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Development 12

Naoko Horii

Breastfeeding in Rural Niger

Lessons from Child Healthcare
Promotion

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Preface

This book aims to understand how to measure the real impact of a behavior change program on mothers' behavior in the early initiation of breastfeeding, which is translated by an act of putting their child to the breast immediately after birth, a crucial action free of cost to reduce neonatal mortality risks in the developing world.

In March 2010, I visited Niger for the first time. I was assigned as a communication for development specialist by the United Nations Children's Fund (UNICEF) to Niamey, the capital city of Niger, after I had accomplished my mission with UNICEF in Mali. I remember that day when I made a transit stay in Japan between two missions, the earthquake hit and devastated the northeast of the country, hometown of my grandparents on both sides, my mother and father, who used to bring us to spend summer holidays in my childhood. The airport was crowded with migrant residents hastening to leave the country. I felt overwhelmed by the kind of grief to take off as though I was renouncing my nation, my family. "We preferred to succumb on our home land," said my parents, who had declined my proposal to leave and settle in Africa, which was in hindsight an unconceivable option to choose.

Niger has a semiarid climate located in the Sahel band. I used to commute to the office by foot every morning. Stepping out of the house, I struggled to move ahead on a street covered by sand from the dunes. Greeting folks shouting "Bonjour Docteur!" with radiant smiles from over a stall selling food in my neighborhood boosted energy to move forward. My colleagues welcomed me by expressing their deep empathy about the lost lives and survivors. I landed in Niger with a primary purpose of contributing to humanitarian actions, but nothing ever inspired me more than the warmth and humanity of Nigeriens I witnessed in their way of being with other people.

People I met had a lofty sense of integrity and pride in taking a lead of improving health and nutrition of mothers and children, a key to build the future of their country. With colleagues from the Ministry of Health and Civil Society, we had been elaborating a national strategic action plan of behavior change communication promoting child healthcare and nutrition. Whereas it fell on the Ramadan's week when the entire country was going to fast, we decided to go ahead with initially planned community-, district-, and regional-level workshops. It was beyond my imagination

how they could sustain their schedule under the heat over 40 °C without having a single drop of water! With colleagues from the National Institute of Statistics in Niger, we carried out a post-intervention survey to evaluate a UNICEF-led communication program promoting family- and community-based child healthcare. Although I was a complete stranger, they welcomed me as though we have known each other over a long time. Some colleagues started calling me “sister,” meaning that we were all to some extent related and therefore merely indifferent to each other. My field experience in Niger remained one of the most vibrant moments in my last 17 years of professional life.

The advents of deaths of their beloved ones among colleagues and their families constantly led us to question what a meaningful life meant to us. Mothers and their husbands, village chiefs, imams, midwives, and community volunteers were my mentors who inspired me continuously on the ground. I admired mothers delivering, breastfeeding, and caring for their children in extremely poor environments with few resources, no electricity and running water at home, community health workers and volunteers who know by heart preventive and curative neonatal and infant healthcare, and a school child who made a demonstration to teach me how to wash hands with soap step-by-step. They harbored their lofty sense of mission to take responsibility for their family and society, as the health of a baby in their village was a concern for the entire village. The well-being, health, and development of children are definitely not a predetermined concept that outsiders can promote by seeking to substitute traditional values by modern technology. I left for N'Djamena, Tchad, before the completion of the questionnaire for the survey, and 2 years later, I decided to dedicate my time to write about breastfeeding mothers in Niger at Paris Descartes University under the supervision of Yves Charbit, professor emeritus of Demography. He welcomed me with enthusiasm to undertake academic training by translating my experience into scientifically valuable work. Breastfeeding has become one of the areas of great interest in my scientific and professional career.

This book is an outcome of fieldwork I was involved in as a program manager and research work I undertook to translate professional experience into evidence in an authentic and rigorous manner and seek result-oriented solutions. Applying pragmatic and scientific approaches simultaneously was a real challenge, but I thought it a crucial need as only evidence-based actions could bring about a sustainable change in mothers' behavior for newborn care and feeding.

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Abbreviations

ANC	Antenatal Care
AOR	Adjusted Odds Ratios
BMI	Body Mass Index
BCC	Behavior Change Communication
CEPED	Centre Population et Développement
CHW	Community Health Worker
CI	Confidence Interval
CLTS	Community-Led Total Sanitation
DFID	Department for International Development
DHS	Demographic and Health and Surveys
ENC	Essential Neonatal Care
FAO	Food and Agriculture Organization
HEA	Household Economy Analysis
IEC	Information Education Communication
IGA	Income Generating Activity
INS	Institut National de la Statistique du Niger
KFP	Key Family Practices
KMC	Kangaroo Mother Care
LBW	Low Birth Weight
MDG	Millennium Development Goals
NGO	Nongovernmental Organization
OR	Odds Ratios
ORS	Oral Rehydration Salts
PIS	Post-intervention Survey
RCT	Randomized Control Trial
SSA	Sub-Saharan Africa
TBA	Traditional Birth Attendant
HC	Health Center
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Chapter 1

Why Promote Early Initiation of Breastfeeding?



1.1 Introduction

Seven thousand newborns died everyday in 2016 on our planet, of whom most lost their lives for preventable causes (United Nations Children's Fund 2018). The recent *Lancet* series revealed that breastfeeding could save lives of 823,000 children below 5 years old and 20,000 mothers from breast cancer each year (Victora et al. 2016). Recently sub-Saharan Africa counted the largest death tolls (38%) during the first 28 days of life (UN Inter-agency Group for Child Mortality Estimation 2017). This is an unacceptable reality for humanity.

In the last decades, a drastic decline of under-5 mortality was observed globally (from 93 deaths per 1000 live births to 41 between 1990 and 2016), and Niger witnessed a significant progress with a trend decreasing from 329 deaths per 1000 live births to 91 between 1990 and 2016 (United Nations Children's Fund 2017). Yet, sluggish progress in reducing neonatal mortality globally from 37‰ to 19‰ (from 55‰ to 26‰ between 1990 and 2016 in Niger) resulted in an increased share of neonatal deaths among under-5 deaths (from 37% to 46% since 1990–2016). It is estimated that, if the current reduction rate sustains among more than 50 countries which are currently out of track to achieve the Sustainable Development Goal (SDG), 60 million children below 5 years will die during the period 2017–2030, half of whom are newborns (United Nations 2017; UN Inter-agency Group for Child Mortality Estimation 2017).

Early initiation of breastfeeding within the first hour of birth has been proven to reduce neonatal mortality in low-income settings (Black et al. 2013; Jones et al. 2003; Debes et al. 2013). Experts called on further efforts to accelerate the reduction in newborn deaths through equity-based access to and optimal use of neonatal healthcare (Bhutta et al. 2013) to reverse the trends of underestimating breastfeeding promotion which is probably one of the least funded public health program interventions (Cai et al. 2012).

According to the World Health Organization (WHO), early and exclusive breastfeeding has been recognized as one of the key areas of research and program interventions in health behavior change and promotion (Harmonization for Health in Africa (HHA) 2011). Behavioral indicators have been recognized to be an important area of study given that they provide a strong measurement to assess the onsets of health outcomes in a study population (Victora et al. 1997). The *Lancet* neonatal survival steering team emphasized the importance of behavior change strategies to improve neonatal healthcare as one of the top priorities of action-oriented research (Martines et al. 2005; Bhutta et al. 2013).

However, research findings on breastfeeding promotion in nutrition and food sciences databases have been scarce (Morris et al. 2008). This constitutes a real bottleneck to practitioners seeking to apply evidence from field interventions. Actions led by international donors, academics, and civil society have been fragmented (Horton and Lo 2013) with few joint efforts in the area of child health promotion. Research should focus on testing the impact of community-based participatory and health facility-based outreach interventions on the socio-economically most vulnerable group of populations. The dramatic decline of child mortality in the last decade (35%) was mostly attributed to successful delivery of oral rehydration salts and tetanus and measles vaccines. These preventive and outreach delivery-focused interventions were a vertical approach and had a direct impact on child mortality reduction (Morris et al. 2008). However a further reduction of neonatal mortality will need family- and community-based approaches (Martines et al. 2005; Chopra et al. 2012).

Socio-economic vulnerability has been thought to be one of the major risks leading to deterioration in life conditions and health status of mothers and children in sub-Saharan Africa. Yet, there has been a gap between global level awareness to advocate interventions in infant and child mortality related to socio-economic disparity as stipulated among the Millennium Development Goals (MDG) (Lake 2012). Since 2012, a community-based integrated program oriented toward reducing the gap between the poor and the better off has been piloted in rural Niger in collaboration with the World Bank and UNICEF whether or not it further increases the chance of practicing neonatal and infant healthcare. Nevertheless, few demographic and behavioral studies have examined socio-economic vulnerability of mothers with regard to breastfeeding promotion in sub-Saharan Africa.

This book is the outcome of a community-based behavior change program evaluation on what worked the best when promoting early initiation of breastfeeding in sub-Saharan Africa. The primary purpose was to understand how community-based interventions responded to promoting child healthcare and whether a program of behavior change communication reached the most deprived mothers. It also analyzed social determinants likely to alter the practice of putting a child to the breast immediately after birth to understand who was at risk of suboptimal breastfeeding practices, known to be impaired by socio-economic disparity (Desgrées du Loû 2011; Horii et al. 2017). Social determinants include multifaceted factors that positively or negatively influence mothers' postpartum breastfeeding. According to

WHO, social determinants were defined by the complex social structures and economic systems responsible for most health inequities. These included social and physical environment, health services, and societal factors shaped by the power and resource distribution at community, district, and national levels (Commission on Social Determinants of Health 2008). These determinant analyses allow us to identify characteristics of mothers who were resisting behavior change and therefore prone to suboptimal breastfeeding after birth which exposes their newborn to life-threatening risks in a resource-limited setting.

1.2 Benefits of Early Initiation of Breastfeeding

1.2.1 Impact of Early Breastfeeding on Newborn Survival

Since breastfeeding has always been a common practice among women in sub-Saharan Africa, a principal cause of high risks of neonatal mortality in this region was thought to be a delivery complication (Lawn et al. 2008; Kusiako et al. 2000). However, recent trials on neonatal care revealed that “behaviorally modifiable” factors were attributable to most neonatal deaths (Kumar et al. 2008). The benefits of exclusive and early initiation of breastfeeding for neonatal survival have been explored and proven by epidemiological research. In 2013, the *Lancet* series on maternal and child nutrition alerted us to high neonatal mortality risks. It reported that suboptimal breastfeeding in the first 2 years of life is one of the leading causes resulting in an estimated 800,000 child deaths (Black et al. 2013). There has been solid scientific evidence that suboptimal breastfeeding was directly related to neonatal mortality risks (Lawn et al. 2008).

According to the World Health Organization (WHO), early initiation of breastfeeding within 1 h of birth protects the newborn against infection, reduces newborn mortality, and suggests the most cost-effective infant feeding (World Health Organization 1998, 2017). The US academic work group on breastfeeding released a recommendation on starting breastfeeding during the first hour of birth based on the literature of epidemiological research demonstrating evidence on the benefits of the first milk in both developed and developing countries (American Academy of Pediatrics Work Group on Breastfeeding 1997). “Prelacteal feeding” such as infant formula, glucose, or plain water prior to giving the first breast milk after birth and “supplementation,” including any food and liquid given to newborns in addition to breast milk, could delay initiation of breastfeeding (World Health Organization 1998). Exclusive breastfeeding without giving any liquids or solids other than breast milk was deemed possible immediately after birth unless the opposite was decided for medical reasons. Hence, early initiation of breastfeeding has been considered to be crucial even when children were born preterm with low birth weight to mitigate the increased risk of infection and long-term illness (World Health Organization 2003).

Early initiation of breastfeeding is not an emerging issue, and evidence has been widely disseminated about its significant effect on reducing neonatal mortality risk (Darmstadt et al. 2005). A trial led by Edmond in Ghana demonstrated for the first time evidence in sub-Saharan Africa that delayed timing of initiating breastfeeding caused neonatal deaths. The study showed that initiating breastfeeding from day 1 reduced neonatal mortality risks by 16% and by 21% if mothers initiated breastfeeding within the first hour of birth (Edmond et al. 2006). A recent *Lancet* study showed that the initiation of breastfeeding within 24 h of birth reduced neonatal mortality by 45% (Bhutta et al. 2013). These findings were relevant in lower-income settings such as Niger and most sub-Saharan African countries which recorded the increasing neonatal mortality in the last years. Lack of hygiene with contaminated water and poor healthcare services for child illnesses led to newborns being exposed to a greater risk if they were not breastfed early and exclusively after birth (Walker and Adam 2000). Besides, benefits of early breastfeeding in reducing the onset of diarrhea have been investigated as different studies showed conflicting results. According to Gunnlaugsson et al. (1995), his prospective case-control study revealed that delayed initiation of breastfeeding increased cases of diarrhea after birth with statistically insignificant results (Gunnlaugsson et al. 1995). Another cohort study in rural Egypt showed significant effects of initiation of breastfeeding within the first 3 days on reducing the risk of diarrhea (Clemens et al. 1999).

1.2.2 Biological Benefits of Colostrum Feeding During the Postpartum Period

The yellow or golden first milk produced from the 6th month of pregnancy, also called colostrum, is an important source of nutrition and immune protection for the newborn (World Health Organization 2010b; Rogers et al. 2011). During the first 3–4 days of birth, it is replaced by transitional milk. From the 15th day of birth, it becomes “mature” milk (Morse et al. 1990). Breast milk is the best source of nutrients for the child during the postpartum period and the first 6 months of life because of its biological composition that meets nutritional requirements for newborn and child health and growth (World Health Organization and United Nations Children’s Fund 1989; Jelliffe and Jelliffe 1978). Colostrum, contained in the first milk, is highly rich in vitamins A and E, proteins, and minerals such as zinc and low in fat and sugar. It is also known since the 1970s for its non-nutritional benefits: anti-infectious protective effects on newborns (Gunnlaugsson and Einarsdottir 1993; Matanda et al. 2014). Secretory immunoglobulin A protects intestinal mucosa, and at least six antibodies protecting newborns from pathogenic organisms are present. Furthermore colostrum protects the child against *Escherichia coli*, *Vibrio cholerae*, *Candida albicans*, streptococci, staphylococci, pneumococci, and enteroviruses (Neumann et al. 1978). Its growth factors are known to increase resistance to and

recovery from infectious diseases. Colostrum feeding immediately after birth significantly reduces the risk of vaginal bleeding during the postpartum period (Sobhy and Mohame 2004).

Early start of suckling stimulates the release of hormones, prolactin, and oxytocin. Prolactin is the hormone contributing to milk production and secretion. Oxytocin is essential for milk ejection from the breast during the first 3 days of life (Huffman 1984; American Academy of Pediatrics Work Group on Breastfeeding 1997). Matthiesen et al. (2001) reported that newborns' suckling and skin-to-skin contact were significantly associated with oxytocin release. His study demonstrated that the amount of oxytocin reached its peak in plasma before the first hour of birth and was increased by the newborns' hand massage (Matthiesen et al. 2001). The immediate start of breastfeeding after birth indeed increased the survival chance and health of both the mother and their newborns (American Academy of Pediatrics Work Group on Breastfeeding 1997). According to Stuart-Macadam (1995), if an infant was put to the breast within minutes of birth, a release of oxytocin stimulated the uterus contraction resulting in accelerated delivery of placenta (Stuart-Macadam 1995). This resulted in preventing postpartum hemorrhage which was a major cause of maternal mortality. In conclusion, research findings showed evidence that early initiation of breastfeeding had a benefit for both maternal and child survival during the postpartum period. Socio-cultural factors related to colostrum feeding are also examined in the following chapter.

1.3 Definition of Neonatal Healthcare and Feeding

1.3.1 *Kangaroo Mother Care*

Kangaroo mother care (KMC) is a skin-to-skin contact between mothers and their child promoted for both preterm and full-term newborns. According to WHO, KMC is:

- Early, continuous, and prolonged skin-to-skin contact between the mother and the baby
- Early and exclusive breastfeeding
- Early discharge from the clinic or hospital (Department of Reproductive Health and Research World Health Organization 2003)

There exists another term similar to the concept of KMC called essential neonatal care (ENC). ENC entails the same practice during the postpartum period as the first two KMC listed above. In addition, it highlights the importance of clean and delayed cord cut. KMC suggests an alternative solution to substitute conventional neonatal care of low birth weights (LWB) as most populations do not access health facilities equipped with adequate neonatal intensive care (Cattaneo et al. 1998; Conde-Agudelo and Diaz-Rossello 2014; Renfrew et al. 2009). There seems to be

yet no consensus on the definition of KMC worldwide, while two components underpin this neonatal care: first, early and prolonged skin contact between mother and child after delivery and, second, early and exclusive initiation of breastfeeding (Bhutta et al. 2013).

Physical contact between newborns and mothers during a “sensitive period” immediately after birth is a key to continuous optimal breastfeeding (Moore et al. 2007). KMC has a positive impact on optimal breastfeeding through skin-to-skin contact and is proven to increase continued breastfeeding in the first 4 months and beyond by 27%. KMC is also known to significantly increase exclusive breastfeeding in the first 4 months of life and its continuation for a longer period. Initiation of breastfeeding within the first hour of birth, as an important component of KMC, increased the chance of breastfeeding a child exclusively during the first 6 months of life (Setegn et al. 2012).

A recent Cochrane review on trials of neonates’ interventions showed that KMC significantly reduced risks of child morbidity and mortality in poor resource settings. Evidence showed that KMC combined with early initiation of breastfeeding reduced neonatal mortality risk by 40% (Darmstadt et al. 2005). The *Lancet* neonatal survival steering team recommended that impact assessment of kangaroo mother care to improve neonatal survival be a top priority in research on community-based health system strengthening (Yoshida et al. 2014).

1.3.2 What Does Optimal Breastfeeding Mean?

The ten steps to successful breastfeeding issued as a joint statement of WHO/ UNICEF was recently revised and clearly indicated that mothers should be encouraged to put their newborn to the breast within a half hour of birth (World Health Organization 1998, 2018; World Health Organization and United Nations Children’s Fund 1989). The benefits of breastfeeding in reducing the risk of infant and child morbidity and mortality have been proven by previous studies (Black et al. 2008, 2013; World Health Organization. 2001). Besides, a number of field experiences (Guitteye et al. 2010; Horii et al. 2011; Institut National de la Statistique Niger 2012), even though they did not provide scientific evidence, reported a drastic reduction in diarrhea and infant mortality. These findings based on process monitoring and program evaluation were available in project reports, and lessons learnt have not been systematically shared outside the financial institutions, executing organizations, and their partners.

Breastfeeding was widely practiced in sub-Saharan Africa where most mothers continued breastfeeding their child for even beyond 24 months of age. Although the postpartum period was known to be the most critical time for neonatal survival as proven by previous research, many failed to breastfeed their child within the first hour of birth and exclusively until 6 months (Davies-Adetugbo 1997). Mothers in sub-Saharan Africa encountered a number of constraints in their family and community preventing them from putting their child to the breast immediately after

birth. Social and behavior change to promote “optimal” breastfeeding seeks to create social, environmental, and physiological conditions in favor of optimal breastfeeding to support mothers willing to breastfeed their child according to the WHO/UNICEF recommendations (World Health Organization 2003). The expert consultation team delivered recommendations in a *Lancet* series on child survival to outline the definition of “optimal” breastfeeding patterns known to be the most efficient and appropriate practices for postpartum, infancy, and child survival under three categories: (1) early initiation of breastfeeding within the first hour of birth; (2) exclusive breastfeeding during the first 6 months of life; and (3) continued breastfeeding until 24 months and beyond. Early initiation of breastfeeding was measured as an act of putting a child to the breast immediately after birth. This book did not question exclusivity, that is to say giving anything but breast milk, while early initiation of breastfeeding implied exclusivity and reduced risk of prelacteal feeding.

Exclusive breastfeeding during the first 6 months of life clearly contributes to optimal growth, cognitive and physical development, and health (World Health Organization 2003). Breast milk is free of cost and the best nutrition resource to provide what is required for growth during the first 6 months of life. Exclusive breastfeeding is, as already mentioned about the benefits of breast milk, known to be an effective health prevention method to mitigate the risks of infectious diseases and mortality by harnessing the immune system of newborns and infants. It was reported that exclusive breastfeeding can reduce child mortality by 13% (Black et al. 2013). Furthermore among exclusively breastfed children the onsets of diarrhea and pneumonia diseases, known to be major causes of under-5 mortality, were, respectively, 4.6 times (95%CI: 1.8; 11.8)¹ and 2.5 times (95%CI: 1.0; 6.0)² less than those who were not breastfed at all (Black et al. 2008). Exclusivity in breastfeeding is a key to optimizing its benefits for child survival during the first 6 months of life even in HIV high prevalence zones (Black et al. 2008; World Health Organization 2010a, b). In order to seek the best infant feeding for preventing mother-to-child transmission of HIV, AFASS conditions require infant feeding practices to be “acceptable,” “feasible,” “affordable,” “sustainable,” and “safe.” These conditions are very unlikely to be met in most sub-Saharan African countries where hygiene and sanitation environments seem to be compromised and access to timely and appropriate healthcare provided by health facilities remains scarce.

Introducing complementary solid food with appropriate timing in addition to breast milk contributes to fostering child health and development. WHO recommended that children should continue to be breastfed up to 24 months of life (World Health Organization 2003) or beyond with adequate complementary feeding from 6 months of age. It was reported that malnourished infants who continued to be breastfed were six times more likely to survive than better nourished but non-breastfed infants (Briend and Bari 1989). Continued breastfeeding was proven to protect infants from diarrhea when they were breastfed beyond 12–18 months (Rao and Kanade 1992).

¹ 95% of confidence interval.

² Ibid.

Chapter 2

Research Methods and Data Sources



2.1 What Is Program Evaluation?

2.1.1 *Using Available Data for Decision-Making and Actions*

This book had an ambitious plan to bring about insights and in-depth understanding of how best we could exploit already existing datasets of population-based surveys to respond to questions remained often unanswered: what really worked and what did not work to make a change for the better at the end of a field-based project and why. The author referred to an example of a program evaluation in child healthcare promotion. The surveys used for analysis drew on individual interviews with mothers about what they did in the months preceding the interview. It is true that this retrospective approach did not provide the most accurate information when looking into causal relations between the outcome, which was initiating or not breastfeeding within the 1st hour of birth, and influencing factors either negative if preventing this practice or positive if encouraging such practice. Epidemiologists may argue a scientific shortfall in the study design given that the surveys were retrospective cross-sectional studies preceded by program interventions and not a trial based on a prospective study to test new interventions. Hence secondary analysis based on these surveys could not dissociate reasons explaining behavior change of the study populations from other unrelated factors. Despite the above criticisms and counter-arguments, the author opted for taking a careful look at these databases to run exhaustive statistical analysis to conduct program evaluations. The question such as what was meaningful in using retrospective surveys has been carefully thought over step-by-step as follows:

First we should keep in mind that a large number of existing datasets of program evaluation surveys were available since considerable financial and technical investments have been focused on primary data collection within field-based program context. Yet most datasets have hardly been subject to thorough analysis, and it

seemed as though there was not much use in exploiting these surveys which failed to draw meaningful conclusions and sound policy recommendations. Second, based on the personal experience, it is crystal clear that when managing a large-scale program on the ground, the primary role and responsibility of the field-based program officers is not research oriented. Once project surveys were accomplished and the final evaluation reports were submitted by research institutes assigned to the program, decision-makers and executing agencies would hardly dedicate their time to read and discuss the reports, review ongoing strategies, and translate the findings into evidence-based actions. Third, from humanitarian perspectives, given the time-bound decision and actions in the emergency context, it seemed as though it was against equity to run a trial study leading a group of populations defined as a control group to be randomly but arbitrarily prevented from accessing program support to child healthcare. There is no doubt that these trial studies generate scientifically significant and reliable findings. Yet the author emphasized the value of pragmatic and ethically acceptable research methods and processes based on prospective cross-sectional studies for program evaluation purposes. This program evaluation allowed us to integrate a mechanism of applying research findings into action and to stop program activities which did not show any impact on prospective behavior change.

2.1.2 Participatory Action Research in Child Healthcare Promotion

Action research has been considered as one of the most common research methods adopted by field program officers and experts. This was not subject to central discussion of research methodology as the principal objective of the book was rather statistical analysis of the database using the individual and community surveys. However, given the importance of action research that underpinned the whole process of the program design and implementation, a brief description of this method was thought worth presenting. Participatory action research is a qualitative research method which seeks broader and in-depth understanding on the complexity of human behavior by observing patterns and meanings of human phenomena rather than controlling for modification (Streubert and Carpenter 2011). Frequently employed by program planners, field managers, and community development workers in areas including but not limited to health promotion, rural development, and livelihood approaches aimed at improving health, nutrition, and food security, action research seeks to make social change by a specific intervention (MacDonald 2012). Leininger who developed the ethnonursing method in the 1960s addressed healthcare to analyze transcultural nursing (Leininger 1985) enabling us to identify and adopt culturally acceptable healthcare practices within local contexts.

Another specificity of participatory action research is its democratic approach and empowerment of “participants,” totally distinguishable from other qualitative

research methods (MacDonald 2012). It positions researchers to share information with participants who are no longer considered as subject to study but instead take an active role in collecting and analyzing information. The ultimate goal of participatory action research is a sustainable change of current situations toward expected results led by desirable behaviors. That is to say researchers are to identify and tailor the pathways to reach this goal determined with participants, for participants, and by participants. The objectives followed by actions to achieve this goal could therefore be shared between researchers, external project executors, and participants based on a democratic process. This ongoing learning process of participatory diagnosis is aimed at grasping causal linkages between problems constituting major concerns of populations and some specific patterns of their behaviors attributable to current undesirable situations. This is such a powerful tool that, without seeking to change their behavior on site, it leads to an increased awareness of participants and their undertaking decisions and actions based on group reflections and consensus about how possibly they could reverse trends in the causal chain.

Besides, as opposed to an ideal scenario in which community diagnosis and project design should be led by local populations themselves, in most cases, external human resources inputs such as local NGO staff, researchers, project planners, or consultants do most essential work to substitute the investment and efforts which could be available locally and derived from local resources. National and local government institutions often seemed to have serious deficiencies in human resources, logistics, and technical expertise in participatory action research in West and Central Africa. Another challenge was to build a roadmap for scaling up a program intervention which required technically and financially intensive investments dedicated to a small-scale pilot program. Frankly speaking, we have not come up with any cases of a success story using participatory methods focusing on a small group of population scaled up to a large scale for nationwide interventions. For scale-up of participatory approaches for community health promotion to come to effect, establishment of a health hut with trained health professionals, community non-health workers, and other non-health stakeholders should be the government priority in health policy and good governance enabling a strong advocacy for fund raising and distribution (Box 2.1).

**Box 2.1: Pros and Cons of Participatory Methods of Community
Diagnosis: Problem Tree Analysis for Project Planning**

Problem tree analysis is one of the most commonly used participatory rural appraisal tools for situation analysis to identify immediate and fundamental causes of the outcome, e.g., malnutrition among young children. A brief description of how to organize a participatory workshop using this tool is as follows: participants divided into groups of 15 participants maximum (to allow each participant to take part of discussion) are asked to raise one subject they find is the largest concern for their village, such as outbreak of diarrheas

(continued)

Box 2.1 (continued)

and wasting among young children during rainy seasons. Each group discusses to diagnose the immediate and fundamental causes attributable to the onset of seasonal but recurrent diarrheas. For example, a participant reported that people used untreated unsafe water. Another participant stated that babies and young children were given other liquids containing unsafe water than breast milk and so forth. Participants were provided a pen and card to write one sentence to express their idea, and a facilitator assigned in each group collects and presents for the group discussion to constitute causal paths between different cards which might lead to the core problem they selected. If more than one idea were included on a card, the facilitator splits it into two or three different cards. It is important to keep all ideas presented anonymous to avoid any conflicts between participants and to build instead a sense of ownership being part of formulating a community project independently from different opinions. Each participant contributes to building a “problem” tree which is made of a trunk as a *core problem*, roots as *immediate causes* underneath the core problem, and *fundamental causes* at the very bottom. On the top of the tree over the core problem are branches as *outcomes* of the cited care problem. In this example, one of the outcomes was wasting in young child as a consequence of diarrhea outbreaks. Normally, one outcome entails 2–3 immediate causes. Each immediate cause could be attached to 2–3 fundamental causes.

It is important to keep in mind that, when addressing a non-homogeneous group of people, given the importance of hierarchal relations in rural contexts, some participants could feel uncomfortable and be restrained from expressing themselves if they happen to be in the same group as local authority representative. The author was involved in organizing a participatory workshop in a village in Mali having requested in advance that opinion leaders were not invited in this meeting to prevent discomfort in discussion between participants. However, a village chief turned up in a meeting hall and started giving an opening speech and never left the venue. The participants seemed to be overwhelmed by the atmosphere making the gathering an important official event and might have felt nervous and perplex. The participatory workshop did not achieve the expected outcome. Besides, age or gender gap and illiteracy between non-homogeneous participants could impair the outcome of community-based diagnosis using participatory methods. The author witnessed that an illiterate mother remained quiet and never wanted to say a single word despite the presence of an assistant sitting next to her to write her idea on her behalf. We failed to create a friendly environment for all participants to overcome differences in background and level of education. What she might have shared could be of great support to make bottleneck analysis

(continued)

Box 2.1 (continued)

meaningful, but she kept instead silent during the whole workshop which lasted 3 days.

As researcher or project planner, it is important to avoid terminologies and jargons which are meaningless to many other people and especially to those who are unfamiliar with the program. We must break down expressions using the participant friendly language to make it as simple and easy as possible to describe complex issues using examples relevant to the local contexts. Besides, being unfamiliar with the language spoken by participants is a major barrier as a facilitator to follow simultaneously discussions between participants and interact with participants without interpretation of a third person. Needless to say, keeping a humble attitude to be aware of the shortcoming as a researcher and external program officer, the challenge is to draw evidence out of the biased and partial information based on the participatory research. Presence of a colleague whom local people have known in villages and with whom they built trustworthy relationship makes a huge difference. These self-learning and raising awareness tools may not be appropriate to encouraging illiterate people even if it is instructed that it could work if they are to dictate a card to a designated group member or a facilitator. This is a major bottleneck of this PRA tool as the majority in rural areas of sub-Saharan countries are illiterate and totally participatory approach could not be acceptable by many local populations given the socio-cultural contexts. The current participatory methods were subject to further investigations to make community diagnosis relevant and appropriate to the local contexts.

If local authorities integrate health promotion in the priority action plan of their commune, such participatory approaches could further increase the impact of project intervention which might be extended beyond the area geographically targeted by a project. Mothers' involvement as peer promoter could have inspired other women to start acting without any specific project support. Since grassroots activities have an implication of bottom-up effect on empowerment of mothers, it is possible to make a social change a reality by a strong commitment of each individual acting for the sake of health and better life of their offsprings. The benefits of these participatory methods exceed far beyond their limits. By taking part actively in identifying bottlenecks, designing and implementing activities, and understanding what the project brought about on substantial change of behavior directly impacting survival and health of their child, it is possible that local populations gain ownership of information collected and make the best of it through bottom-up reporting to advocate the authority and decision-makers. It is a strong advocacy means to spur policy dialogue and institutional commitment to sustain and scale up health promotion (Box 2.2).

Box 2.2: Participatory Monitoring and Evaluation (PME) and External Evaluation

It is important to distinguish the datasets of the post-intervention survey exploited for the secondary analysis from participatory monitoring and evaluation (PME) by involving local resource persons, e.g., community volunteers and mothers as a part of program activities. This book presents the findings of evaluation exercises undertaken by external researchers to measure the impact of program activities on changing child healthcare practices of the populations living in the areas targeted by the program. PME rests on the records of data collected and analyzed by actors participating in the program implementation. Its primary objective is to track progress in achievement of expected outcomes in a prospective manner, sharing the results and seeking solutions within ongoing learning processes during the whole program cycle (Table 2.1).

Table 2.1 Different types of evaluation exercises

	Participatory monitoring and evaluation	External evaluation	The surveys used in this book
Research design	Participatory rural appraisals, e.g., most significant change (exchange of testimonies and reporting, awarding)	Trial, cross-sectional (retrospective) surveys with a sample of populations (random or purposive)	Cross-sectional surveys with purposive sampling
Data collection tools	Recording of information by community volunteers, trained health workers supported by the project, mothers group, local commune associates	Quantitative (questionnaire)/ qualitative (question guides) by trained data enumerators/ research assistants/health agents supervised by a principal investigator	Quantitative data based on questionnaires
Data analysis	Sharing the findings, discussing and making decision based on the results with a participation of community members	Statistical analysis (quantitative data) or qualitative recorded data transcription and interpretation conducted by consultants, researchers	Statistical analysis done by independent researcher/ consultant

2.2 Description of the Interventions

2.2.1 Definition of Child Healthcare: Key Family Practices

The post-intervention survey (PIS) aimed to evaluate a program of social and behavior change communication promoting maternal and child healthcare as a part of participatory action research launched in Niger since 2008. The Ministry of Health in Niger endorsed a strategic action plan to promote preventive and curative healthcare for mothers and children. The practices to promote are referred to as key family practices (KFP) comprised of eight different family doable practices as follows:

- Exclusive breastfeeding until 6 months of age and early initiation of breastfeeding within the 1st hour of birth
- Use of oral rehydration salts (ORS) for management of diarrhea within a household
- Washing hands with soap at critical moments during the day
- Use of insecticide-treated bed nets by pregnant women and children under 5 years of age for malaria prevention
- Introduction of timely and quality complementary feeding of children after 6 months of age
- Use of prevention health services such as vaccination, deworming, and supplementation of vitamin A
- Appropriate care seeking behavior for treatment of child illnesses including malaria, diarrhea, and pneumonia
- Birth spacing interval of at least 24 months

Initially the program began to promote the first four above-listed practices and progressively addressed the four latter practices. The communication program introduced birth control from late 2010 among other KFPs. Promoting use of contraceptive methods was impeded by socio-cultural factors which were subject to thorough socio-anthropological investigation to identify inhibitors to this practice in a family context. During a field visit in Maradi, a key informant interview was undertaken in 2010 with a program coordinator based in the region, who reported that health workers happened to refuse to provide mothers with a supply of contraceptives to avoid causing troubles if they failed to give evidence of an approval from their husband.

The philosophy behind this multifaceted dimension to address simultaneously different subjects touching upon health and development of female adolescents, pregnant women, mothers, and newborn draws on life cycle approaches. This concept of a continuum of maternal, neonatal, and child healthcare reminded us that it was no longer necessary to target each single illness of child individually but it was crucial to apply global perspectives of health and development priority of every mother and child through affordable, accessible, available, and sustainable continuum healthcare for all. While integrated care defined as a concerted effort of health providers to ensure the continuum of preventive and curative care has been revealed scarce in breastfeeding promotion (Rosin and Zakarija-Grković 2016), it was reported that multisectoral approaches clearly had a positive impact on improving maternal and newborn care services, among others early breastfeeding within community and health facility-based settings (Ekirapa-Kiracho et al. 2017).

Hence multisectoral approaches, if thoroughly designed and implemented with close follow-up, contribute to promoting more effectively optimal breastfeeding. Other dimensions including but not limited to support directly related to healthcare services concern further actions and fund mobilization directed toward promoting hygiene and infectious disease control that could drastically increase access to adequate perinatal and neonatal healthcare services and practices of optimal postpartum breastfeeding (Bhutta et al. 2013; Sinha et al. 2015). By integrating non-health actors

such as traditional birth attendants and community volunteers mobilized to support mothers with maternal and neonatal care and by addressing income poverty of most mothers deprived from accessing basic healthcare facilities, breastfeeding support could result in its optimal outcome. We will discuss this further in detail in Chap. 3 that presented the findings of the literature review on community child health program impact on early breastfeeding promotion (Ekirapa-Kiracho et al. 2017).

2.2.2 Conceptual Framework of Communication for Social and Behavior Change

The design of the integrated communication program is based on a combination of the different types of behavior change methods (Illustration 2.1). Behavior change is not considered as a fixed goal to achieve through improving people's knowledge or transmitting information about child healthcare (Figuerola et al. 2002; Waisbord 2001). Social marketing recognized as an important communication strategy has been largely used for health promotion in sub-Saharan Africa. It can lead a large number of public to adopt an expected behavioral outcome. However, the populations are considered as a target subject to study and therefore prevented from seeking their own solutions to adopt new practice. Another shortcoming of social marketing is making people liable to adopt new concepts relevant to a sales strategy

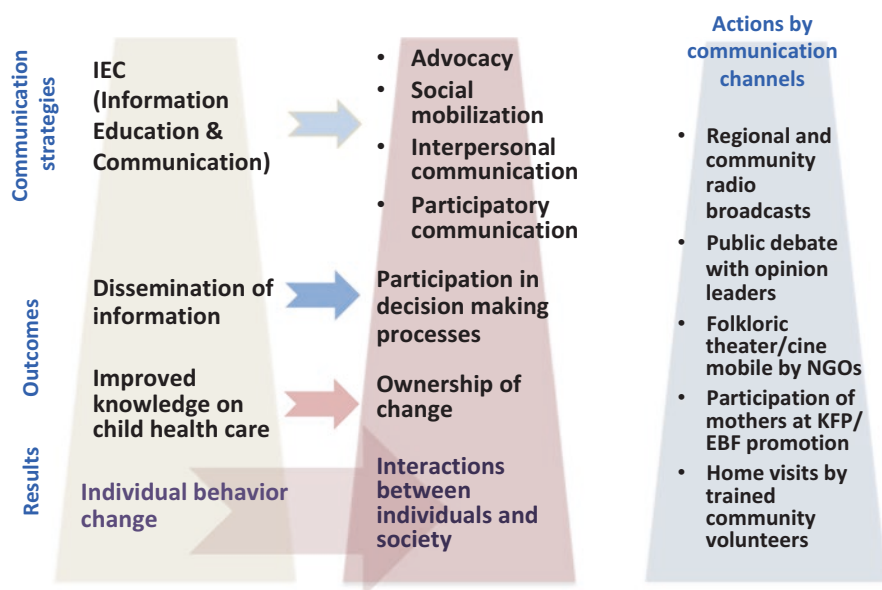


Illustration 2.1 Conceptual framework of social and behavior change communication

of target products, which do not necessarily reflect their social values (Andrien and Beghin 1993). Information, Education, and Communication (IEC) is no longer per se an effective communication tool for long-lasting behavior change of populations as this approach focuses on providing inputs through mass media and communication material (Parlato 1990; Green 1989). Behavior change communication (BCC) seeks to achieve outputs, that is to say the change of people's behavior. The concept of behavior change draws on dynamic processes of changing behavior to adopt a new practice. An integrated package of communication actions encouraged people to get actively involved in the decision-making processes. As a result, expected outcomes of communication interventions are not only their improved knowledge but also people's ownership of change (Moore et al. 2007; World Health Organization 1998). This participatory approach contributes to creating dynamic interactions between individuals and communities to make behavior change sustainable.

The core concept of behavior change strategies is based on the following methods: "advocacy," "social mobilization," "interpersonal communication," and "community-led social change" referred to "proximity communication" (Fund 2008). These strategies encourage actors to be actively involved in prompting child healthcare at individual, family, and community levels (Melkote and Steeves 2001). The further classification of relevant interventions was established according to the type of communication channels most frequently used by the study population (see Chap. 5, Sect. 5.3 *Program Responses to Socio-economic Disparity in Rural Mothers in Early Breastfeeding Promotion* for further examples).

1. Advocacy to call on the participation of donor institutions, civil societies, opinion leaders, personalities, and entities having strong influences on public opinion through folkloric concerts, theaters, and mobile cinema
2. Community-led social change communication through open public radio program, promoting KFP by mothers to the peers in the neighborhood; recognition of those who did early and exclusive breastfeeding by giving a prize of "best mothers"; village assemblies to appoint community volunteers and elaborate action plan; community dialogue and forums mobilizing opinion leaders to discuss and promote KFP
3. Interpersonal communication through home visits led by community volunteers recruited by the village assembly, trained and supported by the program; KFP counseling led by health professionals during ANC within a health facility setting

The participatory action research focused on capacity building of community actors outside the conventional health system, such as community volunteers. A village council chaired by the village chief appointed the community volunteers. All selected volunteers followed prior to their assignment an initial training for 2 weeks on maternal and child care, communication theory and skills, individual counseling method, and monitoring. They were not remunerated for their health promotion activities; however, the program provided them with incentives such as food crops, costumes to distinguish their entitlement as a project community volunteer, and follow-up training and meeting sessions under the supervision of a coordinator,

assigned by the program at commune and department levels, who oversaw community volunteers' performance on the ground. All women having a child less than 5 years as a mother or caregiver in villages covered by the program were concerned by the home visits at least once a month by a community volunteer. Each volunteer was assigned to cover between 30 and 40 households. Community volunteers were also assigned to monitor progress of their home visits through collecting and analyzing information about behavioral outcomes of every KFP they talk about individually with mothers at the time of home visit. They were equipped with a flip chart with visual images illustrating what each KFP represents. Some community volunteers qualified as birth attendants and/or midwives assisted maternity at a health center to substitute the lack of human resources in the government health system.

2.2.3 Target Population of KFP Program

The program started in 2008 in two regions of Niger, Maradi and Zinder, with financial and technical assistance of UNICEF in collaboration with local NGOs and associations. The program originally targeted 51 villages and urban sites in Maradi and Zinder, for a total population of 56,327 people. As of 2011, the total target group for the KFP program had expanded to 212,317 people, which represented 30,331 households in 176 villages of the Maradi and Zinder regions. The zone of intervention was progressively extended geographically, but it remained within the same departments of the two regions (Table 2.2 and Illustration 2.2).

Table 2.2 Zone of intervention KFP in Niger (2008–2010)

Intervention period	Region	Communes	Villages
2008–2009	Maradi	Sarkin Yamma	35 villages
		Maradi II	1 urban area
		Aguié	15 villages
	Zinder	Dungass	56 villages
		Yaouri	19 villages
		Total:	121 villages/urban area
2010	Maradi	Sarkin Yamma	50 villages
		Maradi II	1 urban area
		Aguié	35 villages
	Zinder	Dungass	60 villages
		Yaouri	30 villages
		Total:	176 villages/urban area

Source: UNICEF. Program report promoting the adoption of essential family practices for child survival in Niger (2011)

N.B.: This table does not reflect the most updated scale of the program continued to be expanded to date. It illustrates the picture of populations covered by the program at the time of the 2011 evaluation survey subject to analysis in this book

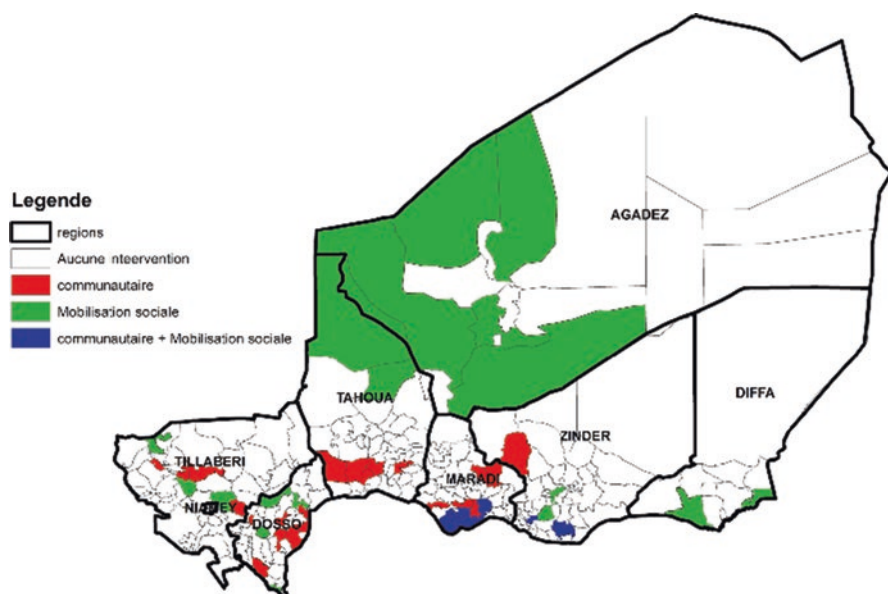


Illustration 2.2 Zone of the communication program promoting key family practices in Niger. (Source: UNICEF-Niger 2015. *N.B.*: The zone reflects the communes covered by the communication program as of 2015. No program intervention was yet launched in Tillabéri and Tahoua at the time of the PIS data collection in 2011)

2.2.4 *Contaminating Effects of the Programs Promoting KFP in Niger¹*

Many institutions and NGOs intervened in the area of maternal child healthcare in the regions of Maradi and Zinder at the time of data collection of the post-intervention survey. According to the 2012 Niger DHS, Maradi recorded the second highest neonatal mortality (33‰) and infant mortality (73‰) across the country (Institut National de la Statistique (INS) and ICF International 2013). With regard to KFP promotion, the program led by UNICEF did not represent an intervention of the largest scale in Niger. Action contre la Faim implemented a community-based integrated program including KFP promotion in Mayahi department of Maradi to cover nearly 600 villages (Souley 2010). Within this program, 1200 community volunteers were recruited, trained, and assigned to detecting child illnesses and malnutrition, referring to health center and organizing health promotion session within a village (Illustration 2.3).

The zone of intervention did not overlap with that of the UNICEF program run in two departments of the same region, Madarounfa and Aguié.

¹ Information is outdated at the time of publication of this book; however the author maintained this data as it was relevant to the time when the 2011 post-intervention survey was undertaken.

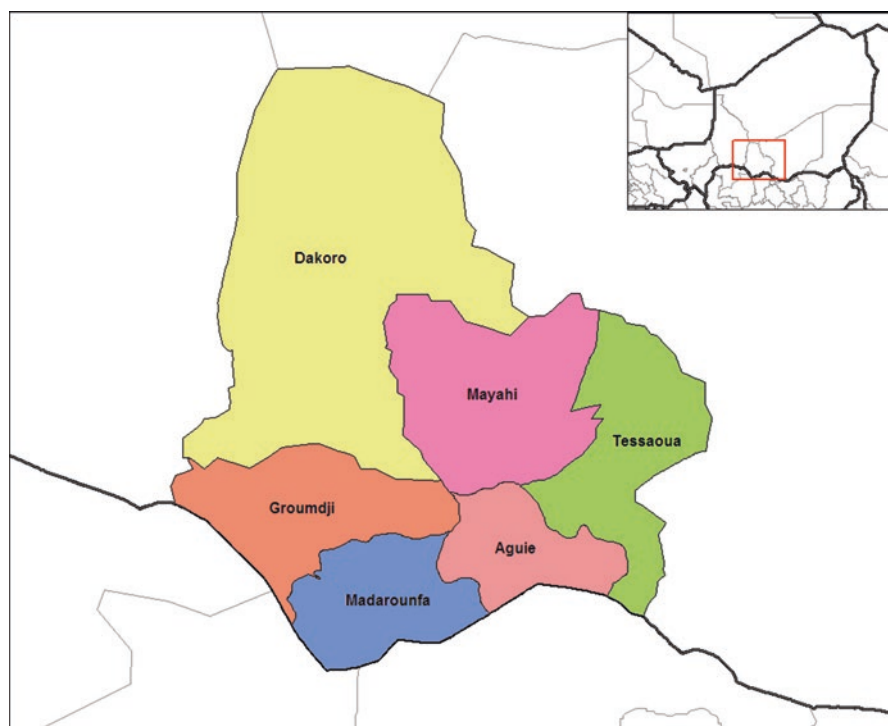


Illustration 2.3 Map of Maradi region (per department) in Niger. (Source: https://en.wikipedia.org/wiki/Aguié#/media/File:Maradi_arrondissements.png)

Since 2010, the Croix-Rouge française was involved in conducting integrated nutrition projects—Community-Based Management of Acute Malnutrition (CMAM)—that included a component promoting maternal and neonatal health-care, infant and young child nutrition, and key family practices (KFP) in Niger under a hunger alliance partnership of the European Union.² In two communes, Olléléwa and Tarka, both located in *Tanout* department of Zinder region, a KFP program was launched in 2014.³ While this study used the 2011 PIS dataset, the above two communes were not included in the study sample of the original PIS dataset (Illustration 2.4).

The 2011 PIS included the study sample from the UNICEF-led participatory action research promoting KFP launched in 2008 in the communes of Yaouri located in *Matamèye* department and Dungass in *Magaria* department (see Annex 1). There was no overlap zone with regard to the geographical area between UNICEF and Croix-Rouge française.

² <http://www.croix-rouge.fr/Nos-actions/Action-internationale/Rechercher-un-programme/Niger-Nutrition>

³ <http://www.croix-rouge.fr/Nos-actions/Action-internationale/Rechercher-un-programme/Niger-Nutrition-communautaire>

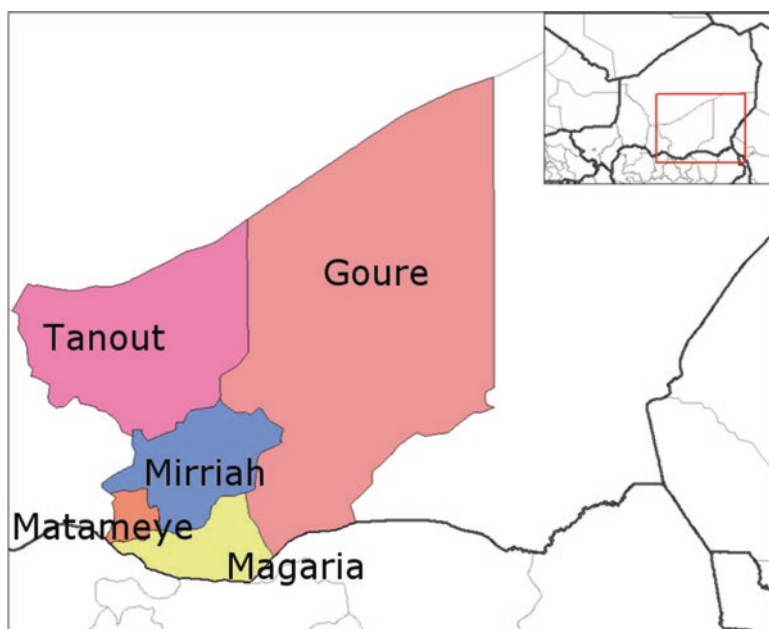


Illustration 2.4 Map of Zinder region (per department) in Niger. (Source: https://upload.wikimedia.org/wikipedia/commons/5/5e/Zinder_Arrondissements.png)

Whereas there seemed to be no geographical overlap in program interventions between UNICEF and other institutes, given the nature of the participatory approaches, it was deemed impossible to exclude the program effects on the study population unexposed to the program activities. First, the PIS applied a stratified random sampling using village boundaries to divide the study population into two strata. The PIS study population of the exposed group did not exclude migrant mothers who moved from outside the pilot zone on condition that they reside geographically in a village selected by the PIS at the time of the interview. Second, internal migration between villages within the same district⁴ that occurred between 2008 and 2011 enabled mothers in the unexposed group to be reached by the program prior to the interviews. Third, some communication channels such as radio broadcast messages could go beyond the village limits to reach out to the population who were in theory defined as unexposed to the program. Accessibility to mass media also relied on whether mothers possessed a radio or accessed to listening to a radio program. Multivariate logistic regression adjusted these confounding effects (Chaps. 4 and 5).

⁴Translated from “commune” in French, defined as an administrative boundary between the village and the department.

2.3 Data Sources Used for Program Evaluation

As mentioned earlier, experimentation of communication strategies to promote key family practices (KFP) started in pilot areas using the method and tools of participatory action research. The program evaluation of surveys taking part in this piloting exercise was therefore essential to seek bottlenecks and hindering causes of suboptimal maternal and child healthcare. This allowed us to understand which models of behavior change communication could influence positively or not early initiation of breastfeeding after birth. This section describes the original datasets from which the sub-datasets were extracted for statistical analysis. Three retrospective cross-sectional surveys, carried out at different points of time in Niger, were used for determinant analysis and impact assessment of the communication program on promoting early breastfeeding. They were two national surveys including demographic, socio-economic, health outcome, and behavioral indicators of populations in Niger in 2006 and 2012 (the Demographic and Health Surveys, hereafter referred to as DHS). Another dataset was a post-intervention survey (PIS) designed specifically to look at KFP and behavior change communication-related indicators. The DHS datasets provided a reference at the national level, whereas PIS was focused on nonrepresentative populations in the areas geographically targeted by the KFP program.

2.3.1 2006 and 2012 Niger Demographic Health Surveys (DHS)

The 2006 Niger DHS was led by the National Institutes of Statistics with assistance of Macro International and was succeeded by ICF International to conduct the 2012 Niger DHS. The author uses these two datasets to perform statistical analysis to compare these two datasets. In Niger, UNICEF,⁵ the World Bank, and UNFPA actively took part in designing, developing, and conducting the surveys to obtain health outcome indicators such as maternal and child health, nutrition status, and health-seeking behaviors such as neonatal, infant, and child care and feeding based on the rural and urban populations.

There were clear advantages of using DHS in determinant analysis of early initiation of breastfeeding. First, it provided complementary information as some important exposure variables related to delivery services and places chosen by mothers were not included in the post-intervention survey (PIS). Second, comparative analysis using different large-scale datasets based on the random sampling provided perspectives on the populations in all Niger. Third, the two different periods when DHS were conducted, in 2006 and 2012, correspond to a time interval during

⁵In 2010, I was involved within the UNICEF-Niger team in providing a number of recommendations for the Niger 2012 DHS to integrate behavioral indicators and critical explanatory variables influencing the health behavioral outcomes of under-5 children.

which the communication program was launched in 2008. Short of a baseline survey prior to the start of the communication program, comparative analysis of these cross-sectional surveys could provide useful information complementary to the case study conducted on a much smaller scale based on purposive sampling within a program settings.

2.3.2 Post-intervention Survey in Four Regions of Niger

2.3.2.1 Study Design

The 2011 post-intervention survey (hereafter referred to as PIS) was designed as an evaluation tool for measuring the impact of a pilot behavior change communication program led by UNICEF. This retrospective cross-sectional survey was based on a post hoc constitution of two groups which were established at the time of conducting this study. The study population was divided into two groups, exposed and unexposed to the program activities in a retrospective manner. This was an observational study and was clearly distinguished from an interventional study to select intervention and control groups based on the random sampling at the beginning of the program (Thiese 2014). This book instead explores what change occurred in terms of health behavior of mothers related to maternal and newborn healthcare after the program implementation by comparing the population exposed to the interventions and those not exposed to such interventions in a retrospective manner.

The originality of this behavior analysis was the design of a quantitative study which encompassed three dimensions: socio-demographic surveys to gather information related to characteristics of mothers and cultural, social and behavioral indicators, and typology of social and behavior change communication strategies. Evidence-based actions led us to questioning the validity of the undergoing strategic action plan and urged us to revisit the communication strategies and to review the tools to check their adequacy and effectiveness to achieve the expected results. It is important to note that the author left Niger prior to the completion of the PIS and did not attend conceptualization and testing of the questionnaire, training of enumerators, and data collection. Oversight and supervisory tasks of the fieldwork were therefore attributed to the colleagues at the National Institute of Statistics (INS) in Niger, assigned to this evaluation study by UNICEF. Finally, using the datasets of the 2006 and 2012 Niger DHS and the 2011 PIS, a common set of variables was established to examine breastfeeding from all angles (see Sect. 2.5 outcome and explanatory variables subject to analysis). Below is a description of research methods applied in the 2011 post-intervention survey.

2.3.2.2 The Study Population of the 2011 Post-intervention Survey

A retrospective cross-sectional study, called post-intervention survey (PIS), was carried out in 2011 to evaluate a UNICEF-led pilot program of behavior change communication. The study populations were selected based on a purposive sampling method according to the following inclusion criteria: first including villages within the pilot program areas if (1) there was a health center located within the village or in another village nearby; (2) community volunteers (relais) trained by the program were operational; and (3) local associations and NGO implemented project activities to promote KFP. Table 2.3 shows at a glance of the study population disaggregated by region and the program exposure. The pilot program initially covered 176 villages in Maradi and Zinder in 2008, among which 50 were selected for the survey retrospectively and classified as the “group exposed to the program.” The survey selected another 25 villages within the same regions of Maradi and Zinder and 52 villages in Tillabéry and Tahoua, both were not targeted at the time of the study and classified as the “unexposed group.” The current program has been extended to these unexposed villages after the completion of the data collection of this survey. The total number of villages included by the survey reached 127 in Maradi, Zinder, Tillabéry, and Tahoua.

As there was no randomization to define the intervention group at the start of the program, the pilot program areas and populations were purposively selected based on its own criteria, while the study population of the PIS was established purposively by including the most successful cases in behavior change outcomes recorded by the field-based program staff. Besides, two-stage clustered random sampling was applied to select households and mothers to be interviewed within each village. The number of selected households from each village was fixed at 15. At primary and secondary units of strata, the ratio of intervention and unexposed groups was 2 to 1 in Maradi and Zinder. (See Annex 1 for the list of the names of all villages and communes selected for the PIS).

The PIS was comprised of three types of surveys: individual women’s survey, household survey, and community survey. The study populations for each survey were defined based on inclusion criteria determined as follows:

Table 2.3 Study population of the original post-intervention survey

Region	Mothers or care givers of children under 5 years					
	Primary units (villages)			Secondary units (households)		
	Exposed group	Unexposed group	Total	Exposed group	Unexposed group	Total
Maradi	25	13	38	375	195	570
Zinder	25	12	37	375	180	555
Tahoua	–	20	20	–	580	580
Tillabéry	–	32	32	–	928	928
Total	50	77	127	750	1883	2633

Source: INS of Niger (2011)

Individual women's survey: Mothers or caregivers aged 15–49 years who had at least a child less than 5 years old or who were pregnant with or without a child less than 5 years old at the time of interview.

Household survey: Heads of household having a child less than 5 years old to be interviewed for collecting socio-demographic status of all household members.

Community survey: Key informant interviews were performed with community representatives such as village chief and health worker at district health center. All 127 villages selected for this survey were included to fill out the questionnaire.

2.3.2.3 Refinement of the Questionnaires

An expert team comprised of UNICEF-Niger, the National Institute of Statistics (INS) of Niger, and World Bank run joint working sessions to design and formulate the questionnaires for each survey. The refinement of the questionnaires was undertaken during the 3-day training workshop organized by INS for the recruited interviewers and field supervisors to get acquainted with the subject and each question asked and answers to fill in. All participants were involved in testing the questionnaires in the outskirts of Niamey city for further refinement prior to data collection. Data collection using three questionnaires was carried out simultaneously in the same selected villages.

Overall variables included by the questionnaires could be categorized into two groups: first, socio-demographic and economic status, health-seeking behavior of mothers, and environmental health as defined in the Niger DHS. Second, behavioral variables specific to KFP and family- and community-based communication actions were also questioned.

Individual women's questionnaire: It contained 12 pages without a cover page.

Instead the first page asked interviewers to fill out geographic location including region, department, canton/commune, village, and numbering of household using identical recording to match individual data with the household data. There was a classification of interviewees by physiological status: mother or caregivers of under-5 child, pregnant, or not. The questionnaire comprised the following sections: (1) livelihoods of mother or caregiver of under-5 child; (2) antenatal care; (3) postpartum breastfeeding practices; (4) child illnesses and curative and preventive treatment including vaccination; (5) use of different types of toilet facilities; (6) social network, e.g., support from neighbors and associations; (7) knowledge, perceptions, and practices of eight key family practices; and (8) involvement of mothers and their family members in social and behavior change communication actions.

Household questionnaire: A cover page referred to information on the geographic location of the household including region, department, commune or canton, and village-specific data. A variable, program exposure, was created based on the village of residence identifiable by recording each household with the coding and the name of the household head whether they were covered or not by the

program at the time of the interviews. The questionnaire contained 11 questions for each household member reported by the household head. Most questions were socio-demographic and economic related such as age, educational attainment, gestation, and occupation.

Community questionnaire: A cover page provided geographic location of village and name of village chief. The questionnaire contained 13 questions concerning socio-economic infrastructure such as school, health center, drinking water point, and electricity. It also reflected involvement of local associations in promoting key family practices within the village.

2.3.2.4 Identification and Training of Interviewers for Data Collection

Sixty-four interviewers were recruited and trained by the INS of Niger. A 3-day training was held covering a theoretical course and practical group work. At the completion of the training workshop, all participants were expected to understand the methodology of the surveys and the expected outcomes of the assignment and to get acquainted with techniques to fill out questionnaires. They took part in simulation exercises on the ground by interviewing mothers and community members and recording answers in the local language. Overall, 16 teams were formed each comprising one supervisor, three interviewers, and one driver. Two supervisors were also appointed to ensure oversight of data collection by detecting and amending errors in measurement and in recording for each question. These simulation exercises led to evaluation and improvement of each interviewer's aptitude for filling in questionnaires precisely to obtain the optimal accuracy of information.

The data collection was processed without double entry, but data was verified by the supervisory team assigned to check its consistency. The interviewers were to fill in by hand paper-based questionnaires. The interviews were carried out through home visits using the individual and household questionnaires. The questionnaires were formulated in French and translated into two local languages: Hausa and Zarma. Hausa was used for the interviews in Maradi and Zinder and Zarma in Tillabéry and Tahoua. Follow-up visits were organized to reach out to mothers who were absent at the time of the visit. Data collection of three surveys was completed within 20 days by the data collection teams covering all the study areas.

It was important to recall that Sect. 2.2.3 exclusively rested on documents and information provided by the National Institute of Statistics of Niger. As previously mentioned, the author was involved in the initial stage of the study formulation and conceptualization of the questionnaires. Refinement of the questionnaires was taken over by the National Institute of Statistics of Niger who coordinated field data collection. It was therefore appropriate to use the term "secondary analysis" of the already existing datasets given that the data collection had been completed by the third entity.

2.4 Study Population Extracted for the Secondary Analysis

Prior to data interpretation and statistical analysis using the above-cited original datasets, a considerable time has been invested to clean, combine, and adjust variables to make the datasets exploitable. The most essential information was extracted to obtain meaningful research outcomes. This section illustrates how this data management has been processed and the challenge it presented.

2.4.1 *Study Population for Secondary Analysis*

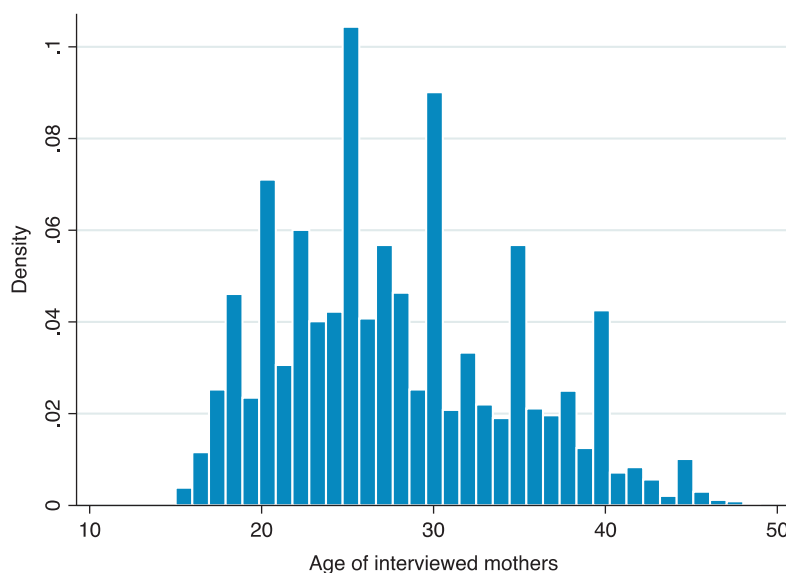
2.4.1.1 The 2006 and 2012 Niger Demographic Health Surveys

The study sample was extracted from the original dataset based on eligibility criteria to include mothers aged 14–49 years having at least one child of less than 24 months born with vaginal delivery. All births recorded with delivery by caesarian were excluded.

It was not technically possible to exclude cases of low birth weight of a newborn below 2500 g because of too many missing information. As opposed to inclusion criteria applied in many studies on early initiation of breastfeeding which focused on mothers who delivered in term a healthy baby, the study sample included all those who met the above criteria regardless of nutritional and health status of newborns. The proportion of missing data of this variable reached close to 70% of the population. In short, the total study population for each survey was 3462 in the 2006 DHS and 4616 for the 2012 DHS. The mean age of the study population in the 2012 DHS in all of Niger was 28 years, and the entire study population was slightly concentrated in a relatively young age group (see Graph 2.1).

2.4.1.2 The 2011 Post-intervention Survey (PIS)

All questionnaires filled in by interviewers were compiled at the headquarters office of the National Institute of Statistics of Niger at the completion of data collection. Data entry was processed with CsPRO by ten agents recruited and trained by an INS information and technology specialist (Institut National de la Statistique Niger 2012). The dataset was transferred to SPSS for further data management and preliminary data analysis by statisticians of INS. The original datasets in the SPSS package including the household survey, individual women's survey, and the community survey were provided by the INS team and converted to STATA for secondary analysis of the book. Prior to the statistical tests, dataset files of an individual women's survey and a household survey were merged into one single dataset by matching the number of households. A community survey was merged into the above combined dataset file by the name of the village.



Graph 2.1 Age distribution of the interviewed mothers in Niger (2012) ($n = 4616$). (Source: 2012 Niger Demographic and Health Survey)

The study population was defined based on inclusion criteria. Mothers who did not meet eligibility criteria, defined as being a woman of a child-bearing age (15–49 years old) with a child below 24 months, pregnant or not, were excluded to tailor the study population for the secondary analysis of the PIS (Table 2.4). Four hundred and sixty-five interviewees were excluded since they failed to meet the eligibility criteria for the secondary analysis. By limiting the age threshold of children, it was possible to mitigate the recall bias of mothers who were asked to answer questions about what happened at the time of birth of the last child.

Interviewees' age coded as missing information was not subject to exclusion on the premises that the survey should have recruited those aged between 15 and 49 years. In addition, the study sample excluded 77 women below 15 years old or above 49 years old. Fourteen women having no information about their age but reported to be eligible for the program were retained. Those who could not respond to the question about the age of their child were also retained whether they were pregnant or not at the time of the interview for the following reasons: first the original post-intervention survey must exclusively interview all mothers having at least a child below 5 years. Second mothers had difficulties to know the exact age of their child given the scarcity of birth register and neonatal screening and follow-up by health professionals. The sample excluded one woman who did not provide information regarding the eligibility. Finally, those who resided outside the regions covered by the program, Maradi and Zinder, whose total number was 1064, were excluded from the post-intervention survey to optimize consistency of socio-cultural background of the interviewed mothers.

Table 2.4 Eligibility of population for secondary analysis ($n = 1026$)

			Study eligibility		
			Eligible	Non-eligible	Missing
Total study population from the original dataset		$n = 2633$	Retained ($n = 2168$)	Dropped ($n = 465$)	–
AGE of interviewed women	15–49 years	$n = 2077$	Retained ($n = 1303$)	–	Retained ($n = 774$)
	Missing	$n = 14$	Retained ($n = 8$)	–	Retained ($n = 6$)
	Beyond 15–49 years	Dropped ($n = 77$)	–	–	–
AGE of children	0–23 months	Retained ($n = 1311$)	–	–	–
	I do not know	$n = 780$	Retained ($n = 779$)	–	Dropped ($n = 1$)
REGION	Maradi	Retained ($n = 491$)	–	–	–
	Zinder	Retained ($n = 535$)	–	–	–
	Tillabéry	Dropped ($n = 514$)	–	–	–
	Tahoua	Dropped ($n = -550$)	–	–	–

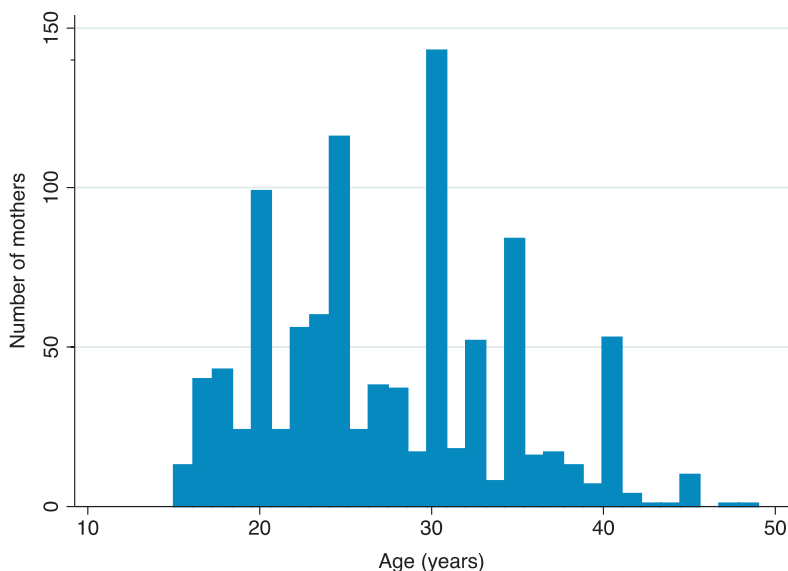
The age distribution of the extracted study sample indicated a relatively young study population with an average age of 27.4 years old. The total population was slightly dissymmetric to the left (Graph 2.2).

2.4.2 Data Management

The book presents the findings of the statistical analysis using the dataset of the 2006 and 2012 Niger DHS and the cleaned merged dataset of the 2011 PIS of the communication program in four regions of Niger. Statistical management of the PIS dataset was a major operation prior to statistical analysis, e.g., transforming continuous variables to categorical and binary variables.

2.4.2.1 The 2006 and 2012 Niger Demographic Health Surveys

The original dataset file was downloaded from the DHS program website (<http://dhsprogram.com/data/available-datasets.cfm>). The sample was extracted from the DHS 2006 based on the same inclusion criteria as the one used to define the study population of the PIS (Table 2.4). The DHS subset sample included all women aged from 15 to 49 years having at least a child less than 24 months in all eight regions



Graph 2.2 Distribution of age of interviewed mothers in Maradi and Zinder. $n = 1026$. (Source: 2011 Post-intervention survey in Maradi, Zinder, Tillabéry, and Tahoua)

of Niger. Each answer to multiple choice questions recorded as an independent continuous variable was merged to create binary or categorical variables to facilitate interpretation of statistical tests.

Regarding “early initiation of breastfeeding after birth,” mothers were asked how long after birth they first put their child to the breast. Answers were recorded in time units per hour as continuous variables and transformed into binary, before or after 1 h of birth. This continuous variable was transformed into binary with a cutoff point of 1 h before and after birth. All mothers who reported having started breastfeeding their child within the 1st hour of birth were categorized as “early initiation of breastfeeding.” Another outcome variable, “exclusive breastfeeding during the first 3 days of birth,” was created to identify patterns of postpartum breastfeeding for descriptive analysis. This variable was constructed by merging 11 variables describing different types of liquids other than breast milk that infants were given in the first 3 days after birth. The above multiple variables were merged into one of the following four categories: breast milk, liquid and juice, water only, and other milks (including animal’s milk and infant formula).

New variables were created by merging several categories of the same variable but recorded separately in the original data file. For example, a variable “who assisted the delivery” was recorded as nine separate categories and merged into one to make a single categorical variable according to the following classification: *health professionals* which combined doctors, nurse, and midwife, *traditional birth attendants (TBA)*, *friends and neighbors*, and *no one*. *Place of birth* initially included 13 categories which were regrouped into 3: *hospital*, *health center*, and *home*. Since

the naming of variables and recoding of answers were not necessarily consistent between 2006 and 2012, data management was processed carefully.

2.4.2.2 The 2011 Post-intervention Survey (PIS)

A number of continuous variables were transformed into categorical and binary variables for the statistical tests. With regard to timing of initiation of breastfeeding after birth, answers were recorded by field interviewers in three different units of time within 1 h, within 24 h, and beyond 24 h. A binary variable was created based on this categorical variable with a cutoff point of 1 h before and after birth. Some other new variables were also created, for example, “number of antenatal care visits” categorized into “1–2 times,” “3–4 times,” and “>4times.” There were a significant number of missing values with regard to how long after birth they put their child to the breast: 345 mothers (33.6%) out of 1026 selected for the secondary analysis did not answer the question. Homogeneity test examined statistical difference between the respondents and nonrespondents to this question using chi-squared tests to compare the socio-economic and socio-demographic status of the interviewed mothers. The results indicated no systematic difference between the two groups, and therefore we concluded that statistical analysis did not generate findings biased by using the timing of initiation of breastfeeding as a principal outcome variable.

2.5 Definition of Outcome and Explanatory Variables

2.5.1 Thresholds to Measure the Timing of Early Initiation of Breastfeeding

Justifying the benefits of breastfeeding on neonatal survival was done by many researchers, and it became unshakable evidence that putting the child to the breast the soonest after delivery could save many newborns' lives. This book sought to deciphering how mothers made a decision and took care of their newborn by looking at multidisciplinary factors likely to determine mothers' behavior. There were fundamental differences in scientific research subject to study initiation of breastfeeding after birth. The first subject considered early initiation of breastfeeding as a major contributor to the health outcome of children. The second instead analyzed early initiation of breastfeeding as a behavioral outcome and look for its determinants to explain why and to which extent the timing to start breastfeeding changed after birth. The definition of a cutoff point for early initiation of breastfeeding varied in previous studies between immediately, 30 min, 1 h, and 2–3 days after birth. Each study set a specific definition and a threshold to consider the timing of giving the first breast milk after the birth as an early or delayed case. To date, there

was no consensus agreement to define the timing whether it was early or delayed (Renfrew et al. 2009).

The book used the cutoff of the 1st hour after birth. Any practice beyond the 1st hour after birth was defined as delayed initiation of breastfeeding for the following reasons: First, recent WHO/UNICEF guidelines for breastfeeding harmonized different messages regarding promotion of early initiation of breastfeeding to be within the 1st hour of birth (Pan American Health Organization 2010). This threshold was coherent with the behavioral outcome set by the program promoting key family practices in Niger and relevant to measure its impact on the timing of initiation of breastfeeding after birth in the study populations. Second, as previously mentioned, giving colostrum immediately after birth had far more significant effects from the biological perspectives on both maternal and child health than when a child was given the first milk beyond 24 h of the birth. This evidence also underpinned the importance of promoting immediate start of breastfeeding to reduce the maternal mortality risks and to increase the chance of newborn survival. The later the timing of giving the first milk after birth, the greater the risk of giving other liquids than breast milk to a newborn.

Many epidemiological studies aimed at examining the impact of early initiation of breastfeeding on a newborn health outcome applied more than one cutoff point such as within the 1st hour, day 1, and day 2. This led to understanding whether there was any change in a newborn health breastfeeding according to the different timing of initiation of breastfeeding. Nevertheless, given the primary purpose of this cross-sectional study to analyze different explanatory variables associated with early initiation of breastfeeding, including more than one cutoff point to constitute outcome variables could make statistical interpretation difficult. Therefore the book opted for a single binary outcome variable within the 1st hour of birth to define the timing of putting a child to the breast.

2.5.2 Definition of Independent Variables by Category According to Socio-demographic Perspectives

Understanding which independent variables were associated with early breastfeeding was a primary objective of this study. Identification of each variable showing positive or negative influence on mothers' breastfeeding after birth required a thorough investigation to fathom out what all the numbers told us. The work required analytical skills and field-based experience in program evaluation and action research. Each variable likely to be related with early initiation of breastfeeding was carefully examined based on the findings of the previous research and the conceptual framework of epidemiological study of social determinants of health outcomes (Illustration 2.5). The preselected variables included socio-economic status of mothers and/or caregivers, maternal and child health-seeking behavior, health system, and environmental health (Commission on Social Determinants of Health

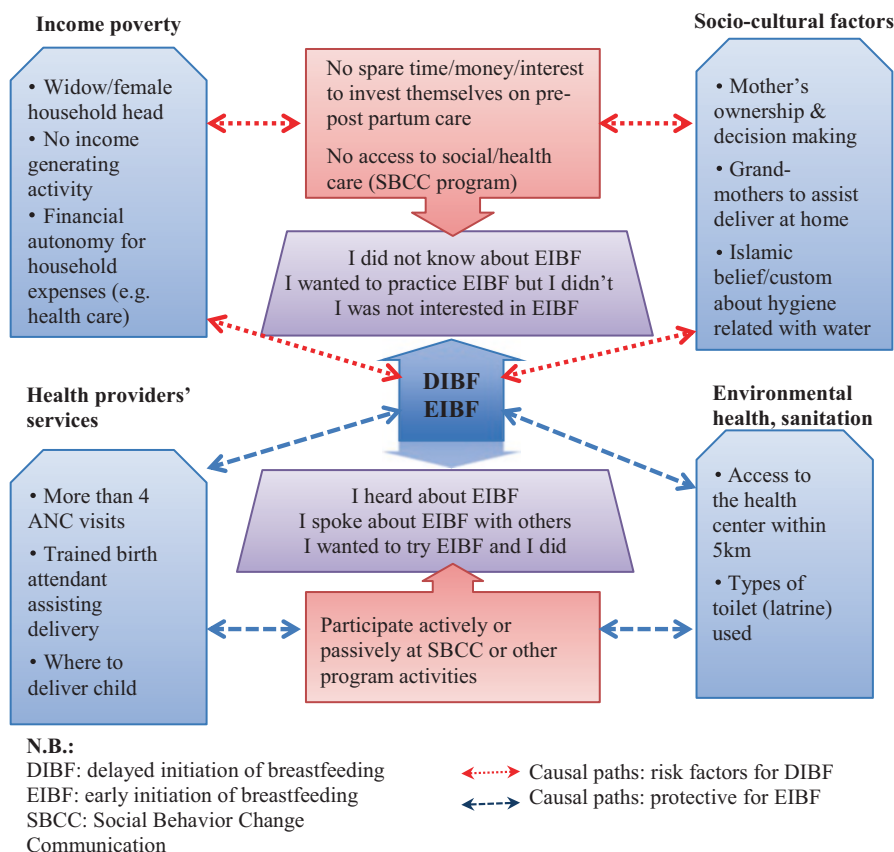


Illustration 2.5 Conceptual framework of determinants of early initiation of breastfeeding after birth

2008; Institut National de la Statistique Niger, United Nations Children's Fund, and University of Bristol 2009; Horii et al. 2011; Avan and Kirkwood 2010).

In addition, in a limited resource setting, poverty is a structural cause of neonatal disease and death, and, inversely, disease outcomes can result in poverty. We cannot emphasize enough the importance of poverty and disparity leading mothers to deprivation of access to basic healthcare and services in Niger. Vulnerability of mothers was measured by wealth ranking, type of occupation, and educational attainment of mothers (Victora et al. 1997). Some proxy indicators such as household status of the interviewed women, e.g., being female household head, and participation in household budget management for healthcare expenses were also considered. The Demographic Health Survey used a poverty index by scoring household economic wealth by household assets and ranking them by quintile, from the poorest to the richest (Institut National de la Statistique (INS) and ICF International 2013). The post-intervention survey did not include wealth ranking

variables but questioned mothers' involvement in income-generating activity and other household and community livelihoods by measuring mothers' ownership in household budget management and social network support which represented non-negligible assets in rural areas (Institut National de la Statistique Niger 2012).

The conceptual framework (Illustration 2.5) showed a glance of how all different independent variables could be possibly linked with early or delayed initiation of breastfeeding. Different potentially influencing factors were tentatively classified by the following categories: poverty income; socio-cultural and traditional customs; access to and provision of the existing health system services; and hygiene and sanitation infrastructure and practices. The question was to know whether poorer mothers were prone to delayed initiation of breastfeeding and how and to which extent the social and behavior change program mitigated poverty to being an impediment to optimal child healthcare. The study looked into equity of access to social and healthcare services by the socio-economically vulnerable group of mothers. Likewise statistical analysis examined causal paths between all explanatory variables and program exposure and between the set of identified explanatory variables and early initiation of breastfeeding. Below was the list of preselected explanatory variables⁶ based on which the determinants of early breastfeeding will be identified:

Place of residence (urban or rural, region)
 Age of mothers
 Educational attainment
 Number of under-5 children in household*
 Marital status (polygynous or monogamous unions)
 Relationship to the household head
 Type of occupation (or principal activity)
 Frequency of listening to radio
 Body mass index of mothers*
 Wealth ranking*
 Income-generating activity**
 Decision of healthcare expenditure of children**
 Decision of healthcare of mothers*
 Number of antenatal care visits
 Type of personal who provided antenatal care counseling
 Counseling of key family practices provided during antenatal care consultation**
 Type of personal who attended delivery*
 Discussion with a husband or the grandmother of the child about child healthcare**
 Source of drinking water
 Types of toilet facility
 Time to get to water resource*
 Distance to health facility
 Type of health facility accessible within 5 km**

⁶*Only included in the Niger DHS. **Only included in the PIS.

In light of the communication actions designed and implemented based on the above social and behavior change theory, the following explanatory variables were explored for the impact assessment of the program activities:

Home visits by community volunteers at least twice in the last month**

Local debates led by opinion leaders talking about one of the eight key family practices**

NGO-led event such as cine mobile, folkloric theater**

Peer education to promote breastfeeding or other key family practices to other women in the neighborhood**

Delivery-related indicators to know with whom and where mothers gave birth, known to have significant influence on the timing of initiation of breastfeeding after birth, were included in DHS, but not in the post-intervention survey. Statistical analysis using the DHS datasets allowed us to provide complementary findings for further in-depth analysis. Other key family practices promoted through the behavior change communication program as well as other UNICEF-led projects such as handwashing, type of toilet facilities, and access to and type of drinking water source were carefully exploited. They were not necessarily directly related with initiation of breastfeeding, but important proxy indicators which might have indirect impact on altering the above-cited explanatory variables and how they could be associated with early initiation of breastfeeding (Victora et al. 1997).

2.5.3 Definition of Socio-economic Vulnerability

Although poverty assessment of households in Niger was beyond the scope of this study, it was deemed important to define the concept of “vulnerability.” In 2008, UNICEF undertook a household survey to assess the risk of poverty and threats children exposed to poverty (Institut National de la Statistique Niger, United Nations Children’s Fund, and University of Bristol 2009). Many international institutions have elaborated and applied sustainable livelihood approaches initially designed by Chambers in community rural development since the 1980s (Chambers and Conway 1991). These approaches have been further elaborated through pilot studies carried out by the Department for International Development (DFID), the Food and Agriculture Organization (FAO), and others (Food and Agriculture Organization 2008; Lovendal et al. 2004). Action contre la Faim (ACF) and other organizations have developed their own conceptual framework based on this approach identifying five different types of individual, household, and community resources that determined people’s vulnerability in Niger (Département Technique Sécurité Alimentaire, Action contre la Faim 2010). Save the Children used an evaluation method of Household Economy Analysis (HEA) to carry out vulnerability studies by ranking the level of poverty set by a number of indicators related to food and nutrition insecurity in Niger (The Save the Children 2009). A conceptual note on defining food insecurity and vulnerability by Ludovic illustrated an overview of different

approaches in carrying out poverty assessment at individual and household levels in Niger (Ludovic and Philippe 2011). A theoretical framework was drawn from field studies to build a set of criteria to define characteristics of women of child-bearing age prone to vulnerability in sub-Saharan Africa. A study conducted by OXFAM-UK in Zambia identified women as a high-risk population. Chambers, R. clearly mentioned that women were a priority population group given their highly vulnerable status. However, to date, no gender-focused approach has been applied to analyze mothers' neonatal care and feeding from demographic perspectives.

The scope of the study was not to analyze structural and cyclical poverty of populations at high risk of food and nutritional insecurity. The concept of vulnerability employed in this study did not refer to absolute poverty. A set of indicators of vulnerability elaborated by this research were not used to examine political, economic, or cultural factors defined as fundamental causes which indirectly influenced mothers' neonatal care and feeding behavior according to a child malnutrition conceptual framework (Black et al. 2013). It rather applied the concept of relative poverty that entailed inadequate and insufficient resources as described by five essential individual, family, and community levels' livelihoods (Chambers 1997). In light of the UNICEF definition of deprived children (Institut National de la Statistique Niger, United Nations Children's Fund, and University of Bristol 2009), we established a set of indicators and cutoff points based on the DHS and PIS data-sets allowing vulnerability assessment of mothers in Niger as follows:

Table 2.5 lists socio-economic and socio-demographic status of mothers to assess the level of individual disparity in the community. These reference indicators referred to "graduated parameters" that determined "disparity" measured by the levels of educational attainment, income, and power as defined by Blau (1977). The concept of socio-economic gradient in healthcare defined by Kawachi et al. (2002) emphasized access to health services and hygiene infrastructure. The above list therefore included these as we considered them as important reference indicators for vulnerability assessment.

2.6 Statistical Analysis

The statistical models used for the secondary analysis were chi-squared tests and bivariate and multivariate logistic regression. Statistical tests were performed using STATA SE/13.1 to measure crude and adjusted odds ratios based on the following steps:

2.6.1 Descriptive Analysis

The first step to do determinant analysis of early initiation of breastfeeding and impact assessment of the program was to depict the characteristics of interviewed mothers stratified into two groups, exposed and unexposed to the program activities.

Table 2.5 Set of indicators assessing vulnerability of mothers of children less than 24 months in Niger

Category	Indicators	Cutoff point of vulnerability	Sources
Socio-demographic status	Educational attainment	No school education	UNICEF/INS
	Number of under-5 children in household	5 children and more ^a	Original ^b
Socio-economic status	Occupation	Household work with no income	Original ^b
	Wealth index	Poorest ^a	UNICEF/INS
	Access to media (radio)	Never listened to radio	UNICEF
Physiological status	Body mass index	Less than 18.5 ^a	UNICEF/WHO
Environmental health	Access to health facility	Having reported as a big problem ^a	UNICEF/INS
		Beyond 5 km from residence ^c	Original ^b
	Source of drinking water	Surface water	UNICEF/INS
	Type of toilet	No facility	UNICEF/INS

N.B.: ^aIncluded only in the 2006 and 2012 Niger DHS

^bThe categories of this indicator were created based on the 2011 PIS database of the communication program in Niger. The cutoff points are not established yet by any international organization

^cIncluded only in the 2011 PIS in the four regions of Niger

The variables included socio-demographic and socio-economic status and health-seeking behaviors to access child healthcare services, environmental health, hygiene, and sanitation. As mentioned earlier, the study populations divided by program exposure were constituted purposively and retrospectively at the time of the post-intervention study after the start of the program. There was no randomization to select who would be taking part in the behavior change communication program. Therefore it was important to examine the characteristics of the study population based on the stratification according to program exposure and to verify if there were differences in characteristics between two groups. The number and proportion of each category of all variables were calculated in each group separately, and chi-squared tests were performed to measure statistical significant differences between two groups.

2.6.2 *Determinants Analysis by Bivariate and Multivariate Logistic Regression*

2.6.2.1 Bivariate Analysis

Using the entire study sample, a bivariate analysis identified risk and protective factors which determined the timing of initiation of breastfeeding after birth. Crude odds ratio of early initiation of breastfeeding were measured in relation to each variable identified by the above descriptive analysis of the characteristics of mothers. In another words, crude odds meant the chance of initiating breastfeeding within the 1st hour of birth was measured without adjusting for any plausible effects of other variables. This bivariate analysis provided a first inventory of variables likely to encourage early start of, or delayed timing of, breastfeeding after birth and implied who were at risk of suboptimal breastfeeding after birth. There were no exclusion criteria to select explanatory variables to examine at this stage, and we considered all variables regardless of the statistical significance shown in the descriptive analysis of the same variables stratified into two groups, exposed and unexposed to the program activities (Table 2.6).

2.6.2.2 Multivariate Logistic Regression Analysis

We further scrutinized the above findings of bivariate analysis by taking into account a number of factors that might interfere with the relation between the outcome variable, initiation of breastfeeding within the 1st hour of birth, and each identified explanatory variable likely to determine this practice. Given the study design based on a retrospective cross-sectional survey, it was crucial to consider the confounding effects for the determinant analysis. To identify these confounding variables, we first examined association between each variable and early breastfeeding. Secondly, we looked at whether these socio-economic and socio-demographic indicators chosen as potential confounders were related to the identified explanatory variable. For example, assuming that among mothers who did antenatal care screening more than four times during the pregnancy, the chance of practicing early breastfeeding increased compared to those who never did. We should question whether it was not because of mothers' social and economic status or cultural background intervening in their decision and action in newborn care that they initiated or not breastfeeding in the 1st hour of birth, independently of antenatal care visits (Illustration 2.6).

The multivariate analysis should examine all explanatory variables showing significance in bivariate analysis and each of these determinants of early initiation of breastfeeding one by one. Logistic regression measured adjusted odds of early breastfeeding for these explanatory variables taking into account the confounding variables shown to be associated with the timing of initiation of breastfeeding and its determinants (see Chaps. 4 and 5 for more details about how to proceed with selecting confounding variables in the multivariate logistic regression).

Table 2.6 Statistical analysis of variables based on inclusion criteria

Types of variables	Inclusion criteria	Statistical analysis
Explanatory variables: Socio-economic and socio-demographic, health-seeking, hygiene and sanitation, sociocultural factors	All variables related to the characteristics of the interviewed mothers based on the conceptual framework	Preselection of variables from the original database of the PIS
		Step 1: Descriptive analysis stratified into two groups
		Characteristics of mothers ←→exposure to the program
		Step 2: Bivariate analysis
		Characteristic of mothers ←→EIBF
	All variables with statistically significant association with exposure to the program AND/OR EIBF (<0.05): <i>Included</i>	Step 3: Multivariate analysis
Confounding variables: Socio-economic and socio-demographic status of mothers	All variables with statistically significant association with <i>neither</i> exposure to the program <i>nor</i> EIBF (>0.05): <i>Excluded</i>	Selection of explanatory variables
		More than one characteristics of mothers ←→EIBF
	All variables with statistically significant association with <i>neither</i> exposure to the program <i>nor</i> EIBF (>0.05), but shown to determine EIBF in the previous research: <i>Included</i>	
	All variables with statistically significant association with exposure to the program and EIBF (<0.05): <i>Included</i>	Selection of confounding variables
	All variables with no statistically significant association with exposure to the program (>0.05): <i>Excluded</i>	Socio-economic, demo status ←→exposure to the program
	All variables with no statistically significant association with EIBF (<0.05): <i>Excluded</i>	Socio-economic, demo status ←→EIBF

N.B.: EIBF early initiation of breastfeeding

2.6.3 Impact Assessment to Measure the Program Exposure

We wanted to know whether the program had any influence on how soon mothers put their child to breast after delivery. Bivariate analysis measured the chance of early initiation of breastfeeding in relation to whether mothers were reached by the program looking at differences between two groups, exposed and unexposed to the program. Nevertheless, to explore real impact of different types of behavior change

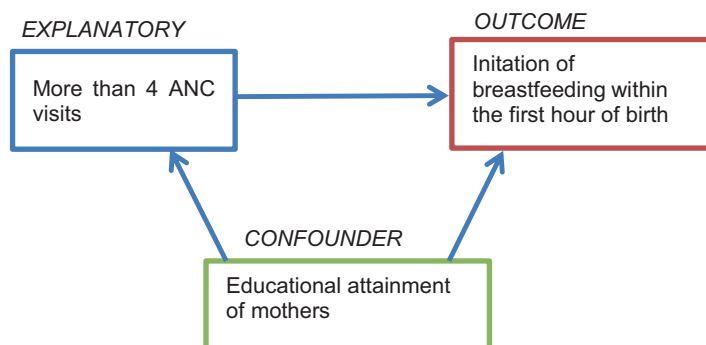


Illustration 2.6 Causal pathway between outcome and explanatory variables

communication strategies, the book examined the impact of the program by the frequency mothers were involved in a specific type of communication action designed and implemented by the program. The statistical analysis attempted to dissociate the possible extent of the impact of each type of communication action. This program impact assessment revealed which action specifically had the most significant influence on early initiation of breastfeeding. These statistical findings provided a clue to answer one of the research questions about what worked and what did not work to promote early initiation of breastfeeding.

The same principal as determinant analysis with multivariate logistic regression (see Sect. 2.6.2) was applied in controlling confounding effects when measuring the association between early initiation of breastfeeding and different types of the social and behavior change communication (hereinafter referred to as SBCC) program. The odds of early initiation of breastfeeding in relation to the SBCC program activities were adjusted for the characteristics of mothers associated with the timing of initiation of breastfeeding and participation at each different type of SBCC action. As above mentioned, the primary purpose of multivariate logistic regression was to isolate the possible extent of the program's impact on early breastfeeding. Furthermore, this was a typology analysis of the program intervention allowing us to understand whether or not income poverty and social disparity among populations interfered with the program coverage and prevented the SBCC program from reaching out to the entire population. Socio-economic vulnerability of mothers and their family members was at the center of discussion of the SBCC program impact assessment in rural Niger. The same processes as determinant analysis were applied to start with bivariate analysis including all different types of communication action implemented within the SBCC program as explanatory variables to explore significant or not significant association with early initiation of breastfeeding. Multivariate logistic regression only included the variables identified as determinants of early breastfeeding with statistical significance in bivariate analysis. We calculated adjusted odds ratio by controlling the confounding effects of variables associated with both early breastfeeding and program exposure.

2.6.4 Study Limits and Ethics Approval

The study population of the post-intervention survey (PIS) was drawn from the purposively selected nonrandomized sample and therefore was not representative of the entire population in each region. We should keep in mind that when interpreting data, the statistical findings of this statistical analysis were relevant to the study populations only in the program setting.

As mentioned earlier, the PIS was a retrospective cross-sectional study to measure the program effects by comparing the groups exposed to the program with those unexposed to such interventions. Unlike other research models such as randomized control trial that could provide further more accurate and reliable evidence, the cross-sectional study could be prone to a number of statistical biases. First, measurement bias with uncontrolled confounding effects over time was a major shortcoming (Kopeck and Esdaile 1990). Causal relationships between outcome and explanatory variables could not be determined due to the implementation of a communication program extended over a long period of time. A recall bias of the respondents was unavoidable in this type of retrospective study. Mothers of children less than 24 months were asked to recall how soon they put their child to the breast after delivery which occurred 2 years earlier preceded by the interview date. Respondent bias could also trigger inaccurate information recording related to delivery and the timing of initiation of breastfeeding after birth for which it was not always simple for mothers to remember exact details and to explain (World Health Organization 1998).

Nevertheless, a cross-sectional study offsets financial and time constraints considered as a major bottleneck in prospective research models, e.g., cohort or randomized control trials. This was one of the reasons why cross-sectional studies, less expensive and less time-consuming, were often used in many project and emergency contexts where field-based executing organizations are compelled to provide time-bound evidence-based actions. Besides, those who were granted funding, e.g., program managers, government officers, or head of district health center, were to provide multiple evaluation reports in different formats as requested by different funding agencies, because evaluation reports were the most valuable product for the external funding agencies to assess accountability. Many studies have been granted with financial and technical investments and generated a large amount of datasets. Yet few have been analyzed thoroughly to draw meaningful conclusions and sound recommendations allowing to review current undergoing program strategies or activities. Although we fully recognized the highly credential accuracy of randomized control trials, datasets of this cross-sectional survey already available in the field were worth further exploitation. They suggested important clues to understand the trends of early breastfeeding and what inhibited mothers from practicing it.

The PIS was initially designed to evaluate the program effects on mothers' behavior change in eight different KFP addressing multiple dimensions of maternal and child healthcare without exclusively focusing on early initiation of breastfeeding. A few indicators related to delivery, a key to demographic analysis of neonatal

care and feeding, have been dropped from the questionnaire which became too long and voluminous. They included types of personal assisting delivery, place of delivery, perception and practice of colostrum feeding, and other prelacteal feeding. The first indicator, *who assisted delivery*, examined the roles of health professionals and that of traditional birth attendants (TBA) known to have a significant influence on the timing of initiation of breastfeeding. The second indicator, *places of delivery*, examined whether birth in a hospital or a health post in a village, made any difference regarding home birth in Niger. The book explored these neonatal care and feeding practices by using the 2012 Niger DHS dataset and the findings of previous research carried out in sub-Saharan Africa and Niger to supplement missing information in the PIS.

Finally, informed consent was obtained from each participant involved in this survey prior to the interview. The PIS was initially designed within the framework of a participatory action research program aimed at promoting key family practices. This program involved actors from various backgrounds at micro, meso, and macro levels: the Ministry of Health, UNICEF and other national, regional, and local institutions; community health professionals; village chief and traditional leaders; mothers; and their family members. Mothers and other actors in their family and villages have been actively involved in collecting and analyzing data for process monitoring and participatory evaluation as a part of their routine communication program activities. The National Institute of Statistics of Niger (NIS) was commissioned to conduct the PIS in collaboration with UNICEF-Niger. The post-intervention survey (PIS) was subject to exemption from ethical approval for the nature of the study purposes as described earlier and for human subjects with no serological or biological test according to regulation no.2004-011 dated March 30, 2004. This program evaluation was aimed at fostering participants' ownership of research findings applied to optimizing the outcomes of field-based activities.

Chapter 3

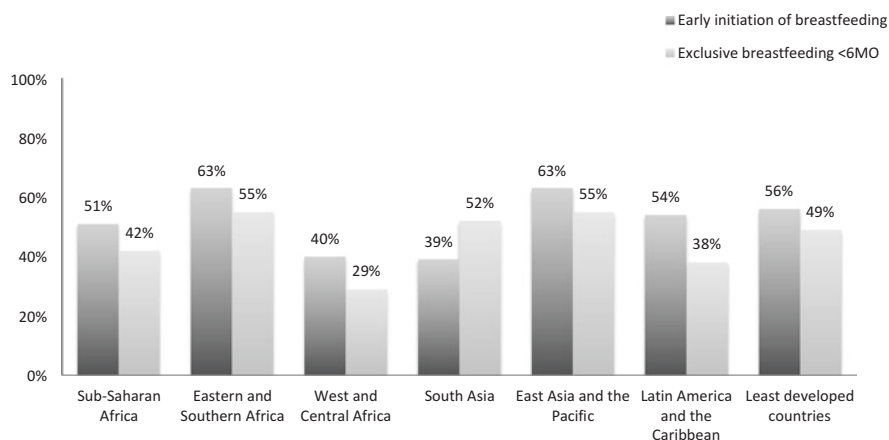
State of the Art of Socio-demographic Approaches to Breastfeeding in Sub-Saharan Africa



This chapter illustrates what we already know about breastfeeding promotion in the developing world, more specifically in sub-Saharan Africa, and new directions explored by the recent research findings. We emphasized the importance of reviewing previous studies about behavior change in early initiation of breastfeeding. Systematic literature review identified risk and protective factors for early initiation of breastfeeding within the 1st hour of birth. This meta-analysis provided evidence-based findings which allowed us to develop further the framework of secondary analysis of the databases of household and community surveys in Niger. Looking at other previous studies and updating ourselves on the most recently published research work on the same subject is the first step to undertake in an original research work. Based on the findings of the previous studies, we built a list of variables likely to be determinants of and other influencing factors for early initiation of breastfeeding after birth in Niger. A theoretical framework of the present research was elaborated in behavioral analysis of neonatal feeding and healthcare from demographic perspectives. Besides, by restricting geographical zones of research to sub-Saharan Africa, the findings drew on the limited scientific research.

3.1 Trends and Patterns of Breastfeeding Practices

This section depicts the trends and patterns of postpartum breastfeeding to provide general perspectives in sub-Saharan Africa (SSA) and Niger. The descriptive analysis from global, national, and regional perspectives positioned Niger among other countries in SSA to understand the level of optimal postpartum breastfeeding: early initiation of breastfeeding within the 1st hour of birth, exclusive breastfeeding during the first 6 months of life, and continued breastfeeding until 24 months of age.



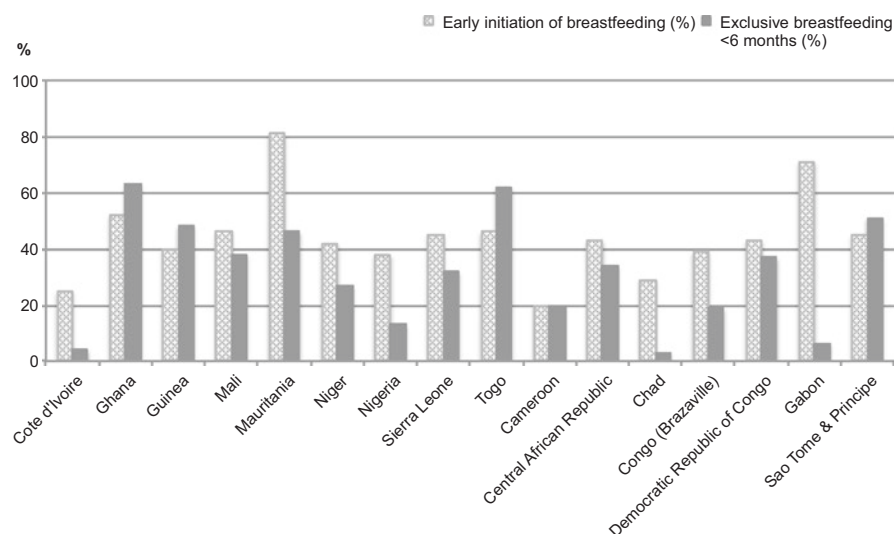
Graph 3.1 Proportion of mothers practicing optimal breastfeeding by region (Global average in 2011–2016). (Sources: UNICEF 2017)

3.1.1 *Breastfeeding Patterns in Sub-Saharan Africa at a Glance*

Global trends of breastfeeding at a glance told us how breastfeeding practices differed between the continents of the world. Unlike the decline of breastfeeding globally, the sub-Saharan African region demonstrated the most significant increase in exclusive breastfeeding up to 6 months of age compared to other regions in the developing countries during the last decade (Edmond et al. 2006; Clemens et al. 1999; Moore et al. 2007): the prevalence nearly doubled from 22% in 1995 to 41% in 2016 (United Nations Children’s Fund 2011, 2017).

Sub-Saharan Africa compared with other regions showed sluggish progress in promoting early initiation of breastfeeding in the last years. Half of mothers put their child to the breast within the 1st hour of birth (51%), yet the prevalence was higher than South Asia (39%) but surpassed by East Asia and the Pacific which demonstrated a significant progress (63%) (Graph 3.1). They seemed to have more difficulties to sustain exclusivity of giving nothing but breast milk during the first 6 months of life; the prevalence remained lower at 42%. The breakdown of sub-Saharan Africa showed that West and Central Africa¹ marked the lowest prevalence in early initiation of breastfeeding (40%) and exclusive breastfeeding (29%) compared to other parts of the world (United Nations Children’s Fund 2013a, 2013b) unlike Eastern and Southern Africa where early breastfeeding attained the highest level (63%).

¹ West and Central Africa includes Benin, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Côte d’Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone, and Togo.



Graph 3.2 Proportion of optimal breastfeeding in West and Central African countries. (*Sources: Demographic Health Surveys: Benin 2006, Côte d'Ivoire 1999, Ghana 2008, Guinea 2005, Mali 2006, Mauritania 2001, Niger 2006, Nigeria 2008, Sierra Leone 2008, Togo 1998, Cameroon 2011, Central African Republic 1995, Chad 2004, Congo (Brazzaville) 2005, Congo Democratic Republic 2007, Gabon 2012, Sao Tome and Principe 2009*)

We now look at the country-specific prevalence of early and exclusive breastfeeding within West and Central Africa. This allowed us to position Niger regarding breastfeeding in the region.

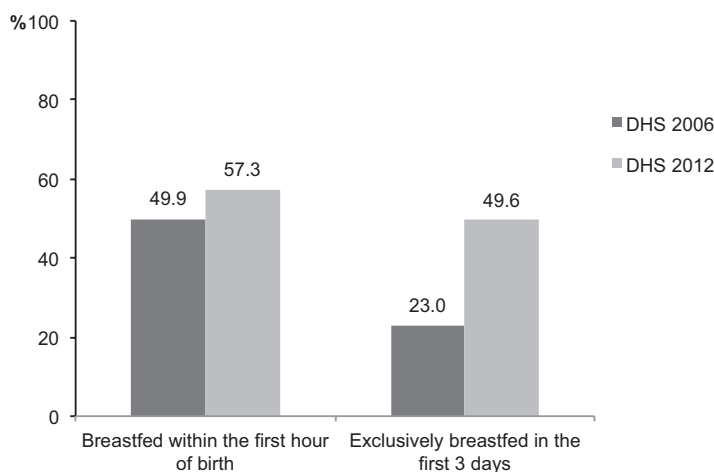
Many countries were below global averages of optimal breastfeeding when looking at the breakdown of figures on exclusive breastfeeding by country in West and Central Africa (Graph 3.2). These countries included Côte d'Ivoire, Guinea, Mauritania, Niger, Sierra Leone, Togo, Cameroon, Central African Republic, and Gabon. Apart from a few exceptions observed in Ghana, Guinea, Togo, and Sao Tomé and Príncipe, early initiation of breastfeeding marked higher prevalence than exclusive breastfeeding which coincided with global trends. The proportions of both types of breastfeeding were symmetric in most countries, whereas a large gap between exclusive and early breastfeeding shown for Côte d'Ivoire, Chad, and Gabon should be interpreted with caution.

Niger was ranked at the fourth-lowest level of early initiation of breastfeeding (42%), and the prevalence of exclusive breastfeeding was far below the average of sub-Saharan Africa, reaching only 27%. Overall the low prevalence of early and exclusive breastfeeding revealed that optimal breastfeeding remained an uncommon practice in sub-Saharan Africa.

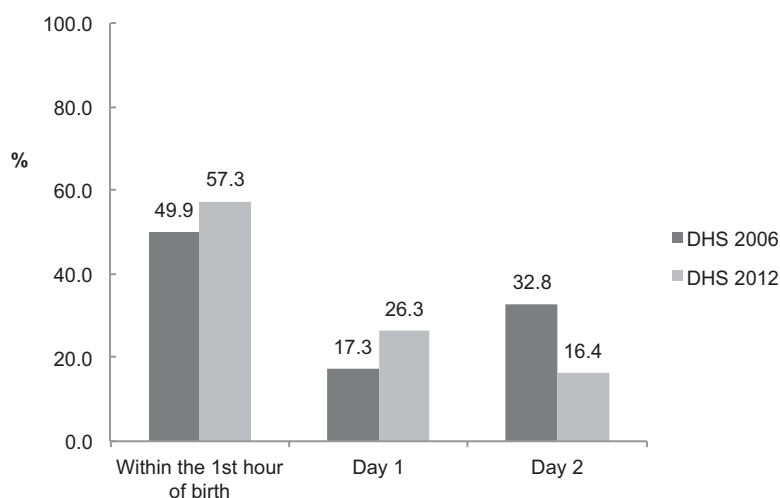
3.1.2 Postpartum Breastfeeding Behavior in Niger

To illustrate the trends and patterns of early initiation of breastfeeding in Niger, descriptive analysis examined how breastfeeding practice has evolved over time. Using the database of the 2006 and 2012 Demographic Health Survey-Multiple Indicators in Niger (Institut National de la Statistique 2007; Institut National de la Statistique (INS) and ICF International 2013), it was possible to track the change of breastfeeding patterns. The sample extracted from the original survey includes mothers aged 14–49 years having at least one child less than 24 months who were born with vaginal delivery. As previously shown, the global average of early initiation of breastfeeding in West and Central Africa was the lowest among other regions of the world.

The proportion of early initiation of breastfeeding has increased by 7% between 2006 and 2012 from 50% to 57%. Half of mothers interrupted exclusive breastfeeding within the first 3 days of birth in 2012 (50%), a drastic decline compared to 2006 where the dropout rate was a lot higher (77%) (Graph 3.3). This figure should be treated with caution since behavior change was unlikely to occur to that extent within such a short time frame. The data collection of the 2006 DHS was undertaken during the period of dry season between January and May when the air temperature reached a peak and mothers were prone to prelacteal feeding with water and other liquids than breast milk. The period of data collection for the 2012 DHS was stretched over the period of April to August including both dry and rainy seasons. Given the gap in the timing of data collection between the two surveys, and that early and exclusive breastfeeding practice was inclined to interruption by water



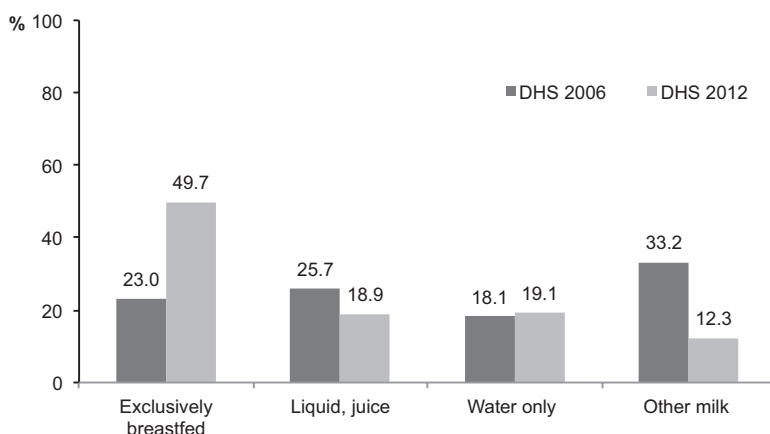
Graph 3.3 Optimal postpartum breastfeeding over time in Niger (*Sources:* 2006 and 2012 Niger DHS. *N.B.:* The dataset of the 2006 Niger DHS includes a study population covering all of Niger including mothers with children less than 24 months. The above figure of mothers who breastfed within the 1st hour of birth differed from the one shown in Graph 2.2)



Graph 3.4 Timing of initiation of breastfeeding within the first 3 days of birth in Niger. (Source: 2006 and 2012 Niger Demographic and Health Surveys)

feeding during the dry season as witnessed by many mothers in villages, the assumption was that the 2012 data may have generated increasing trends of optimal breastfeeding compared to the year 2006. With that being said, this postpartum period presented a critical moment and great risk for mothers to be prevented from giving anything but breast milk.

The breakdown of the timing of starting breastfeeding was described from the 1st hour of birth to 3 days of birth. Graph 3.4 showed three different times of initiating breastfeeding to see how early breastfeeding has evolved between 2006 and 2012 (Graph 3.4). Overall the timing of initiating breastfeeding has become earlier over time. More mothers put their child to the breast during the 1st hour in 2012 compared to 2006 (57% vs. 50%), whereas less waited until the 2nd day after birth in 2012 (33% vs. 16%). This indicated the reduced risk of delayed initiation of breastfeeding after birth since 2006. Early start of breastfeeding was vital for successful exclusive breastfeeding after birth. The earlier mothers put their child to the breast, the better was the chance to give nothing but breast milk (Lennie and Tacchi 2011; Setegn et al. 2012). If newborns were put to the breast within the 1st hour after birth, mothers were very likely to continue breastfeeding their child exclusively for a longer period than those who did not practice early initiation of breastfeeding. Immediate start of suckling was proven to facilitate the milk flow after 2–4 days of delivery in response to the baby's need, and breastfeeding frequency during this period could be as often as every hour until the milk flow was set. Delaying the timing of initiating breastfeeding therefore interfered in milk production and implied the greater risk of giving other liquids than breast milk, which resulted in interruption of exclusive breastfeeding soon after birth.

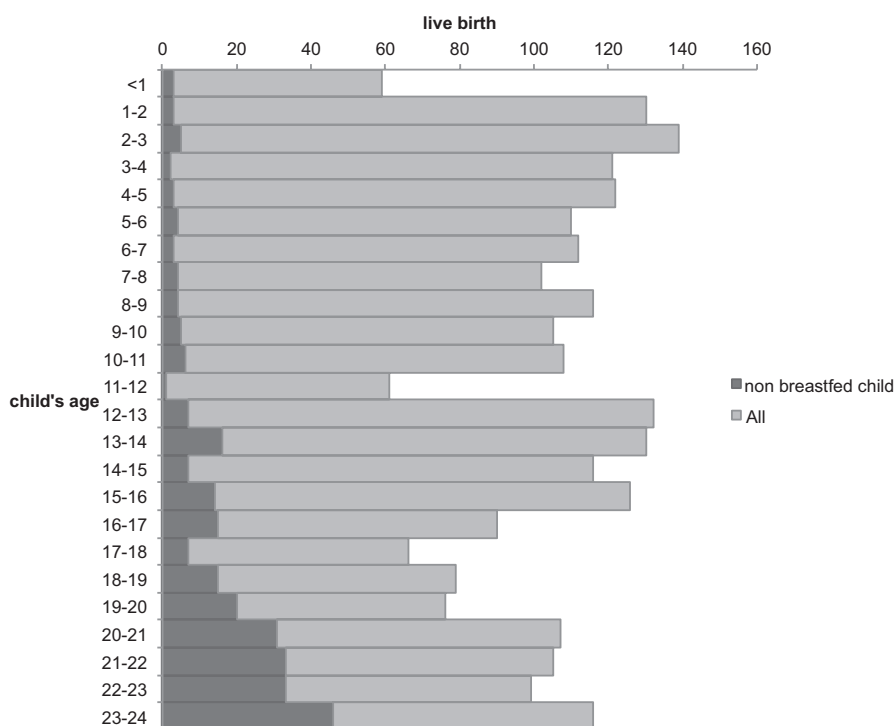


Graph 3.5 Change of breastfeeding patterns within the first 3 days of birth in Niger. (Sources: 2006 and 2012 Niger Demographic and Health Surveys)

We now compared different types of infant feeding in the first 3 days of birth, the period during which many stopped exclusive breastfeeding as shown in Graph 3.3. Infant feeding patterns were divided into four categories: breast milk only; breast milk and/or any liquids other than breast milk measured as « liquid, juice »; breast milk and/or water referred to as « water »; and animal's milk and/or infant formula measured as « other milk ». Other liquid and juice feeding dropped from 26% to 20% and feeding with other milk from 33% to 12%, respectively (Graph 3.5). This decline was translated by an increase of “breast milk only” which nearly doubled from 23% in 2006 to 50% in 2012, while the risk of giving other milk was halved. Besides, water feeding showed a moderate increasing trend and remained as high as 19% since 2006. Infant feeding with water persisting over time represented a major impediment to optimal postpartum breastfeeding. We explore later in the following Chaps. 4 and 5 to see how this prelacteal feeding could influence the timing of initiating breastfeeding after birth.

The increasing trends of exclusive breastfeeding during the first 6 months of life in Niger since 2006 questioned whether there was any impact of the behavior change program dedicated to promote child healthcare and infant feeding within families and communities. This assumption should be examined carefully. The book underpins evidence in light of previous research findings prior to statistical analysis using retrospective cross-sectional surveys which prevented us from establishing causal pathways between the outcome and its potential risk and protective factors. This literature review should offset some shortfalls in the statistical analysis and give some clues to understand what happened when some mothers put their child to the breast immediately after birth and others did not.

Graph 3.6 showed a distribution of children aged 0–23 months whose mothers reported having stopped breastfeeding or never breastfed at the time of interview. A sharp increase was observed in those who interrupted breastfeeding at the 13rd

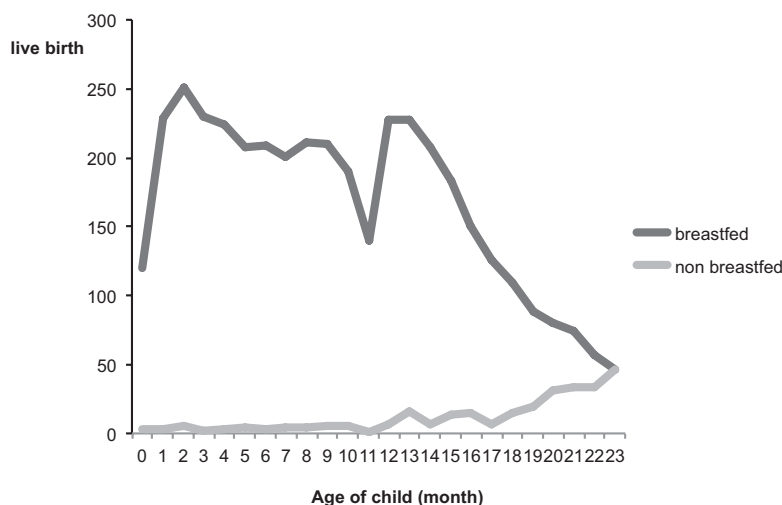


Graph 3.6 Distribution of children aged 0–23 months not breastfed in Niger ($n = 287$). (Source: 2012 Niger Demographic and Health Survey)

month and in a continuous manner until the 24th month. As opposed to the recommendations of WHO/UNICEF on continuous breastfeeding until 24 months, many stopped completely breastfeeding too early.

Graph 3.7 illustrates the trend of breastfeeding practices by comparing the age of children whose mothers have reported still breastfeeding and that of children whose mothers have stopped breastfeeding at the time of interview. The 13th month marked the starting point when mothers dropped out from continued breastfeeding. There were rounding effects at two points of time: the 2nd month and the 12th month, when the number of mothers having reported continued breastfeeding at the time of interview drastically declined. Whereas most mothers practiced continued breastfeeding in the first 12 months of birth, few continued until 24 months of age.

The Ministry of Health of Niger endorsed continued breastfeeding until 24 months of life in its strategic action plan for child survival and development. Optimal breastfeeding stands for early and exclusive breastfeeding and continuous breastfeeding until 24 months of life, and early interruption of breastfeeding is known to have an adverse effect on child survival (World Health Organization 2001; Pugh et al. 2002; Black et al. 2013). Yet the integrated child healthcare package did not seem to focus on promoting continued breastfeeding during the postnatal period.



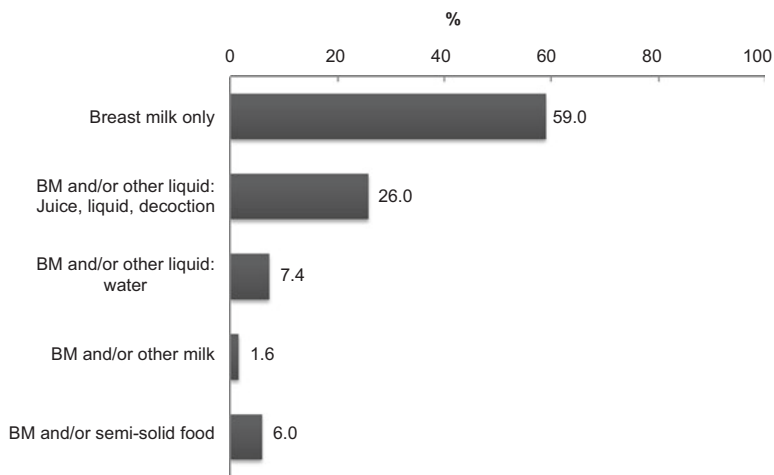
Graph 3.7 Trends of continued breastfeeding in the first 24 months of life. (Source: 2012 Niger Demographic and Health Survey)

3.1.3 Trends in Early Initiation of Breastfeeding of Mothers with Children Under 24 Months in Niger

Graph 3.8 below illustrated infant feeding patterns in the 24 h preceded by the interview date among mothers having children below 6 months of age² in the four regions of Niger. More than half of mothers ($n = 216$, 59%) reported having given nothing but breast milk. One quarter of infants was fed with juice or other liquid ($n = 95$, 26%); water feeding and use of other milk reached 7.4% ($n = 27$) and 1.6% ($n = 6$), respectively. Water feeding and juice consumption were the most dominant patterns of prelacteal feeding followed by early introduction of semisolid food to inhibit early and exclusive initiation of breastfeeding.

We sought to understand how early initiation of breastfeeding influenced infant feeding behavior in the first 6 months of age. Early initiation of breastfeeding led many mothers to exclusive breastfeeding (68%) compared to those who delayed the timing to start giving breast milk as exclusive breastfeeding dropped to 49%. When mothers put their child to the breast within the 1st hour after birth, the chance of giving breast milk exclusively during the first 6 months of age increased by 2.3 times more than when they did not (95% CI: 1.5, 3.5). This highly significant statistical evidence indicated the positive influence of early breastfeeding on sustaining exclusivity in breastfeeding their child during the 1st months of life.

²According to WHO/UNICEF, complementary feeding, giving semisolid food to supplement the required energy and nutrition provided by continued breastfeeding, should be introduced from the sixth month of birth.



Graph 3.8 Feeding patterns of mothers with children below 6 months (24-h recall) in Maradi, Zinder, Tillabéry, and Thaoua. (Source: 2011 post-intervention survey (PIS). N.B.: BM Breast milk)

Qualitative research conducted in Niamey indicated widespread beliefs in water feeding practice; hence mothers were tempted to give water to their child immediately after birth (see 3.2.4. “Colostrum: Perceptions and Practices of the First Milk Rooted in Sociocultural Contexts”). If mothers adhered to the routine water feeding with the newborn, delayed initiation of breastfeeding resulting in interruption of exclusive breastfeeding would be an unavoidable outcome even if they know about positive effects of colostrum (Moussa Abba et al. 2010). Unfortunately, neither the Niger DHS nor the PIS provided prelacteal feeding-related information during the first days of birth, and we did not know what substituted the first breast milk. The next section reviews the findings of other studies dedicated to neonatal care and feeding patterns hindering early initiation of breastfeeding.

3.2 What We Already Know About Risk or Protective Factors of Postpartum Breastfeeding

The systematic literature review identified what determined the timing of initiating breastfeeding after birth. The typology of community-based behavior change communication classified different types of interventions to evaluate their impact on early initiation of breastfeeding. This review addressed two different subjects: first determinant analysis of early initiation of breastfeeding to explore what previous research could tell us about different reasons why some mothers may have decided not to start breastfeeding early after birth. Second the study assessed the impact of assessment of any types of family- and community-based maternal and child

healthcare promotion to detect specific types of actions which positively influenced how soon they put their child to the breast after birth.

3.2.1 Demographic Perspectives on Social Determinants of Health Outcome

This section investigated what we already know about social determinants of early initiation of breastfeeding and what worked and did not work with regard to community-based behavior change communication aimed at promoting early initiation of breastfeeding.

Demographic research describes transitions of a population mainly in terms of mortality, fertility, and immigration (Leridon 2007). It is also aimed at understanding what causes outcomes by looking at socio-economic, cultural, ecological, and biological contexts (Chesnais 1995). However, unlike epidemiological approaches that investigate multifaceted factors influencing a health outcome at the individual level, demographic perspectives are inclined to studying a population on a large scale. Caldwell et al. (1988) attempted for the first time to highlight a few scientific works focusing on observing specific cases in the family and community by adopting socio-anthropological approaches to study social dimensions as determinants of a health outcome indicator (Caldwell et al. 1988). Breastfeeding emerged as one of the important factors in demographic studies on fertility. Historical demographic studies were focused on correlations between breastfeeding duration and its effects on intervals between births (Caselli et al. 2002). The benefits of continued breastfeeding on releasing prolactin, a biological factor, were also statistically measured. In 2012, the World Health Assembly endorsed six nutrition core indicators for monitoring progress reported by the member states of the World Health Organization (WHO) toward the global target. Nevertheless, although the set of indicators included exclusive breastfeeding until 6 months of age, the initiation of breastfeeding within the 1st hour of birth did not appear in the official text (World Health Organization 2014a).

Recently, individual behavior, among others, breastfeeding, has been globally recognized as a measurement indicator for the health outcome of populations (Jones et al. 2009). In addition, social determinants became important for demographic research to analyze health behaviors as socio-economic, cultural, and environmental factors could have significant effects on individual behavior change. Social determinants of health encompassed a vision to address a gap in individual behavior and accessibility to healthcare (Jones et al. 2009). The 67th World Health Assembly, held in May 2014, adopted a resolution on “contributing to social and economic development: sustainable action across sectors to improve health and health equity” (World Health Organization 2014b). They recognized the need of non-health sector interventions leading to improving health outcomes of the poorest. Social determinants and socio-economic vulnerability of mothers altering early initiation of

breastfeeding in sub-Saharan Africa (SSA) became the center of discussion. Yet, the program evaluation to measure the impact of community-based behavior change promoting neonatal care and feeding remained scarce in demographic research (Tylleskar et al. 2011).

Identifying risk and protective factors determining postpartum breastfeeding from previous studies was a key step prior to examining the effect of the communication program. In this study, social determinants were carefully selected based on the findings of the literature review. As defined earlier, social determinants of early breastfeeding were categorized according to the conceptual framework of the study into four groups: income poverty, access to and use of healthcare services, sociocultural factors, and environmental health regarding hygiene and sanitation (see Sect. 2.5.2 “Definition of Independent Variables by Category According to Socio-demographic Perspectives”).

3.2.2 Socio-demographic and Economic Status of Mothers as Proxy Indicators of Income Poverty

Demographic determinants: A cross-sectional study in Southeast Ethiopia found that rural residence impaired early initiation of breastfeeding within the 1st hour of birth (Setegn et al. 2011). The relationship between early breastfeeding and educational attainment remained inconclusive. The higher education level of mothers was the only variable positively associated with early initiation of breastfeeding in rural Southwest Ethiopia (Tamiru et al. 2012), Southeast Ethiopia (Setegn et al. 2011), Uganda (Bbaale 2014), Kenya (Matanda et al. 2014), and Nigeria (Qureshi et al. 2011). A hospital-based randomized control trial (RCT) conducted in Southwest Nigeria showed no significant association with mother’s educational attainment (Morhason-Bello et al. 2009).

In Guinéa-Bissau, lack of previous breastfeeding experience altered early initiation of breastfeeding among those who delivered for the first time (primipara) and belonged to a young age group, both shown to be major risk factors for delayed initiation of breastfeeding (Gunnlaugsson et al. 1992). Mothers who delivered more than once, multipara, were more likely to start breastfeeding within the 1st hour of birth (Horii et al. 2011). Others reported that a number of deliveries, parity, did not alter postpartum breastfeeding (Gunnlaugsson and Einarsdottir 1993). The specificity of the household structures in sub-Saharan Africa was the large extension of intergeneration and presence of co-spouses who were women of childbearing age within the same compound. It was important to question whether marital status, whether mothers were married in monogamous or polygynous unions, impacted neonatal healthcare. As most deliveries occurred at home in Niger ($n = 2774$, 60.4%, the Niger 2012 Demographic Health Survey), the influence of women sharing the house must not be neglected on mothers’ decision and action to practice or not early breastfeeding. Demographic research should investigate carefully the diversity of

household structures as they could lead to controversial family circumstances where relationship between family members, more specifically co-spouses, turned to be cooperative or conflicting (Madhavan 2001). We will examine how polygyny could be related with early breastfed in the following chapter (see Sect. 5.2.3).

Socio-economic vulnerability of mothers: Socio-economic status of mothers was defined by two types of resources: (1) individual resources including income, occupation, education and other individual wealth, and neighborhood support and (2) community resources including houses, access to and availability of food, and availability of transportation (Jones et al. 2009). The impact of socio-economic status of mothers on early initiation of breastfeeding remained inconclusive. A RCT conducted in Nigeria showed that poverty was significantly related with delayed initiation of breastfeeding (Qureshi et al. 2011). According to a retrospective study in eastern Uganda, socio-economic status of mothers was correlated with essential newborn care (ENC) including clean cordon care, thermal care, and initiation of breastfeeding within the 1st hour of birth (Waiswa et al. 2010). Other studies in Egypt and Uganda reported that income poverty inhibited knowledge about the benefits of breastfeeding and therefore the poorer were more likely to delay initiation of breastfeeding compared to the better-off (Clemens et al. 1999; Bbaale 2014). Maternal health and nutritional status was known to be closely related with patterns of breastfeeding: overnutrition of mothers increased the risk of delayed and early interruption of breastfeeding, whereas undernutrition significantly associated with the low birth weight of the newborn had no influence on whether they breastfed their child exclusively or not exclusively (Garcia et al. 2016; Islam et al. 2013).

3.2.3 Health Behavioral Determinants: Access to and Use of Maternal Child Healthcare Services

Breastfeeding promotion by the existing health system: In sub-Saharan Africa, the overall percentage of pregnant women doing at least four antenatal care (ANC) visits during the pregnancy remained very low. Many studies showed that ANC was positively associated with early initiation of breastfeeding (World Health Organization 2003). However, the relation between early initiation of breastfeeding and ANC was not entirely clear. Some studies revealed that ANC delayed the timing of initiating breastfeeding and increased the risk of early interruption of exclusive breastfeeding (Huffman 1984). In private clinics or hospitals, mothers were inclined to hospital routines where health professionals were indifferent if not hostile to an idea of doing any practices related to kangaroo mother care such as skin-to-skin contact immediately after the baby was discharged and early initiation of breastfeeding. Even if mothers were knowledgeable about the benefit of early breastfeeding and emotionally and physically overwhelmed by labor and delivery processes, they could neither discuss openly with health professional nor persuade midwives to let mothers to do what they found the best for them and their child. Health profes-

sionals could also be misled by inadequate training or by the infant formula industry to prevent mothers from practicing early breastfeeding.

A qualitative research analyzed the performance of health professionals providing ANC in the Kintampo district of Ghana (Tawiah-Agyemang et al. 2008). The findings revealed that, despite the proven knowledge of health professionals about the benefits of early initiation of breastfeeding, they did not systematically speak about breastfeeding during the ANC counseling. Providing pregnant women with 16 messages related to essential neonatal care (ENC) during a short counseling did not seem to be realistic. Lack of appropriate knowledge and skills of health professionals in poor health facilities was also reported in Uganda and Benin where health policy did not prioritize breastfeeding promotion. Health systems strengthening has been the top priority for many countries in sub-Saharan Africa. However the serious gap in the funding and management skills generated unequal budget distribution and allocation to the decentralized levels and shortfall of investment in human resources, logistics and infrastructures, which were liable to lead to poor quality health services. It was reported that in Uganda, women did not receive any counseling during the postpartum period to discuss breastfeeding (Mangasaryan et al. 2012).

Who assists delivery: Qualified birth attendants and doctors, nurses, and midwives played a key role in how to feed the newborn immediately after birth. A 2-year prospective study on infant feeding in Farimabougou in Mali indicated that most interviewed midwives knew the benefits of breast milk which could not be substituted by any other liquids or infant formula. Newborns were placed on mothers' chest for skin-to-skin contacts, and they let mothers initiate breastfeeding immediately after birth (Dettwyler 1987). A secondary analysis of the 1996 Benin DHS showed that early initiation of breastfeeding increased regardless of the type of personnel who assisted delivery, traditional birth attendants (TBA) or health professionals (Mangasaryan et al. 2012).

Yet it was not clear whether health professionals knowledgeable about the benefits of early breastfeeding guided mothers to practice it after birth. The above-cited case study in Ghana reported that health professionals discussed with mothers the immediate positive effect of breastfeeding on mothers' health, as they knew that it stimulated contraction to deliver placenta and prevented postpartum bleeding. However, another qualitative study in Niamey, Niger, showed that health professionals were not dedicated to assisting mothers in initiating and continuing breastfeeding their newborns: no information regarding the benefit of early initiation of breastfeeding was shared and no technical assistance of how to make their baby latch and suckle to facilitate the lactation flow and production. It was simply because they reported having being short of time: according to the interviewed midwives, they received 40–60 pregnant women per day in individual counseling (Moussa Abba et al. 2010). Another explanation is the priority set by funding agencies involved in capacity building of health professionals. The same study reported that no breastfeeding advice was given during 40 ANC visits observed in health centers that received large-scale financial support for a HIV prevention project. As a result,

the health professionals were provided extensive training and dedicated ANC counseling to prevention of mother-to-child transmission of HIV (PTMC).

Many qualitative studies indeed illustrated that the attitude of birth attendants determined the timing of initiating breastfeeding. Many are convinced by the importance of allowing mothers to rest and of bathing a newborn immediately after birth in their professional practice that was prone to delaying the timing of initiating breastfeeding. Besides, an adverse effect of the delivery assisted by a traditional birth attendant (TBA) on early breastfeeding was noted. Primipara mothers were instructed to give the first breast milk after day 3 of birth (Tawiah-Agyemang et al. 2008). Another program evaluation undertaken in Senegal also showed that mothers were given advice by grandmothers to initiate breastfeeding after the 3rd day of delivery (Aubel et al. 2004).

Place of delivery: Where mothers delivered was an important determinant of early initiation of breastfeeding. However, the research findings in sub-Saharan Africa remain inconsistent. Cross-sectional studies in Southeast Ethiopia and Uganda showed that hospital delivery significantly increased the chance of early initiation of breastfeeding within the 1st hour of birth compared to delivery at home (Setegn et al. 2011; Bbaale 2014). Another study in rural Ethiopia showed that home birth was a predominantly common practice in rural areas and positively associated with early initiation of breastfeeding when community volunteers intervened in assisting delivery and antenatal and postnatal care outside the health system (Horii et al. 2011). Many mothers who delivered at home were attended by lay birth attendants such as family members and neighbors. Home birth with traditional birth attendants (TBA) or their close relatives seemed to positively influence early initiation of breastfeeding in many countries such as Ethiopia and Niger (22, Horii, N. oral communication, 2013). In Tanzania, traditionally pregnant women were to move into their mother's house at the 9th month of pregnancy to seek better care for delivery preparations (Mrisho et al. 2008).

3.2.4 Colostrum: Perceptions and Practices of the First Milk Rooted in Sociocultural Contexts

Few studies addressed sociocultural factors for early initiation of breastfeeding in sub-Saharan Africa. Beliefs in and practices of dietary restrictions had non-negligible effects on the timing of starting breastfeeding their child after birth. Colostrum was discarded as it was considered to be harmful to newborns in many countries in sub-Saharan Africa. This perception resulted in delaying initiation of breastfeeding and giving other liquids than mothers' breast milk during the first 1–3 days of birth. ANC counseling provided by health professionals to discuss the benefits of colostrum did not change mothers' perception to discard colostrum. They believed that colostrum was contaminated with germs and could infest their child (Holmes et al. 2007; Oche et al. 2011). Sociocultural factors were an

important cross-cutting issue that determined the timing of starting breastfeeding after birth in SSA. Abhorrence of colostrum and traditional birth rituals appeared to be a major obstacle to early initiation of breastfeeding. The quantitative datasets employed for statistical analysis in this study did not address mothers' perception of colostrum. WHO recommended that cultural factors should be integrated in behavioral studies and determinant analysis of breastfeeding. Cultural diversity between different ethnic groups and religious beliefs should be carefully examined (Hadley et al. 2008; Morse et al. 1990) so as to detect the underlying causes harmful to newborn health. This section provides a summary of previous socio-anthropological research on colostrum.

3.2.4.1 Sub-Saharan African Countries

The patterns of beliefs and practice related to colostrum feeding varied in different rituals transmitted from one generation to the next. Discard of colostrum was known to inhibit early initiation of breastfeeding in SSA (Commission on Social Determinants of Health (CSDH) 2008) where many believed that colostrum was contaminated and therefore caused diarrhea and other infectious diseases to newborns. Morse et al. undertook ethnographic literature review on early and exclusive breastfeeding in over 140 cultures. They detected 16 out of 19 cultures in SSA deferring the timing of initiating breastfeeding after 24 h of birth (Morse et al. 1990).

According to Yovsi and Keller (2003), who studied cultural values and practices as determinants of breastfeeding in rural Cameroon, Fulani populations believed that colostrum did no good. Newborns were given only water during the first days of birth in place of colostrum feeding (Yovsi and Keller 2003). A longitudinal study conducted in Mali for the Bambara populations in the outskirts of Bamako (Dettwyler 1987) showed that all interviewed women had a neutral attitude to colostrum by calling it "dark breast water" which they believed was not real breast milk nor was it harmful to the newborn health.

Gunnlaugsson (1993) reported that Balanta, the largest ethnic group in Guinea-Bissau, forbade colostrum feeding (Gunnlaugsson and Einarsdottir 1993). They believed that colostrum was sullied given the murky color, and it could make children ill or cause death. Colostrum was abhorred, and the start of breastfeeding was awaited until "mature milk" came 3 or 4 days after birth. Unlike the prevailing perceptions about colostrum as a threat to neonatal health, Islamic ethnic groups, Fula (Peul in French) and Mandinga, were reported to believe that colostrum was beneficial to the newborn and represented the "will of Allah." However, breast milk of elderly mothers having delivered more than once was less appreciated than the first milk of younger and primipara mothers. Multiparous mothers' colostrum was discarded as they believed it could cause diarrhea to newborns. According to Gunnlaugsson, abhorrence of colostrum was not the only impediment to the immediate start of breastfeeding after birth. The Fula mothers were, despite their belief in the benefit of colostrum feeding, prone to delaying initiation of breastfeeding between 6 and 12 h by giving the newborn liquids other than breast milk. This

example illustrated that the custom of prelacteal feeding immediately after birth could inhibit early initiation of breastfeeding regardless of colostrum discarding.

Prelacteal feeding was therefore an important risk factor for delayed initiation of breastfeeding. The above study conducted in Mali reported that mothers' belief in and practice of colostrum feeding did not stop mothers from giving water to the newborn during the first days of birth, while water was thought to open the stomach of a child (Dettwyler 1987). A small-scale qualitative research in Amhara, northern region of Ethiopia, illustrated that the majority of mothers discarded colostrum, and more than half of the interviewed mothers practiced ritual water feeding after birth (Rogers et al. 2011). A large-scale survey conducted in eight health districts of Burkina Faso reported that reducing prelacteal feeding with water significantly increased the chance of early initiation of breastfeeding (Munos et al. 2014). A hospital-based study at maternity on knowledge, attitude, and practice (KAP) run in Pikine (outskirt of Dakar) and in Khombole (a rural area in Senegal) revealed that among the interviewed mothers, there was no case of withholding of colostrum (Yovsi and Keller 2003).

3.2.4.2 Niger

An anthropological study led by Hampshire, K. et al. in two districts of the Tahoua region, Tahoua and Illéla, in Niger, indicated a complex attitude of the populations toward colostrum (Hampshire et al. 2009). Colostrum feeding was thought to be good, and the trained midwives were dedicated to promote exclusive breastfeeding and other child healthcare to support breastfeeding mothers. However elderly women and midwives who had not been trained on KFP were bound to deny the benefits of colostrum feeding. They thought that colostrum was harmful and advised mothers to interrupt breastfeeding during the first 7 days of birth. Hampshire et al. (2009) reported that in Hausa, Touareg, and Fula, major ethnic groups of Niger, beliefs in colostrum feeding were not related with the age of mothers and knowledge and skills of midwives. Newborn care and feeding with unsafe water was traditionally acceptable and prevailed in Niger (Daulaire 2005).

In short, colostrum discarding seemed to be a common practice in most sub-Saharan African cultural contexts and was therefore an important inhibitor to early initiation of breastfeeding. In short, there were two causal factors for withholding colostrum: first, traditional customs inhibiting colostrum feeding because of abhorrence to the first milk mothers were encouraged to reject. Second, regardless of belief in the benefit of colostrum, water feeding after birth thought to be beneficial to newborn health was commonly practiced and resulted in prelacteal feeding. If the newborn was put to the breast within the 1st hour of birth, there would be certainty about exclusivity of breastfeeding. Hence initiating breastfeeding at the earliest time after delivery was important.

To date, sociocultural factors, likely to influence colostrum feeding in the four regions of Niger, have not been studied in an exhaustive manner, and the findings showed inconsistent results. Some studies clearly demonstrated trends of colostrum

discarding which delayed initiation of breastfeeding in sub-Saharan Africa. Traditional birth rituals held by elderly women seemed to be incompatible with early initiation of breastfeeding that midwives or community volunteers were trained and dedicated to promote. Social and behavior change communication strategies should be elaborated to mitigate the sociocultural bottlenecks which could be detrimental to optimal newborn care and feeding through identifying and adopting culturally acceptable long-lasting solutions.

3.3 Evaluation of Different Types of Interventions Promoting Early Breastfeeding

This section reviews interventional studies to evaluate the effects of community-based behavior change program on promoting early initiation of breastfeeding in sub-Saharan Africa. Different types of interventions were examined to understand what worked and did not work to change mothers' behavior in putting their child to the breast immediately after birth. This review focuses on analyzing socio-economic vulnerability to examine what types of interventions provided equity-based solutions to promote health and social services and community-based participatory actions. This will lead early and exclusive breastfeeding to being the long-lasting and common practice among the most deprived mothers. To date, few studies have been undertaken to measure the effects of community-based programs promoting early and exclusive breastfeeding (Anderson et al. 2005; Chapman et al. 2010; Allen and Gillespie 2001). A cross-country program review on breastfeeding promotion reported that community-based interventions were the least funded and developed component (Mangasaryan et al. 2012). In this section, the studies about community-based interventions selected for review were divided into three categories: first, evaluation of hospital-based programs to measure the impact of services provided by health professionals in existing health structures; second, performance evaluation of community volunteers trained and supported to carry out home visits; and third the impact assessment of mothers' involvement in participatory peer promotion to encourage other women to practice optimal child healthcare.

3.3.1 *Hospital-Based Approaches*

3.3.1.1 Training of Extension Health Workers

A prospective study measured the impact of a 2-day intensive training of health workers on breastfeeding based on the WHO protocol. The training was aimed at strengthening communication skills of health workers in a rural health district of Niger (Davies-Adetugbo 1997). The study compared the extent to which health workers knew about the benefits of early and exclusive breastfeeding between the intervention

and control groups. The results showed that knowledge of the intervention group was significantly higher than that of the control group. The training increased by 26% the proportion of mothers who started breastfeeding their child within the first 30 min of birth in the intervention group compared to the control group.

Nevertheless, a number of shortcomings questioned reliability of the findings: first the role of health workers was not clearly defined as to whether they assisted delivery in a health center. Not knowing how close they were in touch with mothers at the time of delivery made it difficult to measure the degree of influence health workers could have on mothers' decision and action of how soon they put their child to the breast after birth. Second, the study did not specify the methods of post-training follow-up. There was no indication about the types of behavior change communication strategies which have been applied in breastfeeding promotion. Third, the increased knowledge of the health workers seemed insufficient to explain why early breastfeeding increased in the intervention group. Processes of translating knowledge into action were complex and worth careful examination to clarify how they applied what they learned during the training.

3.3.2 Community-Based Interventions

3.3.2.1 Home Visits by Community Volunteers

A clustered randomized control trial (RCT) in Ghana (2013) showed that home visits by trained community health volunteers for neonatal care increased by 22% the chance of early initiation of breastfeeding (Kirkwood et al. 2013). Nearly half of mothers in the intervention group (49%) initiated breastfeeding within the 1st hour after birth compared to those in the control group who did not receive any program support ($p < 0.01$). The research team also compared the actual proportion of mothers not practicing early initiation of breastfeeding to see how much reduction had been made. The gap in early initiation of breastfeeding reduced only by 15% (95% CI: 5, 24). In short, they concluded that home visits had a limited influence on improving early initiation of breastfeeding.

A RCT of community-based neonatal healthcare promotion in rural eastern Uganda (2012) assessed the effectiveness of home visits by trained community health workers (CHW) (Waiswa et al. 2012; Kayemba Nalwadda et al. 2013). The study examined the knowledge of neonatal care and communication skills of community health workers (CHW) during the home visits. The study revealed that community health workers had a high level of knowledge and skills in identifying newborn's danger signs and referring them to the closest health facility. However, they were reported to have difficulties encouraging mothers to continue breastfeeding when referred to a health center or hospital because of their illnesses.

A RCT in rural East Tanzania evaluated individual counseling during the home visits led by trained community volunteers (Penfold et al. 2014). Each volunteer was assigned at least three visits during pregnancy and two postnatal visits to hold

face-to-face discussion with mothers individually at home. Most women (73%) in the intervention group received at least one visit. The majority received the first visit at the 5th month of gestation. The study findings indicated that exclusive breastfeeding in the first 3 days of birth significantly increased in the intervention group. However, neonatal care after birth, such as drying, wrapping, and initiation of breastfeeding within the 1st hour of birth, did not change between the intervention and control groups. It was reported that the major impediment to early initiation of breastfeeding was the delivery of placenta that most midwives focus on to prioritize mother's health status, leaving aside newborn care.

Overall the above trials revealed that individual counseling provided by community volunteers during the home visits did not lead mothers to change their postpartum breastfeeding behavior. Besides, systematic reviews on trials outside sub-Saharan Africa showed conflicting findings regarding the evaluation of the home visits and individual counseling provided by community volunteers (Jones and West 1985; Dennis 2002). In Africa, providing individual counseling during pregnancy did not reduce the risk of delayed initiation of breastfeeding. Many studies suggested that home visits to provide individual counseling might not be the most effective communication strategy given that family and community members continued to have a strong influence on mothers' postpartum breastfeeding. They were traditional birth attendants, relatives such as child's grandmothers or neighbors, who were called to assist delivery at home. The role of community volunteers seemed to have a limited impact on preventing delays in the first 3 days of birth to start giving breast milk exclusively. None of the above-cited studies examined coverage of interventions from a socio-economic perspective. Another common problem raised by the above trials was sustainability of behavior change communication programs. The impact of home visits was finally very much inclined to the motivation of community volunteers who were trained and supported by the programs during a short period of time. Decline of active involvement of community volunteers would be unavoidable after the program phaseout. To date no clear suggestion has been made on how possibly community health and non-health actors could build ownership of program activities and continue to get involved in such interventions. A formative research in Gambia suggested that, as a solution to behavior change strategies promoting early initiation of breastfeeding, traditional and modern communication channels should be identified and mobilized to elaborate a framework of culturally acceptable information sharing for neonatal feeding (Semega-Janneh et al. 2001).

3.3.2.2 Community-Based Peer Counseling

A community-based trial in Burkina Faso, Uganda, and South Africa (2011) showed that peer education doubled exclusive breastfeeding (Tylleskar et al. 2011). A qualitative evaluation of a nutrition project in Senegal revealed that increasing knowledge and communication skills of community volunteers on neonatal care did not change mothers' behavior in postpartum breastfeeding; however, nutrition

education aimed at empowering grandmothers' role in their family and village had a positive influence on early and exclusive breastfeeding (Aubel et al. 2004). The same study reported a significant increase of exclusive breastfeeding in the first 6 months of life from 8% to 90% in the previous decade during the period which government health workers had been deployed to promote neonatal care and feeding. This evidence revoked the assumption that grandmothers were opponents of infant and child nutrition and healthcare promotion led by community volunteers and bound to inhibit mothers from practicing the new behavior. Key informant interviews conducted in Niamey reported cases where community volunteers trained by the program explained the benefits of breastfeeding to mothers and referred them to the nearest health center for ante- and postnatal care (Moussa Abba et al. 2010). A systematic review on peer education stated that neonatal care promotion mobilizing jointly health professionals and peer counselors significantly increased the chance of early initiation of breastfeeding (Fairbank et al. 2000).

A descriptive study in rural Uganda (Nankunda et al. 2006) applied participatory learning methods to recruit and train peer counselors from each community. The participants learned the biological benefits of breast milk to reduce the risks of child deaths and illnesses. Counseling methods were based on interactive discussion about culturally common beliefs inhibiting optimal breastfeeding. All participants were to choose the most appropriate communication tool to address cultural barriers to early breastfeeding at the end of the training. The communication activities led by the peer counselors, who attended these participatory trainings, significantly increased early initiation of breastfeeding. All peer counselors witnessed that they were welcomed by mothers, their family, and community members to discuss breastfeeding. Trials in South Africa, Burkina Faso, and Uganda indicated that peer counseling support significantly increased early initiation of breastfeeding in Uganda only (Engebretsen et al. 2014). However, it was not clear whether the training and follow-up methods set up by this study were standardized between three countries, if so, whether they were applied to homogenous groups of participants in terms of socio-demographic, socio-economic, and sociocultural background. The findings should therefore be interpreted with caution.

3.3.2.3 Community-Based Approaches to Reach Deprived Populations

Unequal coverage of child healthcare and infant feeding has been a center of discussion in sub-Saharan Africa. However, few studies addressed socio-economic and demographic disparity in newborn care and early initiation of breastfeeding (Waiswa et al. 2010; Exavery et al. 2014; Fenn et al. 2007).

Comparative analysis of the DHS in Malawi, Eritrea, and Benin showed that socio-economic status of mothers was strongly associated with child health intervention coverage (Victora et al. 2005). Evaluation of an integrated management of child illnesses (IMCI) examined inequality in child healthcare in rural South Tanzania. The study findings revealed that healthcare seeking increased among better-off households compared to socio-economically vulnerable ones

(Schellenberg et al. 2003). The study did not address early initiation of breastfeeding as a health behavioral outcome. However it gave some insights with a view to the universal healthcare coverage for newborns to illustrate that, even between mothers living in the same village, there existed a distinguishable disparity between rich and poor which was further enhanced by external support which remained inaccessible by the deprived group of populations.

Cross-sectional studies before and after intervention in rural Malawi (Callaghan-Koru et al. 2013) examined a community-based approach to poverty reduction aimed at removing socio-economic barriers preventing mothers from accessing adequate and equal healthcare. The study emphasized the knowledge gaps in identifying danger signs of child illnesses and in early initiation of breastfeeding between the rich and poor mothers according to the wealth quintile. This determinant analysis was limited to studying how poverty was linked with selected health outcome behaviors and did not reveal whether this type of intervention increased early breastfeeding regardless of socio-economic status of mothers.

To our knowledge, there has been no impact assessment of community-based behavior change programs on early initiation of breastfeeding among socio-economically vulnerable mothers in sub-Saharan Africa. This book will provide one of the first studies in the region.

Appendix: Systematic Literature Review on Social Determinants and Program Evaluation Regarding Early Breastfeeding Promotion

A systematic literature review was undertaken based on specific criteria of search through peer-reviewed scientific journals in the area of public health, nutrition, and human and social sciences. The search was carried out on the electronic databases listed below:

PubMed (MEDLINE)

Paris Descartes University search engine including CAIRN, JSTOR

Cochrane Review

The following scientific journals were selected to search articles that matched the established criteria for the review:

International Journal of Breastfeeding

Journal of Nutrition Education and Behavior

International Journal of Gynecology and Obstetrics

Journal of Obstetric, Gynecologic, and Neonatal Nursing

Given the scarcity of the research subject, the definition of each key factor for the research was broadened to encompass a significant number of eligible studies to make this systematic review as comprehensive as possible. The selection criteria were set up as follows:

Publication date: After 1980

Study design: Randomized controlled trials (RCT), other prospective studies such as cohort, socio-anthropological, and retrospective cross-sectional studies were also included.

Study population: Pregnant women and mothers during the postnatal period within 12 months of delivery were included.

Geographical area: Sub-Saharan Africa

Keywords: Breastfeeding, Determinants, Vulnerability, Neonatal care, Health behavior

Studies were selected for review if they met, in addition to the above criteria, the following elements:

- The study design: In addition to randomized controlled trials (RCT), cross-sectional studies undertaken before and after intervention and experimental studies, retrospective or prospective, were also included.
- The area of study: All studies undertaken in other developing countries than sub-Saharan Africa were also included if the rest of criteria were met.
- The study outcome: Patterns of breastfeeding during the postpartum period following the delivery were a primary outcome. Any practices related to optimal breastfeeding such as exclusive and continued breastfeeding until 24 months of life were secondary outcomes and also included if the initiation of breastfeeding was addressed in the same study.
- The type of interventions: Clear description of intervention promoting breastfeeding as a part of the integrated neonatal, infant, and child healthcare; behavior change communication or community-based approaches to breastfeeding promotion; and type of interventions promoting neonatal, infant, and child healthcare.

Chapter 4

What Determined How Soon Mothers Put Their Child to the Breast After Birth in Niger



Although demographic studies have already addressed infant feeding in sub-Saharan Africa as one of the most important research areas (Jones et al. 2009), few investigations apply multidisciplinary approaches to examine health behavior by looking at socio-economic, cultural, and environmental factors. Recently, individual behaviors including breastfeeding have been globally recognized as measurement indicators for health outcomes of populations (Caldwell et al. 1988). Analysis of social determinants became an important subject in demographic research given their significant effects on health behavioral outcome (Horii et al. 2017).

This chapter analyzes a household survey dataset covering all Niger to understand the trends of mothers' characteristics and risk factors for delayed initiation of breastfeeding after birth based on the 2012 Demographic Health Survey (hereinafter referred to as DHS). After thorough description of socio-economic and demographic status of mothers, based on a selected set of indicators determining socio-economic status of mothers, chi-squared tests and multivariate logistic regression were performed to measure the influence of each variable likely to alter the timing of initiating breastfeeding. The findings of the 2006 Niger DHS were compared to the 2012 DHS dataset (Institut National de la Statistique 2007; Institut National de la Statistique (INS) and ICF International 2013) to track the change over time looking at the same set of determinants of early initiation of breastfeeding.

This analysis provides an overall picture of multidisciplinary dimensions of individual, household, and community health, socio-demographic, and economic assets of mothers having children below 5 years old. It further analyzes how mothers willing to start breastfeeding immediately after delivery were affected by these dimensions. The categories of explanatory variables included socio-economic status as a measurement of vulnerability, health-seeking behavior, hygiene and sanitation, and accessibility to healthcare services (Illustration 2.1 Conceptual framework of determinants of early initiation of breastfeeding after birth).

4.1 Who Put Their Baby to the Breast Early After Birth?: Descriptive Analysis of the 2012 Niger Demographic and Health Survey

4.1.1 Geographic Dimension of the Residential Areas

In Niger, the majority of populations lived in rural areas (77%, Table 4.1). Breakdown per region highlighted that the distribution of residential zones was not homogeneous as shown by a statistically significant difference ($p < 0.001$). Apart from Niamey, a 100% urban capital city, and Agadez where more than two-thirds were urban populations, most regions were predominantly rural. In most regions, the proportion of rural areas exceeded 80%. Dosso and Tillabéri were the most predominantly rural areas covering 90%.

4.1.2 Characteristics of Mothers According to Key Indicators Related to Early Breastfeeding

Based on the findings of the previous studies on determinants of early initiation of breastfeeding, it was possible to preselect indicators potentially related to early initiation of breastfeeding (see Sect. 2.5.2 “Definition of Independent Variables”). Using the 2012 Niger DHS dataset, this section examined different types of indicators including but not limited to socio-economic, health-seeking behavior and environmental health such as hygiene and sanitation. Table 4.2 shows stratified analysis of socio-demographic and economic status of mothers of children under 24 months in Niger by place of residence: urban and rural areas. Overall population was marked by socio-economic vulnerability across the country.

Table 4.1 Geographic distribution of residence of mothers interviewed in Niger (2012) ($n = 4616$)

Variables		<i>n</i>	%	Type of residential zone				<i>p</i> -value
				Urban		Rural		
				<i>n</i>	%	<i>n</i>	%	
Type of residential zone	Urban	1058	22.9	–	–	–	–	–
	rural	3558	77.1	–	–	–	–	–
Region	Niamey	382	8.3	382	100.0	0	0.0	<0.001
	Agadez	229	5.0	151	65.9	78	34.1	
	Diffa	322	7.0	65	20.2	257	79.8	
	Dosso	647	14.0	65	10.1	582	90.0	
	Maradi	960	20.8	137	14.3	823	85.7	
	Zinder	718	15.6	118	16.4	600	83.6	
	Tillabéri	577	12.5	33	5.7	544	94.3	
	Thaoua	781	16.9	107	13.7	674	86.3	

Source: 2012 Niger Demographic and Health Survey

Table 4.2 Characteristics of mothers of children under 24 months in Niger stratified by residence (2012) ($n = 4616$)

Variables		Urban		Rural		Niger (all)		<i>p</i> -value
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
<i>Socio-economic and demographic status of mothers</i>								
Age of interviewed mothers	15–20	141	13.3	621	17.5	762	16.5	<0.01
	21–34	719	68.0	2263	63.6	2982	64.6	
	35–49	198	18.7	674	18.9	872	18.9	
Educational attainment	No education	595	56.3	3182	89.6	3777	820	<0.001
	Primary	225	21.3	288	8.1	513	11.1	
	Secondary+higher	236	22.3	83	2.3	319	6.9	
Number of under-5 children in household	0–2	728	68.8	2007	56.4	2735	59.3	<0.001
	3–5	314	29.7	1434	40.3	1748	37.9	
	6 and more	16	1.5	117	3.3	133	2.9	
Marital status	Monogamous union	735	74.2	2285	65.3	3020	65.4	<0.001
	Polygynous union	235	25.8	1214	34.7	1469	31.8	
Relationship to household head	Head of HH	39	3.7	313	8.8	352	7.6	<0.001
	Wife	894	84.5	2953	8.0	3847	83.3	
	Other relative	125	11.0	292	8.2	417	9.0	
Literacy	Cannot read at all	685	65.0	3344	94.5	4029	87.7	<0.001
	Can read part or whole sentences	369	35.0	194	5.5	563	123	
Occupation	Household work	691	65.6	2710	76.3	3401	73.8	<0.001
	Service, sale	315	29.9	613	17.3	928	20.1	
	Agriculture	3	0.3	145	4.1	148	3.2	
	Skilled manual work	45	4.27	85	2.4	130	2.8	
Wealth index	Poorest/poorer	4	0.4	1635	46.0	1639	35.5	<0.001
	Middle	10	1.0	848	23.8	858	18.6	
	Richest/richer	1044	98.7	1075	30.2	2119	45.9	
Frequency of listening to radio	Not at all	288	27.3	1453	40.9	1741	37.8	<0.001
	< once a week	256	24.2	1021	28.7	1277	27.7	
	At least once a week	512	48.5	1079	30.4	1591	34.5	
Body mass index	<18.5 (underweight)	32	6.7	209	12.6	241	11.3	<0.001
	18.5–30.0	381	80.2	1430	86.0	1811	84.7	
	>30.0 (obesity)	62	13.1	24	1.4	86	4.0	
<i>Health-seeking behavior</i>								
Person who usually decides on mother's health care	Mother alone	56	5.6	85	2.4	141	3.3	<0.001
	Mother and her husband	208	20.9	610	17.4	818	18.7	
	Husband alone or other	731	73.5	2813	80.2	3544	78.7	
Number of antenatal visits	Never	25	2.5	559	16.1	584	13.0	<0.001
	1–3 times	521	51.3	1876	54.1	2397	53.5	
	>4 times	469	46.2	1031	29.8	1500	33.5	

(continued)

Table 4.2 (continued)

Variables		Urban		Rural		Niger (all)		p-value
		n	%	n	%	n	%	
Types of personnel at antenatal care	Doctors	28	2.8	24	0.8	52	1.3	<0.001
	Nurses/midwives	965	97.0	2785	95.7	3750	96.1	
	CHW/TBA ^a	2	0.2	100	3.4	102	2.6	
Place of delivery	Home	141	13.4	2633	74.5	2774	60.4	<0.001
	Hospital	339	32.1	44	1.2	383	8.3	
	Health center	576	54.6	859	24.3	1435	31.3	
Types of personnel who assisted delivery	No one	34	3.2	553	15.7	587	12.8	<0.001
	Doctor/nurse/midwife	924	87.9	915	25.9	1839	40.1	
	TBA	42	4.0	1143	32.3	1185	25.9	
	Friends, neighbors	51	4.9	923	26.1	974	21.2	
Washing hands with soap	Yes	796	75.8	1496	42.4	2292	50.1	<0.001
	No	254	24.2	2030	57.6	2284	49.9	
Mothers slept under mosquito bed nets	Yes	504	47.6	889	25.0	1393	30.2	<0.001
	No	554	52.4	2669	75.0	3223	69.8	
Visits to HC during last 12 months	Yes	726	68.6	2287	64.4	3013	65.3	0.01
	No	332	31.4	1266	35.6	1598	34.7	
Environmental health								
Source of drinking water	Pipe or public tap	995	94.9	668	18.9	1663	36.2	<0.001
	(Un)protected well	53	5.1	2783	78.5	2836	61.8	
	Surface (spring, river) water	1	0.1	93	2.6	94	2.1	
Type of toilet facility	Ventilated or flush	275	26.2	41	1.2	316	6.9	<0.001
	Traditional latrine	657	62.6	520	14.7	1177	25.6	
	No facility	117	11.2	2981	84.2	3098	67.5	
Time to get to water source	On premises	581	57.2	114	3.3	695	15.4	<0.001
	<30 min	349	34.4	2037	58.3	2386	52.9	
	>30 min	85	8.4	1343	38.4	1428	31.7	
Distance to health facility	Big problem	314	29.8	1681	47.3	1995	43.3	<0.001
	Not a big problem	741	70.2	1871	52.7	2612	56.7	
Types of personnel at antenatal care	Doctors	28	2.8	24	0.8	52	1.3	<0.001
	Nurses/midwives	965	97.0	2785	95.7	3750	96.1	
	CHW/TBA ^a	2	0.2	100	3.4	102	2.6	
Place of delivery	Home	141	13.35	2633	74.46	2774	60.41	<0.001
	Hospital	339	32.1	44	1.24	383	8.34	
	Health center	576	54.55	859	24.29	1435	31.25	
Types of personnel vtfio-assisted delivery	No one	34	3.24	553	15.65	587	12.8	<0.001
	Doctor/nurse/midwife	924	87.92	915	25.89	1839	40.11	
	TBA	42	4.0	1143	32.34	1185	25.85	
	Friends, neighbors	51	4.85	923	26.12	974	21.24	
Visits to HC during last 12 months	Yes	726	68.62	2287	64.37	3013	65.34	0.01
	No	332	31.38	1266	35.63	1598	34.66	

(continued)

Table 4.2 (continued)

Variables		Urban		Rural		Niqer (all)		p-value
		n	%	n	%	n	%	
<i>Environmental health</i>								
Source of drinking water	Pipe or public tap	995	94.85	668	18.85	1663	36.2	<0.001
	(Un)protected well	53	5.05	2783	78.53	2836	61.75	
	Surface (spring, river) water	1	0.1	93	2.62	94	2.05	
Type of toilet facility	Ventilated or flush	275	26.22	41	1.16	316	6.88	<0.001
	Traditional latrine	657	62.63	520	14.68	1177	25.64	
	No facility	117	11.15	2981	84.16	3098	67.48	
Time to get to water source	On premises	581	57.24	114	3.26	695	15.41	<0.001
	<30 min	349	34.38	2037	58.3	2386	52.92	
	>30 min	85	8.37	1343	38.44	1428	31.67	
Distance to health facility	Big problem	314	29.76	1681	47.33	1995	43.3	<0.001
	Not a big problem	741	70.24	1871	52.67	2612	56.7	

Source: 2012 Niger Demographic and Health Survey
N.A.: ^aCommunity health workers or traditional birth attendants

4.1.2.1 Socio-economic and Demographic Status of Mothers

More than one third of the population lived below the poverty level identified as poorer or the poorest according to the wealth index ($n = 1639$, 36%). The majority of mothers have never been to school ($n = 3777$, 82%) and did household work with no direct income as their main activity ($n = 3401$, 74%). There exists clear discrepancy between urban and rural populations: Most rural mothers have never been to school (90%) compared to those living in urban areas (56%). The frequency of being married in *polygynous union* was higher among rural mothers (35%) than that of urban area (26%). Three out of four mothers did *household work* (76%) without direct income. This indicator is often used as a proxy indicator to measure income poverty level in demographic analysis. Nearly half of mothers were categorized in the poorest or poorer groups of the population (46%) in rural areas compared to 0.4% in urban areas. Many rural mothers had no access to modern communication tools such as radio (41%). The proportion of underweight among rural mothers, measured as *body mass index (BMI) below 18.5*, was twice more than that in urban areas (13% vs. 7%).

We further examined income levels by *type of occupation* (Table 4.3). Farmers marked the highest proportion of the poorest (42%) followed by household mothers without direct income (39%). The highest proportion of richest populations was found in service and sales, far better-off than the rest of the occupational categories. Farmers had the lowest share of the richest wealth index (22%), whereas the likelihood of being in the richest category was twice more among those doing household work (42%). As mentioned earlier, household work generating no direct income

Table 4.3 Vulnerability according to type of occupation of mothers having children under 24 months in Niger

Variables		Types of occupation										p-value
		Household work		Service/sales		Agriculture		Skilled manual work				
		n	%	n	%	n	%	n	%			
Wealth index	Poorest/poorer	1 322	38,9	201	21,7	62	41,9	51	39,2	<0,001		
	Middle	647	19,0	139	15,0	53	35,8	18	13,9			
	Richest/richer	1 432	42,1	588	63,4	33	22,3	61	46,9			
Body mass index	<18.5 (underweight)	194	11,9	41	10,5	2	3,3	4	7,27	<0,001		
	18.5–25.0	1 142	70,2	245	62,7	45	73,8	32	58,2			
	>25.0 (overweight)	291	17,9	105	26,9	14	23,0	19	34,6			

Source: 2012 Niger Demographic and Health Survey

was used as a proxy indicator of income poverty to define the threshold of socio-economic vulnerability of mothers (see Table 4.3 Set of indicators assessing vulnerability of mothers of children less than 24 months in Niger). This conflicting result, revealing that farmers could be poorer than mothers doing household work, implied that having no direct income did not necessarily mean that mothers were of the poorest income level based on the total resources owned by the entire household mothers belong to. However, the 2012 DHS did not investigate distribution of income and natural resources between the household members to question mothers' equal access to available resources, whereas the post-intervention survey did (see Chap. 5). The implication of mothers in decision-making about the use of household resources was an important factor to measure mothers' autonomy. Having no direct income meant a lot as it could restrict mothers' ownership of resource management for household expenses. As a matter of fact, the percentage of underweight mothers measured by *below 18.5 BMI* among those doing *household work* was the highest (12%) compared to other types of occupation such as *agriculture* (3%). Unfortunately the DHS did not include any of these socio-economic indicators to investigate household budget distribution and the degree of mothers' empowerment (see Chap. 5 for further analysis of household socio-economic disparity and mothers' vulnerability using the database of the 2011 post-intervention survey).

We further examined *type of occupation* stratified by region and over time to see if there was change between 2006 and 2012 (Table 4.4). *Household work* was defined as “not working” in the initial data files of both the 2006 and 2012 Niger DHS. The subsets of the datasets including four regions, Maradi, Zinder, Tillabéry, and Tahoua, were extracted from the original data files. First, the share of *household work* had drastically increased since 2006 as shown by a significant gap over time. In Maradi, the percentage of mothers doing household work increased by 29% between 2012 and 2006 (71% vs. 43%). It was unlikely that socio-economic status of mothers has evolved in 5 years to that extent. Second, the 2012 DHS seemed to overestimate the share of household work as a socio-economic activity in the four regions, predominantly rural. Besides, the share of *agriculture* in Maradi dropped

Table 4.4 Comparison of household work according to the 2006 DHS and 2012 DHS in Maradi, Zinder, Tillabéry, and Thauoua

Type of occupation	2006 DHS <i>n</i> (%)				2012 DHS <i>n</i> (%)			
	Maradi	Zinder	Tillabéry	Tahoua	Maradi	Zinder	Tillabéry	Tahoua
Agriculture	138 (26.2)	65 (16.5)	79 (16.0)	38 (6.4)	21 (2.2)	29 (4.0)	41 (7.1)	25 (3.2)
Sales/services	151 (28.7)	91 (23.2)	44 (8.9)	45 (7.6)	244 (25.5)	174 (24.2)	89 (15.4)	76 (9.8)
Household work	227 (43.2)	217 (55.1)	311 (63.1)	465 (78.6)	684 (71.4)	507 (70.6)	430 (74.5)	661 (84.9)
Skilled manual work	10 (1.9)	20 (5.1)	59 (12.0)	44 (7.4)	9 (0.9)	8 (1.1)	17 (3.0)	17 (2.2)

Source: 2006 and 2012 Niger Demographic and Health Surveys

by 24% between 2006 and 2012 (26% vs. 2%). We should therefore interpret the findings of household work in the 2012 DHS dataset with caution.

4.1.2.2 Health-Seeking Behavior

Based on strong linkages between health-seeking behavior and breastfeeding shown by previous studies, we carefully examined patterns of health service-oriented and home-based care-related variables. Most mothers in Niger had no autonomy to *decide their own healthcare in their family* and reported that *husband and other family members decided their healthcare* excluding mothers themselves (79%, Table 4.2). Implication of rural mothers in decision-making significantly decreased compared to urban areas (19.8% vs. 26.5%). Two out of three mothers failed to do *more than four antenatal care (ANC) visits* in 2012, whereas pregnant women were encouraged to have at least eight contacts with a health provider during the pregnancy (World Health Organization 2016). ANC showed a clear geographical disparity: urban mothers did ANC more frequently (more than four times) than those in rural areas (46% vs. 30%), and many rural mothers never went to ANC compared to those living in a city (16% vs. 3%). While midwives and nurses provided the majority of mothers with ANC (96%), very few consulted community health workers (CHW) or traditional birth attendants (TBA). Most mothers visiting CHW or TBA during the perinatal period were in rural areas (3.4% vs. 0.2% in urban areas). The classification of these categories including non-health and untrained persons such as community health workers and TBA should not be included if applying strict meaning of what ANC stands for (see Sect. 5.1.2 “Definition of Antenatal Care”).

Regarding *Place of delivery*, more than half of mothers delivered at home (60%) in all of Niger. This trend has been reversed in urban areas where the majority delivered at health facilities (86.7%), whereas home delivery was the most common method of delivery among rural mothers (75%). Forty percent of deliveries were assisted by qualified birth attendants in Niger, yet there were increasing trends of deliveries attended by TBA in rural areas compared to urban areas (32% vs. 4%). One third of mothers (35%) have never been to health facilities in the last 12 months in all of Niger.

4.1.2.3 Environmental Health

Many mothers declared to have no access to health, hygiene, and sanitation infrastructure in Niger. Overall, more than half of mothers got water from a well, protected or unprotected (62%). Use of surface water was used as an indicator of measurement to assess the level of vulnerability of the study populations (see Sect. 2.5.3 “Definition of Socio-economic Vulnerability”). They represented 2.1% in all of Niger. Only one-fifth of rural mothers had access to *pipe or public tap water*, whereas the majority used tap water in urban sites (19% vs. 95%). Two-thirds of mothers had *no toilet facility* (68%) in the country. Sanitation conditions in rural areas have been clearly aggravated as shown by a high proportion of mothers with *no toilet facility*

(84%) as opposed to the majority of urban populations who used a toilet regardless of the type of facility (89%). *Time to get to a water source* showed geographically significant difference: urban populations used running water at home (57%), whereas most rural mothers sought water outside their home, one-third of whom reached the first water point after 30 min of walking distance (38%). Half of rural mothers reported having encountered serious problems in reaching the nearest health facility compared to urban areas (47% vs. 30%). The figures distinguished rural mothers prone to a deteriorated hygiene environment short of safe drinking water.

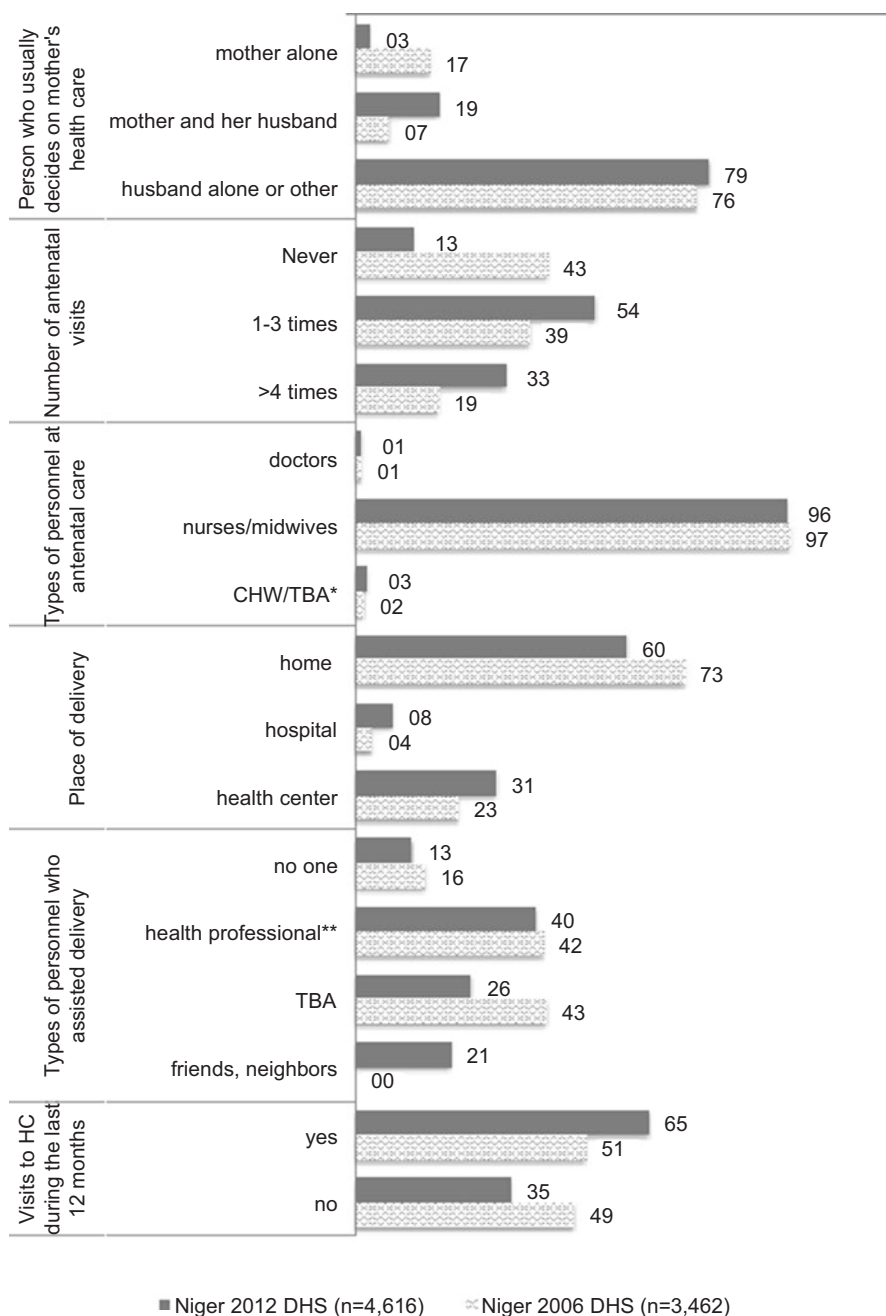
4.1.3 *Change in Terms of Mothers' Health-Seeking Behavior over Time*

We now investigate to which extent the identified characteristics of mothers, more specifically health-seeking behavior of mothers, have evolved over time during the period between 2006 and 2012. Socio-economic status of mothers and environmental health were excluded from this comparative analysis.

Discussion with mothers' husband about mother's healthcare more than doubled from 7% to 19% between 2006 and 2012. Support from their husband and their child's grandmother, mother's implication in decision-making about their own healthcare showed an increasing trend overtime. The number of antenatal care (ANC) visits also recorded significant change: *more than 4 ANC* increased from 19% to 34% in 2012. A chi-squared test indicated that mother's decision about their own healthcare was strongly correlated with ANC: those who decided what to do alone about their health were more likely to do ANC ($n = 53$, 38%) even further more with the consent of their husband ($n = 317$, 40%) compared to when they were totally dependent on their husband's decision ($n = 1098$, 32%, $p < 0.001$). Mothers' exclusion from decision-making on their healthcare hindered ANC during pregnancy.

There was an upward trend of delivery in a health facility during this period, and delivery at home dropped from 73% to 60% between 2006 and 2012. Hospital birth doubled from 4% to 8% and health centers became a main birthplace for one third of mothers in 2012 (31%). The decline of *delivery assisted by traditional birth attendants* from 43% to 26% implied that family- and community-based care was being replaced by hospital-based healthcare services. However, for the majority of rural mothers, delivery at home remained the most common method (74.5%, see Table 4.2).

There was inconsistency in the definition of the variable *types of personnel who assisted delivery* between the two surveys the 2006 and 2012 Niger DHS, which made the interpretation of the findings difficult. A new category of *friends and neighbors* was integrated in 2012, whereas the 2006 survey did not include it to answer the question who were present to assist mothers' delivery. Those who have been to a health facility at least once increased slightly from 51% to 65%. Yet, the purpose of the visit to seek health care remained unclear (Graph 4.1).



Graph 4.1 Health-seeking behavior of mothers having children less than 24 months in Niger in 2006 and 2012 (%). *N.B.:**Community health workers or traditional birth attendants, **doctors, nurses, or midwives

4.2 What Determined the Timing to Initiate Breastfeeding After Birth

4.2.1 *Bivariate Analysis of Selected Explanatory Variables*

Social determinants of postpartum breastfeeding have been a center of discussions in many research works. This section explores the identified characteristics of mothers in Niger in relation to early breastfeeding and identifies what could potentially encourage mothers to put their child to the breast immediately or incline them to delay the timing of initiating breastfeeding after birth.

4.2.1.1 Socio-economic and Demographic Status of Mothers

Two socio-economic and demographic indicators identified mothers who were at high risk of delayed initiation of breastfeeding: they were mothers who have never been to school and with no school education (55% vs. 74% among those who attained secondary education level, $p < 0.001$) and who were the poorest according to the wealth quintile compared to the richest (49.7% vs. 67%, $p < 0.001$). These two indicators showed a clear distinction between what could be protective and risk factors with highly significant statistical associations. With regard to type of occupation, service or sales persons with regular working hours and stable income mitigated the risk of delayed initiation of breastfeeding, whereas farmers with variable income and heavy workload assigned to women sometimes even during the pregnancy were less likely to adopt new practice, e.g., early breastfeeding (63% vs. 48%, $p < 0.001$). Based on the field experience, volunteers or extension workers supported by the program of child healthcare promotion have the most difficulties to reach them as they hardly stay home. As shown earlier in a bivariate analysis to explore socio-economic vulnerability by types of occupation (Table 4.3), agriculture and skilled manual work recorded the highest share of the poorest or poorer (42%, 39%, respectively).

Parity, defined as the number of deliveries, known to be associated with early initiation of breastfeeding in previous studies, showed conflicting findings. Some studies reported a positive effect of being multipara having already delivered more than once, and others concluded that multipara increased the risk of delayed initiation of breastfeeding (see Sect. 3.2). The statistical findings here revealed that there was no significant association between early breastfeeding and parity ($p = 0.2$). Having many young children seemed to hinder early breastfeeding: mothers who looked after less than two children below 5 years old were the most likely to initiate breastfeeding within the 1st hour of birth (60%, $p < 0.001$) (Table 4.5).

Being married in monogamous unions were positively associated with early breastfeeding (58%, $p = 0.03$). What relation mothers had vis-à-vis the household

Table 4.5 Determinants of early initiation of breastfeeding in Niger (2012) (*n* = 4616)

Variables		Initiation of breastfeeding within 1H of birth (chi2)		
		<i>n</i>	%	p-value
Educational attainment	No education	2013	55.0	<0.001
	Primary	316	64.4	
	Secondary+higher	230	74.0	
Parity	Primipara	1 033	58.4	0.2
	Multipara	1 525	56.6	
Number of under-5 children in household	0–2	1 606	59.8	<0.001
	3–5	897	54.0	
	6 and more	60	48.4	
Marital status	Monogamous union	1 706	58.2	0.03
	Polygynous union	776	54.7	
Relation to household head	Head of HH	207	60.9	<0.01
	Wife	2 156	57.8	
	Other relative (daughter, etc.)	200	49.8	
Occupation	Household work	1 857	56.5	<0.01
	Service, sales	569	62.8	
	Agriculture	69	48.3	
	Skilled manual work	63	50.0	
Wealth index	Poorest/poorer	787	49.7	<0.001
	Middle	402	47.7	
	Richest/richer	1 374	67.3	
Person who usually decides on mother's health care	Mother alone	81	60.0	<0.001
	Mother and her husband	550	69.1	
	Husband alone or other	1 856	54.1	
Number of antenatal visits	Never	266	45.9	<0.001
	1–3 times	1 329	55.8	
	>4 times	955	64.1	
Types or personnel at antenatal care	Doctors	33	60.0	0.09
	Nurses/midwives	2 206	59.2	
	CHW/TBA ^a	50	49.5	
Place of delivery	Home	1 263	47.1	<0.001
	Hospital	264	71.9	
	Health center	1 024	73.7	
Types of personnel who assisted delivery	No one	240	42.3	<0.001
	Doctor/nurse/midwife	1 306	73.5	
	Traditional birth attendant	609	53.0	
	Friends, neighbors	398	41.7	

(continued)

Table 4.5 (continued)

Variables		Initiation of breastfeeding within 1H of birth (chi2)		
		<i>n</i>	%	p-value
Source of drinking water	Pipe or public tap	1 068	66.8	<0.001
	(Un)protected well	1 440	52.2	
	Surface (spring, river) water	45	50.6	
Type of toilet facility	Ventilated or flush	229	75.8	<0.001
	Traditional latrine	781	68.9	
	No facility	1 545	51.3	
Time to get to water source	On premises	501	75.3	<0.001
	<30 min	1 328	57.4	
	>30 min	677	48.7	

Source: 2012 Niger Demographic and Health Survey

N.B.:^aCHW community health worker, TBA traditional birth attendant

head showed significant influence. Being a relative member in a household was a clear disadvantage hindering early breastfeeding unlike those having the status of wife (49% vs. 58%, <0.001).

4.2.1.2 Health-Seeking Behavior for Preventive and Curative Neonatal and Infant Healthcare

When mothers were excluded from decision-making about their own healthcare and such decisions were made by their husband alone, early initiation of breastfeeding was impaired compared to those involved in decision-making (54% vs. 69%). The frequency of ANC visits was strongly correlated with likelihood of early breastfeeding. More than four ANC visits positively influenced early initiation of breastfeeding compared to no ANC at all during the pregnancy (64% vs. 46%, $p < 0.001$). Delivery assisted by health professionals and delivery at health center appeared to be major protective factors (73.5%, 73.7%, $p < 0.001$, respectively). As opposed to the positive effects of home delivery on early initiation of breastfeeding shown by other studies (N. Horii, Guyon, and Quinn 2011), delivering at home inhibited early breastfeeding most significantly compared to delivery at health center (47% vs. 73%, $p < 0.001$). Likewise intervention of neighbors or friends during delivery negatively influenced early breastfeeding compared to trained health professionals (42% vs. 74%, $p < 0.001$). In short, major protective factors were mothers' involvement in decision about their healthcare in agreement with their husband, more than 4 ANC visits during pregnancy and health center delivery assisted by health professionals. Besides, the implication of traditional health attendants (TBA) in delivery did not seem to be incompatible with early breastfeeding promotion.

4.2.1.3 Environmental Health

All cited environmental health indicators were significantly related to early initiation of breastfeeding (Table 4.3). Early breastfeeding became a common practice for mothers using safe drinking water from pipe or public tap compared to those using untreated spring or river water (67% vs. 51%, $p < 0.001$). Access to toilet facilities regardless of types, e.g., ventilated, flush toilets or traditional latrines, increased early breastfeeding significantly (76% and 69%, respectively) compared to open defecation (51%, $p < 0.001$). *Access to drinking water at home* was likely to be positively associated with early breastfeeding, whereas a water access point beyond a 30-min walk contributed to delaying initiation of breastfeeding (75% vs. 49%, $p < 0.001$). It probably seems odd to explore causal paths between early breastfeeding and the above hygiene and sanitation practices. To illustrate this point, socio-cultural contexts of Niger could provide further insights to better understand why mothers living in a more hygiene and sanitation friendly environment were more likely to practice early breastfeeding (see Chap. 5, Sect. 5.2.2).

4.2.2 *Influence of Socio-economic Disparity on the Associations Between Identified Risk or Protective Factors and Early Initiation of Breastfeeding*

This section seeks to understand what change the above-identified determinants of early breastfeeding could further bring if mothers were deprived from essential resources, basic healthcare, and social services. Multivariate analysis was aimed at identifying what altered the timing of initiating breastfeeding when controlling the confounding effects of socio-economic status of mothers. This was the core of this book aimed at exploring plausible effects of different factors with a particular focus on vulnerability of mothers, leading toward or against practicing initiation of breastfeeding within 1 h of birth. The outcome of this analysis would be a reference to interpret the program survey dataset to give a clue to the best possible way to design and implement promotion of child healthcare and early breastfeeding among the most vulnerable group of populations.

Prior to the multivariate analysis, it was important to establish a set of indicators to define the threshold of socio-economic vulnerability based on the findings of systematic literature review and identified determinants of early breastfeeding in bivariate analysis (Table 4.6). Multivariate logistic regression was performed by taking into account these socio-economic and demographic variables which were highly likely to confound the statistical finding of determinants analysis of early initiation of breastfeeding. Only variables significantly associated with early initiation of breastfeeding were eligible to be included in the multivariate analysis. In addition, current age of the interviewed mothers and place of residence were also included in each analysis systematically. Based on the bivariate analysis in the

Table 4.6 Eligibility of preselected confounding variables for the multivariate analysis according to the 2012 Niger DHS

Variables	Categories	Chi-squared tests with early breastfeeding	Inclusion for multivariate analysis
<i>Socio-demographic status</i>			
Educational attainment	No school education	Highly significant ($p < 0.001$)	Included
Number of under-5 children in household	5 children or more	Highly significant ($p < 0.001$)	Included
<i>Socio-economic status</i>			
Occupation	Household work (with no direct income)	Highly significant Household work not the greatest risk	Included ^a
Wealth index	Poorest or poorer	Highly significant ($p < 0.001$)	
Access to media (radio)	Never listened to radio	Not significant ($p = 0.2$)	Excluded
Body mass index (BMI)	<18.5	Not significant ($p = 0.1$)	Excluded
<i>Environmental health</i>			
Source of drinking water	Surface water	Highly significant ($p < 0.001$)	Included ^b
Type of toilet	No facility	Highly significant ($p < 0.001$)	Included
Distance to health facility	Having reported as big problems	Not significant ($p = 0.7$)	Excluded

N.B.: ^aHousehold work was included for multivariate analysis given the fact that type of occupation is an important socio-economic indicator associated with early breastfeeding despite inconsistent findings (see Table 4.3)

N.B.: ^bSource of drinking water was not associated with socio-economic status of mothers according to the 2011 post-intervention survey (see Chap. 5). However, given the importance of this environmental health indicator, all multivariate analyses integrated it as a confounder influencing the impact of other explanatory variables on postpartum breastfeeding

previous section, all variables significantly associated with early initiation of breastfeeding—socio-demographic and economic status, health-seeking behavior, and environmental health—were included in this determinant analysis adjusted for the following confounding variables (Table 4.6).

The multivariate analysis to examine the determinants of early breastfeeding generated outcomes different from bivariate analysis. Educational attainment, marital status, and type of occupation of mothers were no longer associated with how soon mothers put their child to the breast after having been adjusted for socio-economic status of mothers (Table 4.7). For example, there was no difference between mothers educated until the secondary level and those who have never been to school. This result implied that if mothers who received school education were

Table 4.7 Multivariate logistic regression of early initiation of breastfeeding adjusted for socio-economic status of mothers ($n = 4616$)

Variables		Initiation of breastfeeding within 1H of birth (OR)	95% CI	<i>p</i> -value
Educational attainment	No education	1	—	—
	Primary	1.12	0.91–1.39	0.27
	Secondary+higher	1.20	0.90–1.61	0.21
Number of under-5 children in household	0–2	1	—	—
	3–5	0.83	0.73–0.94	<0.01
	6 and more	0.69	0.48–1.12	0.05
Marital status	Monogamous union	1	—	—
	Polygynous union	0.96	0.83–1.12	0.62
Relation to household head	Head of HH	1	—	—
	Wife	0.76	0.60–0.96	0.02
	Other relative members	0.55	0.40–0.76	<0.001
Occupation	Household work	1	—	—
	Service, sale	1.05	0.89–1.23	0.55
	Agriculture	0.88	0.63–1.24	0.27
	Skilled manual work	0.63	0.44–0.92	0.02
Person who usually decides on mother's health care	Mother alone	1	—	—
	Mother and her husband	1.76	1.19–2.62	<0.01
	Husband alone or other	0.96	0.66–1.39	0.83
Number of antenatal care visits	Never	1	—	—
	1–3 times	1.25	1.03–1.51	0.02
	>4 times	1.58	1.29–1.94	<0.001
Types of personnel at antenatal care	Doctors	1	—	—
	Nurses/midwives	1.02	0.54–1.92	0.96
	CHW/TBA ^a	0.95	0.45–2.00	0.89
Place of delivery	Home	1	—	—
	Hospital	1.50	1.11–2.03	<0.01
	Health center	2.53	2.16–2.96	<0.001
Types of personnel who assisted delivery	No one	1	—	—
	Doctor/nurse/midwife	3.09	2.49–3.89	<0.001
	TBA	1.60	1.30–1.97	<0.001
	Friends, neighbors	1.02	0.82–1.26	0.9
Source of drinking water	Surface (spring, river) water	1	—	—
	(Un)protected well	1.09	0.71–1.67	0.7
	Pipe or public tap	0.97	0.62–1.52	0.9

(continued)

Table 4.7 (continued)

Variables		Initiation of breastfeeding within 1H of birth (OR)	95% CI	p-value
Type of toilet facility	No facility	1	–	–
	Traditional latrine	1.07	0.86–1.33	0.5
	Ventilated or flush	1.15	0.81–1.63	0.4
Time to get to water source	On premises	1	–	–
	<30 min	0.87	0.67–1.11	0.26
	>30 min	0.67	0.51–0.89	<0.01

Source: 2012 Niger Demographic and Health Survey

N.B.: The adjusted odds ratio (OR) was calculated by controlling confounding effects of the following variables: residence, age of the respondents, wealth index, number of under-5 children in household, occupation, wealth index, source of drinking water, type of toilet facility

^aCHW community health workers, TBA traditional birth attendants

more likely to practice early breastfeeding in bivariate analysis, it was because they were better-off, not because they were better educated. Many hygiene- and sanitation-related variables also lost their significance and no longer changed the timing of initiating breastfeeding except for access to a water point more than a *30-min walking distance*. This deprivation of safe drinking water increased by 33% the risk of delayed initiation of breastfeeding compared to those having pipe or tap water at home (95%CI: 0.51, 0.89).

Regardless of socio-economic status of mothers, the increasing number of under-5 children to look after at home contributed to the greater risk of delayed initiation of breastfeeding. The chance of early initiation of breastfeeding decreased by 17% when mothers had more than three children below 5 years old (95%CI: 0.7, 0.9) compared to those having less than two under-5 children. Household head, identified as a protective factor for early initiation of breastfeeding in the bivariate analysis, showed significant association. Other status such as being a relative member increased the risk of delaying the timing of breastfeeding by 45% (95%CI: 0.4, 0.8) compared to when mothers were a household head.

Decision about mothers' healthcare based on the mutual agreement with their husband remained significantly associated with early initiation of breastfeeding (AOR: 1.8, 95%CI: 1.2, 2.6) compared to when mothers made decision alone. More than four ANC visits increased by 1.6 times the chance of early breastfeeding (95%CI: 1.3, 1.9). This result suggested that ANC was effective in changing infant newborn care and feeding-related behavior among the socio-economically most vulnerable group of mothers. The place where mothers delivered and by whom the delivery seemed to determine the timing of initiating breastfeeding whether they were poor or not: health center births showed the most outstanding effect on chang-

ing the timing to put the child to the breast after birth and increased by 2.5 times the chance of early initiation of breastfeeding (95%CI: 2.2, 3.0).

Deliveries assisted by a qualified health professional (AOR, 3.1; 95%CI, 2.5, 3.9) and by traditional birth attendants (AOR, 1.6; 95%CI, 1.3, 2.0) had highly significant and positive influence on early breastfeeding compared to those who delivered alone. This suggested that qualified and nonqualified birth attendants introduced mothers to early initiation of breastfeeding. There was a potential role that TBA could play to promote appropriate newborn care and breastfeeding as an experienced advisor that many rural mothers relied on. In short, health providers and hospital-based antenatal care and delivery remained strong protective factors for early breastfeeding beyond the fact whether mothers were socio-economically vulnerable or not. This implied that health system provided extension services and care and community-oriented support to reach mothers who could not access any health facility. Community-based maternal child health promotion implemented by NGO and institutions in Niger should also have contributed to an upward trend toward more frequent ANC visits and hospital or health center births with qualified health professionals which the country pledged to promote in its national strategic action plan. Besides, previous studies showed conflicting results that the implications of health professionals in prenatal, delivery, and postnatal care was a major bottleneck hindering early initiation of breastfeeding within the first hour of birth.

The above findings of multivariate analysis revealed that regardless of the socio-economic status of mothers, a family with many young children and long distance to get to the water point were major risk factors for delayed initiation of breastfeeding. Major protective factors for early breastfeeding included support from husbands for mother's healthcare, and antenatal care and delivery support provided by health professionals and TBA.

4.2.3 What We Understand from the Determinants Analysis of Early Breastfeeding

An unusually high proportion of household work among other types of occupation in Niger questioned the credibility of the 2012 DHS dataset. The definition of questionnaire responses to this category of the variable—type of occupation—and how they were registered by the interviewers remained unclear. We presume that respondent and measurement bias led to overestimating household work as rural mothers were often involved in multiple activities in addition to household work. Another explanation was that the type of occupation did not necessarily reflect the income level of mothers. Among the richer or richest household defined by the wealth index and type of occupation generating income, it could happen that mothers were deprived of minimum diet requirement and basic healthcare due to an unequal distribution of household resources.

Not being a wife or a household head hindered early initiation of breastfeeding. Those who did not have such status were more likely to be young mothers, inclined to advice and decisions made by other elderly women more experienced in delivery

and newborn care at home. Interactions between mothers and other family members within households, measured by *decision about maternal healthcare*, indicated that exclusion of mothers from decision-making on their own healthcare was also an impediment to optimal postpartum breastfeeding. The following chapter further illustrates the implication of other family and community members in newborn feeding and care.

Better-off mothers were far more likely to initiate breastfeeding within the 1st hour of birth than the most deprived mothers. The previous research findings comparing the datasets of the Niger DHS between 2006 and 2012 indicated that the gap between better-off and vulnerable mothers in early breastfeeding has become wider in 2012: there was a sharp increase in early breastfeeding among better-off mothers against sluggish improvement if not a decline among vulnerable mothers (Horii 2015). This uneven increase implied that the communication program more likely supported the group of mothers having better-off characteristics in early breastfeeding promotion. To verify this assumption, further statistical analysis was conducted in the following chapters to measure how the community-based communication actions impacted the most vulnerable groups of mothers.

More than four antenatal care visits during pregnancy dramatically increased between 2006 and 2012 (Institut National de la Statistique 2007; Institut National de la Statistique (INS) and ICF International 2013). ANC was one of the health behavioral outcomes of the communication program for preventive prenatal care in the program pilot area. In this research, we examined it as an explanatory variable and explored its impact on early initiation of breastfeeding. Although ANC was assigned to health providers such as midwives and qualified birth attendants, the programs trained additional non-health actors, e.g., community health workers working as a program volunteer. Among these volunteers, some were qualified as midwives and supported health professionals to provide ANC at maternity. This external support should have strengthened the currently existing healthcare services. Yet, their contribution was limited to benefiting a few mothers ($n = 102$, 2.6%), far from filling in the gap of 584 mothers (13%) who were left out of the health system and therefore have never been to ANC (Table 4.2). ANC was certainly an important opportunity for the communication program to promote early breastfeeding.

According to an anthropological study, some villages with no health facility recorded a higher proportion of early initiation of breastfeeding compared to other villages where access to a health center was warranted.¹ The outcome of this analysis suggested that early breastfeeding could be more effectively promoted by non-health community workers or volunteers such as women's groups leading grandmothers and traditional birth attendants who could play a key role in promoting optimal infant feeding and child healthcare. This could allow the government

¹Laboratoire d'études et recherches sur les dynamiques sociales et le développement local (LASDEL) conducted a qualitative study commissioned by UNICEF within the framework of the participatory action research of Key Family Practices in the same regions of Niger. According to the findings of their study, time to access health facilities was no longer a critical issue for mothers adopting neonatal infant healthcare practices as promoted by program community volunteers in their villages.

health staff to delegate extensive care and support to reach out to the majority of rural mothers who delivered at home.

Unlike previous studies which identified delivery attended by health professionals as a risk factor for suboptimal postpartum breastfeeding (Temple Newhook et al. 2017), the 2012 DHS showed the opposite and qualified health providers contributed to increasing the chance of early initiation of breastfeeding. Traditional birth attendants (TBA) were in charge of the most common delivery: home birth that one third of rural mothers opted for. This highlighted the critical role and responsibility of TBA on whether or not a child was put to the breast immediately after birth for many mothers given that who was present at delivery and where it happened must have determined the timing of initial breastfeeding (Callaghan-Koru et al. 2013). Community health workers (CHW) and TBA had different backgrounds, but both were important communication channels promoting child healthcare in villages. The CHW were trained health assistants capable to provide first care and assist delivery. They were recruited after 6-month training and assigned to a health post to cover the catchment area of one or two villages. As of 2012 in Niger, there was no community healthcare strategy to standardize the criteria of recruitment and incentives for CHW. Besides TBA never received any official training and practiced without license so that they were not affiliated with the existing health system at the time of data collection of the post-intervention survey in 2010–2011. The program seeking to promote early and exclusive breastfeeding should definitely involve both CHW and TBA within the integrated package of maternal and child healthcare based on life cycle approaches.

Future action research should explore the role of community non-health actors outside the government health system to tailor blueprint of affordable, acceptable, accessible, and sustainable solutions by local populations for evidence-based actions. These actors were those with whom mothers were in close touch during the perinatal period such as TBA, grandmothers, traditional healers, other female household members, neighbors, or senior women taking part in women's groups. Unfortunately, the DHS did not provide information related to these non-health actors most likely to directly influence early breastfeeding. The following Chaps. 5 and 6 will present the findings of a case study focusing on family- and community-based behavior change communication to investigate how these non-health actors brought about a behavioral change in breastfeeding at birth.

Chapter 5

What Change in Early Breastfeeding from Family and Community Perspectives in Pilot Study Areas of Niger



We now look at a case study (post-intervention survey, hereinafter referred to as PIS) in the pilot study areas selected by UNICEF to assess the impacts of the social and behavior change communication program promoting child healthcare piloted in two regions, Maradi and Zinder, since 2008. The previous chapter identified who initiated early breastfeeding and if not why based on the 2012 Niger Demographic and Health Survey. The 2012 Niger DHS included health behavior-oriented indicators allowing us to assess the role of health service providers. Using the PIS dataset undertaken in 2010–2011, we investigated social determinants of early breastfeeding in family and community environments within the program context to give insights to other non-health actors than health professionals. The uniqueness of the PIS was that it addressed intra-family interactions, community involvement of the interviewed mothers in child healthcare, and infant feeding promotion. While addressing socio-demographic status of mothers, the PIS better reflected family- and community-based factors considered as important determinants of early breastfeeding.

Mothers made a decision about what they thought was the best for their child based on the information obtained from different communication channels: family members, stakeholders in a village, and institutions who had undeniable influences on mothers' decision and action about early initiation of breastfeeding. They included imams village chiefs, sultans' family who inherited the throne for many generations, women's groups, midwives at maternity, traditional birth attendants in a village, and financial institutions providing external support¹. Given the complexity of behavior change processes through sharing and exchanging information and

¹The author was involved in designing and facilitating district and regional participatory workshops to formulate the social and behavior change communication strategies for child health and nutrition in Niger. In the agenda of the 3-day workshops, one of the participatory tools of diagnosis for stakeholders' analysis, called "orbit of influence," was applied to identify different actors having conflicting relationships with mothers with regard to child healthcare and infant feeding. These listed actors were the outcome of this exercise.

experience about breastfeeding between mothers and these actors, the PIS could bring some insights to the roles of these resource persons mobilized by the program as they could become promoter of or opponent to early and exclusive breastfeeding within family and community settings.

5.1 Characteristics of Mothers When Exposed and Unexposed to the Program Intervention

5.1.1 Socio-economic and Demographic Indicators as Measurement of Vulnerability

One of the main objectives of this section was to describe the trends of socio-economic characteristics of mothers by exposure to the program to see whether mothers who took part in the program activities were different from those who were not included. This descriptive analysis also led us to question the equal access to social and health services provided by the program with regard to socio-economic vulnerability of mothers.

As mentioned earlier (Chap. 2 “Research Methods and Data Sources”), the eligibility of the study population of the PIS was tailored independently from the program coverage defined at the start of the social and behavior change communication program. The study population of the PIS was divided into two groups of mothers, exposed and unexposed to the program activities, which have been constituted in purposive and retrospective manners. It was critical to take into account the effect of program exposure in the determinant analysis as the degree of associations between early initiation of breastfeeding and identified explanatory variables could differ according to whether mothers were exposed or not exposed to the program (Horii et al. 2017).

The majority of mothers in the exposed group were below 35 years ($n = 527$, 80.9%), and no difference has been noted between the two groups ($p = 0.32$). It seemed mothers in the exposed group were better educated than those in the unexposed group: while more than half of the exposed group have never been to school, trends of no education increased further in the unexposed group (56% vs. 68%, $p < 0.001$). The attainment of secondary education level in the exposed group doubled compared to the unexposed group (11% vs. 5%). There were a significant number of mothers who have been to Koranic school (22%) among those who have received education in both groups. This variable was key to deciphering sociocultural factors specific to the Muslim world as a hindering factor for behavior change. Mothers in the exposed group were more likely to be in monogamous unions compared to the unexposed group (70% vs. 62%, $p = 0.01$). There was no difference in terms of the number of deliveries (parity), 90% of multipara mothers who delivered more than once included both groups (Table 5.1).

Table 5.1 Characteristics of the interviewed mothers per zone of intervention ($n = 1026$)

Variables		Exposed group		Unexposed group		p-value
		n	%	n	%	
Age	15–20	143	21.3	76	21.7	0.32
	21–34	399	59.6	194	55.4	
	35–49	128	19.1	80	22.9	
Educational attainment	No education	378	56.2	238	67.6	<0.001
	Koranic school	145	21.6	76	21.6	
	Primary	79	11.7	20	5.7	
	Secondary or+	71	10.6	18	5.1	
Marital status	Monogamous	457	70.0	209	62.2	0.01
	Polygynous	196	30.0	127	37.8	
Parity	Primipara	74	11.0	43	12.2	0.56
	Multipara	599	89.9	309	87.8	
Occupation	Household work	211	31.4	162	46.0	<0.001
	Agriculture/ livestock	339	50.5	145	41.2	
	Sales/services	122	18.2	45	12.8	
Income-generating activity		382	56.7	140	40.1	<0.001
	By foot	211	31.3	136	38.6	
Means of transport	Carriage	305	45.3	151	42.9	0.04
	Vehicle	158	23.4	65	18.5	
Listening to KFP radio program in the last 30 days		360	53.4	153	43.47	0.002
	Never	20	3.0	30	8.6	
Number of antenatal care (ANC)	1–3 times	192	28.8	83	23.8	<0.001
	>4 times	455	68.2	236	67.6	
Type of personnel at ANC	Doctor/nurse	268	41.2	146	45.8	0.18
	Midwife	382	58.8	173	54.2	
Accessed a health facility within the village		520	77.2	139	39.5	<0.001
	Piped or public tap	154	22.9	63	17.9	
Source of drinking water	Borehole	290	43.0	169	48.0	0.06
	Protected well	106	15.7	43	12.2	
	Traditional well	124	18.4	77	21.9	
	No facility	487	72.4	310	88.3	
Type of toilet facility	Traditional latrine	132	19.6	31	8.8	<0.001
	Ventilated/flush	54	8.0	10	2.9	
Healthcare expenditure of child led by mother alone		299	44.4	164	47.1	0.4

(continued)

Table 5.1 (continued)

Variables		Exposed group		Unexposed group		p-value
		n	%	n	%	
To whom asked for transport mean to reach the nearest health center	No one	129	33.2	75	35.9	0.81
	Parents	65	16.7	35	16.8	
	NGO	65	16.7	37	16.8	
	Neighbors	130	33.4	62	29.7	
	Mother alone	235	41.2	85	34.6	
Who decided harvest use	Husband	176	30.9	76	30.9	0.12
	Mutual agreement	159	27.9	85	34.6	
Discussed child healthcare with husband or child's grandmother		518	77.0	171	48.7	<0.001

The descriptive analysis distinctively showed socio-economic vulnerability of the group of mothers who were not covered by the program: with regard to *types of occupation*, mothers were more likely to be dedicated to household work without direct income in the unexposed group than the exposed group (46% vs. 31%, $p < 0.001$). Mothers in the unexposed group were less likely to get involved in income-generating activities (IGA) than the exposed group (40% vs. 57%, $p < 0.001$). The opportunity to take part in IGA implied that the mothers were supported to run a small-scale business allowing them to receive direct income, one of the key indicators to measure the empowerment of and the socio-economic vulnerability of mothers.

We further examined the association between type of occupation and IGA opportunity based on the entire study population of Niger. Only one out of four mothers doing household work as a principal activity with no direct income were involved in IGA ($n = 286$, 21%), whereas most sales workers participated in IGA ($n = 176$, 91%). Many NGOs and local associations supported women to run a small-scale business. However this result revealed that such programs rather contributed to increasing the gap between sales workers who benefited the most from external support against mothers doing household work incapacitated to seize such opportunities because they were probably deprived from the minimum requirement to meet eligibility criteria defined by IGA support. Besides, the proportion of those who have never been to antenatal care (ANC) hit the highest ($n = 90$, 6.7%). This implied that ANC did not reach out to the most vulnerable group of populations to change the timing of initiating breastfeeding after birth.

5.1.2 *Community-Based Child Healthcare Services*

Antenatal care (ANC) is defined as a screening of healthy pregnant women to detect asymptomatic diseases or complicating obstetric conditions² and to provide preventive care and treatment to mitigate the risks of maternal and newborn death caused mainly by infection, complication of preterm birth, and asphyxia. ANC is assured by qualified health professionals during the pregnancy to help mothers overcome the most critical time, which is delivery and the first week following the birth, when they are prone to the highest level of the mortality risk (The Partnership for Maternal, Newborn and Child Health 2006). Among the above three major causes hindering mother and newborn's lives, low birth weight is an underlying cause directly related to mothers' health and nutritional status which is subject to close monitoring for optimal diet and lifestyle. Given that the risk factors for maternal and neonatal death were thought to be mostly preventable by behavioral change of mothers, the program highlighted ANC as one of the most important communication channels to promote health-seeking behavior and optimal care for mothers and their child before, during, and after delivery.

The majority of mothers interviewed in the post-intervention survey (PIS) received ANC regardless of the number of visits: 80% and 70% in the exposed and unexposed groups, respectively (Table 5.2). *More than four ANC visits*, defined by WHO as the minimum threshold during pregnancy, doubled among the entire study population, exposed and unexposed to the program in Maradi and Zinder, compared to the average in the 2012 DHS in all Niger (68% vs. 34%) (Table 4.2). Besides, there was a significant discrepancy between two groups: those who never did ANC during pregnancy in the unexposed group were nearly three times as much as the exposed group (8.6% vs. 3%, <0.001). Whereas ANC was not a primary behavioral outcome in the behavior change communication program, this preliminary result implied that the program positively influenced ANC showing an increasing trend. Provided that health professionals were actively involved in promoting child health-care without excluding community non-health workers and volunteers who played the key role in the program pilot areas, for many mothers including those who delivered at home whose percentage attained 66% and 73% in Maradi and Zinder, respectively (Institut National de la Statistique (INS) and ICF International 2013), ANC became a reference point to obtain advice for better newborn care and feeding. The application of the national policy of maternal and child health of Niger to direct pregnant women toward health facilities for antenatal care and deliveries assisted by health professionals must have been optimized in the program pilot areas.

Mothers' accessibility to health, hygiene, and sanitation facilities within the household and village environment was a critical indicator in determinant analysis of early breastfeeding, while these subjects were investigated by the community survey. We merged three datasets, the individual woman's survey and the household

² Bjorn Backe et al., Antenatal care. Accessed in 2019: <http://www.nfong.org/files/guidelines/1%20NGF%20Obst%20Antenatal%20care%20Backe.pdf>

Table 5.2 Determinants of early initiation of breastfeeding in Maradi and Zinder (*n* = 1026)

Variables		Initiation of breastfeeding within the first hour of birth		
		Crude OR	95% CI	p-value
Age	15–20	1	–	–
	21–34	1.05	0.64, 1.71	0.85
	35–49	1.4	0.72, 2.85	0.31
Educational attainment	No education	1	–	–
	Koranic school	0.5	0.31, 0.81	<.01
	Primary	1.02	0.46, 2.25	0.97
	Secondary or+	1.03	0.45, 2.40	0.94
Marital status	Monogamous	1	–	–
	Polygynous	1.2	0.75, 1.89	0.5
Parity	Primipara	1	–	–
	Multipara	1.62	0.92, 2.86	0.1
	Household work	1	–	–
Occupation	Agriculture/ livestock	1.68	0.84, 3.36	0.14
	Sales/services	1.06	0.68, 1.66	0.8
Income-generating activity	No	1	–	0.88
	Yes	1.03	0.68, 1.57	
	No	1	–	–
Means of transport	Carriage	0.44	0.23, 0.84	0.01
	Vehicle	0.45	0.23, 0.88	0.02
Radio listening in the last 30 days	Not at all	1	–	0.62
	Yes	0.9	0.59, 1.37	
Number of antenatal care (ANC)	Never	1	–	–
	1–3 times	2.39	0.88, 6.46	0.09
	>4 times	2.81	1.10, 7.14	0.03
Type of personnel at ANC	Doctor/nurse	1	–	–
	Midwife	1.51	0.98, 2.32	0.06
Discussed KFP ^a during ANC visit		3.0	1.93, 4.65	<0.001
Distance to the nearest health facility	Within the village	1	–	–
	Outside the village	0.51	0.33, 0.77	<0.01
Source of drinking water	Piped or tap	1	–	–
	Borehole	1.36	0.79, 2.34	0.27
	Protected well	1.14	0.55, 2.37	0.72
	Traditional well	0.78	0.43, 1.43	0.42
Type of toilet facility	No facility	1	–	–
	Traditional latrine	7.88	2.45, 25.36	<0.01
	Ventilated/flush	3.44	1.05, 11.30	0.04
Healthcare expenditure of child led by:	Others	1	–	–
	Mother alone	2.16	1.41, 3.31	<0.001
	No one	1	–	–

(continued)

Table 5.2 (continued)

Variables		Initiation of breastfeeding within the first hour of birth		
		Crude OR	95% CI	p-value
To whom asked for transport mean to reach the nearest health center	Neighbors/friends	4.25	1.94, 9.30	<0.001
	Parents	2.07	0.92, 4.63	0.08
	Rental/NGO	1.61	0.79, 3.29	0.19
Decision for harvest use by:	Mother alone	1	–	–
	Husband alone	1.28	0.75, 2.18	0.37
	Both	3.9	1.84, 8.29	<0.001
Discussed child healthcare with family members	No	1	–	–
	Yes	2.39	1.56, 3.66	<0.001

N.B.: *Others include daughter, niece, daughter-in-law, sister-in-law, and cousin

Given the insignificant number of mothers who consulted doctors for ANC, two categories, *doctors* and *nurses*, are included in the variable. *Type of personnel at antenatal care* was merged into one to create one single category: *doctors or nurses*

survey covering the same study population and the community survey undertaken in the selected villages defined as exposed and unexposed groups. New categorical variables have been created to measure the type of health facilities and the accessibility to the nearest functioning health facility within 5 km walking distance from the village of residence. Measuring accessibility to the nearest health facility by distance allowed a more precise measurement to minimize respondent biases unlike the 2012 DHS which used mothers' perceptions.

Distance to the nearest health facility showed a gap between two groups: the chance of living within 5 km walking distance to a health center in the exposed group nearly increased by two times more than the unexposed group (77% vs. 40%). Niger was one of the first countries in West and Central Africa having endorsed the national strategy for community-based child healthcare and executes a strategic plan by recruiting community health workers (agents de santé communautaire) assigned to a health post at village level. Also the PIS selected the exposed group of mothers based on the inclusion criteria, e.g., accessing a health center inside the village. This purposive sampling of the PIS study population biased proximity to reach the first health facility in relation to the program exposure.

The majority of mothers regardless of the program exposure defecated outside without using any toilet facility. Significant difference between two groups in *toilet facility use* revealed that mothers did not live in similar sanitation environments. The proportion of *use of traditional latrines* in the exposed group was twice as much as the unexposed group (20% vs. 9%, $p < 0.001$). Mothers in the exposed group were less likely to defecate outside than the unexposed group (72% vs. 88%, $p < 0.001$). If mothers in the exposed group were better-off compared to those in the unexposed group, toilet facility use was significantly correlated with poverty. External financial support provided by UNICEF improved hygiene environments for which the impact remained sporadic, yet it may also have contributed to increas-

ing the socio-economic gaps between the exposed and the unexposed groups. The community-led total sanitation program (hereinafter referred to as CLTS³) promoted building traditional latrines at home by using locally available material without external resources positively impacts use of traditional latrines among the most deprived population at high risk of outdoor defecation.

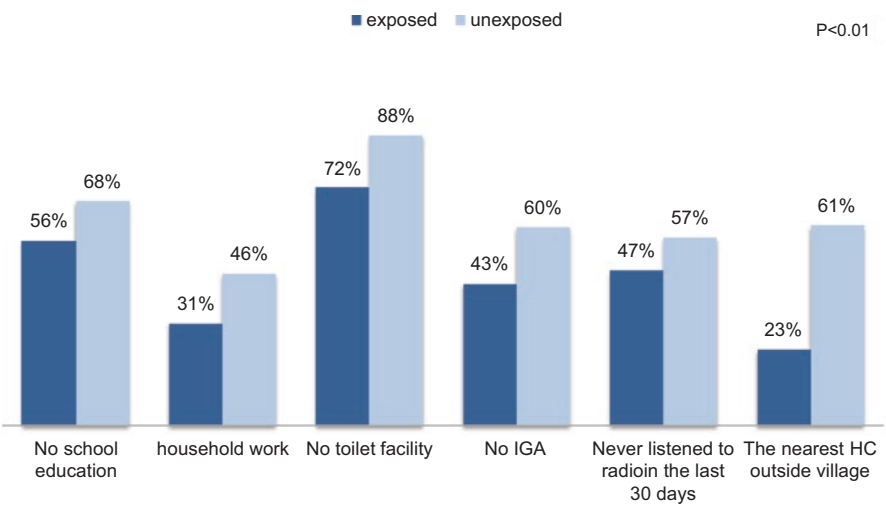
5.1.3 Support from Neighbors and Family to Child Healthcare

Social network related to child healthcare and intra-household decision-making was the cornerstone of social and behavior communication strategies aimed at mobilizing actors in family and community having a casting vote in what to do with infant feeding. Analysis of household and community assets and coping strategy was important to understand the extent to which mothers were vulnerable (Chambers 1995; Lovendal et al. 2004) and explore potential risk factors for delayed initiation of breastfeeding. The above indicators showed whether mothers made decision by themselves about how much money was to spend to look after their child when they were ill, whether mothers were helped by others to go to the health facility when needed, and whether mothers were involved in household budget. All cited indicators did not show any difference between two groups. It was surprising to see that nearly half of mothers in the unexposed group discussed child healthcare and KFP promoted by the program. This underpinned the contaminating effects of the program exposure in the proximity beyond the program coverage zone (see Chap. 1, Sect. 1.2).

Chi-squared tests analyzed the distribution of key socio-economic and demographic characteristics of mothers between the two groups. This analysis allowed us to highlight vulnerability of mothers who were deprived from basic social and health services based on individual and community assets to see whether there were any differences when exposed or unexposed to the program. The variables included mothers who have never been to school, those who did household work as a main activity without direct income, those who defecated outside without using any toilet facility, mothers who were never involved in income-generating activity (IGA), those who did not listen to the radio in the 30 days previous to the interview date, and those who had to walk more than 5 km from the village to reach the nearest health facility (Graph 5.1).

It was crystal clear that among mothers living in the zones which were not covered by the program, socio-economic and demographic deprivation of mothers was outstanding compared to mothers who took part in the program activities. All above-cited categories measuring the degree of vulnerability of mothers indicated there were more socio-economically vulnerable mothers in the unexposed group

³Further information about CLTS in Niger is available at http://www.unicef.org/wash/niger_57677.html



Graph 5.1 Disparity between exposed and unexposed group of KFP promotion in Maradi and Zinder (*n* = 1026)

with statistical significance. In short, the findings revealed that socio-economic status of mothers between two groups was not homogeneous and implied that program intervention generated further poverty gap by supporting mothers who were better-off.

5.2 Who Were at High Risk of Delaying the Timing of Initiating Breastfeeding After Birth in the Program Contexts

According to the post-intervention survey (PIS) of the behavior change communication program promoting neonatal and child healthcare conducted in four regions, Maradi, Zinder, Tillabéry, and Thaoua, early initiation of breastfeeding was clearly distinguishable between two groups: those exposed and unexposed to the program activities. Mothers in the exposed group practiced early breastfeeding (*n* = 394, 89%) compared to the unexposed group (*n* = 348, 40%). When residing in village covered by the program, the chance of initiating breastfeeding within the first hour was 12 times more than those in village that was not targeted by the program (95%CI: 8.7. 16.9). It was too early to conclude, despite the statistically significant difference, that the communication program promoting KFP significantly increased early initiation of breastfeeding in the four regions of Niger.

This section analyzed the social determinant of early breastfeeding of mothers residing in two regions, Maradi and Zinder, where the communication actions to

promote child healthcare and infant feeding were initially carried out since 2008. Each variable was carefully examined in relation to early initiation of breastfeeding. We wanted to know who did not start breastfeeding early, within the first hour of birth, and what happened if mothers were prevented from doing so. It measured the extent to which each variable was associated to determine the timing of initiating breastfeeding after birth. We interpreted the findings by four categories in line with the conceptual framework of the social and behavior change communication strategies (Illustration 2–5). Keeping in mind the inconsistency of the socio-economic background of mothers between the exposed and the unexposed groups, the study was aimed at identifying the high-risk groups of mothers who were inclined to delayed initiation of breastfeeding after birth in the program context.

5.2.1 What Influenced How Soon Mothers Start Breastfeeding After Birth

5.2.1.1 Socio-demographic Determinants of Early Initiation of Breastfeeding

Some indicators known to be associated with early breastfeeding no longer influenced the timing of initiating breastfeeding after birth. They were parity measured by the number of deliveries, marital status, and occupation of mothers (see Sect. 4.2.1. “Bivariate Analysis of Selected Explanatory Variables”). Parity showed inconclusive findings regarding its association with early initiation of breastfeeding (Waiswa et al. 2010; Narayan et al. 2005). Multipara was no longer a protective factor for early initiation of breastfeeding, and this finding supported Gunnlaugsson’s study showing cultural abhorrence of multipara mothers’ first milk in Islamic groups in Guinea-Bissau (Gunnlaugsson and Einarsdottir 1993). Income poverty measured and translated by variables, e.g., household work with no direct income, no opportunity to undertake income-generating activities, and use of unsafe drinking water, was not statistically associated with early initiation of breastfeeding. This statistical evidence counterargued the findings of the 2012 DHS based on the entire population in all Niger (Chap. 4, Table 4.3) and previous findings (Horii et al. 2017; Horii 2016b) which showed impairment of socio-economic vulnerability and disparity to breastfeeding (Temple Newhook et al. 2017; Ogbo et al. 2015; Dyson et al. 2010). These statistical findings implied that mothers residing in Maradi and Zinder, two regions selected to pilot the social and behavior change communication program promoting family and community doable child healthcare and feeding, were no longer prevented by socio-economic disparity from adopting early breastfeeding into their routine infant feeding practices. Although the program generated socio-economic discrepancy between those who benefited from direct support and those

who did not, the overall program impact on the entire population allowed mothers to overcome poverty gap which was no longer a risk factor for the delayed initiation of breastfeeding. Nevertheless, it was noteworthy that there was a socially and culturally marginalized group of populations who remained opposed to early initiation of breastfeeding despite the intensive program promotion: they were mothers who have been to Koranic school. Whereas some previous studies revealed that the level of educational attainment did not alter breastfeeding patterns (Horii et al. 2016; Bhutta et al. 2005, 2013), the current statistical findings showed the opposite: Koranic school education seemed to increase by 50% risk of delayed initiation of breastfeeding after birth compared to no education at all (95%CI: 0.3, 0.8).

5.2.1.2 Maternal Healthcare Services Provided by Health Professionals

The findings of the DHS data analysis and previous research suggested that health providers were one of the most important communication channels to convey and exchange information about the benefits of early breastfeeding and provide psychological support to encourage mothers to start breastfeeding immediately after birth. According to the PIS, mothers who did more than 4 ANC visits were 2.8 times more likely to initiate breastfeeding within the first hour of birth (95% CI: 1.1, 7.4), and if the number of ANC visits went below 3, there was no longer association with early breastfeeding compared to those who have never been to antenatal care visits (95% CI: 0.9, 6.5). When mothers consulted midwives for ANC, they were 50% more likely to practice early breastfeeding than if received by doctors or nurses (95% CI: 1.0, 2.3). This finding suggested the training and support oriented toward the capacity building of health workers at maternity positively impacted one of the behavioral outcomes of the communication program promoting child healthcare in family and community.

5.2.1.3 Environmental Health, Hygiene, and Sanitation

Distance to the nearest health facility seemed to be detrimental to early breastfeeding: when it was located outside the village beyond 5 km walking distance, risk of delayed initiation of breastfeeding increased by 50% compared to when a health center was accessible inside their village (95% CI: 0.3, 0.8). Sanitation measured by *type of toilet facility* was associated with early breastfeeding, especially among those who built their traditional latrine for their daily use, the chance of putting child to the breast in the first hour of birth increased by 7.9 times compared to those who never used toilet facility (95% CI: 2.5, 25.4). Defecation outside without access to any toilet facility was likely to delay the timing of initiating breastfeeding after birth.

5.2.1.4 Sociocultural and Intra-household Factors

Interactions with family members and neighbors were important indicators and subject to careful investigation. The PIS included a number of variables to measure the degree of ownership of mothers in household decision and healthcare management. Results showed that decision on child healthcare by mothers and support provided by their family were key protective factors for early initiation of breastfeeding. Mothers involved in decision-making for child health expenditure were 2.2 times more likely to put their child to the breast within the first hour of birth than those who were excluded from such decision (95% CI: 1.4, 3.3). Support from neighbors and friends to obtain transport to go to the nearest health center positively influenced early breastfeeding (OR, 4.3; 95% CI, 1.9, 9.3). With regard to the decision of harvest use, mutual consultation between mothers and their husband showed the highest positive impact to generate an early breastfeeding-friendly environment compared to when mothers made a decision alone. This suggested that husband and child's grandmother, through discussing child healthcare at home promoted by the program, became open and flexible to change their conception and routine of birth and supportive to mothers willing to put their child to the breast within the first hour of birth.

5.2.2 *Is Poverty a Bottleneck to Colostrum Feeding? Socio-economic Status and Early Initiation of Breastfeeding*

The odds of early breastfeeding in relation to each identified explanatory variable were calculated by controlling the confounding effects of socio-economic and demographic status of mothers likely to interfere how the program intervention impacted mothers early breastfeeding. Based on the selection criteria of statistical significance $p < 0.05$ with program exposure and early breastfeeding in bivariate analysis, explanatory and confounding variables were identified to undertake multivariate analysis (Table 5.3). Five variables were shown to be significantly associated with the program exposure allowing to measure the effect of behavior change communication strategies and actions and initiation of breastfeeding within the first hour of birth. They were educational attainment of mothers, type of occupation, means of transport, access to the health center, and use of toilet facility, likely to confound the relation between early breastfeeding and its determinants. All variables significantly associated with initiation of breastfeeding were included as explanatory variables.

Many variables associated with early breastfeeding in the bivariate analysis no longer had significant influence after having adjusted for socio-economic and demographic status of mothers. This adjustment to isolate to the possible extent the effect of these confounding variables was important since the primary purpose of the

Table 5.3 Selection of explanatory and confounding variables for multivariate analysis

Variables	Statistical significance ($p < 0.05$) with:		Inclusion as:	
	Program exposure	Early initiation of breastfeeding	Explanatory variables	Confounder
Age	NO ($p = 0.32$)	NO ($p = 0.56$)	No	No
Educational attainment	YES ($p < 0.001$)	YES ($p < 0.03$)	Included	Included
Marital status	YES ($p = 0.01$)	NO ($p = 0.46$)	Included^a	No
Parity	NO ($p = 0.5$)	NO ($p = 0.1$)	No	No
Type of occupation	YES ($p < 0.001$)	NO ($p = 0.33$)	Included^a	Included^a
Income-generating activity	YES ($p < 0.001$)	NO ($p = 0.88$)	No	No
Means of transport	YES ($p < 0.04$)	YES ($p < 0.03$)	–	Included
Listening to the radio in the last 30 days	YES ($p = 0.02$)	NO ($p = 0.62$)	No	No
Number of ANC	YES ($p < 0.001$)	YES ($p < 0.07$)	Included^a	–
Access to the health center	YES ($p < 0.001$)	YES ($p < 0.001$)	Included	Included
Source of drinking water	YES ($p = 0.06$)	NO ($p = 0.17$)	No	–
Use of toilet facility	YES ($p < 0.001$)	YES ($p < 0.001$)	Included	Included
Decision of healthcare expenditure of child	NO ($p = 0.4$)	YES ($p < 0.001$)	Included	–
To whom asked for transport	NO ($p = 0.8$)	YES ($p < 0.01$)	Included	–
Decision for harvest use	NO ($p = 0.1$)	YES ($p < 0.01$)	Included	–
Discussed child healthcare with family	YES ($p < 0.001$)	YES ($p < 0.001$)	Included	–

N.B.:^aThe variables were included as they were shown to be significantly associated in the previous research

study was to understand what worked the best to promote early breastfeeding among the most vulnerable group of population. If some variables showed statistical significance and positively associated with early initiation of breastfeeding, they were protective factors leading mothers to practice early breastfeeding regardless of the socio-economic status of mothers. If significant but negative association was revealed, these risk factors showed some trends of the high-risk group of mothers prone to delayed initiation of breastfeeding. If some explanatory variables lost their statistical significance after having adjusted for the confounding variables, it means

that these factors did not truly change the timing of initiating breastfeeding. The same variables shown positively and significantly associated with unadjusted odds ratio of early breastfeeding suggested that if they put their child to the breast immediately after birth, it was because they were better-off, not because what have been indicated by the variable.

The findings of multivariate analysis indicated that the program remained significantly associated with early initiation of breastfeeding which has proven its positive impact on increasing the chance of early breastfeeding after having adjusted for socio-economic, demographic status of mothers (AOR, 2.1; 95% CI, 1.25, 3.34). The social and behavior change communication aimed at promoting child healthcare in the pilot area allowed mothers, including the most socio-economically vulnerable ones, to adopt early breastfeeding whether they were better-off or poor. It suggested that the number of program activities designed and implemented in the areas covered by the program intervention adopted social and health equity-sensitive approaches. We will further investigate in the following chapter the impact of different types of communication actions on promoting early breastfeeding.

The socio-demographic status of mothers that remained strongly and negatively correlated with early breastfeeding was Koranic school education: chance of early breastfeeding decreased by 53% compared to those who have never been to school (95% CI: 0.28, 0.79). This result indicated that, as opposed to previous research findings reporting no influence of education levels on optimal breastfeeding (Matanda et al. 2014), being educated at Koranic school was a major risk factor for delayed initiation of breastfeeding beyond the fact that they were poor or not. Other preselected socio-economic variables as explanatory variables, such as being in polygynous union and doing sales and services as principal activities generating direct income, were statistically not significant and did not show positive influence on early breastfeeding. Two variables lost statistically significant association with the timing of initiating breastfeeding, and these were related to maternal healthcare services provided by health professionals: more than four antenatal care visits no longer showed positive influence (Table 5.4).

This result implied that ANC visits had limited influence and was no longer a critical protective factor for promoting early breastfeeding among the most vulnerable mothers. The following section explores whether there would be difference in the timing to start breastfeeding after birth when ANC was provided by health professionals who were trained by the program to strengthen their interpersonal and group communication skills to discuss maternal and neonatal care and nutrition.

The communication program contributed to capacity building of midwives and birth attendants allowing them to develop their communication skills to provide individual and group counseling and to learn optimal newborn and infant feeding as well as all other related maternal child healthcare and nutrition. However, the above findings revealed that ANC was not the most effective communication channel

when promoting early breastfeeding among the most vulnerable group of population: the majority of rural mothers opted for home delivery ($n = 2633$, 75%) assisted by no qualified birth attendants or family members (Institut National de la Statistique (INS) and ICF International 2013). Patterns of breastfeeding would be determined

Table 5.4 Multivariate analysis of early initiation of breastfeeding ($n = 1026$)

Variables		Initiation of breastfeeding within the first hour of birth		
		Adjusted OR ^a	95% CI	p-value
Educational attainment	No education	1	–	–
	Koranic school	0.47	0.28, 0.79	0.004
	Primary	0.78	0.33, 1.82	0.56
	Secondary	0.78	0.33, 1.90	0.59
Marital status	Monogamous	1	–	–
	Polygynous	1.05	0.64, 1.73	0.85
Type of occupation	Household work	1	–	–
	Agriculture/ livestock	0.75	0.46, 1.22	0.25
	Sales/services	1.19	0.56, 2.52	0.66
Number of antenatal care visits (ANC)	Never	1	–	–
	1–3 times	2.08	0.69, 6.25	0.19
	>4 times	2.59	0.91, 7.34	0.07
Distance to the health facility	Outside the village	1	–	–
	Within the village	1.34	0.83, 2.17	0.23
Use of toilet facility	No	1	–	–
	Yes ^b	5.1	2.0, 13.0	0.001
Healthcare expenditure of child led by:	Other family members	1	–	–
	Mothers alone	1.76	1.1, 2.83	0.02
	No one	1	–	–
To whom asked for transportation mean	Neighbors	6.29	1.86, 21.2	0.003
	Family	2.73	0.82, 9.08	0.1
	Rent (NGO)	1.40	0.42, 4.68	0.59
Decision for harvest use by:	Mother alone	1	–	–
	Husband alone	1.41	0.73, 2.70	0.31
	Both	4.25	1.82, 9.94	0.001
Discussed child healthcare with family members	No	1	–	–
	Yes	1.87	1.13, 3.10	0.01

^aN.B.: Odds ratio adjusted for the program exposure, region of residence, selected socio-demographic and economic variables: educational attainment of the interviewed mothers, type of occupation, means of transport, access to the health center, and type of toilet facility

^bToilet facilities include both traditional or ventilated latrines

by who was present and by what could be done at the time of delivery (Kirkwood et al. 2013). Program interventions focusing on delivery could more effectively increase colostrum feeding and kangaroo mother care combined with initiation of breastfeeding within the first hour of birth. For example, it was deemed crucial to examine the role of traditional birth attendants (TBA) by whom 32% of deliveries were assisted in rural areas (Table 4.2. *Characteristics of mothers of children under 24 months in Niger stratified by residence*). However, determinants related to evaluate the roles of TBA were scarce, and the only variable in which TBA appeared in the 2012 Niger DHS was types of personal assisting delivery, while the PIS did not address delivery and functions of TBA.

Another question was whether outreach support could be extended to mothers delivering their child at home outside the catchment area if they could not be referred to a health center for delivery assisted by a qualified birth attendant. A participatory communication action promoting KFP in Mali piloted a mechanism of referring mothers to the health center. The program decided to approach the traditional birth attendants and integrate them in playing the key role in KFP promotion after SWOT⁴ analysis showed that they could be a potential threat to the achievement of the program: They were trained and actively involved in neonatal care and infant feeding so as to play an intermediate role between mothers and health professionals (Guitteye et al. 2010). This field experience provided an insight into a participatory community-based approach integrating non-health actors who played a key role to promote early breastfeeding as one of the most important communication channels.

Living close to reach the nearest health facility no longer helped mothers to adopt early breastfeeding practice, and this implied that health center was not the only and the most effective entity of communication channel to promote early initiation of breastfeeding inside the village. Distance to health facility could be characterized by socio-economic disparity between urban and rural areas and between mothers and their families living in the same village. This indicator identified who benefited better from health service to consult qualified health professionals as opposed to those deprived from accessing such service. Yet, key informant interviews with health professionals in a pilot area of the communication program in Maradi region illustrated that the degree of commitment of community health workers was inconsistent and that it could entirely pertain to individual motivation (Hamani and de Sardan 2012) (Box 5.1, case 1). Another example of comparison between two villages to explore what impact distance to the health center on promoting early initiation of breastfeeding suggested that not accessing within 5 km walking distance to reach the nearest health facility did not hinder early initiation of breastfeeding after birth (Box 5.1, case 2). This example illustrated that being far from the health facilities was not a

⁴A participatory rural appraisal tool to assess the current situations based on four dimensions: strengths to describe what have been available, weaknesses to say the shortcoming, opportunities to illustrate potential to explore, and threats as a factor impeding the successful achievement of the expected results.

constraint when promoting family doable newborn care and infant feeding. The communication actions led by non-health workers and community members possibly made substantial and positive change to encourage mothers to adopt new infant feeding behavior outside the conventional health system.

Box 5.1 Field Observation in the Program Pilot Area of Maradi Region
Case 1: Sarkoinyama village

The individual key informant interviews with heads of health posts, qualified as community health workers, were undertaken during the field visits in Maradi and Zinder in 2011. A head of health post in Sarkin Yama said he had no motivation to join the initiatives of community volunteers, local institutions, and women's group. To date, he had no opportunity to organize individual or group counseling dedicated to mothers to talk about newborn care and infant feeding during the ANC consultation. He also mentioned that he was aware of the undergoing program promoting key family practices and that these community volunteers in the village were reporting directly to the head of the district health center. He always thought that he was not concerned by this community-based action for improving family- and community-based child healthcare.

Another head of health post we interviewed was very enthusiast about this community extension worker's contribution to promote healthcare in each family in the health catchment area. He mentioned that he was dedicated to organizing a weekly group meeting and collaborating with community volunteers to provide extension healthcare and meet pregnant women at home. These interviews illustrated two opposite cases and revealed that the degree of commitment of community health workers was inconsistent and could only be determined by individual motivation.

Case 2: Comparison between two villages: Garin Dogo and Moullé

Two villages were compared, both covered by the communication program to give insights to relation between proximate access to the health facility and promotion of early breastfeeding. Garin Dogo where there was no health center, recorded more cases of behavioral change in newborn care and infant feeding than Moullé where residents had easier access to the health facility located inside the village. The majority of mothers in Garin Dogo (94%) were screened at the time of the pretesting of community monitoring tools reported having adopted at least one out of seven KFP. This suggested that early breastfeeding could be promoted outside the health catchment area among the socio-economically vulnerable population living in a remote area as effectively as among the population provided with health services within 5 km of walking distance.

Sanitation infrastructure and practice measured by toilet use remained positively associated, and this suggested it could be a key protective factor for early initiation of breastfeeding: toilet facility use was likely to increase by five times the chance of early breastfeeding (95% CI: 2.0, 12.0). It was presumed that significant increase of toilet facility use in the exposed group was an outcome of intensive support provided by the community-led total sanitation (CLTS) program in the same pilot areas as the social and behavior change communication program promoting KFP. Local authorities and traditional leaders in villages were actively involved to encourage populations to build latrines at home. The selected pilot villages of CLTS which have also been covered by the communication program promoting KFP led traditional latrine users to practice further early initiation of breastfeeding after birth compared to the populations in the areas which have not been covered by any of the above programs. Early initiation of breastfeeding was strongly correlated with hygiene practice measured by *toilet use* regardless of socio-economic status of mothers. This finding supported the anthropological study undertaken in the same region (Hamani and de Sardan 2012) where the majority of the population were Muslims practicing ablutions based on the belief that water itself purified human bodies. Hence, using soap and safe drinking water, health behavioral outcomes targeted by KFP promotion, did not guarantee hygiene environment for the newborn. The concept of hygiene promoted by the communication program did not obviously reflect what mothers believed was hygiene in their sociocultural context. As shown in the previous studies, water feeding was one of the major inhibitors of early and exclusive breastfeeding after birth. It was presumed that the CLTS program allowed mothers to understand the mechanism of defecation causing directly infested and unsafe drinking water in their neighborhood. They became aware that untreated water could be contaminated and that water feeding which resulted in prelacteal feeding before giving the first milk to their child after birth was a life-threatening act to newborn.

Most explanatory variables related to intra-family interactions remained statistically significant. Mothers who made decision alone about child healthcare were more likely to initiate breastfeeding within the first hour of birth compared to those who were not involved in such decision-making (AOR, 1.8; 95% CI, 1.1, 2.8). When mothers took part in managing harvest distribution in their household with their husband, the chance of early breastfeeding increased by 4.3 times (95% CI: 1.8, 9.9). Discussion with mothers' husband about KFP seemed to increase nearly twice as much the chance of early initiation of breastfeeding as when there was no such exchange between the family members (95% CI: 1.1, 3.1). Mothers who could seek support from neighbors or their parents to go to the nearest health facility were six times more likely to practice early initiation of breastfeeding than those who had no one to ask for such support (95% CI: 1.7, 21.2).

The post-intervention survey did not investigate ethnic groups or religion of the interviewed mothers. According to the 2006 Niger Demographic Health Survey, the population was predominantly Muslim in the four regions (Maradi, Zinder, Tillabéry, and Thaoua: $n = 1975$, 99%). The above-cited study on Islamic ethnic groups in Guinea-Bissau by Gunnlaugsson showed that colostrum feeding, considered to be

culturally beneficial to newborn health, was widely practiced unlike other ethnic groups in sub-Saharan Africa (Gunnlaugsson and Einarsdottir 1993; Horii 2015). Gunnlaugsson's study also described cultural abhorrence of multipara mothers' first milk in the Islamic ethnic group. This cultural belief specific to Muslim opposed the assumption made by other studies that mothers having delivered many times in the past could more easily practice early and exclusive initiation of breastfeeding after birth. Withholding of colostrum was specific to cultural and traditional customs of each ethnic group and was subject to further investigations to explore how ethnicity and sociocultural factors were related with early initiation of breastfeeding.

In short, there was no statistical significance of socio-economic and demographic variables in relation to early initiation of breastfeeding. Those findings clearly indicated that income poverty did not hinder early initiation of breastfeeding. Besides the previously published article using the same dataset showed that whether being primipara or multipara did not change much the outcome of early breastfeeding (Horii et al. 2017). The determinant analysis in this chapter showed that parity was no longer associated with early breastfeeding after having controlled for the confounding effect. It implied that the social and behavior change communication program undertaken through various communication channels to promote child healthcare, infant feeding, hygiene, and sanitation allowed mothers to get over poverty and cultural belief incompatible with optimal breastfeeding practices.

5.2.3 Marital Status and Early Breastfeeding: Polygynous Union as a Protective Factor⁵

This section examined marital status of mothers and demonstrated that this variable was not a simple demographic status but had an implication of sociocultural factor rooted in family and community. The 2012 Niger DHS showed that more than one third ($n = 1214$, 34.7%) lived in polygamous unions in rural areas. Previous research showed evidence that being in polygynous union turned to be a protective factor of early initiation of breastfeeding using the 2011 PIS dataset which included a study population of 2090 in 4 regions of Niger: Maradi, Zinder, Tillabéry, and Thaoua (Horii 2016a). This led us to draw an assumption that marital status be a key determinant altering the timing of initiating breastfeeding after birth (Jimerson et al. 2012) as opposed to the findings of the PIS in Maradi and Zinder where the variable showed no significance. Before rejecting the assumption that polygynous unions favored early breastfeeding, it was deemed important to identify factors associated with polygynous unions to understand who they were. The analysis further explored what impact they might or might not have on the timing of putting child to the breast

⁵This section has been published following an international conference on *Allaitement et pratiques de sevrage: approches pluridisciplinaires et diachroniques*, National Institute of Demographic Study (INED), Paris in 2013.

after birth independently from other confounding factors strongly related with marital status of those in polygynous unions (Horii 2019).

In this section we carried out again statistical findings using the above dataset of the PIS in four regions which included the study areas extended to two other regions where no program actions were implemented at the time of the data collection. Chi-squared tests and multivariate logistic regression measured the odds ratio of marital status adjusted for socio-economic and demographic status of mothers.

5.2.3.1 Characteristics of Mothers Married in Polygynous Unions

Among mothers exposed to the program, the proportion of polygynous unions attained 30%, significantly higher than that in the unexposed group (Table 5.5). The proportion of polygynous unions was significantly higher in the exposed group than unexposed group (23%, $p = 0.002$). As to regional disparity, Maradi, where most women were living in the villages covered by the program ($n = 325$, 48%), recorded the largest proportion of polygynous mothers among other four regions.

Bivariate analysis using chi-squared test indicated that mothers in polygynous unions practiced early breastfeeding far more than when they were in monogamous unions: more than half of mothers in polygynous unions initiated breastfeeding within the first hour of birth ($n = 209$, 65.7% vs. 53.7, $p < 0.001$). We further scrutinized to verify the assumption that being married in polygynous unions positively influenced early initiation of breastfeeding. Trends of characteristics of those married in polygynous unions were examined looking at socio-economic and demographic status and behavioral indicators identified as key determinants of early initiation of breastfeeding in the previous research (Horii et al. 2017). They included age, parity, educational attainment and type of occupation of the interviewed mothers, use of toilet facilities, decision of harvest use within a household, and support from others to obtain transport to access the nearest health facility. At first sight, all variables showed statistically significant association with marital status except for distance to the health center and decision of harvest use (Table 5.5). It appeared that the eldest age group over 21 years were the most likely to be in polygynous unions (29% vs. 17% in the youngest age group of 15–20 years, $p < 0.001$). Polygynous

Table 5.5 Distribution of mothers in polygynous unions by exposure to the program ($n = 2090$)

		Mothers with at least one child below 24 months in polygynous unions		
		Number	%	<i>p-value</i>
Program exposure	Exposed	196	0.30	0.002
	Unexposed	313	0.23	
Region	Maradi	176	0.38	<0.001
	Zinder	147	0.28	
	Tillabéry	77	0.16	
	Tahoua	109	0.21	

mothers were more likely to be multipara, mothers who gave birth more than once, than primipara (27% vs. 16%, respectively, $p = 0.001$). *Secondary or higher school* and *Koranic school education* was significantly associated with polygynous unions (32%, $p = 0.003$), while the proportion dropped to 23% of those who have never been to school. There were lot less mothers in polygynous unions who did *household work* with no direct income than sales and services with highly significant association (22% vs. 44%, $p < 0.001$). Use of improved latrine was more frequent among polygynous mothers and outside defecation practice turned to be significantly less (39% vs. 24%, $p < 0.01$). In short, the above bivariate statistical findings implied that mothers in polygynous unions were better educated, better-off with stable direct income, and in a more favorable hygiene and sanitation environment. It was clear that the association between polygyny and postpartum breastfeeding was strongly confounded by socio-economic vulnerability. Previous studies associated polygyny with a high status of household economic wealth in sub-Saharan Africa (Jacoby 1995).

We further examined the impact of marital status on the timing of initiating breastfeeding after birth by controlling possible confounding effects of socio-economic and demographic variables. The potential explanatory variables likely to be associated with marital status were selected based on the above findings of bivariate analysis, and all those having shown statistical significance were included for multivariate analysis. The confounders were selected based on the significant bivariate analysis in relation to the program exposure (Table 5.3) and to outcome variable, which was marital status (Table 5.5). The selected confounding variables were exposure to the program, region, educational attainment, type of occupation, and use of toilet facility. The multivariate logistic regression measured the adjusted odds of being married in polygynous unions in relation to each of the selected explanatory variable separately.

An elderly group beyond 35 years of age remained significantly associated increasing the chance of being in polygynous unions by 2.4 times (95%CI: 1.7, 3.5) (Table 5.6). Primipara also remained significantly associated with being married in polygynous unions (AOR, 2.3; 95%CI, 1.5, 3.4). The association between marital and socio-economic status indicated that among those doing sales and services which brought stable and direct income, polygynous unions were included two times more than those who did household work known to be socio-economically deprived group of populations (95%CI: 1.3, 2.6). This result implied that it was not because of socio-economic advantageous reasons that we found more cases of polygynous unions among the sales and services workers. This was because of no other reasons but the fact that they were in polygynous unions. They could afford more time to do income-generating activities than doing household chore and looking after their child: they reported there was a mechanism of rotating the role of cooking and cleaning between co-spouse sharing the same living space. Koranic school education which turned to be a major risk factor for delayed initiation of breasted in the multivariate analysis (see Table 5.3) was positively associated with polygynous unions which increased by 1.3 times compared to those who have never been to school (95% CI: 1.0, 1.7), whereas those who went up to secondary level or

Table 5.6 Determinants of polygynous unions (chi2) (*n* = 2090)

		Mothers married in polygynous unions		p-value
		n	%	
Age	15–20	61	0.17	<0.001
	21–34	294	0.26	
	35–49	149	0.29	
Parity	Multipara	477	0.27	0.001
	Primipara	32	0.16	
Educational attainment	No education	285	0.23	0.003
	Koranic school	133	0.30	
	Primary	31	0.24	
	Secondary or +	38	0.32	
Occupation	Agriculture/livestock	142	0.28	<0.001
	Sales and services	81	0.44	
	Household work	285	0.22	
Decision of harvest use	Mothers alone	175	0.25	0.89
	Husband alone	101	0.25	
	Both	94	0.27	
Use of toilet facility	Open defecate	400	0.24	0.002
	Traditional latrine	75	0.31	
	Improved latrine	32	0.39	
Support from the neighbors	Neighbors	84	0.21	<0.001
	Parents	34	0.16	
	Rent	41	0.25	
	Other	79	0.33	

beyond were no longer associated. The findings suggested that polygynous unions could be better-off but socio-economic favorable environment did not necessarily direct mothers to a path for better and higher education in rural Niger where the Islam culture and beliefs were deeply anchored. Those who benefited from the highest-quality type of toilet facility with the improved latrine system with flush water remained significantly associated with being in polygynous unions (AOR, 2.1; 95% CI, 1.3, 3.4). With regard to intra-family and community members' interactions measured by whose support polygynous mothers relied on to obtain means of transport to get to the nearest health facility, only the support provided by parents remained significantly associated, and it was twice less likely that polygynous mothers sought a help from the family (AOR, 0.52; 95% CI, 0.3, 0.9).

In short, compared to those in single and monogamous unions, mothers in polygynous unions were likely to be elder and therefore to have already delivered a child and being a mother for many years. Dedicated to sales or services generating direct

income, they seemed to afford financial independence for a decision-making without asking for others' support. However, socio-economically better-off status was not necessarily directed to doing ANC and seeking preventive and curative maternal and child healthcare. Many polygynous mothers were more likely involved in sales and services generating direct income. The shortcoming of mutual support between family members to reach the health center suggested regardless of the better-off socio-economic status, polygynous mothers had no strong ties between family members when seeking preventive and curative maternal and child care from the health professionals in the village and being with other women as co-spouses living in the same compound was not a reliable indicator of social network to seek maternal and child healthcare (Tables 5.7 and 5.8).

As mentioned earlier, polygynous mothers were more likely to put their child to the breast within the first hour of birth. The crude odds of early initiation of breastfeeding with regard to polygynous unions were adjusted for the same set of confounding variables identified earlier. Polygynous mothers were 1.7 times more likely to initiate breastfeeding within the first hour of birth than monogamous mothers (CI 95%: 1.3, 2.2). However, after having adjusted for socio-economic and demographic status of mothers, marital status, being in polygynous unions did not make any difference with the timing of initiating breastfeeding after birth (95%: 0.7, 1.4). The effect of polygynous unions on early initiation of breastfeeding appeared to be inconsistent (Waiswa et al. 2010), and we therefore concluded that polygyny was not a determinant of early initiation of breastfeeding independently of socio-economic and demographic status of mothers (Jimerson et al. 2012).

Distribution of polygynous unions was not equal, and there existed significant difference between the exposed and unexposed groups. There were several reasons why the program rather extended its services to polygynous mothers: First, a majority of the exposed group of the survey was found in Maradi region where traditionally women were inclined to polygynous marriage. This region had the largest proportion of polygynous unions ($n = 176$, 38%) among other regions ($p < 0.001$). Another explanation was that the characteristics of the polygynous unions clearly indicated better-off socio-economic status. Polygynous mothers tended to be over age 35, better-off because they could afford the improved latrine at home and benefited from stable income derived from sales and services they were most likely to be involved in. The program intervention generated further the gap between rich and poor as when they were richer, they got better chance to be provided support. The previous research revealed segregation of socio-economically vulnerable mothers deprived from receiving program support such as individual and group counseling of maternal and child healthcare provided by health professionals, home visits led by community volunteers, and public debate led by community leaders (Hori et al. 2016). In short, it was not because mothers were in polygynous unions but because they were better-off that they readily accessed health facility and child healthcare services made available by the program within the village. Many polygynous were elder and doing sales and services. A few women we met in a village in Maradi said

Table 5.7 Determinants of polygynous unions (adjusted odds) ($n = 2090$)

		Mothers married in polygynous unions		
		<i>Adjusted odds ratio</i>	<i>CI (95%)</i>	<i>p-value</i>
Age	15–20	1	–	–
	21–34	1.90	1.38, 2.61	<0.001
	35–49	2.44	1.71, 3.48	<0.001
Parity	Primipara	1	–	–
	Multipara	2.25	1.50, 3.39	0.001
Educational attainment	No education	1	–	–
	Koranic school	1.32	1.02, 1.71	0.04
	Primary	1.02	0.72, 1.43	0.93
	Secondary or +	1.39	0.91, 2.13	0.13
Occupation	Household work	1	–	–
	Agriculture/livestock	0.93	0.68, 1.22	0.61
	Sales and services	1.84	1.28, 2.63	0.001
Use of toilet facility	Open defecate	1	–	–
	Traditional latrine	1.27	0.93, 1.76	0.14
	Improved latrine	2.11	1.30, 3.42	0.002
Support from neighbors to get transport	No one	1	–	–
	Neighbors	0.80	0.52, 1.25	0.33
	Parents	0.52	0.31, 0.87	0.01
	Rent	0.85	0.52, 1.36	0.49

N.B.: Odds ratio adjusted for region, exposure to the program, educational attainment, type of occupation, and use of toilet facility

that they could spare time to do some business other than cooking and cleaning for the family by sharing household tasks between co-spouses. We could draw a conclusion that polygynous unions were not a protective factor but it was the socio-economic status of mothers that influenced the timing of initiating breastfeeding after birth.

Some literature showed conflicting outcomes about the relationships between co-spouses in polygynous unions: collaborative and supportive dialogue between co-spouses contributed to stopping prelacteal feeding which often resulted in delaying initiation of breastfeeding. Furthermore, polygynous households could often be exposed to conflicting situations because of discord between co-spouses (Bove and Valeggia 2009). Unfortunately the PIS did not provide any further information to explore how interactions between women of reproductive age married in polygynous unions impacted neonatal care and early breastfeeding after birth in rural Niger.

In short, socially and economically deprived mothers were at greater risk of delaying initiation of breastfeeding. Association between polygyny and early initia-

Table 5.8 Early initiation of breastfeeding according to marital status (crude and adjusted odds) (*n* = 2090)

		Early initiation of breastfeeding within 1 h after delivery					
		Crude OR			Adjusted OR ^a		
		Odds ratio	CI (95%)	<i>p</i> -value	Odds ratio	CI (95%)	<i>p</i> -value
Marital status	Monogamous unions	1.0	–	–	1.0	–	–
	Polygynous unions	1.66	1.27, 2.16	<0.001	1.01	0.72, 1.42	0.96

^a*N.B.*: Odds ratio adjusted for region, exposure to the program, educational attainment, type of occupation, and use of toilet facility

tion of breastfeeding was influenced by socio-economic vulnerability of mothers prone to delayed initiation of breastfeeding. A behavior change strategy should adopt socioculturally acceptable methods and provide economically accessible and sustainable responses to address the poverty gap regardless of marital status of mothers, whether they were in monogamous or polygynous unions. Further research on typology of communication strategies should be conducted to investigate whether specific types of socio-economic inequality, ethnicity, and religion-sensitive actions would effectively address optimal breastfeeding promotion and lead a whole community to actively taking part in improving healthcare of their children. The following and last section investigates which types of behavior change communication strategies reached the most deprived group of population. Based on the identified high-risk groups prone to delayed initiation of breastfeeding, the responsiveness of the communication program to socio-economic disparity, leading a whole community to actively taking part in promoting child healthcare, will be assessed.

5.3 Program Responses to Socio-economic Disparity in Rural Mothers in Early Breastfeeding Promotion

This section evaluates different types of participatory behavior change communication strategies and examines how these impacted the timing of initiating breastfeeding after birth. The primary objective was to depict which types of communication actions reached the most deprived mothers to promote eight key family practices, among others early initiation of breastfeeding. To date there was little scientific evidence on family- and community-based child healthcare improving optimal postpartum breastfeeding in sub-Saharan Africa (Waiswa et al. 2012). Yet social and behavior change to improve child healthcare is one of the top priority areas of action research (Martines et al. 2005). Although social determinants analysis revealed that

socio-economic vulnerability did not impede early breastfeeding, it was deemed crucial to tailor what communication actions worked the best to change behavior of the high-risk group of mothers. The social and behavior change communication program launched in 2008 was not intended to extend specific support to change behavior of the high-risk group of population clinging to suboptimal care and feeding of their child. This is why the study sought to investigate what actions impacted most positively behavior change of the group of mothers whose characteristics hindered early initiation of breastfeeding after birth. Yet we do not know much about which types of behavior change program showed evidence of poverty-sensitive efficiency and effectiveness to promote early initiation of breastfeeding.

Using the dataset of the post-intervention survey (PIS), we extracted a study sample of 1026 in 2 regions of Niger, Maradi and Zinder, to measure the associations between initiation of breastfeeding within the first hour of birth and each different type of communication activities promoting key family practices (KFP). This secondary analysis of the post-intervention survey illustrates how socio-economic status of mothers could affect the way a community-based social and behavior change communication program influenced early initiation of breastfeeding. This leads to understand whether the program design and implementation were responsive to a high-risk group of population identified by the determinants analysis in the previous section.

5.3.1 Modeling Social and Behavior Change Communication Promoting Early Initiation of Breastfeeding

This typology of communication actions investigates whether the program reached all rural mothers in selected pilot program areas, especially socio-economically vulnerable mothers and their family members without excluding marginalized groups of population outside the catchment area. At the time of piloting communication interventions within the participatory action research in Maradi and Zinder in 2008, the communication strategic plan promoting maternal child healthcare and nutrition was designed for universal healthcare coverage to provide support to all pregnant women and mothers of children below 5 years of age. The communication program expanded its sphere of actions for social and behavior change through letting family and community members and other stakeholders to adopt, support, and advocate appropriate child healthcare. In light of the strategic action plan of social and behavior change communication improving child healthcare and nutrition (see Chap. 2, Sect. 2.2.2. *Conceptual framework of communication for social and behavior change*), a number of communication actions have been elaborated and tested in the pilot area of Maradi and Zinder since 2008. The 2011 post-intervention survey (PIS) examined the involvement of the interviewed mothers and their family members in each communication action undertaken in light of behavior change strategies: advocacy, social mobilization, community-led social change, and interpersonal communication (Box 5.2).

Box 5.2 Success Story of Social Behavior Change Communication**Case 1: Advocacy with mass media through open public radio program**

A series of quiz competition were organized by a local radio station and rolled out in every village of the program pilot areas. Village residents were invited to participate as audience or as a candidate to sing a song or recite a poem addressing a KFP-related topic during the event open to the public. The programs lasting all day were recorded and disseminated through a regional radio broadband network, made every time a massive number of people queuing to perform a song with their own words, and the one which was the most original and convincing was awarded a prize. Laughs and applauds of the audience were factors contributing to the final scores for jury members to decide winners to award a prize with symbolic gifts, handwashing kit with bucket, and water can. The songs or poems composed and recited in local language by an unknown villager became popular among population. The author attended one of the radio programs, and the prizes were awarded to a mother of young children who was singing a song about breastfeeding and a school boy of 10 years who wrote a poem about washing hand with soap after defecation. They became popular songwriters and looked very proud of the recognition. The author was convinced that it was one of the most successful cases of advocacy with mass media to bring about the substantial and long-lasting change in the concepts of what they thought the best hygiene, infant feeding, and sanitation for children at home.

Case 2: Community-led social change

Data collection, analysis, and dissemination of the findings in form of open discussion allowed mothers and other participants to strengthen their ownership of information to understand what data said and empower capacities in making decision to adopt a new practice for their child health, and some went further to encourage others to do so. After sharing visual images highlighting the gap between mothers who breastfed exclusively during the first 6 months of birth and those who did not, mothers spontaneously started sharing their experience. One mother declared that the first child who was not breastfed had diarrhea and was ill and that the second child put to the breast immediately after birth and exclusively breastfed was healthy, gaining more weight and growing faster than the first child. Another mother confessed, having heard this testimony, that she felt like doing the same, inspired of her peers' experience, whereas she was reluctant about breastfeeding (Horii 2016b).

One of the success stories illustrating advocacy using mass media as a communication channel with participatory approaches was a radio program broadcasting key family practices (KFP) for the large public. It became such an event for the entire village that all residents gathered to attend this radio program competition which broadcast on radio throughout the region. The event was led by a facilitator who was such a well-known actor that the event mobilized the majority of residents in the village regardless of the age. Participatory method allowed them to be spontaneous candidates without prerequisite eligibility criteria with only one condition that they should present their original work and use the most convincing expressions to spread the most accurate information as possible about one topic related to KFP behavioral outcomes, e.g., early and exclusive breastfeeding.

Peer education by mothers promoting KFP to other women in the neighborhood was a noteworthy example of community-led social change. It was within a pilot program of participatory action research to test the new monitoring and evaluation tools that we convened mothers in Skarkinyama village in Maradi region. A few participatory rural appraisal (PRA) tools were exploited to be directly applied to the project. They were most significant change, problem-objective tree analysis, and SWOT analysis which stand for strengths, weaknesses, opportunities, and threats. A good mother competition was organized to award a special recognition to women who respected and put into practice all KFP promoted behaviors to provide appropriate care and feeding to their child from birth.

Local debates were led by opinion leaders to address KFP for “advocacy” purposes aimed at conveying key messages related to child healthcare and nutrition to the public audience. The primary purpose was to get the public familiar with the KFP topics and aware of the importance of practicing it. The benefit of promoting early breastfeeding was not limited to one single family as an outcome of child growth and health individually. It could change the perception in the whole community provided that communication actions were sustained until the new practice for better child healthcare and feeding after birth was integrated into the routine of every single family’s life. The impact assessment of social change in promoting early breastfeeding could draw a conclusion the program was successful if mothers who practiced it felt a self-accomplishment and recognition as a good mother to be rewarded by their husband, grandmother of their child, and neighbors. It is true that these participatory approaches were fastidious consuming investments in technical and human resources. Nevertheless there is strong evidence that only a community-based participatory approach could empower mothers and community non-health actors and their ownership of change to make optimal newborn care and infant feeding sustainable.

5.3.2 Program Coverage Between Mothers Exposed and Unexposed to the Communication Program

Based on the PIS study population stratified into two groups of mothers, exposed and unexposed to the program, descriptive analysis examined the extent to which mothers with under-24-month children were reached by different types of

communication actions. The number of attended communication actions measured the extent to which a mother took part as an audience or as an active participant in different types of communication actions such as KFP radio program, NGO-led events, KFP counseling at ANC by health professionals, home visits by community volunteers, and participatory KFP promotion. Each communication action drew on a community-based holistic approach aimed at promoting simultaneously different dimensions of child healthcare, which was thought to optimize the program impact on promoting child healthcare. The area of intervention included nutrition, maternal and child preventive and curative healthcare, hygiene, sanitation, and family planning. Based on a life cycle approach to maternal and child health throughout the period of female adolescence, pregnancy, delivery, and postpartum period, KFP promotion addressed multiple dimensions of child illnesses. Evidence showed that such a multisectoral approach generated more effectively change of mothers' behavior in adopting optimal postpartum breastfeeding, among both the deprived and better-off group of mothers (Jimerson et al. 2012).

This integrated communication program designed to apply various social and behavior change strategies and involve multiple communication channels at different levels sought to encourage mothers, their family members, and others in the village to make early and exclusive breastfeeding to create an optimal breastfeeding-friendly environment during the most critical time of child survival, the delivery, and the first week of birth where most newborn deaths were preventable by putting them early to the breast and give nothing but breast milk. However, when looking at the participation rate at different communication actions (Table 5.9), only 39% of eligible mothers took part in more than four different activities in order to assess the impact of the comprehensive package of the communication program.

In theory, all interviewed mothers in the exposed group were to take part in different communication actions, and the unexposed group were not. However the above statistical findings looked different and more complex. For example, we saw a clear distinction between the exposed and unexposed groups when comparing the frequency of participation which exceeded four times and beyond (39% vs. 6%, respectively, $p < 0.001$). The program coverage of the unexposed group who participated less frequently at one to three activities increased to 77%. This result supported the assumption of the program's contaminating effect (Chap. 1, Sect. 1.2), and we wondered why so many mothers in the unexposed group participated at communication activities. It was partly because of the nature of the participatory action research program for which scientific evidence was neither the prime purpose nor the end result, and it was thought to be ethically unacceptable to exclude mothers asking to take part in the program activities because they were from outside the program pilot area. The program coverage reached an optimal level with 97% of mothers in the exposed group who attended at least one communication activity. Yet when looking into the coverage of each program activity, some activities recorded a moderate percentage of participation.

Most NGO-led activities involved both mothers and their husband or other family members; rarely mothers alone participated in such events (43% vs. 11%). Among the exposed group, only 46% reported having listened to the KFP radio program. This moderate proportion could most probably be explained by the shortfall in radio

Table 5.9 Different types of communication actions implemented in Maradi and Zinder ($n = 1026$)

Variables	Exposed group		Unexposed group		p-value
	n	%	n	%	
Number of attended communication actions ^a	Not at all		19	3.0	17.6
	1–3		371	58.2	76.9
	4 or more		247	38.8	5.6
Listening to KFP radio program in the last 14 days	At least once per week		311	46.4	28.8
Participation at NGO events in the last month by:	No one		234	40.6	82.6
	Mother and husband		246	42.7	9.6
	Husband or other family member only		35	6.1	1.4
	Mother only		61	10.6	6.4
KFP counseling during ANC visit in the last month			407	60.5	44.0
Home visits by community volunteers			376	54.6	10.5
Mothers involved as peer in promoting:	Not at all		198	29.5	40.2
	Breastfeeding		181	26.9	10.3
	Other KFP ^b		293	43.6	49.6

^a *N.B.*: All interventions include listening to KFP radio program, mothers' participation at NGO events, KFP counseling at ANC, home visits, and mothers promoting KFP

^b Other KFP include diarrhea treatment with ORS, identification of danger signs of infant illnesses, vaccination/deworming, and birth spacing

at home. As a matter of fact, among mothers having listened to the radio in the last 30 days, the proportion listening to the KFP radio program increased to 57% ($p < 0.001$). The proportion of mothers who received KFP counseling at ANC visit reached 61% in the exposed group. Community volunteers assigned to provide outreach support through home visits did not reach all eligible mothers but 61% in the exposed group ($p < 0.001$). With regard to peer promotion activity, the majority of mothers in the exposed group were involved in supporting their peers to practice early and exclusive breastfeeding or other practices related to KFP (70%, $p < 0.001$).

The ramification of KFP counseling integrated into antenatal care visits also went beyond the village boundaries, and the percentage attending ANC combined with KFP counseling reached 44% among the unexposed group. This must be related to the overlapping classification of the program intervention area and health catchment area: some villages were determined as areas unexposed to the program according to the classification of village boundaries, but the same villages identified as unexposed group could be covered by a health facility supported by the program as a reference point to provide maternal and child healthcare and treatment. Qualified birth attendants and midwives posted in health facilities received the program training and support to foster their communication and technical skills specializing in maternal, newborn, and infant care and feeding practices. Regardless of the existence of health post within the village of residence, many mothers preferred going to do ANC in a communal health center or a maternity in a district hospital outside their village to seek better-quality care as witnessed during interviews with mothers in a program pilot area of Maradi region.

In short, the statistical findings implied that the benefit of communication activities which seemed to positively influence child healthcare was being transmitted from person to person through sharing experience individually or collectively regardless of the geographical classification of the program coverage. This contaminating effect of the program intervention made statistical analysis difficult to measure accurately the extent to which each communication action influenced the timing of initiating breastfeeding after birth. Nevertheless, from the program perspectives, it gave a clue to understand how such intensive efforts to pilot a participatory action research could be scaled up as this question remained a challenge for many field project planners and executing organizations. A group of mothers and an entire village implementing KFP promotion could inspire their pairs as a model case because earnest desire to see their child developing faster and becoming healthier could be a universal value and shared by all mothers, their family, and community. This pilot social and behavior change communication suggested a possible pathway to building a sustainable mechanism of maternal child healthcare promotion with people-centered approaches.

5.3.3 *How Did the Program Coverage and Intensity Impact the Timing of Initiating Breastfeeding After Birth?*

We now examine what among the above-listed program actions influenced the most positively early initiation of breastfeeding. Bivariate analysis measured to which extent the implication of mothers and their family in each identified communication action changed the chance of initiating breastfeeding within the first hour of birth. The integrated approach using various types of communication strategies was meant to make optimal child healthcare socially and culturally prevailing values that mothers and their family seek and practice good care for their child. The program sought to sustain individual behavior change by creating an environment favorable to practices such as putting the child to the breast immediately after birth. In another word, processes of social and behavior change could be translated by mothers' self-awareness to take their own responsibility to give their child the best they could for their survival and health.

The findings of bivariate analysis indicated that there was a gradient effect of the number of communication actions correlated to early initiation of breastfeeding: the greater the number of activities that mothers attended, the more likely they practiced early breastfeeding. When mothers participated in more than 1–3 activities, the chance of early breastfeeding increased by 2.4 times (95%CI: 1.2, 4.7) and 6.5 times (95%CI: 2.7, 15.7) with more than 4 activities compared to those who never attended any program activity during the previous 2–4 weeks. Mothers and their husband who participated at NGO-led events were 2.8 times more likely to practice early breastfeeding compared to those who never attended such events. KFP counseling provided by midwives or qualified birth attendants during the ANC visit at health center to discuss newborn care and early and exclusive breastfeeding revealed highly significant and positive impact on early initiation of breastfeeding after birth (OR = 3.0, 95%CI: 1.9, 2.3). *Home visits by community volunteers*, selected by the village assembly, appointed by the village chief, and trained and supported by the program, positively influenced early breastfeeding (OR, 2.2; 95%CI, 1.5, 4.0). Mothers involved in breastfeeding promotion to their peers showed the most outstanding effect on increasing the chance of early initiation of breastfeeding compared to those who never did any health promotion activity (OR, 3.3; 95%CI, 1.7, 6.3) (Table 5.10).

All above-cited communication actions had statistically significant and positive effects on promoting initiation of breastfeeding within the first hour of birth except for one variable: listening to KFP radio program which did not change the timing of initiating breastfeeding. It was after the start of the community-based program of behavior change communication (BCC) that ANC became an important vector for mothers-to-be to change their routine prelacteal feeding and adopt early and exclusive initiation of breastfeeding after birth. KFP counseling during ANC integrated behavior change strategies aimed at strengthening the health professionals' skills and capacities of individual and group discussion, dialogue, and negotiation. This

Table 5.10 Impact of communication actions on promoting early initiation of breastfeeding after birth ($n = 1026$)

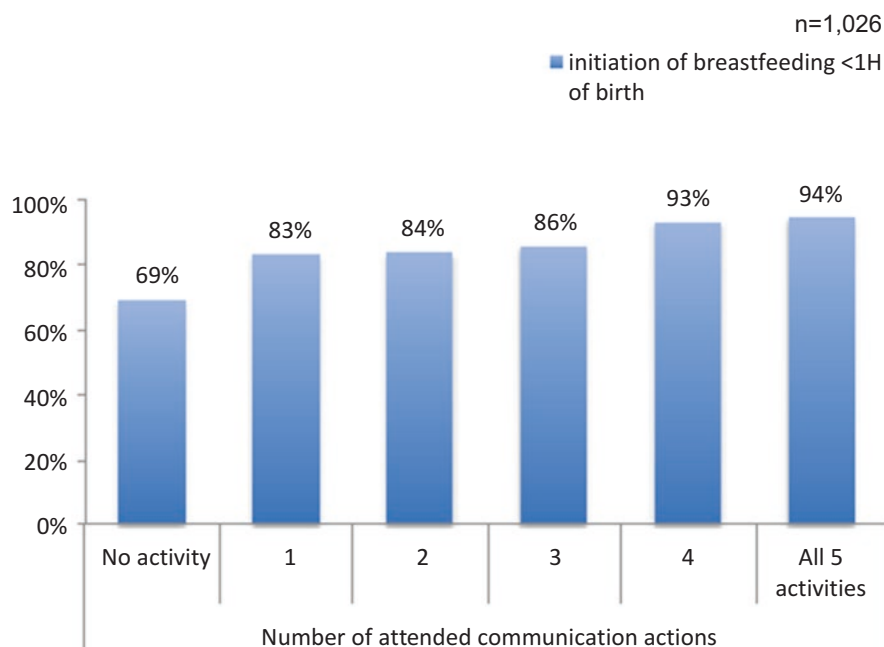
Variables		Initiation of breastfeeding within the first hour of birth		
		Curde OR	95% CI	p-value
Number of attended communication actions ^a	Not at all	1	–	–
	1–3	2.35	1.16, 4.73	0.02
	4 or more	6.54	2.72, 15.7	<0.001
Listening to KFP radio program in the last 14 days	Not at all	1	–	–
	At least once per week	0.91	0.59, 1.39	0.65
Participation at NGO events by mothers:	Not at all	1	–	–
	At least once in the last month	2.28	1.37, 3.79	0.001
Participation at NGO events by other family members (husband):	Not at all	1	–	–
	At least once in the last month	2.84	1.50, 5.36	0.001
KFP counseling during ANC visit	Not at all	1	–	–
	At least once in the last month	3.00	1.93, 4.65	<0.001
Home visits by community volunteers	Not at all	1	–	–
	At least twice in the last month	2.24	1.49, 4.00	<0.001
Mothers involved as peer in promoting:	Not at all	1	–	–
	Breastfeeding	3.28	1.70, 6.30	<0.001
	Other KFP ^b	1.71	1.08, 2.70	0.02

^aN.B.: Communication actions include (1) listening to KFP radio program, (2) mothers' participation at NGO events, (3) KFP counseling during ANC visit, (4) home visits by community volunteers, and (5) mothers promoting KFP

^bOther KFP include diarrhea treatment with ORS, identification of danger signs of infant illnesses, vaccination/deworming, and birth spacing

comprehensive approach of social and behavior change communication to promote preventive and curative maternal child health resulted in increasing the impact of clinical-oriented perinatal service which was no longer effective to prevent suboptimal care and feeding after delivery (Horii et al. 2016).

With regard to the program coverage intensity, a chi-squared test showed a linear progression of early breastfeeding along with the increasing number of program exposures to different communication actions in the range of 0 to 5 (Graph 5.2). Increasing number of participations in program activities did not seem to make a difference on early initiation of breastfeeding so long as the number of participations in the program activities exceeded 4. The prevalence of early initiation of breastfeeding among those who never participated in communication actions reached 69%. It looked like early breastfeeding became routine newborn care and



Graph 5.2 Early initiation of breastfeeding according to the number of communication actions in which mothers were involved. $n = 1026$. *N.B.:* *Communication actions include (1) listening to KFP radio program, (2) mothers' participation at NGO events, (3) KFP counseling at ANC, (4) home visits by community volunteers, and (5) mothers promoting KFP

feeding beyond the areas which have been covered by the intensive program for more than 3 years. Another possible explanation was that what determined mothers' timing of initiating breastfeeding was not the number of participations in different communication activities, but the types of communication strategies and approach which impacted most positively early initiation of breastfeeding.

The impact assessment of the communication actions emphasized two actors who could play a key role to encourage mothers to practice early initiation of breastfeeding. First are the family members, more specifically mother's husband and the child's grandmother, who were the first contacts to exchange about newborn care and infant feeding. Intra-family interactions between the mother and their husband and child's grandmother were a cornerstone of child healthcare during the perinatal period. Grandmothers were often involved in assisting delivery at home and therefore had a strong influence on mothers' decision to put or not their child to the breast within the first hour of birth. Second are the midwives trained to provide KFP counseling in a health facility. Whereas ANC turned ineffective communication channel to encourage mothers to practice early breastfeeding in the previous analysis, after the communication program integrating KFP counseling, they became a strong protective factor for promoting early breastfeeding.

5.3.4 *What Impact and Which Strategies of Social and Behavior Change Communication with Regard to the High-Risk Population*

We now look into socio-economic disparity in rural Niger which was thought to interfere with the effects of communication actions on early initiation of breastfeeding. Earlier in this chapter, statistical findings implied that the most deprived group of mothers were excluded from the social and behavior change communication program (Table 5.1, Graph 5.1). This section verifies which type of communication action promoting optimal breastfeeding after birth was responsive to socio-economic disparity among the identified high-risk group prone to delayed initiation of breastfeeding.

We selected the same set of preselected confounding variables associated with early initiation of breastfeeding and program exposure (Table 5.3). In addition, we included marital status, an important sociocultural indicator in rural Niger (see Sect. 5.2.3), significantly associated with early initiation and program exposure in bivariate analysis. The program exposure and the region of residence were also considered as important confounders: since the program inclusion criteria were based on purposive nonrandom sampling, multivariate analysis could adjust the effects of major bias when interpreting the findings. The multivariate analysis investigated influence of each communication action separately to understand what worked and what did not work for mothers to put their child to the breast during the first hour of birth regardless of socio-economic status of mothers.

The increasing number of programs in which mothers participated actively remained highly significant in its positive association with early initiation of breastfeeding: the greater the number of times they attended different types of communication actions, the more likely they started initiating immediately after birth. This suggested there was interactive influence between different types of activities which optimized the impact of every communication action by adopting the integrated approaches to undertake different strategies simultaneously to promote early breastfeeding after birth.

The adjusted multivariate analysis (Table 5.11, Graph 5.3) showed that many communication actions no longer influenced early breastfeeding except for *KFP counseling during ANC visit* and *breastfeeding promotion by mothers to their peers*, which remained positively associated with early initiation of breastfeeding. In light of the community-led social change as one of the key social and behavior change strategies with participatory approach, this communication action empowered participants by taking leadership as a promoter of improvement of child healthcare at home in their neighborhood. This activity showed the most significant impact on early initiation of breastfeeding among mothers who were involved in peer promotion of early and exclusive breastfeeding (AOR, 1.7; 95%CI, 1.3, 5.5). ANC was no longer a protective factor for early breastfeeding, but introducing counseling to discuss child healthcare had a strong impact on the entire group of populations. Mothers who received an individual or group KFP-related counseling during the ANC visit

Table 5.11 Effects of different types of the communication program activities on early initiation of breastfeeding adjusted for socio-economic status of mothers ($n = 1026$)

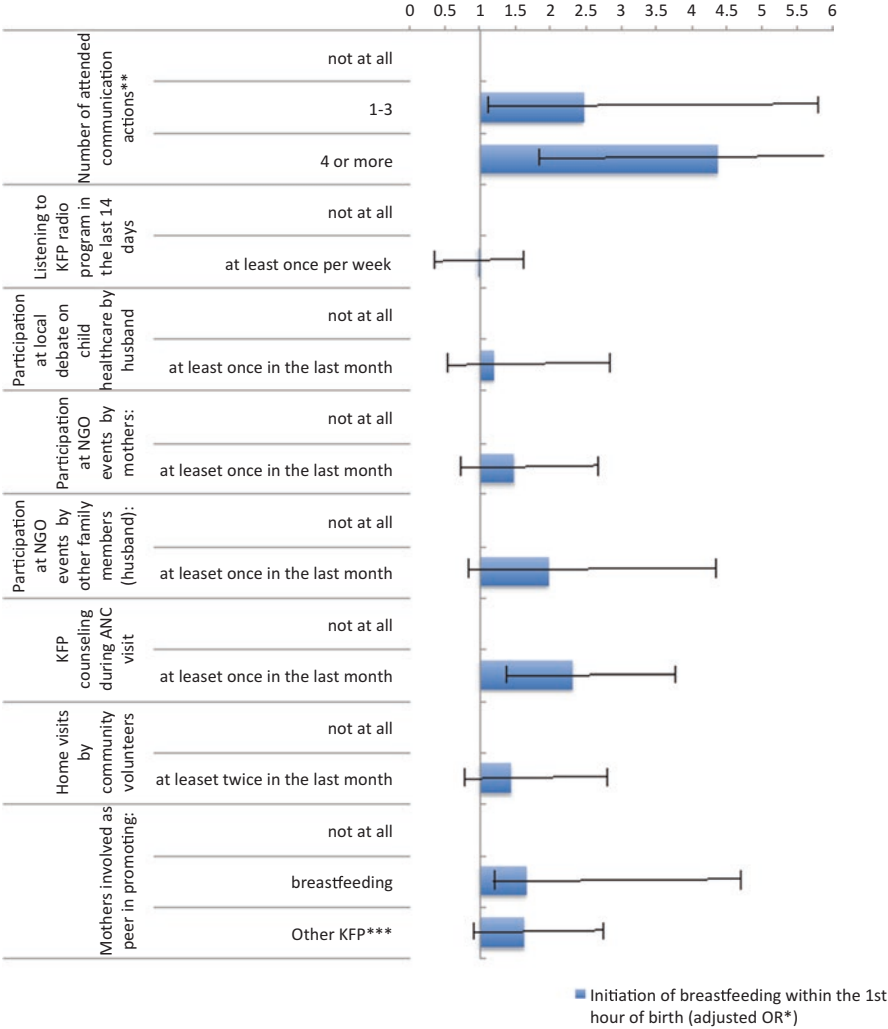
Variables		Initiation of breastfeeding within the first hour of birth		
		Adjusted OR*	95% CI	p-value
Number of attended communication actions**	Not at all	1	—	—
	1–3	2.48	1.10, 5.57	0.03
	4 or more	4.38	1.59, 12.1	<0.01
Listening to KFP radio program in the last 14 days	Not at all	1	—	—
	At least once per week	0.97	0.60, 1.57	0.91
Participation at local debate on child healthcare by husband	Not at all	1	—	—
	At least once in the last month	1.21	0.56, 2.65	0.62
Participation at NGO events by mothers:	Not at all	1	—	—
	At least once in the last month	1.49	0.82, 2.70	0.19
Participation at NGO events by other family members (husband):	Not at all	1	—	—
	At least once in the last month	1.98	0.88, 4.43	0.1
KFP counseling during ANC visit	Not at all	1		
	At least once in the last month	2.33	1.45, 3.76	0.001
Home visits by community volunteers	Not at all	1	—	—
	At least twice in the last month	1.45	0.79, 2.67	0.23
Mothers involved as peer in promoting:	Not at all	1	—	
	Breastfeeding	1.67	1.30, 5.47	<0.01
	Other KFP***	1.63	0.97, 2.75	0.07

*Odds ratio adjusted for the program exposure, region of residence, selected socio-demographic and economic variables: exposure to the program, region of residence at the time of the interview, educational attainment of the interviewed mothers, type of occupation, means of transport, distance to the health facility, use of toilet facility and marital status

**Communication actions include: (1) listening to KFP radio program, (2) mothers' participation at NGO events, (3) KFP counseling during ANC visit, (4) Home visits by community volunteers, and (5) mothers promoting KFP

***Other KFP include: diarrhea treatment with ORS, Identification of danger signs of infant illnesses, vaccination/deworming and birth spacing

were 2.3 times more likely to initiate breastfeeding within the first hour of birth (95%CI: 1.5, 3.8). The degree of applying counseling methods provided by health professionals was unknown and subject to further investigation. Qualitative research to assess the health system performance to deliver perinatal care would be useful to revisit the current behavior change strategies to contribute to strengthening capacities of health professionals and improving the quality of maternal and child health-care services.



Graph 5.3 Effects of different types of the communication program activities on early initiation of breastfeeding. *n* = 1026. *N.B.1:* *Odds ratio adjusted for the program exposure, region of residence, and selected socio-demographic and economic variables, educational attainment of the interviewed mothers, type of occupation, means of transport, distance to the health facility, use of toilet facility, and marital status. **All interventions included listening to KFP radio program, mothers' participation at NGO events, KFP counseling at ANC, home visits, and mothers promoting KFP. ***Other KFP included diarrhea treatment with ORS, identification of danger signs of infant illnesses, vaccination/deworming, and birth spacing. *N.B.2:* The reference category for each variable is not listening to KFP radio program at all; mothers' husband not participating at local debate about KFP; ANC counseling not addressing KFP; no home visit by community volunteers; and mothers not involved in any activity as peer promoter

Among those who received at least one home visit by community volunteers over the 14 days prior to the interview, the chance of early breastfeeding was no longer statistically significant (95%CI: 0.8, 2.7). A community volunteer nominated by a village assembly was assigned to cover between 30 and 60 households to make a monthly visit. The catchment area allocated to each volunteer could be extended over a large geographical surface to cover households in a remote area beyond 5 km walking distance. This home visit aimed to meet pregnant women and breastfeeding mothers at their house, providing them opportunities to meet a volunteer and hold a discussion on KFP at least once a month and check the progress how they were doing with newborn, infant, and child care and feeding. Community volunteers were also mothers of young children, living in the same village as their peers, but the local population were not used to having unknown young woman knocking at the door to discuss openly their children's health touching an intimate subject for the family. The people in the village were aware, for example, that a project coordinator of a local NGO was recruited by the program to be appointed from outside their village and therefore regarded as an entity which did not belong to their community. The community volunteers, thought to be granted incentives and special support by the program, often became a target of criticism that there was unequal distribution of resources and the program could have benefited the most deprived families. In some pilot areas, there were growing tensions between community volunteers and poor families who could not afford essential materials to practice KFP as encouraged by volunteers such as washing hands with soap at the critical time. A focus group discussion with female community volunteers revealed the difficulties that they encountered as they sought to contact individually each mother at home to encourage her to change the habit by giving only breast milk to her child immediately after birth. They witnessed that in the beginning, when they went to see a mother at home, they were systematically rejected. There was nothing the mother wanted to learn from them, and the mother got angry thinking that they were hiding a soap or handwashing kit and they did not want to share any with her.⁶ Statistical findings showed that home visits did not increase the chance of early breastfeeding when adjusted for the socio-economic status of mothers and implied that this type of communication action had limited impact on breastfeeding promotion among the most deprived mothers.

In short, the participatory integrated approach combining different types of social and behavior change strategies with stakeholders from different backgrounds reached the most deprived group of population to promote early initiation of breastfeeding. Besides, typology analysis adjusted for socio-economic and demographic status of mothers suggested that when examining each communication action and channels and its impact one by one, *KFP counseling by midwives* during ANC and *promoting breastfeeding to the peers by mothers*, revealed the most significant outcome of early initiation of breastfeeding among the most deprived population in rural Niger. However, within the current program, the above two communication actions covered a limited number of populations: slightly more than half of mothers

⁶Observations and interviews were conducted during the field visit in Sarkin Yama, Maradi, 2011.

in the exposed group received KFP counseling during the KFP ($n = 407$, 61%) and only one out of four mothers exposed to the program was involved in breastfeeding promotion by peers ($n = 181$, 27%) (Table 5.9). This impact assessment of the social and behavior change communication program provided a clue to evidence-based actions and opportunities to reorient the interpersonal communication oriented strategy toward participatory people-centered approach. Home visits by volunteers would require thorough investigation as to why there was no effect as opposed to the intensive technical and financial support from the program that many other international NGOs seemed to continue to apply. Equity healthcare and access to social network and community support and services could be warranted only by mothers and their families and community members, directly concerned by practicing the health behavioral outcomes. Husband, grandmothers, traditional birth attendants, and other traditional leaders were to play more important roles to become a principal behavior change supporter in this program as their highly recognized social status and trustworthy personality could allow the new behavior to be readily accepted by the villagers. They are major contributors to creating breastfeeding-friendly environment for all mothers willing to give her breast milk, and according to Jean-Jacque Rousseau (1979), no one else could excel mothers when it comes to nurse the baby in the first year of life.

Conclusions and Recommendations

Delayed initiation of breastfeeding is clearly a major public health concern in rural Niger. Twenty-four-hour recall showed that nearly half of mothers stopped breastfeeding their child exclusively within the first 3 days of life. If early initiation of breastfeeding has become a routine, newborn care and feeding adopted by many rural mothers through KFP promotion in the regions and prelacteal feeding with other liquids than breast milk, especially water feeding, remained culturally predominant, and early and exclusive initiation of breastfeeding after birth remained uncommon practice.

Demographic analysis of determinants of postpartum breastfeeding was based on the three different datasets that included the 2006 Niger DHS, the 2012 Niger DHS, and the 2011 PIS in Maradi and Zinder. It was a complex process for data management and analysis and makes cross-dataset statistical interpretation difficult with regard to conflicting results generated from the statistical tests. Nevertheless, each statistical analysis using different datasets was meant to meet a specific purpose: the 2012 Niger DHS contrasted distinctive characteristics of urban and rural mothers and identified determinants of early breastfeeding in all of Niger prior to the start of the communication program from 2008. Comparative analysis between the 2006 and 2012 Niger DHS illustrated change in how the identified risk or protective factors influenced the timing of initiation of breastfeeding after birth over time. The 2011 PIS depicted social determinants of family and community do-able child healthcare and feeding. The principal aim of this secondary analysis was to evaluate the effects of communication actions on mothers' behavior change in early start of breastfeeding after birth taking into account trends of characteristics inclined to suboptimal infant feeding.

High-Risk Group and Socio-economic Disparity: Does the Communication Program Reach the Most Deprived Mothers?

Early initiation of breastfeeding was impaired by socio-economic vulnerability of mothers, and the statistical findings of the PIS suggested that socio-economic disparity was no longer a bottleneck among mothers actively involved in improving newborn care and feeding. On the other hand, the findings suggested that the program excluded the socio-economically most vulnerable group of mothers as in many other behavior change communication programs and that it further increased socio-economic disparity between the better-off and the poor through providing support and care to promote key family practices. Socio-economically vulnerable mothers were prevented from access to basic healthcare and services during the postpartum period at health facilities, community gatherings, or events. As a result, they were likely to be excluded from opportunities provided by such program support to participate actively in actions promoting optimal breastfeeding (Andrien and Beghin 1993).

Poverty was beyond the scope of the strategy of social and behavior change communication, and the design of such interventions did not systematically prioritize actions on the high-risk groups of population. Behavior change to improve maternal and child healthcare was not meant to improve living standards of mothers. The communication program promoting KFP was not designed with a systematic method to identify a high-risk group of population. It was only since 2012 that UNICEF introduced a new framework of a strategic plan of social and behavior change communication program promoting maternal and child health with a focus on vulnerable groups of population¹. However, the 2011 post-intervention survey (PIS) showed that the community-based communication program promoting key family practices enabled the socio-economically most vulnerable mothers to overcome disparity to adopt early initiation of breastfeeding. The findings suggested that universal health coverage to provide equal opportunity to access the quality healthcare services was effective when combined with promoting hygiene and sanitation to respond to the socio-economic and cultural bottleneck impeding early initiation of breastfeeding.

¹The author was involved in modeling this framework by adapting to the emergency context specific to Tchad to identify the most vulnerable groups of population based on which a strategic plan of behavior change communication for the polio eradication program was formulated.

Implication of Health and Non-health Actors as Communication Channels

The government strategy of maternal health focused on antenatal care and delivery assisted by qualified health professionals. Promoting deliveries in a health facility became one of the top priorities as it was thought to provide a safe environment to mitigate the risks of maternal and neonatal mortality. However, there is strong evidence that in poor resource setting, kangaroo mother care dramatically reduced newborn deaths. In rural areas, many mothers could not do anything but deliver at home without qualified birth assistants, deprived from accessing basic social and healthcare. Social and behavior change communication strategies should therefore emphasize community-based newborn care with KMC and training and involvement of traditional birth attendants in villages in parallel to promotion of mothers' equal access to health services and capacity building of health providers at maternity.

The typology analysis showed that home visits conducted by community volunteers had no significant effect on increasing early breastfeeding and did not reach the most deprived group of population. Beyond the fact that socio-economic status determined what worked in promoting early breastfeeding, we should explore why this interpersonal communication strategy showed limited impact on leading mothers to adopt early breastfeeding individually.

Dialogue with the husband or the child's grandmother about KFP was one of the critical child healthcare-related behaviors leading all mothers including the most deprived to adopt optimal postpartum breastfeeding. Interaction between mothers and their family members had already shown positive influence on early breastfeeding in previous studies (Maisonneuve 2013; Naudet 2012). Yet, the communication program did not implement specific actions to approach child's grandmothers. Further stakeholder analysis would be necessary to examine the roles of senior women holding an important position in a family and village to determine the timing of initiation of breastfeeding after birth.

Sustainable Change of Behavior for Family and Community

The community-led social change strategy positioned mothers in the sphere of more global perspectives than the household limited to interaction between family members. This communication strategy led mothers to waken to their role to play as a member of the community by acting actively for changing the way children were taken care of for the better. Groups of mothers actively involved in promoting early and exclusive breastfeeding were rewarded a recognition to be a "good mother" through interactions with other community members. This resulted in dynamics of constant change in social values (Figuerola et al. 2002; Byrne et al. n.d.). Behavior change became conceivable when it addressed a group than an individual (Raine

2003; Nankunda et al. 2006). When a group of mothers assimilated the change as a common practice, a new practice could be adopted more easily than when a mother was to stand on her own to make such a decision isolated from her peers (Blau 1977). Another implication of participatory communication was the ownership of mothers by actively participating in planning, acting, and understanding the impact of their actions (Chambers 1997; Waisbord 2001) on promoting KFP that dramatically increased early initiation of breastfeeding beyond the fact that they were poor or better-off.

The social and behavior change communication program with participatory approaches combined with hygiene promotion, suggesting a response to socioeconomic disparity, optimized further newborn healthcare and feeding for neonatal survival (Horii et al. 2016). There is evidence that a comprehensive package of community-based perinatal and neonatal care based on a continuum of care covering the antenatal to postnatal period dramatically reduced neonatal mortality risks (Bhutta et al. 2005; Darmstadt et al. 2005). Further holistic approaches to combine other non-health sectoral programs for women's empowerment and female education were deemed crucial to optimize the impact of these clinical interventions.

Annexures

Annex 1. Lists of the Selected Villages for the Post-intervention Survey (PIS) in the Four Regions of Niger

1.1 Study Area of the Intervention Groups

Region	Department	Department code	Canton/commune	Code canton	Name of village
Maradi	Madarounfa	41	Sarkin Yamma	14	Garin Bajini
		41		14	Soumarana Maazou
		41		14	Tchouboula
		41		14	Garin Gaja
		41		14	Dan Koge
		41		14	Dan Mazadou
		41		14	Guidan Bawa Sanfo
		41		14	Garin Goulbi
		41		14	Serkin Yamma Sofoua
		41		14	Moulle Sofoua
		41		14	Garin Dogo
		41		14	Serkin Yama Saboua
		41		14	Garin Makoyo
		41		14	Dadin Kowa Abarchi
		41		14	Garin Kouzgou
	Aguié	42	Aguié	10	Dan Gouari
		42		10	Gamji Saboua
		42		10	Dan Gao
		42		10	Guidan Nahantchi (VA)

Region	Department	Department code	Canton/ commune	Code canton	Name of village
Zinder	Matamèye	74	Yaouri	10	Danana Haoussa Et Bougage
		74		10	Guertaou
		74		10	Katofou
		74		10	Angoual Gourey
		74		10	Koukal Maikia
		74		10	Dan Gareya
		74		10	Kinkaou
		74		10	Yaouri
		74		10	Dan Katchao
		74		10	Dan Katchao
Zinder	Magaria	73	Dungass	13	Kouna
		73		13	Takey
		73		13	Gantchi II
		73		13	Kazake Ibrah
		73		13	Fada
		73		13	Korama Namago
		73		13	Bangaza
		73		13	Zangounat Kouregue
		73		13	Dungass
		73		13	Kafouta
		73		13	Dan Kourtchi
		73		13	Garin Sarkin Fawa
		73		13	Angoal Koraw
		73		13	Wachawa
		73		13	Tanti Gagadja
		73		13	Toulouki

Source: Institut National de la Statistique (2011)

1.2 Study Area of the Control Groups

Region	Department	Code department	Canton/ commune	Code canton	Name of village
Maradi	Madarounfa	41	Safo	13	Riadi
		41		14	Tchicadji
		41		14	Bakawa+D28
		41		14	Rougougoua
		41		13	Babban Rafi
		41		13	Serkin Yaki Tanko
		41		13	Safo Nassaraoua
		41		13	Safo Nassaraoua
	Aguié	42	Aguié	10	Dan Saga (VA)
		42		10	Jikata (VA)
		42		10	Naki Karfi (VA)

Region	Department	Code department	Canton/commune	Code canton	Name of village
		42		10	Dan Harou Tambari (VA)
		42		10	Debi
		42		10	Kafin Kouka
		42		10	Dourgou
		42		10	Algafia (VA)
		42		10	Dajin Halilou
		42		10	Longo Maijanguero
		42		10	Gassakoli (VA)
Zinder	Matamèye	74	Yaouri	10	Wadare Peulh
		74		10	Garin Gawassa
		74		10	Garin Na Kaka
		74		10	Angoual Tanko Peulh
	Magaria	73	Dungass	13	Fan Kaya
		73		13	Garin Malam Mamiya
		73		13	Dan Tama
		73		13	Garin Kondo
		73		13	Foula Takado
		73		13	Garin Tangam
		73		13	Garin Kanta
		73		13	Rougan Gantchi
		73		13	Tagouaye II
Tahoua	Bouza	54	Bouza	1	Tallabé Abaza
		54		1	Tountoubé
		54		1	Kaba Gabass
		54		1	Gradoumé Koré
		54		1	Madatta II
		54	Déoulé	2	Guidan Tamak
		54		2	Déoulé
		54		2	Hiro
		54		2	Loubé
		54		2	Gounzou
	Illéla	55	Illéla	3	Koma
		55		3	Malawa
		55		3	Libattan Guidan Rana
		55		3	Dangada Amadou
		55		3	Dangada Toudou
		55	Bagaroua	4	Akassou
		55		4	Akassou Folakawa/Bagaroua
		55		4	Akassou II/Bagaroua
		55		4	Changnassou
		55		4	Gao

Region	Department	Code department	Canton/commune	Code canton	Name of village
Tillabéry	Tillabéry	61	Anzourou	1	Bissakirey
		61		1	Farié
		61		1	Gattali
		61		1	Margamarga
		61		1	Bangoutande
		61		1	Walla Gountou
		61		1	Goulbal
		61		1	Sangara
		61	Kourthey	2	Sonsoni Bella
		61		2	Barma Goungou
		61		2	Weila
		61		2	Damalé
		61		2	Farié-Haoussa
		61		2	Kobagué
		61		2	Leyni
		61		2	Zamey
Tillabéry	Ouallam	64	Ouallam	3	Boleyzeydo
		64		3	Foygourou
		64		3	Garbey Malo Koira
		64		3	Sargane Baba Windi
		64		3	Samtigué
		64	Simiri	4	Gatwan
		64		4	Dadaga Mossi
		64		4	Tilwa Gabine
		64		4	Simiriko
		64		4	Bamana Gorou
		64		4	Forgoye Gorou
		64		4	Tilwa Yassi
		64		4	Boukanda
		64		4	Malo Koira
		64		4	Warou

Source: Institut National de la Statistique (2011)

**Annex 2. Quests of the Post-intervention Survey (PIS):
Household Questionnaire, Individual Women’s Questionnaire,
and Community Questionnaire**

2.1 Household Questionnaire



**ENQUETE QUANTITATIVE : Recherche Action sur
les Pratiques Familiales Essentielles (PFE)**

QUESTIONNAIRE MENAGE

1. IDENTIFICATION		
1.1	REGION DE : _____	Code Region 4=Maradi 5=Tahoua 6=Tillabéry 7=Zinder
1.2	DEPARTEMENT DE : _____	_____
1.3	CANTON/COMMUNE DE : _____	_____
1.4	VILLAGE DE : _____	_____
	TYPE DE VILLAGE	1= Village PFE 2= Village Filets sociaux, 3=village témoin _____
1.5	QUARTIER (pour centre urbain) :-----	
1.6		_____
1.7	NUMERO DU MENAGE :	_____
1.8	NOM ET PRENOM DU CHEF DE MENAGE _____	
1.9	NOM DE L'ENQUETEUR _____	
1.10	NOM DU CHEF D'EQUIPE _____	

Date de passage : ...____/____/____ 2 011

Observations

2.2 Individual Women’s Questionnaire

REGION	DEPARTEMENT	COMMUNE	VILLAGE	N° MENAGE	N° MERE/ GARDIENNE/ FEMME ENCEINTE

QUESTIONNAIRE INDIVIDUEL FEMME

TYPE DE FEMME : 1 = MERE D'ENFANT DE MOINS DE 5 ANS
2 = MERE D'ENFANT DE MONS DE 5 ANS ET ENCEINTE /____/
3 = GARDIENNE D'ENFANT DE MOINS DE 5 ANS
4 = FEMME ENCEINTE SANS ENFANT

I. CADRE DE VIE DE LA MERE / GARDIENNE D'ENFANT DE MOINS DE CINQ (5) ANS OU FEMME ENCEINTE		
EF1. VOTRE MENAGE POSSEDE T-IL UN POSTE RADIO ?	1 = OUI 2 = NON	/____/
EF2. VOTRE MENAGE POSSEDE T-IL UNE TV ?	1 = OUI 2 = NON	/____/
EF3. AVEZ-VOUS ECOUTE LA RADIO AU MOINS UNE FOIS AU COURS DES 30 DERNIERS JOURS ?	1 = OUI 2 = NON	/____/
EF4 AVEZ-VOUS REGARDE LA TV AU MOINS UNE FOIS AU COURS DES 30 DERNIERS JOURS?	1 = OUI 2 = NON	/____/
EF5. POUVEZ VOUS PRENDRE UNE DECISION DES DEPENSES POUR LES SOINS DE VOS ENFANTS SANS DEMANDER L'AVIS DE VOTRE MARI OU SES PARENTS?	1 = OUI 2 = NON 3 = NC (FEMME ENCEINTE SANS ENFANT)	/____/
EF6. VOTRE MENAGE DISPOSE T-IL D'UN MOYEN DE TRANSPORT POUR ALLER DANS LE CENTRE DE SANTE QUE VOUS FREQUENTIEZ ?	1 = OUI 2 = NON SI OUI ALLER A EF8	/____/
EF7. SI EF6 = 2 AUPRES DE QUI VOUS VOUS ADRESSEZ GENERALEMENT POUR AVOIR UN MOYEN DE DEPLACEMENT ?	1. = VOISIN/AMIS 2. = PARENTS 3. = ASSOCIATIONS/ONG 4. = LOCATION 5. = AUTRES	/____/

EF8. QUEL EST LE PRINCIPAL MOYEN DE DEPLACEMENT QUE VOUS UTILISEZ POUR VOUS RENDRE AU CENTRE DE SANTE ?	1. = VEHICULE 2. = CHARRETTE 3. = MOTO 4. = BICYCLETTE 5. = ANIMAUX 6. = PIROGUES 7. = A PIEDS 8. = AUTRES	/___/
EF9. EXERCEZ-VOUS UNE ACTIVITE GENERATRICE DE REVENU (AGR)?	1 = OUI 2 = NON	/___/
EF10. SI OUI GEREZ VOUS LES BENEFICES TIRES DE CETTE ACTIVITE ?	1 = OUI 2 = NON	/___/
EF11. EXPLOITEZ-VOUS UN LOPIN DE TERRE ?	1 = OUI 2 = NON	/___/
EF12. SI OUI EN EF11 QUI DECIDE DE L'UTILISATION DE LA RECOLTE ?	1. = MOI-MEME 2. = MON MARI 3. = CONJOINTEMENT	/___/
EF13. POSSEDEZ-VOUS DU BETAIL OU DE LA VOLAILLE ?	1 = OUI 2 = NON	/___/
EF14. QUEL EST LE PRINCIPAL LIEU DE DEFECATION DES MEMBRES DE VOTRE MENAGE ?	1. plein air 2. latrine traditionnelle 3. latrine améliorée 4. autres	/___/
EF15. QUEL EST LA PRINCIPALE SOURCE D'APPROVISIONNEMENT EN EAU DE BOISSON DE VOTRE MENAGE ?	1. Robinet 2. forage 3. puits protégé/ 4. puits traditionnel 5. eau de surface	/___/

II. SANTE DE LA MERE/GARDIENNE D'ENFANTS DE MOINS DE 5 ANS OU ENCEINTE		
SD1. COMBIEN DE FOIS AVEZ-VOUS ACCOUCHE ?	UNE FOIS.....1 PLUS D'UNE FOIS.....2 JAMAIS.....3	/___/
SD2. ETES-VOUS ACTUELLEMENT ENCEINTE ?	OUI.....1 NON2 → SD4 NSP.....9 → SD4	/___/
SD3. SI OUI EN SD2 AVEZ-VOUS FAIT DES CONSULTATIONS PRENATALES AU COURS DES DEUX MOIS ?	OUI.....1 NON2	/___/
SD4. AVEZ-VOUS FAIT DES CONSULTATIONS PRENATALES AU COURS DE LA DERNIERE GROSSESSE ?	oui.....1 non.....2 → MI1 NC.....3 → MI1	/___/
SD5. SI OUI EN SD3 PAR QUEL TYPE DE PERSONNEL DE SANTE?	MÉDECIN1 SAGE-FEMME.....2 INFIRMIÈR/INFIRMIERE.....3 AUTRE (PRÉCISER)4 NSP.....9	/___/
SD6. COMBIEN DE FOIS AVEZ-VOUS ETE CONSULTÉE ?	une seule fois.....1 deux à trois fois.....2 quatre fois et plus.....3 NSP9	/___/

III. UTILISATION DE LA MOUSTIQUAIRE IMPREGNEE (MI) ET CPN (FEMMES ENCEINTEES ET FEMME ENFANT DE MOINS DE 5 ANS)	
MI1. EST-CE QUE VOTRE MENAGE POSSEDE UNE MOUSTIQUAIRE IMPREGNEE ?	1 = Oui 2 = Non → MODULE SUIVANT /___/ 3 = NSP → MODULE SUIVANT
MI2. EST-CE QUE VOUS AVEZ DORMI SOUS UNE MOUSTIQUAIRE IMPREGNEE LA NUIT DERNIERE ?	1 = Oui 2 = Non /___/
MI3. EST-CE QUE TOUS VOS ENFANTS DE MOINS DE 5 ANS ONT PASSE LA NUIT DERNIERE SOUS UNE MOUSTIQUAIRE IMPREGNEE ?	1 = Oui 2 = Non /___/ 3= NC (n'a pas d'enfant) 8= NSP

IV. ALLAITEMENT MATERNEL (AM) (MÈRES DES ENFANTS DE 0-23 MOIS)	
AM1. AVEZ-VOUS UN ENFANT DE 0 A 23 MOIS ?	1 = OUI 2 = NON → MODULE SUIVANT /____/
AM2. QUEL AGE (NOM) A-T-IL ? TRANSCRIRE L'AGE DE L'ENFANT EN MOIS	MOIS /____ /____/
AM3. COMBIEN DE TEMPS APRES LA NAISSANCE AVEZ-VOUS MIS (NOM) AU SEIN POUR LA PREMIERE FOIS ?	MOINS D'UNE HEURE...1 1-24 HEURES2 > 24 HEURES3 /____/ NSP.....8
AM4. CONNAISSEZ-VOUS L'ALLAITEMENT MATERNEL EXCLUSIF POUR LES ENFANTS DE MOINS DE 6 MOIS	OUI.....1 NON2 → AM6 /____/
AM5. ALLAITEZ VOUS OU AVEZ-VOUS ALLAITE (NOM) EXCLUSIVEMENT	OUI.....1 NON2 /____/
AM6. (NOM) EST-IL ALLAITE DE FACON CONTINUE JUSQU' A 23 MOIS?	OUI.....1 NON2 /____/
AM7. A QUEL AGE AVEZ-VOUS COMMENCE A DONNE UN ALIMENT AUTRE QUE LE LAIT MATERNEL	/____/_____ NSP.....99 NC.....98
AM8. HIER DU MATIN A LA NUIT, (NOM) A-T-IL/ELLE BU/MANGE L'UNE DES CHOSES SUIVANTES : Lire à haute voix le nom de chaque élément et enregistrer la réponse avant de passer à l'élément suivant.	
AM8A. SUPPLEMENT DE VITAMINES, DE MINERAUX, OU MEDICAMENTS ?	OUI.....1 SI OUI COMBIEN DE FOIS /____/ NON2
AM8B. EAU ?	OUI.....1 SI OUI COMBIEN DE FOIS /____/ NON2
AM8C. EAU SUCREE, PARFUMEE OU JUS DE FRUIT OU THE OU INFUSION?	OUI.....1 SI OUI COMBIEN DE FOIS /____/ NON2
AM8D. SOLUTION DE REHYDRATATION ORALE (SRO) OU EAU SUCREE SALEE ?	OUI.....1 SI OUI COMBIEN DE FOIS /____/ NON2
AM8E. PREPARATION POUR BEBES VENDUE COMMERCIALEMENT ?	OUI.....1 SI OUI COMBIEN DE FOIS /____/ NON2
AM8F. LAIT EN BOITE, EN POUDRE OU LAIT FRAIS	OUI.....1 SI OUI COMBIEN DE FOIS /____/

V. SOINS DES ENFANTS MALADES (MERE OU GARDIENNE D'ENFANTS DE 0-59 mois)	
SE1. EST-CE QU'UN DE VOS ENFANTS A EU LA DIARRHÉE AU COURS DES DEUX DERNIÈRES SEMAINES? LA DIARRHÉE EST DÉTERMINÉE SELON LA PERCEPTION DE LA MALADIE PAR LA MÈRE OU LA GARDIENNE OU TROIS SELLES LIQUIDES PAR JOUR, OU DU SANG DANS LES SELLES	1= Oui 2 = Non → SE4 /_____/ 3= NSP → SE4
SE2. DURANT LE DERNIER ÉPISODE DE DIARRHÉE, QU'EST-CE QUE VOUS AVEZ DONNÉ À BOIRE À L'ENFANT :	1 = SRO 2 = EAU SALÉE SUCRÉE RECOMMANDÉE PAR LE SERVICE DE SANTÉ 3 = ANTIBIOTIQUE /_____/ 4 = MÉDICAMENT TRADITIONNEL 5 = RIEN
SE3. DURANT LA DIARRHÉE DE L'ENFANT, A-T-IL ÉTÉ ALIMENTÉ MOINS QUE D'HABITUDE, ENVIRON LA MÊME QUANTITÉ OU PLUS QUE D'HABITUDE ?	1= MOINS QUE D'HABITUDE 2 = ENVIRON LA MÊME QUANTITÉ /_____/ 3 = PLUS QUE D'HABITUDE 4 = NSP
SE4. EST-CE QUE UN DE VOS ENFANTS DE MOINS DE 5 ANS A SOUFFERT D'UNE MALADIE DONT VOUS AVEZ RECONNU UN DES SYMPTÔMES OU APRÈS AVOIR IDENTIFIÉ UN SIGNE DE DANGER POUR LA SANTÉ DE L'ENFANT ?	1 = OUI 2 = NON → SE7 /_____/
SE5. EST-CE QU'UN DE VOS ENFANTS A SOUFFERT DE LA TOUX AU COURS DES DEUX DERNIÈRES SEMAINES?	1= OUI 2 = NON ALLER SE7 /_____/ 3 = NSP ALLER SE7
SE6. QUEL TYPE DE MÉDICAMENT AVEZ-VOUS DONNÉ PRINCIPALEMENT À (NOM) LORSQU'IL SOUFFRAIT DE LA TOUX ? DEMANDER À VOIR LE TYPE DE MÉDICAMENT SI LE TYPE DE MÉDICAMENT N'EST PAS CONNU	1 = Cotrim 2 = AMOXICILINE 3 = AUTRES ANTIBIOTIQUES /_____/ 4 = AUCUN ANTIBIOTIQUES 5 = MÉDICAMENT TRADITIONNEL
SE7. EST-CE QU'UN DE VOS ENFANTS A SOUFFERT DE LA FIÈVRE, AU COURS DES DEUX DERNIÈRES SEMAINES?	1 = OUI 2 = NON → SE9 /_____/ 3 = NSP → SE9
SE8. QUEL TYPE DE MÉDICAMENT AVEZ-VOUS DONNÉ PRINCIPALEMENT À (NOM) LORSQU'IL A ÉTÉ MALADE ? DEMANDER À VOIR LE TYPE DE MÉDICAMENT SI LE TYPE DE MÉDICAMENT N'EST PAS CONNU SI LE TYPE DE MÉDICAMENT NE PEUT ÊTRE DÉTERMINÉ MONTRER LES ANTIPALUDEENS TYPÉIQUES À L'ENQUÊTE	1= FANSIDAR/ MALOXINE 2= CHLOROQUINE/AMODIAQUINE 3 = CAMOQUINE 4 = QUININE 5 = COARTÈM 6 = ARINATE/COARINATE /_____/

SE9. EST-CE QUE TOUS VOS ENFANTS ONT REÇU UNE DOSE DE VITAMINE A AU COURS DES 6 DERNIERS MOIS ? MONTRER LES CAPSULES DE VITAMINE A	1= OUI 2 = NON /_____/
	8 = NSP
SE1.0 EST-CE TOUS VOS ENFANTS DE MOINS DE 5 ANS ONT REÇU DU MEBENDAZOLE AU COURS DES 6 DERNIERS MOIS ? MONTRER LES COMPRIMES DE MEBENDAZOLE	1= OUI 2 = NON /_____/
	8 = NSP

2.3 Community Questionnaire

Enquête quantitative relative à la Recherche Action sur les Pratiques Familiales Essentielles(PFE)

QUESTIONNAIRE COMMUNAUTAIRE

1. IDENTIFICATION		
1.1	REGION DE : _____	Code Région 4=Maradi 5=Tahoua 6=Tillabéri 7=Zinder
1.2	DEPARTEMENT DE : _____	_____
1.3	CANTON/COMMUNE DE : _____	_____
1.4	VILLAGE DE : _____	_____
1.5	TYPE DE VILLAGE	1= Village PFE 2= Village Filets sociaux, 3=village témoin
1.8	NOM ET PRENOM DU CHEF DE VILLAGE OU SON REPRESENTANT _____	
1.9	NOM DU CHEF D'EQUIPE _____	

Date de passage : ...|_|_|_|/|_|_|_|/|2|0|1|1|

Observations:

INFRASTRUCTURES			
I.1	Y a-t-il une école primaire dans le village ?	1. Oui 2. Non <input type="text"/>	Si Non à quelle distance se trouve l'école primaire la plus proche 1- Moins de 5 km 2- 5 à 15 km 3- Plus de 15 <input type="text"/>
I.2	Y a-t-il un collège dans le village?	1. Oui 2. Non <input type="text"/>	Si Non à quelle distance se trouve le collège le plus proche 1- Moins de 5 km 2- 5 à 15 km 3- Plus de 15 km <input type="text"/>
I.3	Y a-t-il un centre de santé dans le village ?	1. Oui 2. Non <input type="text"/> Si non aller I.6	Si Oui, quel type 1. Case de santé 2. CSI type I 3. CSIType II <input type="text"/>
I.4	Si oui en I.3, est il fonctionnel ?	1. Oui 2. Non <input type="text"/>	
I.5	Le centre de santé dispose t-il d'une ambulance fonctionnelle	1. Oui 2. Non <input type="text"/>	
I.6	Si I3=non ou I4= non ; quel est le type de centre de santé le plus proche du village?	1. Case de sante 2. CSI type I 3. Type II <input type="text"/>	à quelle distance se trouve ce centre 1- Moins de 5 km 2- 5 à 15 km <input type="text"/> 3- Plus de 15 km
I.7	Existe-t-il un point d'eau potable (robinet, forage/puits protégé) dans le village ?	1. Oui 2. Non <input type="text"/>	Si oui quel type : 1=oui 2=non 1. <input type="text"/> Robinet 2. <input type="text"/> forage 3. <input type="text"/> puits protégé
I.8	Le village dispose t-il de l'électricité	1. Oui 2. Non <input type="text"/>	
I.9	Quel est le lieu de défécation de la majorité des ménages de votre village ?		1. plein air 2. latrine traditionnelle 3. latrine améliorée <input type="text"/>
I.10	A quelle distance se trouve votre village par rapport à la route bitumée ou latéritique la plus proche ?		----- km

I.11	Y'a-t-il un marché dans votre village ?		1. Oui 2. Non <input type="checkbox"/>
I.12	Y'a-t-il des acteurs locaux qui ont pris l'initiative d'organiser au moins une activité/événement où on parle de l'importance des PFE dans votre village au cours des six derniers mois ? ¹	1. Oui 2. Non <input type="checkbox"/>	Si oui quels sont ces acteurs ? 1=oui 2= non a. relais communautaires <input type="checkbox"/> b. groupements féminins <input type="checkbox"/> c. leaders traditionnels et religieux <input type="checkbox"/> d. matrones <input type="checkbox"/> e. enseignants <input type="checkbox"/> f. agents de santé communautaire <input type="checkbox"/> f. animateurs de radio communautaire <input type="checkbox"/> g. autres <input type="checkbox"/>
I.13	Y a-t-il des ONG/associations qui ont mobilisé les acteurs communautaires pour exécuter des activités de promotion des PFE dans ce village ? ²	1. Oui 2. Non <input type="checkbox"/>	Si oui quels sont ces acteurs ? 1=oui 2= non a. relais communautaires <input type="checkbox"/> b. groupements féminins <input type="checkbox"/> c. leaders traditionnels et religieux <input type="checkbox"/> d. matrones <input type="checkbox"/> e. enseignants <input type="checkbox"/> f. agents de santé communautaire <input type="checkbox"/> f. animateurs de radio communautaire <input type="checkbox"/> g. autres <input type="checkbox"/>

¹ Cet indicateur se réfère au changement social au niveau communautaire en matière du degré de leadership, de motivation et de participation des membres de la communauté.

² Cet indicateur vise à mesurer les interventions menées et/ou appuyées par des organisations externes au village.

Annex 3. Nonrespondent Bias of the Post-intervention Survey

1. Missing data: outcome variable Initiation of breastfeeding within the 1st H of birth

tab QAM3_missing

Missing values			
allaitement en			
1H ¹⁹	Freq.	Percent	Cum.
-----+-----			
Non respondents	786	37.59	37.59
Respondents	1,305	62.41	100.00
-----+-----			
Total	2,091	100.00	

2. Missing data: explanatory variables socio-economic and demographic status of the interviewed mothers

. tab QM04_cat QAM3_missing, col ch

Groupe		Missing values		
d'age de		allaitement en 1H		
femmes		Non respo	Responden	Total
-----+-----				
15-20	103	272		375
	13.21	20.97		18.05
-----+-----				
21-34	420	750		1,170
	53.85	57.83		56.33
-----+-----				
35-49	257	275		532
	32.95	21.20		25.61
-----+-----				
Total	780	1,297		2,077
	100.00	100.00		100.00

Pearson chi2(2) = 43.8773 Pr = 0.000

¹⁹ The binary variable “Missing values for the question: *Timing of initiating breastfeeding within the first hour of birth*” was created to distinguish between interviewed mothers who responded or not to the question regarding the timing of initial breastfeeding.

Educational attainment

tab QM07_cat QAM3_missing, col ch

	Missing values		
Niveau	allaitement en lH		
d'instruction	Non respo	Responden	Total
-----+-----+-----			
Aucun	458	797	1,255
	58.49	61.40	60.31
-----+-----+-----			
Coranique	185	274	459
	23.63	21.11	22.06
-----+-----+-----			
Primaire	94	150	244
	12.01	11.56	11.73
-----+-----+-----			
Secondaire et plus	46	77	123
	5.87	5.93	5.91
-----+-----+-----			
Total	783	1,298	2,081
	100.00	100.00	100.00
-----+-----+-----			
Pearson chi2(3) = 2.1756 Pr = 0.537			

Marital status of mothers

tab QM06_bin QAM3_missing, col ch

	Missing values		
etat	allaitement en lH		
matrimonial	Non respo	Responden	Total
-----+-----+-----			
mariee monogame	554	926	1,480
	74.36	74.44	74.41
-----+-----+-----			
mariee polygame	191	318	509
	25.64	25.56	25.59
-----+-----+-----			
Total	745	1,244	1,989
	100.00	100.00	100.00
-----+-----+-----			
Pearson chi2(1) = 0.0014 Pr = 0.970			

Parity (number of deliveries)

```
tab QSD1bin QAM3_missing, col ch
```

	Missing values		
d'accouche	allaitement en 1H		
	Non respo	Responden	Total
-----+-----+-----			
primipa	81	136	217
	10.32	10.43	10.39
-----+-----+-----			
multipa	704	1,168	1,872
	89.68	89.57	89.61
-----+-----+-----			
Total	785	1,304	2,089
	100.00	100.00	100.00

Pearson chi2(1) = 0.0065 Pr = 0.936

Relationship to the household head

```
tab QM03_cat3 QAM3_missing, col ch
```

	Missing values		
lien avec le	allaitement en 1H		
chef de menage	Non respo	Responden	Total
-----+-----+-----			
chef de menage	9	15	24
	1.15	1.15	1.15
-----+-----+-----			
conjointe	701	1,154	1,855
	89.41	88.70	88.97
-----+-----+-----			
autres	74	132	206
	9.44	10.15	9.88
-----+-----+-----			
Total	784	1,301	2,085
	100.00	100.00	100.00

Pearson chi2(2) = 0.2757 Pr = 0.871

Occupation of mothers

```
. tab QM08_cat3 QAM3_missing, col ch
```

	Missing values		
	allaitement en 1H		
Activite principale	Non respo	Responden	Total
-----+-----+-----			
Agriculture/elevage	195	327	522
	24.87	25.27	25.12
-----+-----+-----			
Commerce/Administrati	79	116	195
	10.08	8.96	9.38
-----+-----+-----			
Travaux menagers	510	851	1,361
	65.05	65.77	65.50
-----+-----+-----			
Total	784	1,294	2,078
	100.00	100.00	100.00

Pearson chi2(2) = 0.7122 Pr = 0.700

Income generating activities

```
tab QM09_bin QAM3_missing, col ch
```

Income	Missing values		
generating	allaitement en 1H		
activities	Non respo	Responden	Total
-----+-----+-----			
Oui	275	442	717
	35.08	34.00	34.40
-----+-----+-----			
Non	509	858	1,367
	64.92	66.00	65.60
-----+-----+-----			
Total	784	1,300	2,084
	100.00	100.00	100.00

Pearson chi2(1) = 0.2511 Pr = 0.616

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