Cost of Formula Milk Feeding in Infancy
in AL-Amara City/ Iraq

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Aim of study:

- To determine the cost and burden of formula feeding on the family in Al-Amara city.
- To determine the distribution of formula milk in relation to gender, number of gravida and residence area.
Introduction:
Formula feeding: The alternative to human milk is iron-fortified formula, which permits adequate growth of most infant and is formulated to mimic human milk (1).
Predominant or mixed breast feeding: Means feeding breast milk along with infant formula, baby food and even water, depending on the child's age (2).
Mixed feeding: Mean giving other liquids and/or foods together with breast milk to infants under 6 months of age, is widespread in many countries. This practice poses risks to an infant’s health because it can increase the chance of their getting diarrhea and other infectious diseases (3).
The U.S. Federal Food, Drug, and Cosmetic Act (FFDCA) defines infant formula as "a food which purports to be or is represented for special dietary use solely as a food for infants by reason of its simulation of human milk or its suitability as a complete or partial substitute for human milk" (4).
Historically; almost all U.S. newborns were nursed up until around 1950. In the last 50 years, however, infant feeding has changed markedly. After World War II, with the development and large-scale manufacture of infant formula, formula feeding became the standard.
Breastfeeding fell by half between 1946 and 1956, and by 1967, only 25 percent of American infants were being breastfed at the time of hospital discharge. The percentage of infants being breastfed when they left the hospital then began to increase steadily, reaching 62 percent in 1982, declined approximately 16 percent from 1982 to 1990, and increased slowly again to hover around 64 percent by 1998 (5).
Mothers may refrain from breastfeeding for a number of reasons: aggressive formula product marketing; lack of support from family and friends; insufficient knowledge among medical professionals about breast feeding techniques and challenges; religious beliefs; cultural attitudes; and lack of public acceptance (6).
All or some of these factors may come into play, but it is of interest that increased formula feeding parallels a rapid increase in the number of working women. Breast feeding and working outside the home are commonly believed to be incompatible. Increased participation of women in the labor force is frequently cited for the low rates of breast feeding (7).
The increase in the number of working women since World War II is one of the most significant social and economic trends in modern U.S. (8).
The American Academy of Pediatrics (AAP) recommends breast milk as the best nutrition for infants. Babies should be breastfed exclusively for the first six months, according to the AAP. After other foods have been introduced, the AAP encourages mothers to continue to
breastfeed until baby is at least a year old, and as long after that as both mother and child are willing (9).

It was found that if 90% of US families could comply with medical recommendations to breastfeed exclusively for 6 months, the United States would save $13 billion per year (10). A study by Karen M. Zeretzke, MEd, IBCLC showed that total annual cost of not breast feeding was $1.186 to $1.301 Billion (11).

Successfully promoting and supporting breastfeeding in the United States may depend on persuading both mothers and society that breastfeeding is not only nutritionally sound but economically beneficial as well. Current U.S. rates of breastfeeding are 64 percent for mothers in-hospital and 29 percent at 6 months postpartum, below the recommendations of the Surgeon General (75 and 50 percent, respectively). This analysis concludes that a minimum of $3.6 billion would be saved if the prevalence of exclusive breastfeeding increased from current rates to those recommended by the Surgeon General (12).

Breastfeeding is associated with lower rates of infant illness in both developing (13,14) and industrialized (15,16,17) countries.

Study of the costs of not breastfeeding (1997) by Dr. Jan Riordan “Breastfeeding, a valuable natural resource, promotes health, helps prevent infant and childhood disease, and saves health care costs. Additional national health care costs, incurred for treatment of four medical conditions in infants who were not breastfed were estimated. 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 a billion dollars of extra health care costs each year.” (18).

In addition to having more illnesses, formula-fed infants cost the health care system money. Health care plans will likely realize substantial savings, as well as providing improved care, by supporting and promoting exclusive breast feeding (19).
Materials and methods:
The study was carried out in Al-Sader Teaching Hospital in Al-Amara city in prospective study in period from August/2015 to February/2016 .
A total of 100 mothers of infants less than 6 months were selected randomly from pediatrics ward and interviewed with a questionnaire, we picked up those who were feeding an exclusive formula and mixed feeding (formula milk with breast milk)
The questionnaire was about infant age, gender, residence (whether urban or rural area), number of children (primigravida or multigravida) type of formula milk(marketing name),price of formula can, average of ounces consumption per a day .
Then calculating the cost of ounces consumption per a day.
Here we are not calculating the indirect costs of formula milk feeding , such as the need for bottles, teats ,sterilizing materials or sterilizing machine , sterilized water for formula preparation and so on .
Apart from costs needs for health care system for infectious diseases in formula fed infants. Using Microsoft Excel 2010 in interpretation of the final results into tables and figures.
Results:

Table 1. Cost of formula milk during 1st month of age.

<table>
<thead>
<tr>
<th></th>
<th>NO. of samples</th>
<th>Mean cost of ounces consumption /day</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed feeding</td>
<td>4</td>
<td>774 IQD</td>
<td>238.5</td>
<td>0.0001</td>
</tr>
<tr>
<td>Exclusive formula feeding</td>
<td>8</td>
<td>1,584 IQD</td>
<td>447</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Cost of formula milk during 2nd month of age.

<table>
<thead>
<tr>
<th></th>
<th>NO. of samples</th>
<th>Mean cost of ounces consumption /day</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed feeding</td>
<td>6</td>
<td>1,032 IQD</td>
<td>318</td>
<td>0.001</td>
</tr>
<tr>
<td>Exclusive formula feeding</td>
<td>14</td>
<td>1,806 IQD</td>
<td>556.5</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Cost of formula milk during 3-6 months of age.

<table>
<thead>
<tr>
<th></th>
<th>NO. of samples</th>
<th>Mean cost of ounces consumption /day</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed feeding</td>
<td>16</td>
<td>1,462 IQD</td>
<td>447.5</td>
<td>0.01</td>
</tr>
<tr>
<td>Exclusive formula feeding</td>
<td>52</td>
<td>2,322 IQD</td>
<td>715.5</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1. Distribution of formula feeding in relation to gender.

Figure 2. Distribution of formula feeding in relation to gravida.
Figure 3. Distribution of formula feeding in relation to residence.
**Discussion:**

In our results, the cost of formula milk is high. A study compiled by Pat Lindsey, IBCLC in USA showed that average formula costs saved by breastfeeding ($USD) is 122$ in the first month, 302$ in the second month, 477 $ in the third month and 1045$ in the sixth month age \(^{(20)}\).

So when comparing our results with this study, the cost is much less than US cost. This is may be related to the aggressive formula product marketing and presence of original brand name with high quality in US.

There are insufficient studies in arabic countries about same study. In our study we chose hospitalized patient and calculate the cost of consumptive ounces per a day, so the cost may be slightly higher if we choose healthy infants from AL-Amara city rather than hospitalized infants.

There was a significant difference in the cost of formula milk between exclusive formula feeding and mixed formula feeding \((P \leq 0.05)\). The age of the child was significantly related to the cost of ounces consumption per day, during 1st month of age, the cost of formula milk is higher in the exclusive formula feeding than mixed formula feeding \((P=0.0001)\).

Significantly more cost of formula milk between exclusive formula feeding and mixed formula during 2nd month of age \((P= 0.001)\) and more significantly during 3-6 months of age \((P= 0.01)\).

The study revealed that formula feeding is more prevalent in males, multigravida and urban area, this may be due to social, educational cultural attitude, and environmental factors.
**Conclusion:**
In general the cost of formula milk feeding in infancy is high and causing a burden on the family. Apart from the indirect cost which may cause more burden. So saving money, health and emotional wellbeing will direct our vision toward breast feeding.
Acknowledgment:
To the fountain of patience, optimism and hope
To each of the following in the presence of God and his Messenger, my mother dear
To the big heart my dear father
To those who have demonstrated to me what is the most beautiful of my brother’s life
To my fiancée
To the people who paved our way of science and knowledge
All our teachers Distinguished
To the patients families
To the taste of the most beautiful moments with my friends.
References:

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3- http://www.unicef.org/nutrition/index_24824.html
4- U.S. Food and Drug Administration. What is an infant formula
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20-Cost Comparison of Breast milk Vs Formula, compiled by Pat Lindsey, IBCLC