

Economic and Health Benefits of Breastfeeding: A Review

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Abstract

The aim of this paper is to review the health, economic and other benefits of breastfeeding to the children, mother, community and country. The review was undertaken by using different tools as sources of information for gathering ideas on issues of economic, health and social benefits of breastfeeding. Report indicated that Sub-optimum breastfeeding, especially non-exclusive breastfeeding in the first 6 months of life, results in 1.4 million deaths and 10% of disease burden in children younger than 5 years. Breastfeeding for a period of two years is more cost-effective than the alternative of having to purchase artificial or animal milk, which contributes to about 15%-20% of the health budget in some countries. Breastfeeding lead to a 13% reduction in deaths of children under five if infants were exclusively breastfed for 6 months and continued to be breastfed up to two years. Optimal breastfeeding of children under two years of age has the potential to prevent 1.4 million deaths in children under five in the developing world annually. As economic impact of breastfeeding for three illnesses otitis media, gastroenteritis, and NEC found that increasing the proportion of children who were breastfed and would have saved an estimated \$3.6 billion annually in terms of both direct and indirect costs.

Keywords: breastfeeding, breast milk, economic, social, benefits

Introduction

Maternal and child under nutrition is the underlying cause of 3.5 million deaths, 35% of the disease burden in children younger than 5 years and 11% of total global DALYs. The number of global deaths and DALYs in children less than 5 years old attributed to stunting, severe wasting, and intrauterine growth restriction constitutes the largest percentage of any risk factor in this age group. Sub-optimum breastfeeding, especially non-exclusive breastfeeding in the first 6 months of life, results in 1.4 million deaths and 10% of disease burden in children younger than 5 years (Black *et al.*, 2008).

The important role of early nutrition in later life human health and development is increasingly evident in scientific research into human health and development. In 2001 the World Health Assembly endorsed recommendations for 6 months of exclusive breastfeeding and continued breastfeeding to 2 years and beyond, along with appropriate complementary foods. The accumulating evidence on the importance of breastfeeding is also recognized by the American Academy of Pediatrics (AAP), as is the important role of health providers in advising mothers on infant feeding (Smith *et al.*, 2008, Chudasama *et al.*, 2009).

World Health Organization (WHO) and United Nations Children's Fund (UNICEF) recommend that all mothers should breastfeed their children exclusively for the first 6 months and thereafter they should continue to breastfeed for as long as the mother and child wish, and both appropriate and sufficient weaning food should be added after six months of life. In resource poor countries, where the negative impact of HIV/AIDS is high, exclusive breastfeeding for the first six months has greater benefit than mixed feeding or formula feeding for the prevention of mother to child transmission of HIV (Alemayehu *et al.*, 2009).

Breastfeeding provides adequate and essential nutrients for infant's growth and development, protects infants against infections and ensures chances of survival. The benefits of breastfeeding, especially exclusive breastfeeding are well established particularly in poor environments where early introduction of other milk is of particular concern because of risk of pathogens contamination and over dilution of milk leading to increased risks of morbidity and under nutrition (Chudasama *et al.*, 2009).

Nutrients such as vitamins A and C, iron, zinc and vitamin D are more easily absorbed from breast milk than from other milk and also Breast milk contains essential fatty acids needed for the infant's growing brain, eyes, and blood vessels and these are not available in other milks. Breast milk protects against infection as the infant shares the mother's ability to fight infection. Exclusively breastfed infants are less likely to become ill with diarrhea, and less likely to die from diarrhea or other infections. Offering foods to infants before six months reduces breast milk intake and interferes with full absorption of breast milk nutrients (Tiruzer, 2011).

Roudbari *et al.* (2009) showed that the physical and mental growth of children is mostly completed within the first two years of life, particularly in the first six months. During this period, they are especially sensitive to bacterial and viral infections which can cause mental diseases, incurable disabilities or mortality.

Some research has shown that breastfeeding might even protect mothers against breast cancer as well as some types of ovarian cancers. Furthermore, breastfeeding for a period of two years is more cost-effective than the alternative of having to purchase artificial or animal milk, which contributes to about 15%–20% of the health budget in some countries.

The powerful benefits of breastfeeding for child survival, growth and development are well known.

Scientific evidence has shown that breastfeeding could lead to a 13% reduction in deaths of children under five if infants were exclusively breastfed for 6 months and continued to be breastfed up to two years. Breastfeeding also plays an important role in preventing stunting (low height for age), a condition that can cause irreversible physical and cognitive damage, and which is viewed as a key indicator reflecting inequities in society (UNICEF, 2011).

Breastfed children have at least 14 times greater chance of survival in the early months than non-breastfed children. In the first 6 months of life, non-breastfed infants were more than 14 times more likely than to die from all causes, 10 times more likely to die from diarrhea and 15 times more likely to die from acute respiratory infection -two major child killers. In addition, breastfed infants have a reduced incidence of serious infections affecting the whole body (sepsis), ear infections and other infections. Breastfed infants also have a reduced risk of Sudden Infant Death Syndrome (Black *et al.*, 2008).

For the first six months of life, breast milk alone is the ideal nourishment, providing all of the nutrients, including vitamins and minerals, an infant needs, meaning that no other liquid or food is needed. It has been estimated that optimal breastfeeding of children under two years of age has the potential to prevent 1.4 million deaths in children under five in the developing world annually (Xiaodong *et al.*, 2012).

Mullany *et al.* (2008) indicated that infant and young child feeding is critical for child health and survival. Based on well-established evidence, the WHO and the United UNICEF recommend that mothers put newborns to the breast within one hour of birth and also there has been growing evidence of the significant impact of early initiation of breastfeeding, preferably within the first hour after birth, on reducing overall neonatal mortality.

2. Methodology

Method for writing this paper were literature search was undertaken using the laptop, searching Bibliography of different researches and research titles of breastfeeding, infant nutrition, Google on the different websites like *lancet series* of breastfeeding, *international journal of breastfeeding*, *Ethiopian journal of health development* using the key-words of 'breastfeeding', 'breastfeeding duration' 'infant feeding', Reviewing abstracts and different studies which includes the cross-sectional and longitudinal studies on the effects of breastfeeding on the disease control its economic benefits and other health effects on the children, mothers and hospitals, formula feeding for infants and its health impact etc. And a total of eight year to recent(2008-2014) papers on exclusive breastfeeding and its economic and health benefits were used for the review.

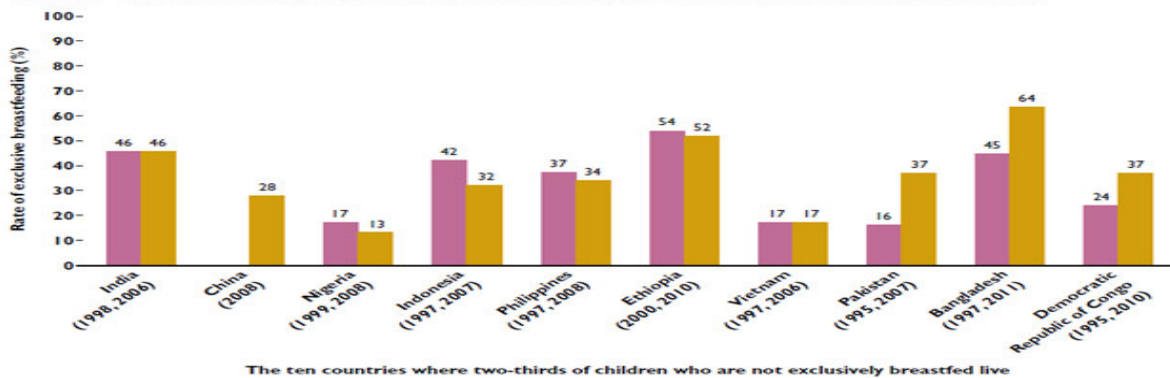
3. Literature Review

3.1 Importance of Breastfeeding

Promotion of exclusive breastfeeding is the single most cost-effective intervention to reduce infant mortality in developing countries. It is estimated that sub-optimal breastfeeding, especially non-exclusive breastfeeding in the first six months of life, results in 1.4 million deaths and 10% of diseases in under-fives. Non-exclusive breastfeeding also has long term impact, including poor school performance, reduced productivity, and impaired intellectual and social development. It can also increase the risk of dying due to diarrhea and pneumonia among 0-5 month old infants by more than twofold (Setegn *et al.*, 2012 and Xiaodong *et al.*, 2012).

Breastfeeding is also linked with childhood intelligence and adult health. WHO has published a systematic review to assess the association between breastfeeding and hypertension, diabetes and related indicators such as serum cholesterol, overweight and obesity(Horta *et al.*, 2007). Breastfed babies have significantly higher total cholesterol and LDL- cholesterol compared to mixed fed babies in the first 6 months of life with improving HDL-cholesterol /LDL-cholesterol ratio at 6 months. High cholesterol intake in infancy may have a beneficial long-term programming effect on synthesis of cholesterol by down-regulation of hepatic enzyme(Harit *et al.*, 2008). Al-Binali (2012) stated that breastfeeding is an important public health strategy for improving infant and child morbidity and mortality, improving maternal morbidity, and helping to control health care costs.

FIGURE - RATES OF EXCLUSIVE BREASTFEEDING ACCORDING TO NATIONAL SURVEYS



Source: UNICEF, World Breastfeeding Conference, 2012*

Extensive research, especially in recent years, has proven that BF reduces immunological disorders, such as eczema, food allergy, and also the risk of chronic disorders later in life, such as Crohn's and coeliac diseases, childhood cancers and diabetes mellitus. Breastfeeding promotes mother-infant interaction and bonding, and it can also decrease postpartum bleeding, an earlier return to pre-pregnancy weight, delayed resumption of ovulation (which results in increased child spacing), and a possibly reduced risk of ovarian and breast cancers (Koosha *et al.*, 2008).

3.2 Determinants of Breastfeeding

There are a number of factors that determine the level and extent of breastfeeding which are by itself depends on other factors. Some of these factors include:

Breastfeeding intention

The prevalence of timely initiation of breastfeeding in some developing countries other than Ethiopia was documented as in Ghana (41%), Sudan (54.2%), Zambia (70%), Jordan (49.5%), North Jordan (86.6%), Nepal (72.2%), and Bolivia (74%). Trend data suggest the prevalence of exclusive breastfeeding among infants younger than six months in developing countries increased from 33% in 1995 to 39% in 2010. The prevalence increased in almost all regions in the developing world, with the biggest improvement seen in West and Central Africa (Cai *et al.*, 2012)

In Ethiopia, one third of babies do not receive breastfeeding within the first hour of birth and national prevalence of breastfeeding initiation was documented to be low with wide regional differences. Realizing the importance of timely initiation of breastfeeding, the Ethiopian government had developed infant and young child feeding guidelines giving appropriate emphasis to key messages on timely initiation of breastfeeding in 2004 (Setegn *et al.*, 2011).

Dashti *et al.* (2010) stated that high rates of delayed breastfeeding initiation and pre-lacteal feeding in various Muslim cultures are related to the traditional beliefs held by women that colostrum should not be fed to the infant because it is of limited nutritional value or because it might harm the infant. For instance, Pakistan, Somali and Turkish women reportedly believe colostrums to be dirty, stale milk that has been stored in the breast for nine months. Similarly, Gambian women believe that colostrum is "hot milk" which could give their baby stomach ache and diarrhea, while some Pakistan women believe that colostrums might even kill their infant. These beliefs, while more common in less literate women, are firmly entrenched and reinforced by religious leaders and elders, both female and male and supported by traditional birthing assistants.

3.3 Socio-demographic factors, employment status and level of income

As to the associated factors with exclusive breastfeeding, the binary logistic regression model showed that employment status, initiation of breastfeeding and child's age were closely associated with exclusive breastfeeding practice. In conformity with the result in Guatemala City, 1999 where unemployed mothers were more likely to exclusively breastfeed for six months than employed (women who did not work outside the home were 3.2 times more likely to exclusively breastfeed than women who worked outside the home) but it contradicts with the finding in Ethiopia, 2006 where employment status had no association with exclusive breastfeeding because in the current study majority of the respondents were housewife's by occupation. So, they might have higher chance of staying with their baby than those employed. In this study, there was no association between mother's monthly income and exclusive breastfeeding practices and it disagrees with the study in Saudi Arabia, 2010 where low income mothers were more likely to breast-feed exclusively. On the contrary, in Ethiopia, 2006 high income mothers were more likely to exclusively breastfeed for six months (Berhe *et al.*, 2013).

Major socio-demographic factors that affect prolonged breastfeeding behaviors are: age, marital status, education and income level. Similarly, there are literatures which shows strong evidence that older age, being married, being well educated and a higher income are each associated with longer breastfeeding duration. These factors are not amendable to change by midwives once the woman is pregnant. Knowing that successful long term breastfeeding is less likely to be achievable for young, poorly educated, unmarried and lower income mothers helps midwives to focus their education and support for these groups of women (Shahla, 2010).

3.4 Woman's sense of breastfeeding self-efficacy

High maternal breastfeeding self-efficacy has been reported to be associated with prolonged breastfeeding. Women's breastfeeding self-efficacy is influenced by exposure to breastfeeding, her perception of being supported, her own breastfeeding experiences and physical/mental status. In a qualitative study among low-income mothers lack of exposure to breastfeeding was reported as a failure factor to enhance self-efficacy and commitment to successful breastfeeding. The positive influence of support on breastfeeding self-efficacy has been also reported in many studies (Shahla, Kathleen and Ashley, 2010).

3.5. Economic Benefits of breast feeding

The economic impact of infant feeding is extensive and multi-faceted. Studies in the USA, Australia, and the Netherlands have shown that large-scale savings to their national economies would result from raising breastfeeding rates. The costs of *not* breastfeeding include health service costs such as treating a range of related diseases affecting mothers and children, and costs to families such as the cost of purchasing infant formula (Renfrew *et al.*, 2012).

In addition to the health advantages of breastfeeding for mothers and their children, there are economic benefits associated with breastfeeding that can be realized by families, employers, private and government insurers, and the nation as a whole. For example, a study conducted more than a decade estimated that families who followed optimal breastfeeding practices could save more than \$1,200-\$1,500 in expenditures for infant formula in the first year alone.

As Economic impact of breastfeeding for three illnesses otitis media, gastroenteritis, and NEC found that increasing the proportion of children who were breastfed and would have saved an estimated \$3.6 billion annually. These savings were based on direct costs (e.g., costs for infant formula as well as physician, hospital, clinic, laboratory, and procedural fees) and indirect costs (e.g., wages parents lose while caring for an ill child), as well as the estimated cost of premature death (Bartick and Reinhold, 2010).

A more recent study that used costs adjusted to 2007 dollars and evaluated costs associated with additional illnesses and diseases (sudden infant death syndrome, hospitalization for lower respiratory tract infection in infancy, atopic dermatitis, childhood leukemia, childhood obesity, childhood asthma, and type 1 diabetes mellitus) found that if 90 percent of U.S. families followed guidelines to breastfeed exclusively for six months, the United States would save \$13 billion annually from reduced direct medical and indirect costs and the cost of premature death and if 80% of U.S. families complied, \$10.5 billion per year would be saved (USDHHS, 2011, Breastfeeding Strategy for Northern Ireland, 2012 and Bartick and Reinhold, 2010).

By increasing the nation-wide prevalence of exclusive breastfeeding from 60% to 80%, the total cost of illness related to NEC would fall from \$8,054,323 to \$5,369,549 in low birth weight babies (n=16,000) and from \$3,565,882 to \$2,397,232 in very low birth weight babies (n=3,300). The total costs related to gastrointestinal illness in term babies (n=240,000) would drop from \$11,585,376 to \$7,840,608. The total cost of illness related to eczema in low birth weight babies (n=16,000) would fall from \$97,584 to \$78,888, and in term babies (n=240,000) would fall from \$4,066,944 to \$3,122,832. Lifetime special educational costs would decrease by \$31.2 million and Costs related to IDDM would fall by \$144,000 (Drane, 2013).

Breastfeeding is beneficial to health outcomes but also on family finances through not purchasing formula and the equipment needed for artificial feeding (taking an average of 1 tin per week for 26 weeks plus bottles sterilizing etc. it costs about £250 to formula feed for 6 months) (Breastfeeding Strategy For Northern Ireland, 2012).

A study from USA, which looked in to health care costs of formula feeding in the First year of life came out with some very striking facts. The study determined the excess cost of health care services for three illnesses i.e. lower respiratory tract illnesses, otitis media, and gastrointestinal illness in formula-fed infants in the first year of life, after adjusting for potential confounders. There were 2033 excess office visits, 212 excess days of hospitalization, and 609 excess prescriptions for these three illnesses per 1000 never breastfed infants compared with 1000 infants exclusively breastfed for at least 3 months. These additional health care services cost the managed care health system between \$331 and \$475 per never-breastfed infant during the first year of life (APA, 2008).

Six months food cost was \$299 lower for breast-feeding mother-infant pairs than for the formula-fed cohort (\$269 versus \$568, $p < 0.0001$). With the addition of a 26% administrative cost adjustment, 6 months food

cost remained less for the breast-fed cohort than for the formula-fed cohort, \$339 versus \$715. The 6 months, post-rebate (manufacturer's rebate) WIC food cost for the formula-feeding cohort, before adjusting for the program's administrative cost, was \$18.63 less than the food package cost for the breast-feeding cohort. When administrative costs were added to food package cost (calculated with 26% administrative cost of pre-rebate food package), the food cost of the formula-feeding cohort was higher by \$59 than that of the breast-feeding cohort. Compared with the formula-feeding cohort, adjusted pharmacy payments for the breast-feeding cohort were \$29.82 (95% CI: \$21.14 - \$38.50) lower for males and \$12.16(95% CI: \$5.90-\$18.41) lower for females (Montgomery and Splett, 2013).

3.6. Benefits of Breastfeeding for Families, Communities, and Society

As studies in California indicates that breastfed children have fewer visits to the doctor's office, fewer days of hospitalization, and fewer prescriptions than formula fed children. Fewer illnesses among breastfed infants translate into lower health care costs for families, businesses, health care providers, and health care companies, and lower absenteeism in businesses and schools.

3.7. Community Benefits

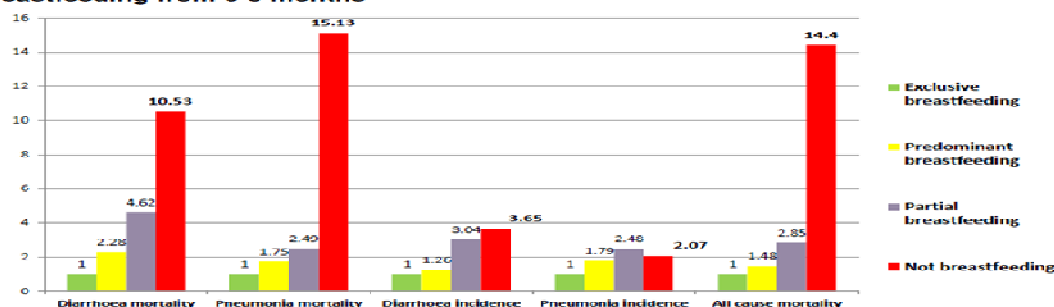
In addition to specific health advantages for infants and mothers, economic, family, and environmental benefits have been described. These benefits include the potential for decreased annual health care costs of \$3.6 billion in the United States; decreased costs for public health programs such as the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC); decreased parental employee absenteeism and associated loss of family income; more time for attention to siblings and other family matters as a result of decreased infant illness; decreased environmental burden for disposal of formula cans and bottles; and decreased energy demands for production and transport of artificial feeding products. These savings for the country and for families would be offset to some unknown extent by increased costs for physician and lactation consultations, increased office-visit time, and cost of breast pumps and other equipment, all of which should be covered by insurance payments to providers and families (APA, 2008).

Breastfeeding offers society not only improved health of children and mothers but also economic and environmental benefits. Breastfeeding reduces the need for costly health services that must be paid for by insurers, government agencies, or families. Breastfeeding reduces the number of sick days that families must use to care for their sick children.

3.8. Other Health Related Benefits for mothers

Choosing to breastfeed can also have a significant impact on cancer rates. First, it has been demonstrated that a female infant who is breastfed can expect a 25% reduction in risk for breast cancer later in life. Also, a large case-control study of breast cancer patients in several U.S. shows a reduction in risk when a woman has a history of lactating for 24 cumulative months over the course of her childbearing years. After adjusting for confounding factors, breastfeeding for at least 24 months showed a risk reduction of 28% for premenopausal breast cancer. Early initiation of breastfeeding strengthened this protection with an odds ratio of .54 for women whose first period of lactation started before 20 years of age. The researchers suggest that lactation "may reduce the risk of breast cancer simply by interrupting ovulation or by modifying pituitary and ovarian hormone secretion" (Sheila and Bungum, 2009).

Relative risk of not breastfeeding for infections and mortality compared to exclusive breastfeeding from 0-5 months



Source: Lancet Child Nutrition Series 2008

Fig: impact of breast feeding on diarrhea and pneumonia

From this graph we can understand that the amount and duration of breastfeeding have a great impact on the health status of the children and his/her death which is an indicator that results in different costs and economic,

social and community problem in addition to the mother's psychological and mental problem.

3.9. Infant Formula Feeding

Health professionals sometimes suggest adding infant formula based on their assessment of the adequacy of breast milk. The high rate of use of infant formula for supplementary feeding is reflected in the unchanged rate of Exclusive Breastfeeding since 1980. The routine use of supplemental and pre-lacteal infant formula feeds is not consistent with best infant feeding practice. However, Any Breastfeeding is still better for the infant than receiving only infant formula and even if mothers use some supplemental infant formula, they should continue breastfeeding as much as possible (Inoue *et al.*, 2012).

Breastfed infants have cognitive advantages over formula-fed infants in a meta-analysis of 20 studies of children, after adjusting for studies that examined developmental time points have observed advantages of breastfeeding in comparison with not breastfeeding for infant development that can be observed from the neonatal period, through to infancy, early childhood, mid childhood, adolescence, and into midlife (Wendy *et al.*, 2012).

The estimated cost of artificial feeding (up to \$1,200 per year for powdered formula) is four times that of breastfeeding (approximately \$300 per year for increased food for a lactating woman). Concentrated and ready-to-feed formulas are even more expensive than powdered formula. The cost of artificial feeding has increased steadily over the last 10 years. Electricity or fuel is consumed in the preparation of infant formula. Breastfeeding requires no packaging, and its production does not harm the environment (*United States Breastfeeding Committee*, 2008).

Conclusion and Recommendation

Breastfeeding for a longer duration appears to have significant benefits for the development, cognitive IQ, protecting different diseases, educational attainment and mental health of the child into adolescence. Breastfeeding also imparts economic benefits for families as well as savings for our society.

Breastfeeding reduces certain immunological disorders, such as eczema, food and respiratory allergy, and also the risk of chronic disorders later in life, such as Crohn's and coeliac diseases, childhood cancers and diabetes mellitus, promotes mother-infant interaction and bonding, decrease postpartum bleeding, an earlier return to pre-pregnancy weight, delayed resumption of ovulation (which results in increased child spacing), and a possibly reduced risk of ovarian and breast cancers.

There are a number of factors that determine breastfeeding rate, duration and the awareness on the exclusive breastfeeding which itself affected by other factors. Some of these factors include Woman's sense of breastfeeding self-efficacy, socio-demographic factors of the society level of education and employment of the mothers and some religious culture and traditional beliefs.

A study conducted in USA, India and California estimated that families who followed optimal breastfeeding practices could save more than \$1,200-\$1,500 in expenditures for infant formula in the first year alone, \$3.6 billion annually for three illnesses otitis media, gastroenteritis, and NEC and if 90 percent of U.S. families followed guidelines to breastfeed exclusively for six months, the United States would save \$13 billion annually from reduced direct medical and indirect costs and the cost of premature death and if 80% of U.S. families complied, \$10.5 billion per year would be saved. If no California infants were breastfed, the cost of artificial feeding would exceed \$930 million per year.

Other study showed that, Infant diarrhea in non breastfed infants costs \$291.3 million; respiratory syncytial virus, \$225 million; insulin dependent diabetes mellitus, from \$9.6 to \$124.8 million; and otitis media, \$660 million. Thus, these four medical diagnoses alone create just over \$1 billion of extra health care costs each year.

Recommendation

There should be a clear policy on the extended breastfeeding at least for six months and the government and other recognized bodies should participate and play role in exclusive breastfeeding to control different drawbacks related with not breastfeeding and ensure benefit to child, mother, community and nation as whole.

The health extension workers and other recognized bodies should work hard to enhance the awareness on breastfeeding among mothers and to avoid the misunderstanding of society's traditional beliefs held by women that colostrums is dirty, stale milk that has been stored in the breast for nine months and should not be fed to the infant because it is of limited nutritional value or because it might harm the infant by some countries like Gambia.

In Ethiopia there is no a well organized document on the economic benefits of breastfeeding and its cost analysis. So, there should be economic cost analysis and money incurred for hospitalization of different diseases due to not breastfeeding and the government and other bodies should focus on effect of not breastfeeding children, mother, society and country as whole. Finally, the future research should focus on the economic

benefits of breastfeeding and its cost benefit analysis to protect and support children health and secure the economy of the country in Ethiopia.

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