made the campaign messages more accessible to women of all education levels in franchise communes than in mass media only communes where the message was transmitted uniquely through television spots.

Conclusion

In general, exposure to Alive & Thrive’s mass media campaign to promote exclusive breastfeeding did not have differential effects among the three population subgroups examined here: mothers of younger infants compared to mothers of older infants, first-time mothers as compared to experienced mothers, and mothers with more versus less education. This is encouraging because the goal of a national, non-targeted mass media campaign is to be as inclusive as possible and these results suggest that the mass media campaign was more or less equally accessible to mothers across these particular subgroups.

There is some evidence that education moderated the effectiveness of the mass media campaign in mass media only communes. It may be a chance result, but, if it is not, it suggests

that something about the way in which the intervention operated in franchise communes – be it the existence of the franchise centers themselves, the use of multiple mass media formats (including billboards, posters, broadcasts via village loudspeakers, and screening of TV spots at the franchise centers), or the interplay between the various components of the intervention – made campaign messages more accessible to women of lower education levels in franchise communes than in mass media only communes. This would support an argument for interventions with multiple components that reach members of the target audience through diverse communication channels and formats as the channel or format that is most effective with one population subgroup may not be effective with another.

Chapter 6 SUMMARY, STRENGTHS & LIMITATIONS, AND CONCLUSION

Summary

In my dissertation, I set out to explore whether a mass media campaign comprised of two television spots to promote exclusive breastfeeding was successful in changing EBF behavior when implemented alone and when implemented in conjunction with other media materials, the training of service providers, and the establishment of a franchise network of infant and young child feeding counseling centers. I also investigated how the campaign worked or failed to work and whether there were differential effects among population subgroups.

The campaign succeeded in generating relatively high levels of exposure. In mass media only communes, 58% of respondents, and in franchise communes, 69% of respondents, reported exposure and could recall at least one message from the two television spots promoting EBF. When I investigated the cross-sectional association between individual level self-reported exposure and EBF behavior, it was positive and significant such that greater message recall was more associated with EBF behavior than lower or no message recall. It is possible, then, that direct individual exposure to the campaign led to better EBF outcomes. However, it is also possible that those individuals who were already more favorable to EBF were more likely to recall campaign exposure and messages. As we cannot sort out causal order from the individual level cross-sectional data, we turned to analyses at the commune level to explore changes across time by commune level exposure. These analyses reflect individual, social, and institutional models of effects in which the campaign leads to changes in the larger social environment which lead to changes in individual behavior. Unlike with the individual effects model, the effects are not limited to those directly exposed to campaign messages; individuals can be both directly exposed and indirectly exposed to the campaign through exposed others.

Overall, at the commune level, EBF rates improved over the course of the mass media campaign. However, upon closer examination, we see that it was change in the franchise areas

that drove the effect. EBF rates remained relatively flat in mass media only communes after the launch of the campaign, never differing significantly from baseline. In the franchise communes, EBF rates improved sharply and remained significantly different from baseline at all subsequent waves. This analysis suggests that the Alive & Thrive television spots alone were not successful in changing population-level EBF rates, but that the television spots in combination with other media (billboards, posters, broadcasts via village loudspeakers, and screening of TV spots at the franchise centers) and trained service providers organized in a franchise network of IYCF counseling centers was successful in changing population-level EBF rates (EBF rate before: 24%, after: 55%).

In order to link the improved EBF rates in franchise communes to the mass media campaign, I explored whether communes that were going to be high in exposure after the campaign began experience greater before-after increases in EBF than communes that were going to be low in exposure. Although even low exposure communes experienced significant before-after increases in EBF, high exposure communes experienced significantly greater increases than low exposure communes. This effect remains when we control for additional exposure to other components of the mass media campaign and when we drop all the individuals who attended the franchise out of the construction of the EBF variable, suggesting that commune level exposure to the mass media campaign really did have an effect on EBF behavior in franchise areas. These analyses also suggest that one of the ways in which effects took place in franchise areas was through social diffusion.

I then explored the mechanisms of effect and failure in franchise communes and mass media only communes. In franchise communes, the mass media campaign had an effect in part by driving women to the “Little Sun” franchise centers to seek additional IYCF support and that support appears to have had an effect on EBF behavior. However, not all of the effects of the mass media campaign on EBF behavior in franchise communes occurred through franchise attendance; there is some evidence to suggest that the mass media campaign also worked in franchise areas by improving perceived injunctive and descriptive social norms regarding EBF.

In mass media only communes, high exposure communes did not experience greater before-after increases in knowledge, attitudes or social norms than low exposure communes. In fact, the only significant effect of commune level exposure on cognitions in mass media only communes was a negative effect on self-efficacy such that high exposure communes experienced significantly smaller over time increases in self-efficacy than low exposure communes.

Quantitative baseline analyses revealed that self-efficacy, as measured here, was not strongly associated with EBF behavior. Because the two EBF promotion spots were designed before baseline data was collected and analyzed, the core message of the “Nurse More” spot was a self-efficacy appeal: “the more you breastfeed, the more milk your body will produce.” Like the other self-efficacy belief statements, this item in particular was found in baseline analyses to have a very low percent-to-gain (most mothers already agreed with the belief statement and it was not highly associated with EBF behavior). Therefore, it is not surprising that the campaign had no effect on self-efficacy.

The boomerang effect is somewhat surprising, but not unfathomable. I am reluctant to over interpret the small negative effect of exposure to the mass media campaign on self-efficacy and I do not believe it is uniquely responsible for the lack of behavior change in mass media only communes. However, it is a potential contributor to the ineffectiveness of the mass media campaign.

Notably, the “Little Sun” franchise promotion spots were aired on the same national and regional television channels as the “Nurse More” and “No Water” EBF promotion spots. This means that franchise promotion spots were aired even where there were no franchises with only a short disclaimer: “The program is being implemented in 15 provinces, more detailed information is available at www.mattroibetho.vn.” It is unclear how mothers responded to having one of their core infant feeding beliefs (“my infant needs water”) undermined and then discovering that the “Little Sun” franchise centers were not available in their districts for follow-up support. It is possible that just knowing that the franchise centers were not available in their districts for

support, if needed, made them less likely to try the recommended behavior of not giving water. And, indeed, main effects analyses with not giving water as the outcome rather than EBF show parallel results. In franchise areas, communes that were going to be high in exposure experienced significantly greater before-after increases in the behavior of not giving water than communes that were going to be low in exposure. In mass media only areas, communes that were going to be high in exposure already had a higher no water rate at baseline and did not improve at a faster rate than communes that were going to be low in exposure.

Finally, exposure to Alive & Thrive's mass media campaign to promote exclusive breastfeeding did not, for the most part, have differential effects among the three population subgroups examined here: mothers of younger infants compared to mothers of older infants, first-time mothers as compared to experienced mothers, and mothers with more versus less education.

Strengths & Limitations

One of the questions driving this study was: can mass media alone impact exclusive breastfeeding behavior? It is important to note that this study has specific strengths and limitations for exploring the effects of mass media alone on EBF.

Regarding the strengths, the evaluation design was structured to equally sample mass media only areas and franchise areas and to examine differences in effects between mass media only and mass media plus interpersonal counseling in the form of the "Little Sun" franchise model. This evaluation model is rare as limited evaluation resources are often focused on the areas with the strongest intervention and the best chance of producing effects. In addition, the production quality of the EBF spots was professional and the spots were designed based on theory (reasoned action model) and extensive qualitative formative research. Finally, the EBF spots were aired with relatively high frequency: over the course of the 32 month mass media campaign, there were twelve media bursts of, on average, 40.5 spots a week across four and a half weeks for a total of 53 weeks on the air.

Regarding the limitations, this study explores the effects of one very particular and somewhat limited mass media campaign that was composed of two 30 second EBF spots. In the mass media only communes, the campaign did not include any other marketing strategies like those included in the franchise communes (for example, bus wraps, billboards, posters, and loudspeaker messages). And although the spots were high quality, theory-based, and inspired by qualitative formative research, baseline analyses suggest that the core message of one of the spots, “the more you breastfeed, the more milk your body will produce,” had a very low percent-to-gain. This means that there is not a strong association between that belief and EBF behavior among our sample of Vietnamese mothers and that most mothers already held the desired belief at baseline. So, from the outset, the “Nurse More” spot was unlikely to affect EBF behavior, essentially reducing the mass media campaign to one 30-second spot.

As a result, this is a relatively weak test of the potential effectiveness of mass media for influencing EBF behavior and the results should not be generalized to other contexts and stronger mass media interventions. A more rigorous test of the potential effectiveness of mass media alone on EBF behavior would involve numerous spots designed around beliefs that are identified as promising drivers of behavior change after both qualitative and quantitative formative research. And a truly rigorous test would offer opportunities for exposure through multiple mass media channels and multiple formats including more interactive and entertaining formats like talk shows or soap operas.

Finally, there are several more general limitations to the study. First, the individual level data are cross-sectional, making it impossible to sort out causal order at the individual level. However, the fact that the same 118 communes were sampled over time makes it possible to examine longitudinal effects at the commune level thereby reducing threats of reverse causation. Second, there are significant differences between samples at each wave on a number of important confounders including mothers’ age, education, occupation, primipara status, whether the mother had a cesarean section, whether the mother had gone back to work at the time of the interview, and the age of the infant, so these variables were controlled for in all individual level

analyses. Control variables were deemed unnecessary at the commune level after analyses revealed that these variables were unlikely to be confounders of the overtime relationship between exposure and EBF. Third, the measure of exposure is not ideal as it only captures whether the respondent has ever been exposed to the mass media campaign and gives no indication of the recency or frequency of exposure. By combining the aided recall measure with a measure of confirmed recall, we have a more nuanced measure of exposure that permits us to explore a dose-response relationship between exposure and EBF behavior. However, that measure is likely confounded with prior interest and knowledge. Fourth, the survey items used to construct the primary outcome variable, EBF, were measured slightly differently at baseline and follow-up waves. This makes it difficult to be completely certain that the observed overtime effects are campaign effects and not measurement effects. Nevertheless, the fact that we found effects in franchise areas and not in mass media only areas makes it less likely that the effects are an artifact of measurement.

Conclusions

From the studies that comprise this dissertation, we can conclude that: 1) Mass media alone, in the format of two 30-second spots, was not effective in changing EBF behavior in Vietnam; 2) Where other intervention strategies were implemented alongside mass media, the mass media campaign led to increased EBF behavior change (high exposure communes changed more over the course of the campaign than low exposure communes); 3) In the geographic areas where the intervention was comprised of multiple components, the mass media campaign had effects through a process of social diffusion.¹²

Each of these conclusions has important implications for future campaign design and evaluation. On the design side, message strategies should be based on both qualitative and quantitative formative research. Mass media campaigns may need to be more intensive and

¹² The campaign may also have had effects in franchise areas at the individual level, through direct exposure to campaign messages. However, as analyses at the individual level are cross-sectional we cannot confidently claim these effects.

multi-faceted, engaging audiences through multiple media formats and channels. Mass mediated social and behavior change interventions for complex behaviors like EBF may be more effective when accompanied by an interpersonal communication component. A multi-component intervention including diversified mass media, community mobilization, and interpersonal counseling can be effective in changing behavior where a single-component mass media intervention was not. Mass media is valuable for scaling up the effects of other program components. Social and behavior change interventions should strive to activate a process of social diffusion to extend campaign effects beyond those directly exposed to campaign messages. Having multiple program components may help activate a process of social diffusion.

On the evaluation side, it is important that evaluations of social and behavior change interventions endeavor to measure social routes of effect. Had analyses only been conducted at the individual level, we might have mistakenly inferred (based on the cross-sectional association between direct exposure and EBF behavior) that the campaign was equally effective in both mass media only and franchise areas. Furthermore, had the same communes not been measured at all five waves, we would not have been able to conduct longitudinal analyses at the commune level and, consequently, the commune level analyses would have suffered from the same threats to inference as the individual level analyses. Because the intervention and evaluation design permitted longitudinal analyses at the commune level, we were able to explore effects via social diffusion and observe that these effects took place in franchise areas but not in mass media only areas.

This finding, although disappointing on some levels, is also important because it provides insights into conditions that are more likely to activate a process of social diffusion. And it suggests that social diffusion may be an important contributor to campaign effectiveness. These insights can inform future intervention and evaluation design so as to both maximize the potential for effects via social diffusion and to continue to refine our understanding of intervention characteristics that promote social diffusion of important public health behaviors thereby contributing to improving the effectiveness of future social and behavior change interventions.

Appendix 1 Location of data collection



Appendix 2 Baseline questionnaire

INFORMED CONSENT FORM

A&T Interim Survey of Mothers with a child under 0-5.9 months old

Principal Investigators:

Nemat Hajeebhoy – Country Director, Alive & Thrive in Vietnam
Nguyen Truong Nam – Director, Institute of Social and Medical Studies

Introduction/Purpose of research

We would like to invite you to participate in a study of mothers who have a child under 6 months of age.

The purpose is to evaluate the work of a program called “Alive and Thrive”, which aims to improve the feeding of young children.

Research Procedure

If you agree to participate, the interviewer will ask you some questions about your knowledge, belief and practices on IYCF. The interview will take about 40 minutes.

Confidentiality

All information will be kept confidential and will be used only for the research purpose. Your personal information will be coded and kept confidential and then it will be destroyed as data is inputted and analyzed.

Risks

There will be no risks to you or your child’s health when participating in this study.

Benefits

Your answers will benefit the community and country by helping A&T project make their programs for mothers and children more effective.

Incentives

After completing the interview, we would like to give you VND 40,000 to thank you for your participation.

Voluntary participation and withdrawal from the research

Your participation in the interview is completely voluntary. You can refuse to participate in the interview or answer any questions at any time. Even after agreeing to participate in the study, you can withdraw at any time in case of any inconvenience. Your withdrawal from the research will not prevent you from receiving services at the commune health center.

Do you have any questions?

Contact information

If you have any further question about the research, please contact Dr. Nguyen Truong Nam – Principal Investigator or Ass. Prof. Dr. Pham Van Hoan, Chairman of IRB:

Dr. Nguyen Truong Nam
Principle Investigator- Director of Institute of
Social and Medical Studies
Address: No 50, Lane 141, Nguyen Khang Street,
Yen Hoa Ward, Cau Giay District, Hanoi
Tel: 04.3555.8288/Fax: 04.3555.8274.

Dr. Pham Van Hoan
Chairman of IRB – Institute of Social and
Medical Studies
Address: No 50, Lane 141, Nguyen Khang
Street, Yen Hoa Ward, Cau Giay District,
Hanoi
Tel: 04.3555.8288/Fax: 04.3555.8274.

Participant's commitment:

I am volunteering to participate in the research. I know that I can withdraw from the research at any time and the interviewer will answer any questions I may have.

DD/MM/YY

Name of participant

Investigator's commitment:

I have explained the procedures involved in this research as well as the risks and benefits when participating in the research for voluntary participants.

DD/MM/YY

Name of data collector

MOTHER OF CHILD UNDER 6 MONTHS

Questionnaire ID

1. (Background and characteristics)

START

TIME: _____ hour _____ minute

No	Question	Code	
1.1	Field Supervisor's name/ code		
1.2	Interviewer's name/ code		
1.3	Date of interview:	_____ / _____ /2013	
1.4b	Province/ city that the interview is being conducted in:	Hai Phong 31 Quang Nam.....49 Dak Lak.....66 Tien Giang.....82	
1.5b	District:		
1.6	Commune:		
1.7	Village/ hamlet:		
1.8	What is your name/code of mother?		
1.9	What is your ethnicity?	Kinh1 Other (specify)7	
1.10	What is your birth date? <i>(Remind respondent to use the solar calendar. If she does not remember her birth date, ask mother's age.)</i>	Birth date: ____/ ____/ ____ OR Age: _____ years old	
1.12b	What level of education have you completed ?	Never attended schools 0 ≤ 5 years 1 6-9 years 2 10-12 years 3 > 12 years 4	
1.13	How many children from 2 to 5 years do you have? <i>Include adopted or fostered children if respondent is primary care-giver.</i>		children
1.14	How many infants under 24 months do you have?		infants
1.15	Name of the index child	
1.16	Is (NAME) a boy or a girl?	Male 1 Female 0	

1.17	What is (NAME's) birth date? Remind the mother to use the solar calendar.	____/____/____	
1.18	Mother's main occupation before delivery	Farmer (planting, feeding animals, farming)/fisherman Salary government employee2 Salary non-government employee (including factory worker)3 Small trader/ self-employment /self owned business/services (tailor/hairdresser/builder)/freelance r4 Housewife/unemployment/university student/pupil5 Other (specify)7	
1.19b	Have you gone back to work (e.g., to the field, previous employment)?	Yes1 No0	02.2b
1.20b	How long after giving birth to (NAME) did you go back to work? month(s)..... days	

2. (Breastfeeding Practice)

Now I would like to ask you some questions about pregnancy, delivery and breastfeeding.

No	Question	Code	
2.2b	When you were pregnant with (NAME), did you receive any advice about breastfeeding from anyone ?	Yes 1 No 0	02.3c
2.3b	From whom did you receive this advice? Multiple responses possible Probe: Anyone else?	Husband 0 Mother/Mother in law 1 Other Family members 2 Neighbors/ Friends 3 Hamlet health worker/nutrition collaborator 4 Women Union staff 5 Midwife/nurse 6 Doctor/physician assistant 7 Other (specify) 8	
2.3c	When you were pregnant with (NAME), did you receive any advice about breastfeeding from any other sources ? Multiple responses possible	None 0 Yes, books/newspapers/magazines.. 1 Yes, television 2 Yes, internet (computer, phone...)..... 3 Yes, loudspeaker/radio..... 5 Yes, other events 4	

		Hamlet health worker/nutrition collaborator 4 Women Union staff..... 5 Midwife/nurse 6 Doctor/physician 7 Other (specify) 8	
2.20	Are you still breastfeeding (NAME)?	Yes 1 No 0	13.1b
2.21	How old was (NAME) when you stopped breastfeeding? <i>(If answer is not numeric, probe for approximate number)</i> month(s)..... days Never breastfed Yes..... 1 No..... 0	

3. **(Feeding Practices)** Now I would like to ask you some questions about how (NAME) was fed.

3.1b	Thinking about the time period from when (NAME) woke up yesterday morning until the time s/he woke up this morning , was (NAME) given any . . . (READ LIST) . . . ?		Y	N	DK	
		Breast milk	1	2	8	
		Plain water	1	2	8	
		Infant formula	1	2	8	
		Other milk (e.g. Packaged milk, Fresh milk, Condensed milk)	1	2	8	
		Milk products (e.g. cheese, yogurt, sponge cake....)	1	2	8	
		Packaged fruit juice/sugar water/herbal tea	1	2	8	
		Clear broth/rice water/soup	1	2	8	
		Other fluids (e.g. peps, coca...)	1	2	8	
		Soft, solid, semisolid foods (e.g. cereal, flour)	1	2	8	
		Fruits (including pressed fruits)	1	2	8	
		Candy, cookies, chips, other snacks	1	2	8	
Vitamins, minerals, syrup drop	1	2	8			
3.1.1	From the time s/he woke up yesterday morning until time s/he woke up this morning. Did	Yes 1 No 0				

	(NAME) drink anything from a bottle with a nipple?		
--	--	--	--

4. (Illness and feeding during illness) Now I would like to ask you about any illness (NAME) had in the past two weeks.

No	Question	Code	
4.1	Was (NAME) ill in the past two weeks?	Yes1 No0	06
4.2	If yes, what symptoms were his/her main symptoms? <i>Multiple responses possible.</i>	Fever1 Cough/Cold2 Fast breathing/shortness of breath3 Diarrhea.....4 Other (specify).....7	

6. (Determinants)

6.0 (Intention)

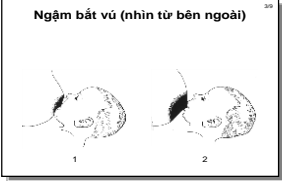
Now I want you to think ahead to a time when you might have another child. For these next statements, please respond for the actions you would take if you had another child. Please tell me whether you strongly disagree, disagree, disagree somewhat, agree somewhat, agree or strongly agree with each of the following statements. **[As you read the responses, point to each box.]** Please put your finger on the box to indicate how strongly you disagree or agree with each of the following statements.

If the answer is “don’t know,” code as 8.

1	2	3	4	5	6
Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly agree

No	Question	Code
6.0.7	If I have another child, I will breastfeeding him within 1 hour after giving birth	
6.0.1	If I have another child, I will not give him any water to drink or to wash out his mouth for the first 6 months.	
6.0.2	If I have another child, I will not give him anything other than breast milk in the first 3 days after birth.	
6.0.3	If I have another child, I will not give him any infant formula for the first 6 months.	
6.0.4	If I have another child, I will not give him any liquids besides breast milk for the first 6 months.	
6.0.5	If I have another child, I will not give him any semi-solid or solid foods for the first 6 months.	
6.0.6	If I have another child, I will not give him any food, water, or infant formula for the first 6 months.	

6.1. (Knowledge of breastfeeding) Now we would like to ask your opinion about infant feeding.

No	Question	Code
6.1.1b	How long after birth should a newborn start breastfeeding? If the mother answers “immediately”, interviewers ask the mother again about the exact time and record the appropriate time.	Within 1 hour1 Number of hours2 Number of days3 Hours Days Don't know8
6.1.4b	If a mother thinks her 4-month-old infant is not getting enough breast milk, what should she do? Multiple responses possible. Probe once: Anything else?	Breastfeed more often/more frequently0 Give infant formula1 Give other liquids/foods (e.g. water/fruits juice /Rice porridge/ rice flour)2 Mother needs to drink more water3 Mother needs to eat more food4 Mother needs to eat special food5 Refer to health care workers (doctor, nurse, midwife, nutrition collaborator/village health worker) 6 6 Other (Specify): 7 Don't know 8
6.1.5	In the figure, which picture shows correct attachment, 1 or 2? 	Position 1 is correct1 Position 2 is correct2 Both of these positions is correct ..3 Neither of these positions is correct 4 Don't know8
6.1.6	Each time you breastfeed, do you think you should give a little from each breast or empty one breast before switching to the other?	A little from each breast 1 Empty one breast before switching to the other2 Don't know8
6.1.7	Which is better for an infant under 6 months, breast milk alone or a combination of breast milk and infant formula?	Breast milk alone 1 A combination of breast milk and infant formula.....2 Don't know.....8
6.1.9	Until what month should a mother give her infant ONLY breast milk	Months

	and NO other foods, water or infant formula?	Don't know 98 No response 99	
6.1.10	In what month do you think an infant should START receiving plain water in addition to breast milk?	Months From birth 0 Don't know 98 No response 99	
6.1.11	In what month do you think an infant should first START to receive liquids other than water in addition to breast milk?	Months From birth 0 Don't know 98 No response 99	
6.1.12b	Until what month should a mother continue to breastfeeding? Write down the age as months.	Months Don't know 98 No response 99	

6.2. (Knowledge related to feeding semi-solid and solid foods)

Now we would like to ask your opinions about feeding semi-solid and solid foods

No	Question	Code
6.2.1	After completing what month should an infant first start to receive semi-solid foods (e.g. cereal, rice flour) in addition to breast milk?	Months Don't know 98
6.2.6	What are some foods that are rich in iron? Multiple responses possible. Do NOT read responses.	Red meat (e.g., pork, beef) 1 Organ meats / blood (e.g., liver, kidneys, heart) 2 Egg yolks 3 Fish, shrimp, crab 0 Green vegetables (e.g. katuk, amaranth, watercress, morning glory) 4 Fortified food (e.g. infant cereal, formula milk) 5 Supplementation vitamin/mineral (including syrup and medicine) 6 Other (specify) 7 Don't know/don't know about iron foods 8

6.3. (Beliefs)

I would like to ask your opinion about some other feeding practices. Please tell me whether you strongly disagree, disagree, disagree somewhat, agree somewhat, agree or strongly agree with each of the following statements. **As you read the responses, point to each box.** Please put your finger on the box to indicate how strongly you disagree or agree with each of the following statements.

If the answer is "don't know," code as 8.

1	2	3	4	5	6
Strongly disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly agree

No	Question	Code
	Please tell me your opinion about the following statements. <i>“I” in all of the following statements refers to the respondent and not the interviewer.</i>	
6.3.26	If I breastfeed my infant within 1 hour after giving birth, It'll be good for my child's health	
6.3.27	If I breastfeed my infant within 1 hour after giving birth, It'll be good for my health	
6.3.2	If I am breastfeeding, but DO NOT give my newborn infant formula during the first 24 hours after birth, s/he will be hungry.	
6.3.1	If I am breastfeeding, but DO NOT give my infant water until s/he completes 6 months, my infant will be thirsty.	
6.3.4	If I feed my infant ONLY breast milk and NO other food, water or infant formula, until s/he completes 6 months, I am giving my infant all the nutrients s/he needs to be healthy.	
6.3.6	If I continue to breastfeed my infant when s/he has diarrhea, it could make the diarrhea worse.	
6.3.7	If I feed my infant a combination of breast milk and infant formula until s/he completes 6 months, I am giving him/her the BEST possible nutrition.	
6.3.8	If DO NOT clean my infant's mouth out with water after breastfeeding, my infant will get thrush.	
6.3.10	If I am breastfeeding my 5 month old infant, but DO NOT give my infant water, s/he will be too hot.	
6.3.11	If I am breastfeeding and I wait until my infant has completed 6 months old to start feeding her/him semi-solid or solid foods, it is good for my infant's health.	
6.3.12	If I feed my infant a combination of breast milk and other foods when s/he is between 4 and 6 months of age, I am giving my infant the best possible nutrition.	
6.3.13	If a woman has small breasts, she will have difficulty producing enough breast milk to feed her infant.	
6.3.16	If I continue breastfeeding until my infant completes two years, it is good for my infant's health.	
6.3.18	If I feed my infant ONLY breast milk and NO other food, water, or infant formula until he completes 6 months, I am giving my infant all the nutrients s/he needs for optimal brain development.	
6.3.19	If I give my infant organ meats like heart, liver, and kidney, starting at 6-8 months, it is good for his/her health.	
6.3.24	A mother who returns to work when her infant is 4 months old will have to use mainly formula to feed her infant.	
6.3.25	If I feed my child iron-rich foods starting at 7 months, it will help with brain development	

6.4. (Social Norms)

I would like to ask your opinion about some social norms of other feeding practices.

Please tell me whether you strongly disagree, disagree, disagree somewhat, agree somewhat, agree or strongly agree with each of the following statements. **As you read the responses, point to each box.** Please put your finger on the box to indicate how strongly you disagree or agree with each of the following statements.

If the answer is “don’t know,” code as 8.

1	2	3	4	5	6
Strongly disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly agree

No	Question	Code
6.4.14	Most people who are important to me (e.g. family members, friends...) think that a mother after normal delivery, can breastfeed her infant within 1 hour.	
6.4.15	Most people who are important to me (e.g. family members, friends...) think that a mother after caesarean section, can breastfeed her infant within 1 hour.	Not in BL
6.4.16	Most people who are important to me (e.g. family members, friends...) think that infant needs feeding fomula milk in 1 first week.	Not in BL
6.4.1	Most people who are important to me (e.g. family members, friends...) think that I should feed my infant only breast milk, and no other food, water, or infant formula for the first 6 months.	
6.4.3	Most people who are important to me (e.g. family members, friends...) approve of me giving my baby water before she/he reaches 6 months of age.	Not in BL
6.4.4	Most people who are important to me (e.g. family members, friends...) approve of me giving my baby infant formula before she/he reaches 6 months of age.	Not in BL
6.4.5	Most people who are important to me (e.g. family members, friends...) approve of me giving my baby semi-solid or solid foods before s/he reaches 6 months of age.	Not in BL
6.4.10	Most people who are important to me think that a big child is healthy	Not in BL
6.4.17	Most women who have infants like me feed their infant breast milk within 1 hour after normal delivery.	Not in BL
6.4.18	Most women who have infants like me feed their infant breast milk within 1 hour after caesarean section.	Not in BL
6.4.19	Most people who are important to me feed their infant fomula milk in 1 first week.	Not in BL
6.4.2	Most women who have infants like me feed their infant only breast milk, and no other food, water, or infant formula for the first 6 months.	
6.4.6	Most mothers who have infants like me give their babies water before they reach 6 months of age.	Not in BL

6.4.7	Most mothers who have infants like me give their babies infant formula before they reach 6 months of age.	Not in BL
6.4.8	Most mothers who have infants like me give their babies semi-solid or solid foods before they reach 6 months of age.	Not in BL
6.4.12	Most mothers who have infants like me think that a big child is healthy	Not in BL

6.5. (Self-Efficacy)

I would like to ask your opinion about some other feeding practices. Please tell me whether you are very unconfident, unconfident, somewhat unconfident, somewhat confident, confident, or very confident in response to the statement. **As you read the responses, point to each box.**

If the respondent does not know, code 8.


1	2	3	4	5	6
Very unconfident	Unconfident	Somewhat unconfident	Somewhat confident	Confident	Very confident

No	Question	Code
6.5.1	My body can produce enough colostrum to feed my newborn within one hour after birth.	
6.5.3	My body can produce enough breast milk to feed my newborn only breast milk and no water or infant formula in the first 24 hours.	
6.5.4	The "first milk" produced by my body is all my newborn needs in the first 24 hours after birth.	
6.5.5	My breast milk is of good enough quality to nourish my infant so that the infant does not need any other food, water, or infant formula until s/he has completed 6 months.	
6.5.6	If I go back to work before my infant is six months old, I will have to start feeding him infant formula or semi-solid/solid foods.	
6.5.7	The more I breastfeed my infant, the more breast milk my body will produce.	
6.5.9	If my mother-in-law wants to feed my newborn infant formula in the first 24 hours after birth, I can refuse to let her do it.	
6.5.12	I can feed my infant organ meats like heart, liver, and kidney starting at 6-8 months.	
6.5.13	I can refrain from giving my infant water before s/he reaches 6 months of age.	Not in BL
6.5.14	I can convince other caretakers of my infant to not give him/her water to drink before s/he reaches 6 months of age.	Not in BL

7. (Utilization)

7.1. (Exposure to Franchise) Now I would like to ask you some questions about where you might have gotten information about infant feeding.

No	Question	Code
----	----------	------

7.1.1	Have you ever seen the logo “Mặt trời bé thơ” before?		Yes 1 No..... 0													
7.1.2	Have you ever heard the name “Mặt trời bé thơ” before?	Yes 1 No 0		07.2.1												
7.1.3	Do you know anyone who has ever been to “Mặt trời bé thơ” counseling service?	Yes 1 No 0														
7.1.5	Did you receive an invitation card to go to “Mặt trời bé thơ”?	Yes 1 No 0														
7.1.6	Have you ever been to “Mặt trời bé thơ” counseling service?	Yes 1 No 0		07.2.1												
7.1.7	How many times have you been to this service?	Times														
7.1.19 b	How attractive is the facility of “Mặt trời bé thơ” ?	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>Very un-attractive</td> <td>Un-attractive</td> <td>Some-what un-attractive</td> <td>Some-what attractive</td> <td>Attractive</td> <td>Very attractive</td> </tr> </table>	1	2	3	4	5	6	Very un-attractive	Un-attractive	Some-what un-attractive	Some-what attractive	Attractive	Very attractive		
1	2	3	4	5	6											
Very un-attractive	Un-attractive	Some-what un-attractive	Some-what attractive	Attractive	Very attractive											
7.1.21 b	How useful are the advice from “Mặt trời bé thơ”?	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>Very useless</td> <td>Useless</td> <td>Somewhat useless</td> <td>Somewhat useful</td> <td>Useful</td> <td>Very useful</td> </tr> </table>	1	2	3	4	5	6	Very useless	Useless	Somewhat useless	Somewhat useful	Useful	Very useful		
1	2	3	4	5	6											
Very useless	Useless	Somewhat useless	Somewhat useful	Useful	Very useful											
7.1.24	Will you return to “Mặt trời bé thơ” in the future?	Yes 1 No 0														

7.1. (Exposure to other health providers)

Now I would like to ask you some questions about exposure to health providers, other than at “Mặt trời bé thơ”

No	Question	Code	
7.2.1	In the past 3 months, has a doctor or nurse in a health facility [besides at “Mặt trời bé thơ”] given you advice about feeding (NAME)?	Yes 1 No 0	
7.2.3	In the past 3 months, has a village health worker or nutrition collaborator given you advice about feeding (NAME)?	Yes 1 No 0	

7.2.5	In the past 3 months, have you attended a meeting/workshop where breastfeeding was the topic of discussion?	Yes 1 No 0	07.2.7
7.2.6	How many times did you attend a meeting/workshop?	times	
7.2.7	In the past 3 months, have you participated in a community IYCF support group ?	Yes 1 No 0	08.1
7.2.8	How many sessions have you attended?	sessions	

8. (Media exposure)

Now I would like to ask you some questions about media exposure

No	Question	Code																																																	
8.1	Do you ever watch TV?	Yes..... 1 No 0	08.16																																																
8.2b	How often do you watch TV? showcard	Daily (7 days/week) 1 Several times a week (2-6 days/week) 2 About once a week 3 Less than once a week (≤ 3 days/month) 4 Don't know/don't remember..... 8																																																	
8.3b	What are the 2 TV channels you usually watch? Multiple responses possible.	<table border="1"> <tr> <td>VTV1</td> <td>11</td> <td>VTV3</td> <td>13</td> <td>Other national Channels</td> <td>18</td> </tr> <tr> <td>Ha Noi</td> <td>1</td> <td>Quang Tri</td> <td>45</td> <td>Dak Lak</td> <td>66</td> </tr> <tr> <td>Thai Nguyen</td> <td>19</td> <td>Da Nang</td> <td>48</td> <td>Dak Nong</td> <td>67</td> </tr> <tr> <td>Hai Phong</td> <td>31</td> <td>Quang Nam</td> <td>49</td> <td>Tien Giang</td> <td>82</td> </tr> <tr> <td>Thanh Hoa</td> <td>38</td> <td>Quang Ngai</td> <td>51</td> <td>Vinh Long</td> <td>86</td> </tr> <tr> <td>Quang Binh</td> <td>44</td> <td>Khanh Hoa</td> <td>56</td> <td>Ca Mau</td> <td>96</td> </tr> <tr> <td>Other TV:</td> <td>98</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Don't remember</td> <td>99</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	VTV1	11	VTV3	13	Other national Channels	18	Ha Noi	1	Quang Tri	45	Dak Lak	66	Thai Nguyen	19	Da Nang	48	Dak Nong	67	Hai Phong	31	Quang Nam	49	Tien Giang	82	Thanh Hoa	38	Quang Ngai	51	Vinh Long	86	Quang Binh	44	Khanh Hoa	56	Ca Mau	96	Other TV:	98					Don't remember	99					
VTV1	11	VTV3	13	Other national Channels	18																																														
Ha Noi	1	Quang Tri	45	Dak Lak	66																																														
Thai Nguyen	19	Da Nang	48	Dak Nong	67																																														
Hai Phong	31	Quang Nam	49	Tien Giang	82																																														
Thanh Hoa	38	Quang Ngai	51	Vinh Long	86																																														
Quang Binh	44	Khanh Hoa	56	Ca Mau	96																																														
Other TV:	98																																																		
Don't remember	99																																																		
8.4b	What kinds of TV programs do you watch most often? Multiple responses possible. Probe: Anything else? If mother responds "entertainment," probe: What kind of entertainment?	News 1 Music 2 Children's program/cartoons .. 3 Sports 4 Movie 5 Game shows 6 Health/disease programs..... 7 Cooking program 8 Science/life/education programs..... 10 Agriculture program 11 Weather program..... 12																																																	

		Other (specify)98	
8.5	Generally, at what times do you watch TV? Multiple responses possible. Probe: At any other time? If times mentioned overlap multiple categories, circle each category that applies.	0:00 – < 6:00 1 6:00 – < 9:00.....2 9:00 – < 12:00.....3 12:00 – < 15:004 15:00 – < 18:00.....5 18:00 – <21:00.....6 21:00 – < 24:00.....7	
8.6	During last 30 days, did you see any advertisements about infant formula on the television?	Yes 1 No0 Don't know/don't remember..... 8	08.8 88.8
8.7	In the past 30 days, about how often did you see an advertisement about infant formula on the television ? Was it . . . showcard	Daily (7 days/week) 1 Several times a week (2-6 days/week) 2 About once a week 3 Less than once a week (≤ 3 days/month) 4 Don't know/don't remember..... 8	
8.8	Now, I am no longer asking about formula advertisements. During last 30 days, did you see any information on breastfeeding on television?	Yes 1 No 0 Don't know/don't remember..... 8	08.16 88.16
8.9	In the past 30 days, how often did you see information on breastfeeding on television? Was it . . . showcard	Daily (7 days/week) 1 Several times a week (2-6 days/week) 2 About once a week 3 Less than once a week (≤ 3 days/month) 4 Don't know/don't remember..... 8	

TVC2: NURSE MORE AND NO WATER TVCS

8.16	Show Picture set 2 and ask: Have you ever seen a video clip with these snapshots below?	Yes 1 No0 Don't know/don't remember..... 8	08.26 88.26
------	---	--	------------------------------

8.17	In which TV channels did you see the video clips? Multiple responses possible.	Never seen on the TV 0					
		VTV1	11	VTV3	13	Other national Channels	18
		Ha Noi	1	Quang Tri	45	Dak Lak	66
		Thai Nguyen	19	Da Nang	48	Dak Nong	67
		Hai Phong	31	Quang Nam	49	Tien Giang	82
		Thanh Hoa	38	Quang Ngai	51	Vinh Long	86
		Quang Binh	44	Khanh Hoa	56	Ca Mau	96
		Other TV:	98				
		Don't remember	99				
8.18	Where have you seen this video clip besides the TV? Multiple responses possible.	Only on the TV	0				
		Mobile phone/computer/internet	1				
8.92	In the past 30 days, how often did you see this video clip? showcard	TV Screen in health facility	2				
		TV Screen in supermaket	3				
		Other events e.g., seminar	4				
		Other (specify)	6				
8.19	What are the key messages you could recall after watching the video clips? Multiple responses possible.	Daily (7 days/week)	1	Not in W2			
		Several times a week (2-6 days/week)	2				
		About once a week	3				
		Less than once a week (≤ 3 days/month)	4				
		Don't know/don't remember	8				
		Nurse more leads to more breast milk	1				
		Breastfed -> Signal-> More breast milk	2				
		Exclusive breastfeeding for children < 6 months	3				
		Continue to breastfeed if you worry you don't have enough milk	4				
		Breast milk has enough water	5				
		No water for children < 6 months	6				
		No rinsing mouth with water for children < 6 months	7				
		A few drops of water can make your baby sick	8				
		Breast milk has enough nutrients	9				
No formula for children < 6 months	10						
Breast milk makes baby smart	11						
Breast milk makes baby healthy	12						
Leading organizations recommended breastfeeding in the first 6 months	13						
Other (specify)	98						

		
8.20	<p>What did you do after watching the video clips?</p> <p>Multiple responses possible. Probe: Anything else?</p>	<p>Became more confident in breastfeeding the child 1</p> <p>Followed the recommendation from the TVC 2</p> <p>Helped/supported others with child feeding practices 3</p> <p>Discussed the information with others 4</p> <p>Sought for additional breastfeeding information from health care providers, books, internet..... 5</p> <p>Sought for additional breastfeeding information from relatives, neighbors, friends, co-workers... 6</p> <p>Did nothing 0</p>	
8.26	<p>Show Picture set 2 and ask:</p> <p>Have you ever seen these images in other occasions, besides on video format?</p>	<p>No..... 0</p> <p>Yes, posters 1</p> <p>Yes, bill boards (out of home) 2</p> <p>Yes, bus wrap 3</p> <p>Yes, books, magazine..... 4</p> <p>Yes, leaflets 5</p> <p>Yes, website, Facebook, FanPage 6</p> <p>Yes, other events e.g., seminar 7</p>	

Now, I am asking you about approach to the information on **selecting, preparing, and feeding of complementary foods** on television (Not included in Wave 2)

8.31	<p>During last 30 days, did you see any information on selecting, preparing, and feeding of complementary foods on television?</p>	<p>Yes 1</p> <p>No 0</p> <p>Don't know/don't remember 8</p>	
8.32	<p>In the past 30 days, how often did you see information on selecting, preparing, and feeding of complementary foods on television? Was it . . showcard</p>	<p>Daily (7 days/week)..... 1</p> <p>Several times a week (2-6 days/week) 2</p> <p>About once a week 3</p> <p>Less than once a week (\leq 3 days/month) .. 4</p> <p>Don't know/don't remember 8</p>	

TVC3: THE IRON RICH FOOD TVC

8.36	<p>Show Picture set 3 and ask:</p> <p>Have you ever seen a video clip with these snapshots below?</p>	<p>Yes 1</p> <p>No 0</p> <p>Don't know/don't remember 8</p>	<p>08.46</p> <p>88.46</p>
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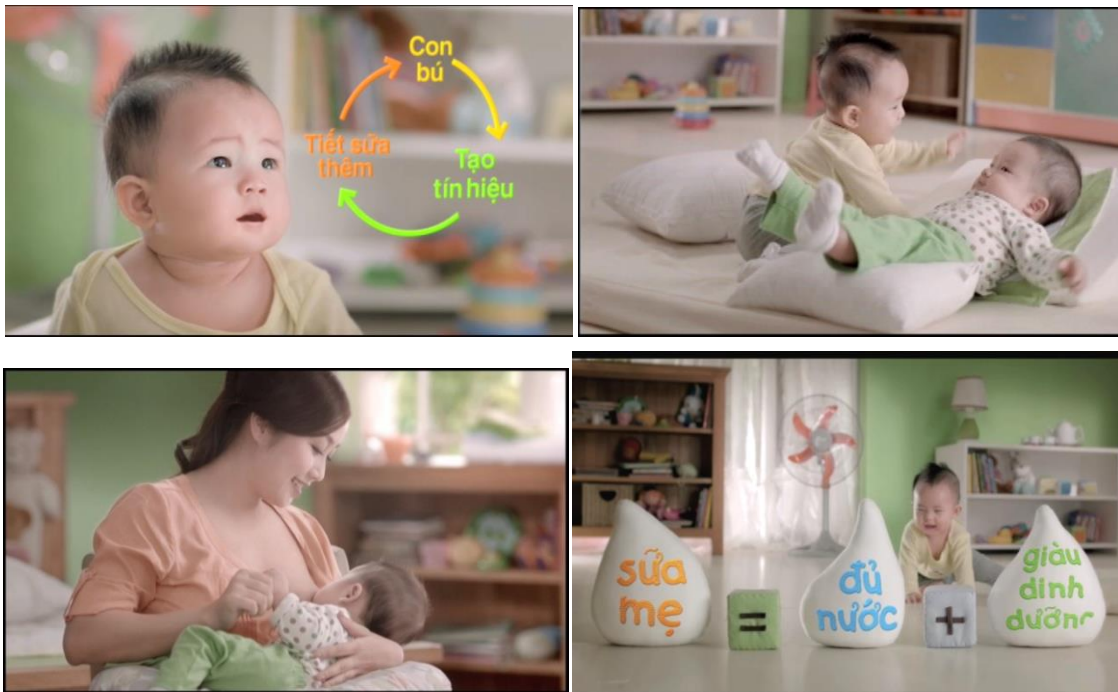
8.37	In which TV channels did you see the video clips? Multiple responses possible.	Never seen on the TV 0					
		VTV1	11	VTV3	13	Other national Channels	18
		Ha Noi	1	Quang Tri	45	Dak Lak	66
		Thai Nguyen	19	Da Nang	48	Dak Nong	67
		Hai Phong	31	Quang Nam	49	Tien Giang	82
		Thanh Hoa	38	Quang Ngai	51	Vinh Long	86
		Quang Binh	44	Khanh Hoa	56	Ca Mau	96
		Other TV:	98				
		Don't remember	99				
8.38	Where have you seen this video clip besides the TV? Multiple responses possible.	Only on the TV 0 Mobile phone/computer/internet . 1 TV Screen in health facility 2 TV Screen in supermaket 3 Other events e.g., seminar4 Other (specify)6					
8.93	In the past 30 days, how often did you see the video clip? READ RESPONSES 1-4.	Daily (7 days/week) 1 Several times a week (2-6 days/week) 2 About once a week 3 Less than once a week (≤ 3 days/month) 4 Don't know/don't remember 8					
8.39	What are the key messages you could recall after watching the video clips? Multiple responses possible.	Iron rich foods helps brain development.....21 Iron rich foods prevent anemia..22 Iron is found in foods like liver, egg, red meat23 Iron is found in green vegetables (e.g. katuk , amaranth, rau den, watercress, morning glory)24 Leading health organizations recommend feeding iron rich foods.....25 Start feeding iron rich foods from 6 months onwards26 Other (specify)98					
8.40	What did you do after watching the video clips? Multiple responses possible. Probe: Anything else?	Became more confident in feeding iron-rich foods for the child 1 Planned to give egg yolk when the child is at 6 mo-olds 2 Planned to give the child animal liver (e.g., pig, chicken, cow) when the child is at 6 mo-olds ... 7					

		Planned to give the child red meat (e.g., pork, beef) when the child is at 6 mo-olds..... 8 Planned to give the child green leafy vegetables (e.g. katuk , amaranth, rau den, watercress, morning glory)when the child is at 6 mo-olds..... 9 Helped/supported others with child feeding practices..... 3 Discussed the information with others 4 Sought for additional information about feeding iron-rich foods from health care providers, books, internet... 5 Sought for additional information about feeding iron-rich foods from relatives, neighbors, friends, co-workers... 6 Did nothing 0	
8.46	Show Picture set 3 and ask: Have you ever seen these images in other occasions, besides on video format?	No0 Yes, posters 1 Yes, bill boards (out of home)2 Yes, bus wrap.....3 Yes, books, magazine4 Yes, leaflets5 Yes, website, Facebook, Fan Page6 Yes, other events e.g., seminar ... 7	

Thank you very much for participating in this survey
Record end time. _____hour_____minute

Signature of supervisor
_____ **date** _____ **month** _____ **2013**

Appendix 3 Images shown to respondents in aided recall measure



Appendix 4 Testing for commune level confounders

FRANCHISE COMMUNES

Table A 1 Regression of education on an interaction between time and commune level exposure

	noschool [95% CI]	less5yrs [95% CI]	yrs6to9 [95% CI]	yrs10to12 [95% CI]	more12yrs [95% CI]
after	-0.056	-0.091	0.038	0.038	0.066
exposure	[-0.127,0.015]	[-0.246,0.064]	[-0.246,0.322]	[-0.215,0.292]	[-0.125,0.258]
after#exp	-0.074	-0.025	0.183	-0.092	0.007
	[-0.153,0.006]	[-0.110,0.060]	[-0.004,0.370]	[-0.244,0.060]	[-0.098,0.112]
_cons	0.030	0.051	-0.066	-0.0124	-0.0001
	[-0.007,0.066]	[-0.033,0.135]	[-0.222,0.090]	[-0.148,0.123]	[-0.101,0.101]
_cons	0.151	0.141	0.192	0.409**	0.107
	[-0.004,0.307]	[-0.012,0.294]	[-0.152,0.536]	[0.123,0.695]	[-0.086,0.299]
N	285	285	285	285	285
adj. R ²	0.089	-0.005	0.072	0.031	0.032

95% confidence intervals in brackets

Table A 2 Regression of occupation on an interaction between time and commune level exposure

	farmer [95% CI]	government employee [95% CI]	salaried employee [95% CI]	self-employed [95% CI]	housewife [95% CI]
after	-0.160	0.007	-0.042	0.135	0.063
exposure	[-0.423,0.103]	[-0.128,0.141]	[-0.283,0.198]	[-0.114,0.384]	[-0.223,0.350]
after#exp	-0.229	0.020	0.039	0.089	0.081
	[-0.461,0.003]	[-0.052,0.092]	[-0.082,0.160]	[-0.014,0.193]	[-0.062,0.223]
_cons	0.029	-0.002	0.129*	-0.073	-0.085
	[-0.116,0.173]	[-0.074,0.071]	[0.004,0.253]	[-0.208,0.062]	[-0.241,0.072]
_cons	0.817***	0.052	0.075	0.012	0.044
	[0.382,1.252]	[-0.078,0.182]	[-0.152,0.303]	[-0.178,0.202]	[-0.212,0.300]
N	285	285	285	285	285
adj. R ²	0.076	-0.008	0.160	-0.003	0.112

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 3 Regression of infant's age on an interaction between time and commune level exposure

	month1 [95% CI]	month2 [95% CI]	month3 [95% CI]	month4 [95% CI]	month5 [95% CI]	month6 [95% CI]
after	0.051	0.029	-0.145	0.095	-0.206	0.175
exposure	[-0.145,0.248]	[-0.133,0.191]	[-0.347,0.057]	[-0.083,0.274]	[-0.460,0.048]	[-0.0611,0.412]
after#exp	-0.0122	-0.018	-0.102	0.0760	-0.041	0.0975
	[-0.123,0.099]	[-0.117,0.080]	[-0.226,0.021]	[-0.019,0.171]	[-0.171,0.089]	[-0.0123,0.207]
_cons	-0.0128	-0.027	0.075	-0.050	0.108	-0.0930
	[-0.117,0.092]	[-0.118,0.064]	[-0.033,0.184]	[-0.149,0.048]	[-0.030,0.246]	[-0.222,0.0363]
_cons	0.095	0.188*	0.370**	0.053	0.297*	-0.00305
	[-0.115,0.305]	[0.009,0.368]	[0.139,0.601]	[-0.113,0.218]	[0.055,0.540]	[-0.203,0.197]
N	285	285	285	285	285	285
adj. R ²	0.016	0.011	0.012	0.001	0.014	0.001

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 4 Regression of other demographic characteristics on an interaction between time and commune level exposure

	ethnicity [95% CI]	mothers age [95% CI]	Primipara [95% CI]	cesarean [95% CI]	back to work [95% CI]
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after	-0.0354	-0.179	-0.0116	0.156	0.00608
	[-0.153,0.0827]	[-2.994,2.637]	[-0.247,0.224]	[-0.0439,0.356]	[-0.129,0.141]
exposure	0.277*	1.879*	0.0687	0.0766	-0.0102
	[0.00575,0.549]	[0.0891,3.669]	[-0.0664,0.204]	[-0.0226,0.176]	[-0.0815,0.0611]
after#exp	0.0254	0.514	-0.0114	-0.0499	0.0147
	[-0.0340,0.0849]	[-1.015,2.043]	[-0.135,0.112]	[-0.158,0.0583]	[-0.0582,0.0877]
_cons	0.391	23.90***	0.603***	0.0500	0.0928
	[-0.148,0.931]	[20.66,27.14]	[0.349,0.857]	[-0.133,0.233]	[-0.0383,0.224]
N	285	285	285	285	285
adj. R ²	0.110	0.102	0.016	0.028	0.012

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 5 Regression of EBF on an interaction between time and education

	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]
after	0.347*** [0.295,0.399]	0.324*** [0.252,0.396]	0.296** [0.114,0.478]	0.376*** [0.273,0.479]	0.399*** [0.318,0.481]
noschool	-0.380 [-0.902,0.142]				
after#noschool	0.149 [-0.515,0.813]				
less5yrs		-0.660** [-1.106,-0.215]			
after#less5yrs		0.281 [-0.246,0.807]			
yrs6to9			0.160 [-0.0964,0.415]		
after#yrs6to9			0.151 [-0.199,0.502]		
yrs10to12				-0.0423 [-0.377,0.293]	
after#yrs10to12				-0.0999 [-0.473,0.273]	
more12yrs					0.222 [-0.197,0.641]
after#more12yrs					-0.343 [-0.873,0.188]
_cons	0.217*** [0.170,0.263]	0.273*** [0.207,0.339]	0.126 [-0.00212,0.255]	0.221*** [0.126,0.315]	0.184*** [0.122,0.246]
N	285	285	285	285	285
adj. R ²	0.275	0.298	0.306	0.278	0.277

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 6 Regression of EBF on an interaction between time and occupation

	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]
after	0.357*** [0.260,0.454]	0.388*** [0.318,0.459]	0.305*** [0.220,0.390]	0.386*** [0.288,0.483]	0.342*** [0.266,0.418]	0.325* [0.0792,0.571]
farmer	0.0777 [-0.077,0.232]					
after#farmer	0.00558 [-0.218,0.229]					
govemp		0.216 [-0.303,0.734]				
after#govemp		-0.423 [-1.115,0.268]				
salariedemp			0.0438 [-0.314,0.401]			
after#salariedemp			0.107 [-0.259,0.472]			
selfemp				-0.0901		

mothersage		0.0194			
		[-0.000439,0.0393]			
after#mothersage		0.00926			
		[-0.0163,0.0348]			
primipara			-0.312*		
			[-0.580,-0.0442]		
after#primipara			0.0214		
			[-0.328,0.371]		
cesarean				-0.405	
				[-0.815,0.00462]	
after#cesarean				0.365	
				[-0.0634,0.794]	
backtowork					-0.329
					[-0.857,0.199]
after#backtowork					0.0246
					[-0.637,0.686]
_cons	0.191**	-0.321	0.438***	0.288***	0.235***
	[0.0790,0.302]	[-0.860,0.218]	[0.236,0.640]	[0.197,0.378]	[0.177,0.292]
N	285	285	285	285	285
adj. R ²	0.273	0.317	0.293	0.277	0.284

* p < 0.05, ** p < 0.01, *** p < 0.001

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Table A 9 Regression of education on an interaction between time and commune level exposure

	noschool [95% CI]	less5yrs [95% CI]	yrs6to9 [95% CI]	yrs10to12 [95% CI]	more12yrs [95% CI]
after	0.0500	0.0906	-0.0765	-0.0232	-0.0409
	[-0.011,0.111]	[-0.013,0.194]	[-0.276,0.123]	[-0.176,0.130]	[-0.171,0.088]
exposure	-0.0141	-0.151*	0.0184	0.0448	0.102*
	[-0.055,0.026]	[-0.276,-0.026]	[-0.135,0.172]	[-0.058,0.148]	[0.0226,0.181]
after#exp	-0.0307	-0.0671	0.0225	0.00206	0.0727
	[-0.066,0.005]	[-0.135,0.001]	[-0.100,0.145]	[-0.092,0.096]	[-0.014,0.159]
_cons	0.0427	0.366***	0.459***	0.166	-0.0334
	[-0.024,0.109]	[0.161,0.571]	[0.207,0.711]	[-0.001,0.333]	[-0.146,0.079]
N	305	305	305	305	305
adj. R ²	0.047	0.211	0.006	0.004	0.148

* p < 0.05, ** p < 0.01, *** p < 0.001

Table A 10 Regression of occupation on an interaction between time and commune level exposure

	farmer [95% CI]	government employee [95% CI]	salaried employee [95% CI]	self-employed [95% CI]	housewife [95% CI]
after	0.0452	0.0196	0.0510	0.176*	-0.290**
	[-0.178,0.269]	[-0.080,0.119]	[-0.088,0.190]	[0.0271,0.325]	[-0.464,-0.117]
exposure	-0.0447	0.0842**	0.0462	0.121**	-0.206***
	[-0.194,0.105]	[0.0211,0.147]	[-0.029,0.121]	[0.0417,0.200]	[-0.310,-0.103]
after#exp	-0.110	-0.0140	0.0864	-0.0984*	0.134*
	[-0.248,0.029]	[-0.079,0.051]	[-0.004,0.177]	[-0.194,-0.003]	[0.0257,0.243]
_cons	0.473***	-0.0261	0.0672	-0.0298	0.516***
	[0.232,0.714]	[-0.118,0.066]	[-0.062,0.196]	[-0.150,0.090]	[0.354,0.677]
N	305	305	305	305	305
adj. R ²	0.065	0.045	0.136	0.008	0.143

* p < 0.05, ** p < 0.01, *** p < 0.001

Table A 11 Regression of infant's age on an interaction between time and commune level exposure

	month1 [95% CI]	month2 [95% CI]	month3 [95% CI]	month4 [95% CI]	month5 [95% CI]	month6 [95% CI]
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after	0.0517	0.177**	-0.0732	-0.0238	-0.110	-0.0214
	[-0.073,0.176]	[0.047,0.306]	[-0.228,0.082]	[-0.144,0.096]	[-0.276, 0.056]	[-0.114, 0.071]
exposure	0.0141	0.101**	-0.0395	-0.0172	-0.0409	-0.0175
	[-0.042,0.070]	[0.036,0.166]	[-0.134,0.055]	[-0.082,0.048]	[-0.129, 0.048]	[-0.070, 0.035]
after#exp	-0.0157	-0.124**	0.0362	0.00999	0.0743	0.0188
	[-0.091,0.060]	[-0.205,-0.042]	[-0.065,0.137]	[-0.067,0.0871]	[-0.031, 0.179]	[-0.042, 0.080]
_cons	0.0559	-0.0023	0.255***	0.222***	0.263***	0.206***
	[-0.035,0.146]	[-0.102,0.0978]	[0.108,0.401]	[0.115,0.328]	[0.120, 0.407]	[0.128, 0.284]
N	305	305	305	305	305	305
adj. R ²	0.011	0.015	-0.004	-0.008	-0.000	-0.008

* p < 0.05, ** p < 0.01, *** p < 0.001

Table A 12 Regression of other demographic characteristics on an interaction between time and commune level exposure

	ethnicity [95% CI]	mother's age [95% CI]	Primipara [95% CI]	cesarean [95% CI]	back to work [95% CI]
after	-0.101	0.153	0.116	0.0528	0.103*
	[-0.245,0.043]	[-3.438,3.743]	[-0.083,0.315]	[-0.042,0.148]	[0.0203,0.186]
avexp	0.139	0.864	0.146**	0.184***	0.0472
	[-0.054,0.332]	[-1.082,2.810]	[0.0380,0.253]	[0.114,0.255]	[-0.003,0.097]
after#exp	0.0670	0.0622	-0.0947	0.00485	-0.0467
	[-0.019,0.153]	[-2.125,2.250]	[-0.215,0.026]	[-0.061,0.071]	[-0.104,0.011]
_cons	0.671***	26.29**	0.488***	-0.0633	-0.00212
	[0.340,1.002]	[23.16,29.41]	[0.307,0.670]	[-0.171,0.045]	[-0.072,0.068]
N	305	305	305	305	305
adj. R ²	0.051	0.015	0.032	0.145	0.012

* p < 0.05, ** p < 0.01, *** p < 0.001

Table A 13 Regression of EBF on an interaction between time and education

	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]
after	0.0308	0.0639	0.0756	-0.0183	0.0255
	[-0.0224,0.0840]	[-0.00156,0.129]	[-0.109,0.260]	[-0.138,0.102]	[-0.0601,0.111]
noschool	-0.393				
	[-1.047,0.261]				
after#noschool	0.278				
	[-0.486,1.041]				
less5yrs		-0.141			
		[-0.564,0.282]			
after#less5yrs		-0.251			
		[-0.665,0.162]			
yrs6to9			0.186		
			[-0.163,0.535]		
after#yrs6to9			-0.0710		
			[-0.486,0.344]		
yrs10to12				-0.103	
				[-0.440,0.233]	
after#yrs10to12				0.244	
				[-0.165,0.652]	
more12yrs					0.0860
					[-0.436,0.608]
after#more12yrs					0.0230
					[-0.470,0.516]
_cons	0.319***	0.330***	0.220**	0.335***	0.300***
	[0.260,0.379]	[0.256,0.403]	[0.0608,0.380]	[0.225,0.446]	[0.220,0.381]
N	305	305	305	305	305
adj. R ²	-0.002	0.055	0.006	0.003	0.001

* p < 0.05, ** p < 0.01, *** p < 0.001

Table A 14 Regression of EBF on an interaction between time and occupation

	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]
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after	0.0621	0.0217	-0.0553	0.136**	0.0668
	[-0.0598,0.184]	[-0.0629,0.106]	[-0.149,0.0382]	[0.0407,0.232]	[-0.0361,0.170]
farmer	0.0816				
	[-0.146,0.310]				
after#farmer	-0.0563				
	[-0.310,0.198]				
govemp		0.00877			
		[-0.537,0.554]			
after#govemp		0.142			
		[-0.464,0.748]			
salariedemp			-0.0779		
			[-0.408,0.252]		
after#salariedemp			0.327		
			[-0.0553,0.709]		
selfemp				0.157	
				[-0.398,0.712]	
after#selfemp				-0.574*	
				[-1.133,-0.0159]	
housewife					-0.151
					[-0.715,0.414]
after#housewife					-0.379
					[-1.001,0.244]
_cons	0.278***	0.310***	0.322***	0.286***	0.341***
	[0.158,0.399]	[0.236,0.384]	[0.238,0.406]	[0.193,0.380]	[0.237,0.444]
N	305	305	305	305	305
adj. R ²	-0.002	-0.001	0.055	0.080	0.050

p < 0.05, ** p < 0.01, *** p < 0.001

Table A 15 Regression of EBF on an interaction between time and infant's age

	EBF	EBF	EBF	EBF	EBF	EBF
	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]	[95% CI]
after	0.0238	0.0740	0.0429	-0.0760	0.0247	0.0482
	[-0.0598,0.107]	[-0.0371,0.185]	[-0.0820,0.168]	[-0.212,0.0601]	[-0.0877,0.137]	[-0.0631,0.160]
month1	0.589					
	[-0.183,1.362]					
after#	-0.0348					
month1						
	[-0.785,0.716]					
month2		0.562*				
		[0.0065,1.118]				
after#month2		-0.209				
		[-0.822,0.405]				
month3			0.194			
			[-0.372,0.760]			
after#month3			-0.0189			
			[-0.664,0.626]			
month4				-0.595*		
				[-1.168,-0.022]		
after#month4				0.574		
				[-0.0537,1.202]		
month5					-0.298	
					[-0.817,0.221]	
after#month5					0.0639	
					[-0.480,0.607]	
month6						-0.500*
						[-0.922,-0.077]
after#month6						-0.0431
						[-0.568,0.482]
_cons	0.265***	0.224***	0.274***	0.427***	0.371***	0.400***
	[0.182,0.348]	[0.116,0.332]	[0.161,0.386]	[0.298,0.557]	[0.253,0.488]	[0.311,0.490]
N	305	305	305	305	305	305
adj. R ²	0.040	0.038	0.005	0.008	0.014	0.067

p < 0.05, ** p < 0.01, *** p < 0.001

Table A 16 Regression of EBF on an interaction between time and other demographic characteristics

	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]	EBF [95% CI]
after	0.0209 [-0.119,0.161]	0.0898 [-0.666,0.846]	0.101 [-0.146,0.348]	0.0742 [-0.0181,0.166]	0.0637 [-0.0152,0.143]
ethnicity	-0.0617 [-0.214,0.0908]				
after#ethnicity	0.0175 [-0.137,0.172]				
mothersage		0.000417 [-0.0196,0.0204]			
after#mothersage		-0.00192 [-0.0296,0.0257]			
primipara			0.0000704 [-0.297,0.298]		
after#primipara			-0.0944 [-0.441,0.252]		
cesarean				0.418 [-0.00886,0.844]	
after#cesarean				-0.223 [-0.653,0.207]	
backtowork					-0.123 [-0.804,0.558]
after#backtowork					-0.232 [-0.942,0.477]
_cons	0.366*** [0.237,0.495]	0.300 [-0.235,0.834]	0.311** [0.0958,0.526]	0.218*** [0.128,0.308]	0.320*** [0.240,0.400]
<i>N</i>	305	305	305	305	305
adj. <i>R</i> ²	-0.001	-0.005	-0.002	0.030	0.020

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A 17 Before-after EBF by commune level exposure in franchise communes; controlling for the percentage of respondents in each commune who were salaried employees

	Model 1 EBF [95% CI]	Model 1 EBF [95% CI]
exposure	0.217* [0.0425,0.391]	0.208* [0.0317,0.384]
after	0.172 [-0.0321,0.376]	0.162 [-0.0495,0.374]
after#exposure	-0.0875 [-0.224,0.0493]	-0.104 [-0.245,0.0362]
salaried employee		0.194* [0.0415,0.346]
_cons	-0.0252 [-0.298,0.248]	-0.0383 [-0.314,0.237]
<i>N</i>	305	305
adj. <i>R</i> ²	0.049	0.083

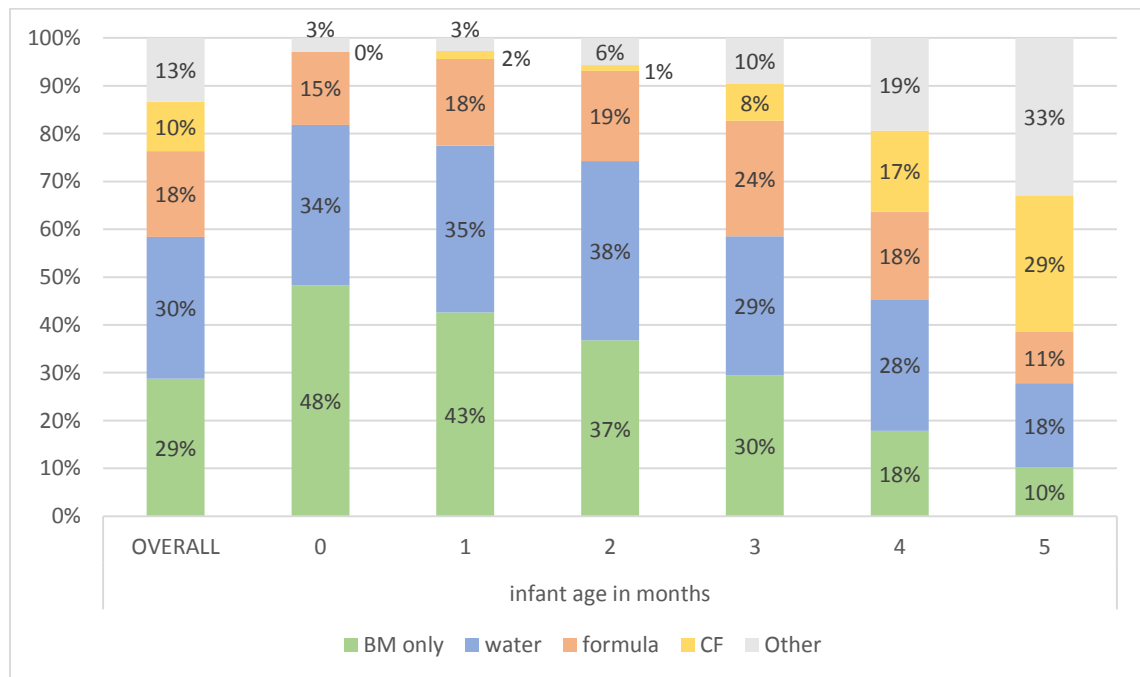
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix 5 Not giving water and other component behaviors of EBF

Exclusive breastfeeding, or not giving an infant anything but breast milk in the first six months of life, is a complex behavior comprised of several component behaviors including on-demand breastfeeding, not giving the infant water or other liquids, not giving infant formula, and not giving complementary foods before six months. Each of these behaviors is necessary to attain exclusive breastfeeding.

Both qualitative formative research and baseline data point to water as one of the primary barriers to EBF in Vietnam. Baseline data suggest that if the mass media campaign could persuade mothers not to give their infants water in addition to breastmilk before the age of 6 months, EBF rates would potentially increase by about thirty percent from 29% to 59% (Figure A 1, column 1: OVERALL).

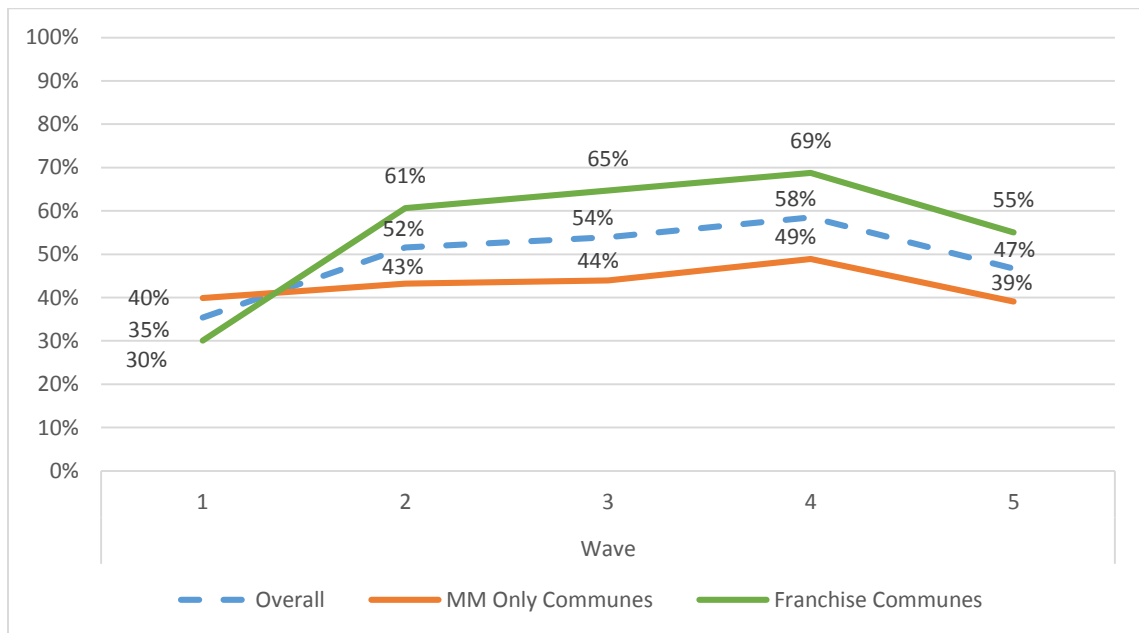
Figure A 1 Potential EBF rates if mothers ceased to give water, formula, and complimentary foods to infants under the age of 6 months (baseline data)



If mothers gave neither water nor formula to their infants, EBF rates would potentially increase by an additional 18% to about 77% and if mothers gave neither water, formula, nor complimentary foods, EBF rates would potentially increase by an additional 10% to 87%. The remaining 13% is probably due to mothers giving liquids other than water or never initiating breastfeeding.

One of the two television spots promoting EBF focused specifically on the behavior of not giving water. Therefore, we repeated the commune level main effects analyses with “no water” as the outcome behavior instead of EBF. The results largely mirror the main effects analyses detailed in Chapter 3. When looking at commune level trends over time in not giving water, we see a non-significant increase from 40% before the campaign aired to 43 % after in mass media only communes (Figure A 2). In franchise communes, rates of not giving water increase significantly from 30% before to 63% after.

Figure A 2 Trends in commune level no water rates over time



Further commune level analyses show that rates of not giving water increased significantly over time even when controlling for whether the commune was a mass media only or franchise commune (Table A 18, Models 1 and 2). The before-after increase in commune level

no water rates was significantly greater in franchise communes than in mass media only communes (Table A 18, Model 3). Consistent with these findings, additional analyses show that, across all communes, there is no evidence that commune level exposure is associated with before-after increases in not giving water above and beyond the effect of being a franchise commune; the interaction between time and exposure is not significant when an interaction between time and franchise is included in the model (Table A 18, Model 4). The significant three-way interaction between time, exposure, and franchise in Model 5 suggests that being in a high exposure commune (as compared to a low exposure commune) is associated with greater before-after changes in not giving water in franchise communes, but not in mass media only communes.

Table A 18 Before-after no water by commune level exposure

	Model 1 no water [95% CI]	Model 2 no water [95% CI]	Model 3 no water [95% CI]	Model 4 no water [95% CI]	Model 5 no water [95% CI]
after	0.222*** [0.179,0.265]	0.222*** [0.179,0.265]	0.079*** [0.035,0.123]	-0.075 [-0.243,0.093]	0.103 [-0.103,0.308]
franchise		0.138*** [0.079,0.197]	-0.098** [-0.170,-0.026]	-0.118** [-0.198,-0.038]	0.384 [-0.062,0.830]
after# franchise			0.296*** [0.229,0.362]	0.268*** [0.189,0.346]	-0.216 [-0.633,0.200]
exposure				0.070 [-0.057,0.196]	0.188* [0.009,0.368]
after#exposure				0.099 [-0.011,0.210]	-0.015 [-0.152,0.121]
franchise#exposure					-0.292* [-0.551,-0.033]
after#franchise#exposure					0.281* [0.048,0.515]
_cons	0.314*** [0.277,0.352]	0.248*** [0.195,0.301]	0.362*** [0.309,0.415]	0.254* [0.055,0.453]	0.069 [-0.214,0.353]
<i>N</i>	590	590	590	590	590
adj. <i>R</i> ²	0.126	0.201	0.257	0.286	0.290

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To better understand the results, I split the three-way interaction into separate models for franchise communes (Table A 19, Models 1A & 1B) and mass media only communes (Table A 19, Models 2A & 2B).

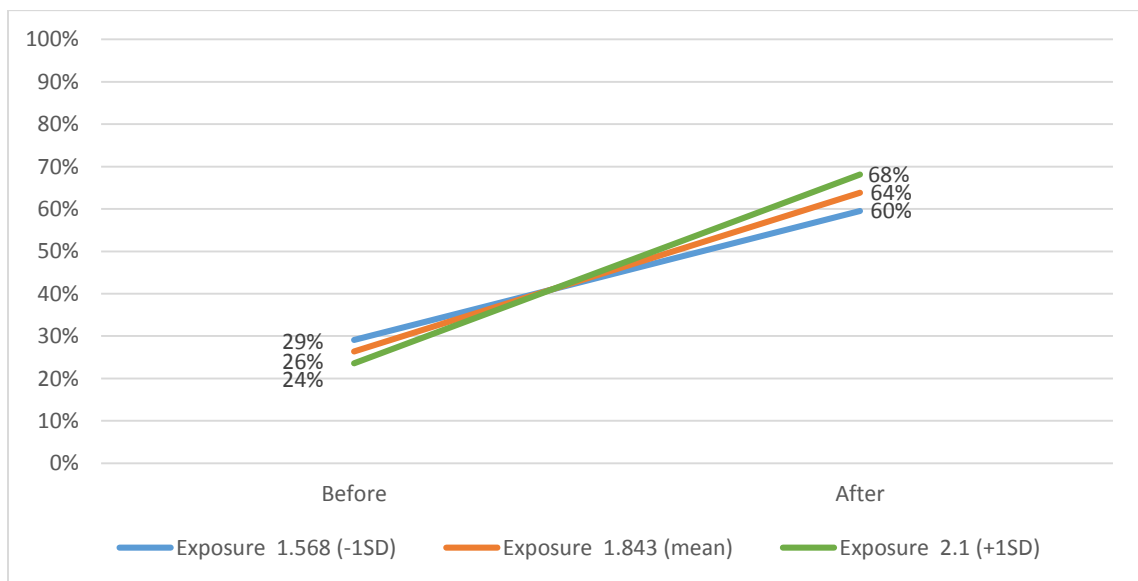
Table A 19 Before-after no water by commune level exposure in franchise and mass media only communes

	Franchise Communes		Mass Media Only Communes	
	Model 1A no water [95% CI]	Model 1B no water [95% CI]	Model 2A no water [95% CI]	Model 2B no water [95% CI]
after (vs. before)	0.375*** [0.324,0.425]	-0.113 [-0.481,0.254]	0.079*** [0.035,0.124]	0.103 [-0.105,0.311]
exposure		-0.103 [-0.293,0.087]		0.188* [0.006,0.370]
after#exposure		0.266** [0.074,0.458]		-0.015 [-0.153,0.123]
_cons	0.263*** [0.214,0.313]	0.453* [0.104,0.803]	0.362*** [0.309,0.415]	0.069 [-0.218,0.356]
N	285	285	305	305
adj. R ²	0.318	0.337	0.019	0.080

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

If we break the interaction down and graph the change over time in not giving water at three levels of exposure, we see that, in the franchise areas, communes that were going to be high in exposure after the campaign began gave water more often before the campaign and less often after the campaign than low exposure communes. In other words, there was a significantly greater improvement over time in not giving water in high exposure communes than in low exposure communes (Figure A 3).

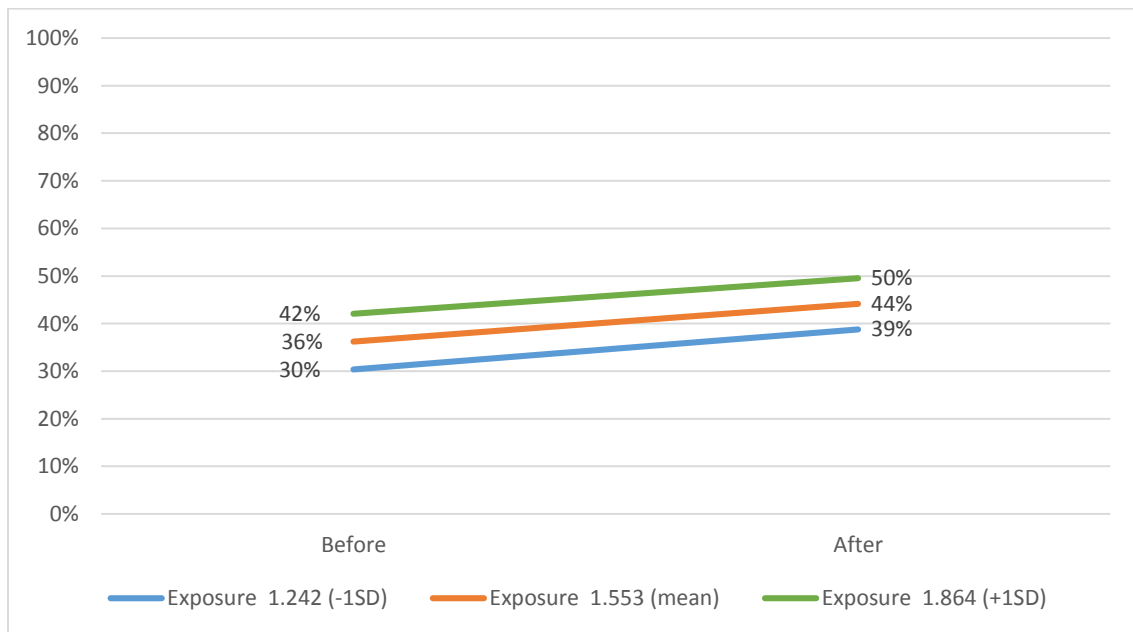
Figure A 3 Before-after no water by commune level exposure: Franchise communes



*The colored lines reflect changes over time in commune level no water at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

In the mass media only areas, the communes that were going to be high in exposure after the campaign began already had a higher no water rate at baseline and did not improve at a faster rate than low exposure communes (Figure A 4).

Figure A 4 Before-after no water by commune level exposure: Mass media only communes

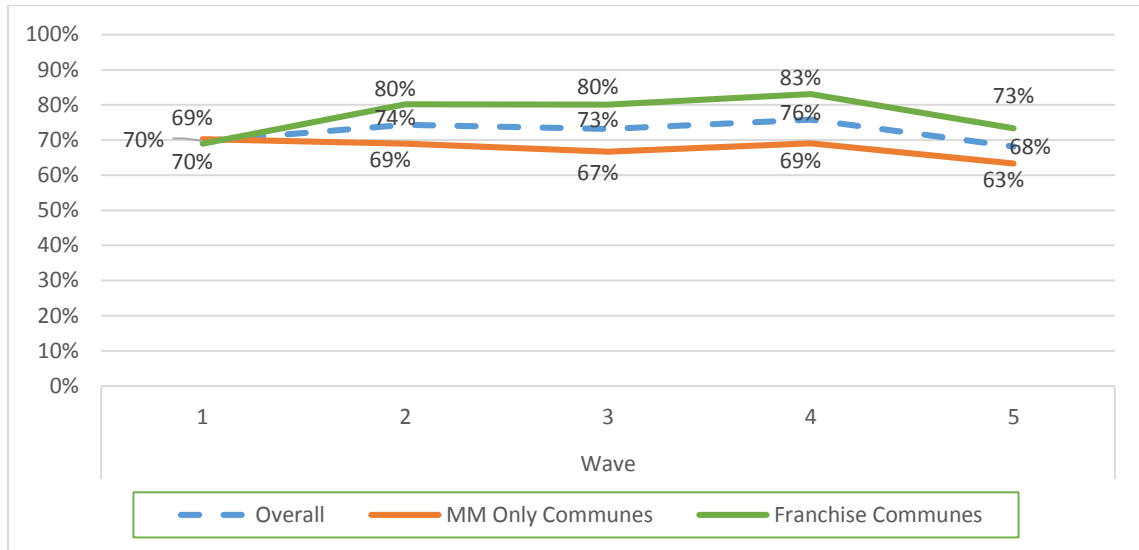


*The colored lines reflect changes over time in commune level no water at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.242), one standard deviation below the mean (1.553), and one standard deviation above the mean (1.864) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

These analyses suggest that, in franchise communes, it was in large part changes in the component behavior of not giving water that drove the overall change in EBF. Unfortunately, at baseline, we did not measure the injunctive and descriptive social norms regarding giving water specifically. However, I would speculate that in franchise areas the social norm around giving water to infants under the age of six months changed, leading to remarkable changes in this behavior in both high exposure communes and low exposure communes.

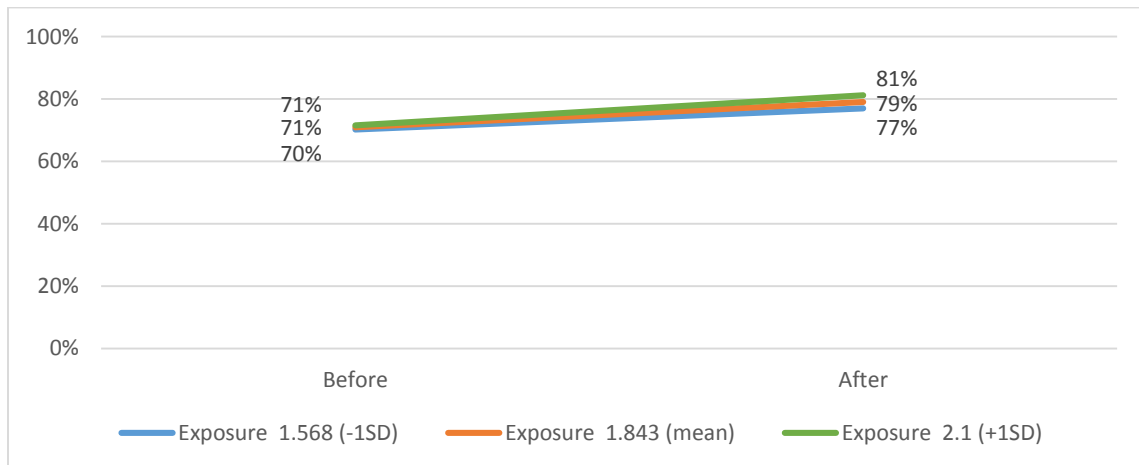
In comparison to the no water component behavior, the component behavior of not giving formula also increased significantly over time in the franchise areas, from 69% before to 80% after (Figure A 5).

Figure A 5 Trends in commune level no formula rates over time



However, communes that were going to be high in exposure to the mass media campaign did not experience significantly greater before-after increases in not giving formula than communes that were going to be low in exposure (Figure A 6).

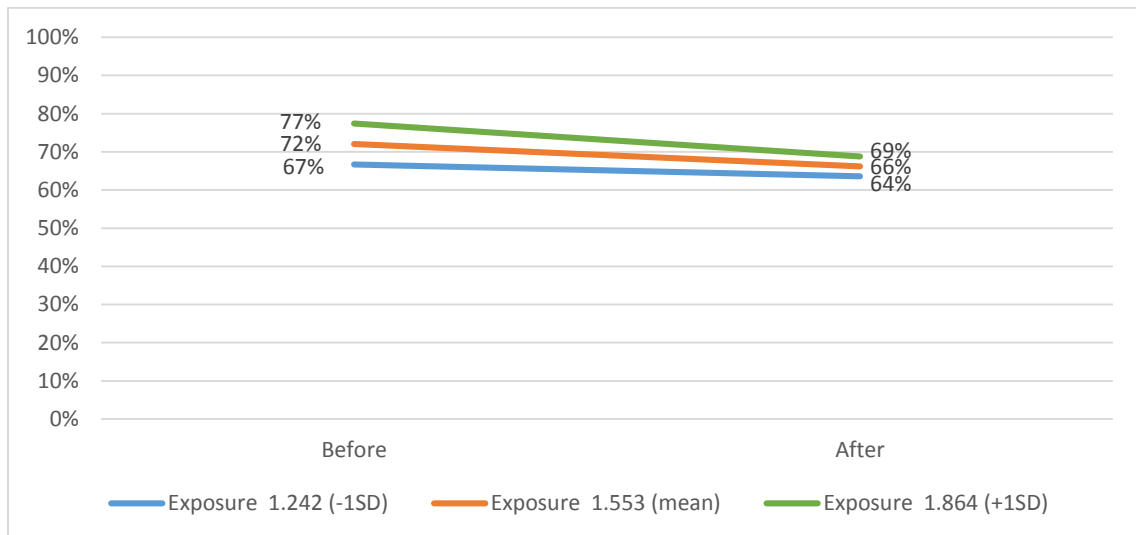
Figure A 6 Before-after no formula by commune level exposure: Franchise communes



*The colored lines reflect changes over time in commune level no formula at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.834), one standard deviation below the mean (1.568), and one standard deviation above the mean (2.1) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

In mass media only areas, the behavior of not giving formula decreased over time (albeit not significantly) from 77% before to 69% after (Figure A 7). Furthermore, there is a significant negative interaction between commune level exposure and not giving formula, such that communes that were going to be high in exposure to the mass media campaign experienced greater before-after decreases in not giving formula than communes that were going to be low in exposure ($b = -.088$, $p = .029$). To attain higher rates of exclusive breastfeeding we would ideally like to observe increases in the behavior of not giving formula, not decreases as we observe in the mass media only communes. This decrease effectively means that infants were formula fed more in mass media only communes after the launch of the campaign than before and that high exposure communes experienced greater increases in formula feeding over the course of the campaign than low exposure communes.

Figure A 7 Before-after no formula by commune level exposure: Mass media only communes



*The colored lines reflect changes over time in commune level no formula at three different intensities of commune level exposure to the mass media campaign: the mean commune level exposure (1.242), one standard deviation below the mean (1.553), and one standard deviation above the mean (1.864) (where 0 = not exposed, 1 = exposed, but recalled no messages, 2 = exposed and recalled 1-2 message, 3 = exposed and recalled 3 or more messages).

In conclusion, in franchise areas, not giving water, the component behavior that was targeted by the mass media campaign, moved sharply in the desired direction over the course of the campaign. It also changed more in communes that were going to be high in exposure to the

mass media campaign than in communes that were going to be low in exposure. In contrast, not giving formula, a component behavior that was not targeted by the mass media campaign only moved slightly in the desired direction in franchise communes over the course of the campaign and it did not change more in high exposure communes than in low exposure communes. This makes us even more confident in the conclusion that the mass media campaign was effective in changing behavior in franchise areas.

In mass media only areas, neither not giving water nor not giving formula moved in the desired direction over the course of the campaign. For the component behavior of not giving water, there was no difference in changes over time between communes that were going to be high in exposure and communes that were going to be low in exposure. For the component behavior of not giving formula, high exposure communes experience significantly greater movement over time in the undesired direction than low exposure communes.

Appendix 6 Supplementary analyses to Chapter 5: Mechanisms of effect of a mass media campaign to promote exclusive breastfeeding in Vietnam

To further explore the unexpected results in franchise areas showing no increased overtime effect of being in a high exposure commune on commune level knowledge, attitudes, social norms, or self-efficacy (even though there was a main effect on EBF behavior), I examined whether commune level exposure was associated with greater over time increases in each of the knowledge and belief items that make up the knowledge, attitude, social norm, and self-efficacy scales. Perhaps exposure to the mass media campaign did not affect attitudes overall, but it might have affected the attitude belief items directly linked with messages in the television spots and not those that were not specifically addressed in the spots. For example, messages about not giving water to infants under the age of six months were emphasized in the television spots more than messages about not giving other liquids, infant formula, or complementary foods. Perhaps there was movement on underlying belief items even if there was not movement on the attitudes construct as a whole. This hypothesis, however, was not supported by the data. Out of the 14 belief items and 5 knowledge items examined, none of the overtime increases were significantly associated with commune level exposure.

I then explored the overtime change in individual level knowledge, attitudes, social norms, and self-efficacy by commune level exposure (Table A 20). This analysis provides me with greater power than the commune level analysis while retaining the ability to examine effects over time by assigning each individual the average commune level exposure for their commune of residence rather than their individual exposure. In the franchise areas, higher exposure communes experienced greater before-after increases in individual level social norms than low exposure communes, but there was no significant effect of exposure on individual level knowledge, attitudes, or self-efficacy.

Table A 20 Overtime changes in individual level cognitions by commune level exposure: Franchise communes

	Model 1 knowledge [95%CI]	Model 2 attitudes [95%CI]	Model 3 norms [95%CI]	Model 4 self-efficacy [95%CI]
after (vs. before)	0.114 [-0.020,0.248]	0.598 [-0.200,1.396]	-0.158 [-1.310,0.995]	0.453 [-0.161,1.067]
commune_exp	0.091* [0.018,0.163]	0.537* [0.0864,0.988]	0.277 [-0.346,0.901]	0.471** [0.166,0.776]
after#commune_exp	0.068 [-0.003,0.139]	0.297 [-0.144,0.738]	0.815* [0.191,1.440]	0.071 [-0.254,0.396]
_cons	0.357*** [0.225,0.490]	2.387*** [1.582,3.193]	2.594*** [1.453,3.734]	3.610*** [3.049,4.170]
N	5604	5534	5580	5595
adj. R ²	0.134	0.193	0.155	0.100

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

These results remain substantively the same even when controlling for confounders including ethnicity, mother's age, education, occupation, primipara status, whether or not she had a cesarean section, the age of the infant, and whether or not the mother had returned to work at the time of the interview. With confounders, coefficient of the interaction between time and commune level exposure on social norms is reduced slightly to .77 and the significance is .018 (as compared with .815 and $p = .011$). The interactions between time and commune level exposure on knowledge, attitudes, and self-efficacy remain insignificant with confounders.

Finally, I went one step further and examined the relationship between commune level exposure on individual level belief items. Out of 14 belief items, greater commune level exposure was associated with greater overtime individual level changes in 4 items: "If I am breastfeeding, but do not give my infant water until s/he completes 6 months, my infant will be thirsty" (attitudes; without confounders: $b = .62$, $p = .032$; with confounders: $b = .55$, $p = .055$); "If I feed my infant only breast milk and no other food, water, or infant formula until he completes 6 months, I am giving my infant all the nutrients s/he needs for optimal brain development" (attitudes; without confounders: $b = .75$, $p = .018$; with confounders: $b = .64$, $p = .036$); "Most people who are important to me (e.g. family members, friends...) think that I should feed my infant only breast milk, and no other food, water, or infant formula for the first 6 months" (norms; without confounders: $b = .70$, $p = .022$; with confounders: $b = .68$, $p = .028$); and "Most women who have infants like me feed their infant only breast milk, and no other food, water or infant formula for the first 6 months" (norms; without confounders: $b = .87$, $p = .014$; with confounders: $b = .83$, $p = .019$). Out of 5 knowledge items, greater commune level exposure was associated with greater overtime individual level changes in 1 item: "Until what month should a mother give her infant only

breast milk and no other foods, water or infant formula?” (knowledge; without confounders: OR = 3.07, $p = .004$; with confounders: OR = 2.92; $p = .008$).

With so many tests and so few significant results, some of these may be chance results. However, the fact that both social norm items are significant gives us greater confidence that the mass media campaign may have increased individual perceptions that other mothers like them breastfeed exclusively (descriptive norms) and that important others support EBF (injunctive norms). Influencing social norms is one of the particular strengths of a mass media campaign and one of the ways in which we expected the mass media campaign to have an effect.

Mass media only communes

To explore these results further, I again examined whether commune level exposure was associated with greater overtime increases in each of the commune level knowledge and belief items that make up the knowledge, attitude, social norm, and self-efficacy scales based on the possibility of movement on underlying belief items even if there was not movement on the scales as a whole. Again, this hypothesis was not supported by the data. Out of the 14 belief items, two reflect greater overtime increases in high exposure communes than in low exposure communes: “*If I feed my infant a combination of breast milk and infant formula until s/he completes 6 months, I am giving him/her the best possible nutrition” (attitudes; $b = -.34$, $p = .036$); and “*The “first milk” produced by my body is all my newborn needs in the 24 hours after birth” (self-efficacy; $b = -.36$, $p = .022$). Out of the 5 knowledge items examined, only one experienced greater overtime increases in high exposure communes than in low exposure communes: “After completing what month should an infant first start to receive semi-solid foods?” (knowledge; $b = .15$, $p = .008$).¹³

¹³ It is interesting that the two belief items that were significant have negative coefficients, suggesting that high exposure communes experienced smaller overtime increases in those beliefs than low exposure communes. Given that all the belief items are coded so as to be favorable to exclusive breastfeeding, this is an undesired result. Although not significantly different from zero, seven of the other twelve belief items (for a total of 9 out of 14) also had negative coefficients. Three out of the 5 knowledge items had negative coefficients. [In the franchise communes, four of the 14 belief items and 2 of the 5 knowledge items had negative, albeit not significant, coefficients]. This suggests that the mass media campaign might not only failed to achieve positive effects but might also have produced boomerang effects. However, the results are not consistent enough to support this concern confidently.

I then explored the overtime change in individual level knowledge, attitudes, social norms, and self-efficacy by commune level exposure (Table A 21). Once again, this analysis provides me with greater power than the commune level analysis, but retains the ability to examine effects over time by assigning each individual the average commune level exposure for their commune of residence rather than their individual exposure. Higher exposure communes experienced significantly smaller before-after increases in self-efficacy (Model 4), but there was no significant effect of exposure on individual level knowledge, attitudes, or social norms in the mass media only areas.

Table A 21 Overtime changes in individual level mediators by commune level exposure: Mass media only communes

	Model 1 knowledge [95% CI]	Model 2 attitudes [95% CI]	Model 3 Norms [95% CI]	Model 4 self-efficacy [95% CI]
after (vs. before)	0.0941 [-0.006,0.194]	0.675** [0.198,1.152]	0.189 [-0.425,0.804]	0.711*** [0.392,1.030]
commune_exposure	0.166*** [0.0736,0.258]	0.915*** [0.397,1.433]	0.763** [0.275,1.251]	0.688*** [0.389,0.987]
after#commune_exp	0.007 [-0.055,0.070]	-0.168 [-0.485,0.148]	0.169 [-0.231,0.568]	-0.315** [-0.513,-0.116]
_cons	0.286*** [0.140,0.433]	2.111*** [1.289,2.932]	2.114*** [1.330,2.899]	3.418*** [2.941,3.895]
<i>N</i>	5616	5547	5616	5609
adj. <i>R</i> ²	0.048	0.067	0.045	0.033

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: These results remain substantively the same even when controlling for confounders including ethnicity, mother's age, education, occupation, primipara status, whether or not she had a cesarean section, the age of the infant, and whether or not the mother had returned to work at the time of the interview. The coefficient of the interaction between time and commune level exposure on self-efficacy remains essentially the same at -.32 and the significance is .001 (compared to -.31 and $p = .002$ without confounders). The interactions between time and commune level exposure on knowledge, attitudes, and social norms remain insignificant with confounders.

Finally, I went one step further and examined the relationship between commune level exposure on individual level belief items. Out of 14 belief items, greater commune level exposure was associated with significantly smaller individual level increases overtime in 5 items: “*If I feed my infant a combination of breast milk and infant formula until s/he completes 6 months, I am giving him/her the best possible nutrition” (attitudes; without confounders: $b = -.38$, $p = .023$; with confounders: $b = -.41$, $p = .014$); “My body can produce enough colostrum to feed my newborn within one hour after birth” (self-efficacy; without confounders: $b = -.35$; $p = .023$; with confounders: $b = -.34$, $p = .015$); “My body can produce enough breast milk to feed my newborn

only breast milk and no water or infant formula in the first 24 hours” (self-efficacy; without confounders: $b = -.49$; $p = .007$; with confounders: $b = -.46$, $p = .010$); “The “first milk” produced by my body is all my newborn needs in the 24 hours after birth” (self-efficacy; without confounders: $b = -.38$; $p = .031$; with confounders: $b = -.40$, $p = .026$); “The more I breastfeed my infant, the more breast milk my body will produce” (self-efficacy; without confounders: $b = -.31$; $p = .044$; with confounders: $b = -.31$, $p = .029$). Out of 5 knowledge items, greater commune level exposure was associated with larger overtime individual level increases in 1 item: “After completing what month should an infant first start to receive semi-solid foods? “ (knowledge; without confounders: $OR = 1.67$; $p=.002$; with confounders: $OR = 1.68$, $p = .003$).

This depressive effect of high exposure communes on self-efficacy for 4 of the 6 self-efficacy belief items explains the overall negative association between commune level exposure and individual level self-efficacy. Three of the significant negative interactions between time and exposure levels on self-efficacy belief items reflect beliefs about early initiation of breastfeeding which were not directly targeted by any of the mass media messages and this may be one explanation.¹⁴

With so many tests and so few significant results, some of these may be chance results. However, the fact that significant results are concentrated among the self-efficacy belief items gives us greater confidence in the conclusion that commune level exposure to the mass media campaign may have had a counterproductive effect on self-efficacy in mass media only communes.

¹⁴ Other explanations for the negative interaction between time and exposure on self-efficacy are not obvious. If the mass media campaign had a negative effect on self-efficacy in the absence of franchise centers, we might expect that greater commune level exposure would also have had a smaller overtime effect on self-efficacy among individuals in the franchise communes who did not attend the franchise, but that is not the case (the coefficient of an interaction between time and commune level exposure regressed on self-efficacy when those who attended the franchise are not included in the model is $-.11$; $p=.541$). Alternatively, the literature upholds that cesarean sections negatively affect early initiation of breastfeeding and rates of cesarean sections were increasing over the course of the campaign, but they do not explain the association between commune level exposure and overtime decreases in individual level self-efficacy. The coefficient of the interaction between time and commune level exposure regressed on individual level self-efficacy remains negative and significant ($b = -.31$, $p=.003$) even when individual level cesarean sections are controlled for in the model ($b = -.09$, $p = .000$). Nor do cesarean sections explain the association between commune level exposure and overtime decreases in commune level self-efficacy. At the commune level, the interaction between time and commune level exposure regressed on commune level self-efficacy also remains negative and significant ($b = -.24$, $p=.022$) even when commune level cesarean sections are controlled for in the model ($b = .15$, $p = .424$).

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