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## Methods and Success Factors of Induced Lactation: A Scoping Review

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**Key Messages**

- Stimulation is essential to induce breastfeeding despite the use or not of pharmacological methods; however, no consensus on what methods to continue exist.
- No standardized approach for women who decide to undergo induced lactation exists.
- Factors associated with the success of induced lactation are the age of the child, interference due to bottle feeding, breast stimulation and the support received

## Methods and Success Factors of Induced Lactation: A Scoping Review

### Abstract

**Background:** Induced lactation enables a woman who has not given birth to breastfeed a child. Lactation may be induced through both pharmacological and non-pharmacological methods, although the outcome cannot always be achieved.

**Research Aim:** The aim of this scoping review was to assess the different methods used to induce lactation, as well as the factors related to sucking effectively the breast and the production of human milk.

**Methods:** We had searched five databases between June 2019 to February 2020 for studies referring to methods and factors related to the breast suckling and/or the volume of milk produced after inducing lactation, using the following search terms and Boolean operators: breastfeeding AND induced lactation AND adoptive mothers OR surrogate mothers OR female homosexuality OR non-gestating. The final review included a total of 24 articles.

**Results:** Pharmacological methods were not always used to produce milk, although breast stimulation was essential. The age of the child, interference due to bottle feeding, breast stimulation and the support received were important factors in induction of lactation. There were several factors that may account for the differences between developing and higher income countries in methods of induced lactation and the amount of milk that study participants produced. There was no consensus over whether previous pregnancy and/or breastfeeding experience influenced induced lactation.

**Conclusion:** Health professionals need to have adequate knowledge about induction methods, the preferences of each woman and the reasons for inducing lactation, to provide proper assistance. However, the lack of standardization about induction of lactation makes it difficult.

### Background

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There are two stages in milk production that are related to hormonal processes during pregnancy and upon delivery. During pregnancy, estrogens stimulate the proliferation and differentiation of mammary glands and ducts, while progesterone causes the growth of lobes and alveoli and inhibits lactation. At the time of the birth, a rapid fall in the levels of these hormones disinhibits prolactin secretion, the increase in which triggers milk secretion. Suckling by the newborn helps to maintain lactation and is accompanied by the production of oxytocin, which causes contraction of the mammary epithelium and the ejection of milk (Truchet & Honvo-Houéto, 2017)

Induced lactation is the process whereby a woman who has not recently been pregnant or who is not nursing another child produces milk (Sriraman, 2017), if they have previously breastfed, it is termed relactation (World Health Organization [WHO], 1998). The main reasons why women induce lactation is to develop the closeness between mother and child and/or to satisfy the child's nutritional needs. The reasons and methods for inducing lactation vary from the different countries (Norsyamliana et al., 2017).

The difference in the duration of breastfeeding between developing and higher income countries may be due to the different reasons why lactation is induced: Ensuring the child's survival through the provision of human milk prior to introducing other foods, in developing countries, as opposed to strengthening the closeness between mother and child, in high income settings (Gribble, 2007; Ogunlesi et al., 2008).

Adoption is historically known as the legal process to achieve parenthood without delivery. The growth and development of assisted reproduction techniques have allowed other options of motherhood including surrogacy or pregnancy in a female same-sex couple (Zeynep & Charlotte, 2019). These new family structures have increased in recent years; therefore, increasing breastfeeding due to the induction of lactation (Schnell, 2015). Although women who adopt a child, who have a child through surrogacy, or the non-pregnant partner

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3 in a lesbian couple may be able to breastfeed. Although, it has been reported that they have  
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5 found a lack of support during the process and disagreement by nurses and physicians  
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7 (Chuisano & Anderson, 2019).  
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10 Providing all women who wish to breastfeed with adequate support and advice should  
11  
12 be a priority for health professionals and would contribute to better health in both the woman  
13  
14 and child with increased rates of breastfeeding (Chetwynd et al., 2019). We define  
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16 breastfeeding for the child as the consumption of human milk including expressed milk and  
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18 milk from a wet nurse and other food or liquid (Noel-Weiss et al., 2012).  
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21 Despite the increased desire for induced lactation, many health professionals do not  
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23 have precise knowledge about induced lactation and may feel insecure when faced with a  
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25 request for advice. The aim of this scoping review was to assess the different methods used to  
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27 induce lactation, as well as the factors related to sucking effectively the breast and the  
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29 production of human milk.  
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## 32 **Methods**

### 33 **Design**

34  
35 We conducted a scoping review, which allows researchers to identify knowledge  
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37 gaps, scope a body of literature and clarify concepts (Munn et al., 2018). We have followed  
38  
39 the five stage-process proposed by Pham et al., (2014) based on Arshey and O'Malley,  
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41 (2005): 1) identifying the research question, 2) identifying relevant studies, 3) study selection  
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43 and 5) collating, summarizing and reporting the results.  
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### 49 **Sample**

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51 Articles were selected if they contained information about the methods used to induce  
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53 lactation and the factors associated with suckling effectively the breast and the volume of  
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55 milk after inducing lactation. Inclusion criteria were: 1) articles with information about the  
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57 methods used to induced lactation; 2) articles with information about the factors associated  
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3 with suckling effectively the breast and/or the volume of milk after inducing lactation; (3)  
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5 English or Spanish language articles; (4) due to the relevance of studies published in the  
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7 1980's, it was decided to include studies published during the last 39 years.. Exclusion  
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9 criteria were: 1) nonclinical studies; 2) non-human studies; 3) reports not written in either  
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11 English or Spanish; 3) letters; 4) protocols; 5) reviews and 6) clinical guidelines. The sample  
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13 selection process is explained in Figure 1. The total sample was 24 articles.  
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### 16 17 **Data Collection**

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19 The literature search was conducted between June 2019 to February 2020 by the first  
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21 author. A literature search was conducted using the following databases: Pubmed, Web of  
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23 Science Cumulative Index to Nursing and Alice Health Literature (CINAHL), JSTOR and  
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25 Psycinfo. The following search terms and Boolean operators were used: Breastfeeding (under  
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27 alternative spellings breast feeding and breast-feeding) AND induced lactation AND adoptive  
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29 mothers OR surrogate mothers OR female homosexuality OR non-gestating. Two authors  
30  
31 read the 98 abstracts to determine if the articles met the inclusion criteria. They carefully read  
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33 those articles selected by their abstracts to extract data on methods and success factors in  
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35 induced lactation from September 2019 to October 2019.  
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### 40 41 **Data Analysis**

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43 We drew up a table in order to classify the 24 articles according to the following  
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45 variables: 1) first author and year of publication, 2) context of induced lactation, 3) study  
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47 design, 4) country in which study was conducted, 5) number of participants (and their  
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49 characteristics), 6) methods of induction of lactation and 7) main contributions and factors  
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51 associated with suckling effectively the breast and/or the volume of milk after inducing  
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53 lactation.  
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57 The first author extracted data from each selected article. The context of induction  
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59 refers to whether induction occurs in case of adoption, surrogacy or in lesbian couples. The  
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3 methods used could be pharmacological: Hormonal treatment or galactagogues (including  
4 herbal galactagogues) or non-pharmacological stimulation (manual or mechanical stimulation  
5 or with at-breast suckling supported by a supplemental nursing system). In the results section  
6 of the studies we extracted the factors associated with suckling effectively the breast and/or  
7 the volume of milk produced after an induced lactation (if there was a reference in the  
8 article).

## 16 **Results**

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19 A summary of variables extracted from each article is detailed in Table 1. It included  
20 the demographic variables (e.g., country where the study was done, year of publication),  
21 study methods (e.g., design, sample size) and the outcome variables of interest in this review  
22 (e.g., method of induction, effectiveness of milk production) that are discussed below.

### 23 **Methods for inducing lactation**

24  
25 Lactation may be induced through non-pharmacological methods (i.e., manual  
26 stimulation of the breasts, the use of breast pumps or suckling by the child) or  
27 pharmacologically via administration of hormones (progesterone and estrogen) and/or  
28 galactagogues.

#### 29 ***Non-pharmacological methods.***

30  
31 In the study by Abejide et al., (1997), Nigerian women ( $N=6$ ) produced enough milk  
32 to feed their adopted child with breast stimulation alone. All participants had previously  
33 breastfed, between 9 months and 2 years prior to beginning the current induction. In all cases,  
34 lactation was initiated by suckling the child at least 10 times each day for at least 10 minutes  
35 on each breast. These participants began to produce milk between 13 and 18 days after  
36 initiating suckling, and after 21-28 days, the breastfeeding was exclusive in all cases. Gribble  
37 (2005) described five cases of adopted children from eight months to five years who  
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3 expressed desire to suckle, by looking for their adoptive mothers' breast. In 3 of the 5 cases  
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5 (60%) breastfeeding was achieved only with breast stimulation by suckling.  
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### 8 ***Pharmacological methods***

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10 **Combined treatment with hormones.** The aim of combined treatment with estrogen  
11 and progesterone is to produce in women a state like pregnancy. Hormones cause changes in  
12 the mammary tissue, but impede lactation, and the treatment must be stopped at least 24-48  
13 hours prior to beginning breast stimulation (Thearle & Weissenberger, 1984). Study  
14 participants began to take combination hormones between two month and a half and five  
15 months before beginning breast stimulation; it was maintained for between six and 10 weeks  
16 (Szucs et al., 2010; Wilson et al., 2015). In the study by Nemba (1994) the method used  
17 depended on whether the participants had previously breastfed a child. Those who had not  
18 were given an intramuscular injection of 100 mg medroxyprogesterone one week prior to  
19 breast stimulation and chlorpromazine 25 mg/4 times per day until lactation was well  
20 established. Participants who had previously breastfed were given either chlorpromazine, 25  
21 mg/4 times a day or metoclopramide, 10mg/4 times a day until lactation was well  
22 established. Both groups stimulated the breasts through frequent suckling by the child. In the  
23 study by Thearle and Weissenberger (1984), the induction method varied depending on  
24 whether or not participants had a history of lactation. All women used a breast pump for  
25 stimulation, but 3 women (50%) who had not previously breastfed also were administered  
26 between 2.5 and 40 mg of non-androgenic progesterone and between 0.05 and 0.4 mg of  
27 estrogen 12-28 weeks prior to beginning stimulation. In the case report ( $N=2$ ) by Wilson et  
28 al. (2015), three months before the baby's due date, one of the participants (A) began taking  
29 drospirenone/ethinylestradiol, 3mg/0.03 mg for 8 weeks. After the last dose she began  
30 pumping a minimum of 15 minutes, 4 times a day, as well as drinking fenugreek tea. She  
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3 also started taking domperidone during this period. The first drops of milk appeared on the  
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5 twelfth day of pumping, after which her production increased to a maximum of 64ml/day.  
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8 Starting 2.5 months before their baby's due date, [participant]B took ethynodiol  
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10 diacetate/ethinylestradiol, 1mg/35mcg for 6 weeks. On the third week of birth control,  
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12 she initiated domperidone, and on the fifth week, she began drinking the same herbal  
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14 tea with fenugreek and taking 2 malunggay (*moringa oleifera*, a tree leaf used as a  
15  
16 galactagogue) pills 3 times a day. (Wilson et al., 2015, page 65).  
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19 After stopping the hormones, she pumped for a minimum of 15 minutes, 4 to 5 times per  
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21 day. The first drops appeared two days after beginning stimulation, and her production  
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23 reached a maximum of 26 ml/day. In the study by Cazorla-Ortiz et al., (2019), five (55.5%)  
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25 of the nine participants, took progesterone and estrogen to induce lactation in addition to  
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27 galactagogues and stimulation of the breasts.  
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31 **Intranasal oxytocin.** Da Rocha et al., (2014) reported on three women who breastfed  
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33 their adopted child. One of them (33.3%) used oxytocin (in addition to alfalfa and cinnamon  
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35 tea) to encourage lactation. Oxytocin nasal spray was also used (just prior to stimulation with  
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37 a breast pump and suckling by the child) by the two women in the case reports by,  
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39 respectively, Hawke et al. (2005) and Cheales-Siebenaler (1999). Finally, in the study by  
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41 Auerbach and Avery (1981), 14 (6%) of the 240 participants used intranasal oxytocin,  
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43 together with breast stimulation, for 2 weeks after the child's arrival. In this group, it was  
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45 often reported that milk production was more likely if the oxytocin nasal spray was used in  
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47 combination with breast stimulation.  
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51 **Galactagogues.** The drug most widely used in the studies reviewed was  
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53 metoclopramide, a dopamine antagonist. Doses ranged from 20 mg to 80 mg per day, and a  
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55 low dose (5 mg/day) could be maintained while breastfeeding; alternatively, some women  
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57 stopped taking metoclopramide after a period of between 10 days and two months  
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3 (Banapurmath et al., 1993; Biervliet et al., 2001; Frahadi & Philip, 2017; Lakhkar, 2000;  
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5 Shiva et al., 2010). In some cases, dopamine was used (dose between 30 and 120 mg/day),  
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7 either around week 20 of pregnancy or after the child was born (Hawke et al., 2005; LeCain  
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9 et al., 2020; McGuire, 2019; Reisman & Goldstein, 2018; Szucs et al., 2010). In the study by  
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11 Zingler et al. (2017) and in the case report by Cheales-Siebenaler (1999), women stopped  
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13 taking metoclopramide because of similar side effects: fatigue, weight gain and emotional  
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15 lability.  
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19 Herbal supplements with a galactagogue effect are sometimes used in combination  
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21 with breast stimulation either with or without additional galactagogue or hormone treatment.  
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23 An adoptive mother of twins took 1220-1830 mg of fenugreek and 340-1020 mg of blessed  
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25 thistle (Szucs et al., 2010). One (33.3%) of the 3 participants combined breast stimulation  
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27 with alfalfa, cinnamon tea and an oxytocin nasal spray (Da Rocha et al., 2014). All  
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29 participants included in this study combined stimulation with herbal galactagogues (Cazorla-  
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31 Ortiz et al., 2019). In the case report about a mother whose baby was born through surrogacy  
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33 with complete androgen insensitivity syndrome (CAIS), “The participant also took fenugreek  
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35 and milk thistle as herbal supplements” (Le Cain et al., 2020, page 2).  
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### 39 40 **Factors associated with suckling effectively the breast and/or the volume of milk after** 41 42 **an induced lactation** 43

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45 Successful induced lactation could be defined as achieving milk secretion, even if the  
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47 quantity produced is insufficient for exclusive breastfeeding of the child (Banapurmath et al.,  
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49 1993; LeCain et al., 2020; Shiva et al., 2010). In this respect, success was more related to the  
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51 mother’s satisfaction and her sense of self-realization than to the amount of milk produced or  
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53 the duration of breastfeeding (Cazorla-Ortiz et al., 2019; Cheales-Siebenaler, 1999; Zingler et  
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55 al., 2017).  
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### 58 ***Factors associated with the mother’s satisfaction*** 59 60

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3           **Support/encouragement by health personnel, partner, family and friends.** One of  
4  
5 the main factors associated with the success of induced lactation was the support and  
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7 encouragement the participants received during the process from health professionals. Health  
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9 professionals played a key role in providing information, advising and counselling women  
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11 who had not been pregnant regarding the different methods to breastfeed their children. It  
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13 was important to consider the woman's priorities and the particular family configuration  
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15 (Szucs et al., 2010; Da Rocha et al., 2014; Wilson et al., 2015; Cazorla-Ortiz et al., 2019).  
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17 This kind of support could be offered by an International Board Certified Lactation  
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19 Consultants (Biervliet et al., 2001; Farhadi & Philip, 2017; Flores-Antón et al., 2017;  
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21 Cazorla-Ortiz et al., 2019). In the report by Kirkman and Kirkman (2001), concerning a case  
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23 of surrogate motherhood between two sisters, the support they offered one another was what  
24  
25 enabled them to continue with the induction process, despite the difficulties they encountered  
26  
27 along the way. Gribble (2001) described an online support group for breastfeeding adoptive  
28  
29 mothers. This resource helped participants to cope with feeling alone and provided both  
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31 information and support through the sharing of experiences of induced lactation. Participants  
32  
33 felt the process as normal and socially acceptable, which was essential for a successful  
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35 outcome. According to Nemba (1994), the mother who was motivated, confident in herself  
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37 and who was well-informed about the induction process was more likely to achieve a  
38  
39 successful outcome. In the study by Cazorla-Ortiz et al. (2019), participants felt that women  
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41 who were breastfeeding without going through an induction of lactation had more support  
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43 than those who were breastfeeding after going through a process of induced lactation.  
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51           **Frequent stimulation.** Each breast had to be stimulated for 10-20 minutes, 4-10  
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53 times a day (including at night), and this could be done manually or by using a breast pump,  
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55 or both (Banapurmath et al., 1993; Cazorla-Ortiz et al., 2019; Flores-Antón et al., 2017;  
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57 LeCain et al., 2020; McGuire, 2019; Reisman & Goldstein, 2018; Szucs et al., 2010; Wilson  
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3 et al., 2015). In the study by Lakhkar (2000), 4 (33.3%) of the 12 participants who began the  
4 process of induced lactation did not produce milk. It was suggested that this was due to a lack  
5 of motivation and insufficient breast stimulation. Although, in the study by Nemba (1994),  
6 some of the participants ( $N=37$ ) received pharmacological treatment during the induction  
7 process, one of the key factors in achieving high levels of prolactin and oxytocin was breast  
8 stimulation. In the cases of adoptive breastfeeding ( $N=240$ ) reported by Auerbach et al.  
9 (1981), the most important factor in inducing lactation was nipple massage and stimulation,  
10 either by the child suckling or through use of a breast pump. Wilson et al. (2015) noted that  
11 breast stimulation also could be achieved when using a supplemental nursing system (SNS),  
12 in this case a bottle with a neonatal nasogastric tube was placed beside the mother's nipple  
13 that enabled the child to feed while simultaneously stimulating the breast; a bottle of this sort  
14 might contain formula, donor milk or milk previously expressed by the mother herself  
15 (Banapurmath et al., 1993).

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33 **Previous pregnancy and/or breastfeeding.** In the study by Auerbach et al. (1981),  
34 of adoptive mothers ( $N=240$ ), participants who had previously breastfed produced milk more  
35 quickly than did those with no history of lactation. In the recent case report by McGuire  
36 (2019), the woman who induced lactation had a previous pregnancy and lactation and  
37 achieved exclusive breastfeeding. In the study by Cazorla-Ortiz et al. (2019) two participants  
38 achieved exclusive breastfeeding without previous pregnancy or breastfeeding, while the  
39 other two participants in the same study had a previous breastfeeding and they did not  
40 achieve exclusive breastfeeding.

#### 41 ***Factors associated with the child***

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53 **Child's age.** Auerbach and Avery (1981) reported that "three fourths of the babies  
54 less than 8 weeks of age responded well to the opportunity to nurse. Infants 8 weeks of age or  
55 older were as likely to accept as to reject the breast" (p. 342). Lakhkar (2000) likewise found  
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3 that success was more likely the younger the child and the earlier that breastfeeding was  
4 initiated. However, Gribble (2005) described five cases of adopted children from eight  
5 months to five years who breastfeed.  
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10 **Interference due to bottle feeding.** The 10 children in the study by Banapurmath et  
11 al., (1993) were fed with formula until the mothers produced enough milk. Four of the  
12 children (40%) who had been bottle fed subsequently had problems taking to the breast; it  
13 was necessary to discontinue bottle feeding in order to achieve adequate suckling. In the  
14 event that formula or donor milk was needed as a supplement, this was given through a cup  
15 or spoon so as not to interfere with the child's suckling (Abejide et al., 2017; Banapurmath et  
16 al., 1993; Nemba, 1994).  
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### 26 *Duration of breastfeeding following induced lactation*

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28 The longest reported cases of breastfeeding following induced lactation corresponded  
29 to middle and high-income countries: mothers breastfed from 1 month to 4 years. In  
30 developing countries, mothers breastfed their children between 4 and 12 months.  
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### 35 **Discussion**

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37 There are several factors that may account for the differences between developing and  
38 higher income countries in methods of induced lactation and the amount of milk that mothers  
39 produce. Mothers in developing countries are generally more knowledgeable about  
40 breastfeeding, breastfeed more frequently, maintain close physical contact with their child,  
41 whose behaviour they consequently learn to interpret, and have a history of breastfeeding that  
42 may also make it easier. They also live in a culture that is supportive of breastfeeding, not  
43 least as it is seen as crucial to children's survival, given the risks of infection associated with  
44 the preparation of formulas. As a result of the latter, there is also less interference due to  
45 bottle feeding or the use of dummies (Gribble, 2004).  
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3 Indeed, there is currently a tendency in the West to regard breastfeeding as a symbol  
4 of maternal identity. The “good” mother is one who breastfeeds her child, as by doing so she  
5 is seeking the best, both for her child and with regard to her own self-realization as a mother  
6 (Lommen et al., 2015). The new family structures with the same sex couples and the rise of  
7 assisted reproduction has resulted in an increase of induced lactation in both these situations;  
8 the maternity in same sex couples and in surrogacy (Imaz, 2017). Induction of lactation will  
9 gain importance and more studies about this process will be necessary.  
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19 Previous experience of breastfeeding appears to be an important, although not crucial,  
20 factor to achieve breastfeeding after an induction of lactation. Prior breastfeeding strengthens  
21 the mother’s intention to breastfeed, determination and self-efficacy to meet her goal, and  
22 provide her with a more realistic understanding of her breastfeeding intentions and  
23 expectations (Hackman et al., 2015). It should also be noted that in their study of the mouse  
24 mammary gland, Dos Santos et al. (2015) suggested that pregnancy is the major modulator of  
25 mammary gland activity and that the cells of this gland retain a memory of past pregnancies,  
26 which would benefit future attempts at breastfeeding. In addition, information is lacking  
27 regarding whether there had been a previous pregnancy. Hormann (1977) reported that 36 of  
28 65 adoptive mothers (55.38%) who induced lactation managed to produce milk prior to the  
29 child’s arrival, and of these, 12 (33.3%) had no history of pregnancy, 4 (11.1%) had  
30 previously been pregnant but had not breastfed and 20 (55.5%) had previous experience of  
31 both pregnancy and breastfeeding. By contrast, Saari and Yusof (2014), carried out in-depth  
32 interviews with adoptive mothers who had induced lactation and concluded that the potential  
33 for success did not differ between those women with previous experience of pregnancy and  
34 breastfeeding and those with no history of maternity.  
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55 The pharmaceutical and herbal galactagogues used to increase milk production have  
56 been associated with a number of side effects, including gastric problems, bradykinesia,  
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3 drowsiness, trembling, lethargy, hypoglycaemia, dyspnoea, strong smelling urine, sweating  
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5 and even depression, although more studies are needed to assess these effects (McGuire,  
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7 2018). In the review by Bazzano et al. (2016), which included 18 studies involving both  
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9 pharmaceutical galactagogues, metoclopramide and domperidone, and herbal galactagogues  
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11 including *Asparagus racemosus* (shatavari), *Coleus amboinicus* L. (torbangun), fenugreek,  
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13 garlic extract and *Moringa oleifera*,-participants who took domperidone reported only dry  
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15 mouth as a side effect. In the articles included in our review, little reference is made to the  
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17 side effects of the drugs used to induce lactation, therefore, more articles analyzing this effect  
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19 would be necessary. In the same way, not all the articles selected in the review refer to the  
20  
21 factors related to suckling effectively the breast and/or the amount of milk after an induction  
22  
23 of lactation. Considering that the cases of induction of lactation will increase, future studies  
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25 should compare the different methods and the different factors related to the success of the  
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27 induction of lactation and how to determine which are the most appropriate in each case.  
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33 The main limitation of the studies reviewed was the lack of current studies about  
34  
35 induction of lactation. Most of the articles were case reports, which do not produce enough  
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37 evidence to generalize results or build an evidence base. Additionally, most of the case  
38  
39 reports were about induction of lactation in adoption. Further research is required to increase  
40  
41 knowledge about methods of inducing lactation in non-pregnant women, the circumstances in  
42  
43 which one method may be better than another, the possible side effects of galactagogues and  
44  
45 the factors associated with a successful outcome.  
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### 49 **Limitations**

50  
51 One of the limitations of this review is that the studies reviewed are in English or  
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53 Spanish, which limits the useability the results. In addition, inclusion criteria have limited  
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55 articles with information about the methods used to induced lactation and the factors  
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3 associated with suckling effectively the breast and/or the volume of milk after inducing  
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5 lactation. Articles referring to other aspects of induction of lactation were not been included.  
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### 8 **Conclusion**

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10 Health professionals can use this review to learn more about the process of induced  
11  
12 lactation. Raising awareness and offering women the help and advice they need, taking into  
13  
14 account their particular family situation, is essential. Guidance of this kind can empower  
15  
16 women and allow them to experience the emotional and nutritional benefits of breastfeeding.  
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20  
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22  
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24  
25 supervision of Josefina Goberna-Tricas and Noemí Obregón-Gutiérrez.  
26  
27

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33  
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For Peer Review

Table 1.

*Articles Included in the Review (N = 24)*

1 <sup>st</sup> Author (year)	Context	Design	Country	Sample (N)	Method of induction	Type of BF	Main contributions/
LeCain (2020)	Surrogacy	Case Report	UK	Woman 37 yrs. with CAIS. No pregnancy or BF	HT, G, S	Mixed BF	It was the first case of induced lactation with hormonal treatment through estrogen only, without progesterone
Cazorla-Ortiz (2019)	Adoption Surrogacy Lesbian Couple	Qualitative descriptive	Spain	Women (N=9) 28 – 38 yrs. Previous BF (n=2)	HT, G, S	3EBF 6 Mixed BF	The age of the children at the start of BF was from birth to 12 weeks. The age of the children at BF cessation from 1.5 months to 4 years
McGuire (2019)	Lesbian couple	Case Report	Australia	Woman 39 yrs. Previous pregnancy and BF	HT, G, S	EBF, not weaned at 15 mo.	BF was an important aspect of mothering. Possibility of sharing BF in a same sex couple inducing BF. Support from the lactation support providers in the hospital in the process of induction lactation
Reisman (2019)	Adoption Surrogacy Lesbian Couple	Qualitative descriptive	Spain	Women with prior BF (N=9) 28 -38. 2 yrs.	HT, G, S	3 EBF. 6 mixed BF	The age of children at start BF was from birth to 12 weeks. The age of children at BF cessation was from 1.5 months to 4 years
Flores-Antón (2017)	Adoption	Case Report	Spain	Woman aged 37. Previous second-trimester miscarriage, no previous BF	G, S	EBF for 2 years	First case of a woman who became milk donor following induced lactation. Main reason for inducing lactation is to establish bond with the child. Importance of motivation and confidence, support of family and the professional guidance
Farhadi. (2017)	Surrogacy	Case Report	Iran	Woman 23 yrs. mother of twins 30 wks. GA no previous BF	G, S	Mixed BF	Importance of the support from the husband, family and lactation support provider. Many fears and challenges.

1	Zingler (2017)	Surrogacy	Case Report	Brazil	Woman 39 yrs. previous pregnancy and BF	G, S	Mixed BF for 4 wks.	BF established bond between mother and child even if milk production was not sufficient. Prolactin levels no change. The mother satisfaction. Importance of sharing the experience. Consider whether the success of induced lactation was EBF or simply as producing any milk
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8	Wison (2015)	Adoption	Case Report	USA	Women (N=2) 38 & 46 yrs. No previous pregnancy or BF	HT, G, S	Mixed BF for 7 months	Importance of individualized counseling that took into account different family configurations
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12	Da Rocha (2014)	Adoption	Qualitative descriptive	Brazil	Women (N=3) 36 -40 yrs. No previous pregnancy or BF	G, IO, S, SNS	Mixed BF from 4 - 23 mos	BF linked to maternity. There was a relation between BF and the closeness between mother and child
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16	Wahlert (2013)	Lesbian couple	Ethics case study	USA	The non-pregnant partner no previous pregnancy or BF	HT, G, S	na	The risks associated with the medication used to induce lactation were outweighed by the benefits of BF. The primary benefit of induced lactation was not nutritional but emotional benefits
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22	Szucs (2010)	Adoption	Case report	USA	Woman 33 yrs. Previous pregnancy that did not reach term. No previous BF	HT, G, S, SNS	EBF for 2 mos	The milk of the mother was a medicinal product. More research needed on G and HT. There was a lack of protocols about induced lactation. Importance of training for professionals The main objective of induction of lactation was to feel a full mothering
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29	Shiva (2010)	Surrogacy	Case report	Iran	Woman 36 yrs. 2 ectopic pregnancies, 2 miscarriages. No previous BF	G, S	Mixed BF for 3 mos	Importance of the clinicians and nurses counseling and the support from the partner and the family. Emotional and psychological factors could have a positive influence on prolactin and oxytocin secretion. The main objective of induced lactation was establish the emotional bond
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37	Hawke (2005)	Adoption	Case report	New Zealand	Woman 40 yrs. No previous pregnancy or BF	G, IO, S, SNS	Mixed BF for 7 mos.	Moments of frustration at lack of results. Uncertainty over the amount of milk produced
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40	Gribble (2005)	Adoption	Case report	Australia	Cases (N=5) adopted children from 8 mos. - 5 yrs.	S	Mixed BF but not all BF	Suckling at the breast provided comfort and stress relief; although, there was no BF
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1	Kirkman	Surrogacy	Case report	Australia	Previous BF ( $n=1$ ) Woman 41 yrs. No previous pregnancy or BF	S, SNS	Mixed BF for 10 mos.	The support from the immediate environment was important for the success of induced lactation
2	(2001)							
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5	Gribble (2001)	Adoption	Descriptive online Survey	Australia	Women ( $N=170$ ) from the USA, CA, AU, NZ & PRC support group for BF adoptive mothers	Not referring	Not referring	The support group helped cope with feeling alone and enabled them to share their experiences and to normalize the situation
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11	Biervliet (2001)	Surrogacy	Case report	UK	Woman 27 yrs. No previous pregnancy or BF	G, S,	Mixed BF for 3 mos.	The option of induced lactation should be made available to all women who had a child through surrogacy
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14	Lakhkar (2000)	Adoption	Descriptive	India	Women ( $N=12$ ) 35 -45 yrs. 3 o 4 BF counselling session No previous pregnancy or BF	G, S	11 mixed BF, 1 EBF	The reasons for not BF. Women described the experience of BF as one of the best they had had. Motivation and family support were the most important success factors.
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19	Cheales-Siebenaler (1999)	Adoption	Case report	USA	Woman 34 yrs. 3 miscarriages. No previous BF	G, IO, S	EBF for 2.5 mos. Mixed BF 4.5 mos.	Weight gain, fatigue, and breast pain were the reason to stop BF. Lactation support providers should empowering adoptive mothers
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23	Abejide (1997)	Adoption	Case report	Nigeria	Women ( $N=6$ ) 22 -56 yrs. All previous pregnancy and BF	S	EBF from 4 mos. - 10 mos.	BF as crucial to the survival of children. Induced lactation was culturally accepted
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28	Nemba (1994)	Adoption	Case report	Papua New Guinea	Women ( $N=37$ ) 19 – 55 yrs. 25 previous pregnancy and BF ( $n=25$ )	No previous BF: HT, G, S Previous BF: G, S	EBF 24 $\geq$ 9 mos. ( $n=24$ )	No differences between previous or no previous BF. Importance of the motivation, psychological preparation, family and professional support
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32	Banapurmath (1993)	Surrogacy	Case report	India	Women ( $N=10$ ) 25 – 45 yrs. All previous pregnancy and BF	G, S	EBF 2 years ( $n=2$ ) Mixed BF ( $n=3$ ) 1 yr No BF ( $n=5$ )	Bottle feeding was an obstacle for suckling at the breast. Induction of lactation was related with the attachment between mother and child. The success of induced lactation was related to the possibility of BF, milk produced
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39	Thearle (1984)	Adoption	Case report	Australia	Women ( $N=6$ ) 32 -34 yrs.	3 women: HT, S, SNS 3 women: S, SNS	Mixed BF 5 wks. - 1 yr.	BF was described as a pleasurable experience. Induction of lactation was related with the attachment between
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Auerbach (1981)	Adoption	Descriptive	USA	No previous pregnancy, 1 previous BF Women ( $N=240$ ) $M$ age = 27. Previous pregnancy ( $n=65$ ), previous BF ( $n=36$ )	Maternal dietary supplementation: increased fluid intake S; SNS ( $n =137$ )	Mixed BF $\geq 7$ mos.	mother and child. Importance of the professional support  Previous BF was related to longer duration of BF after induced lactation and less supplements. The main reason for inducing lactation was to strengthening attachment between mother and child. Children older than 8 weeks had more difficult for suckling. Not achieving EBF did not affect the experience of induced lactation
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*Note.* Main contributions included factors related to suckling effectively at the breast and/or the amount of milk produced. Abbreviations: USA = United States of America; UK = United Kingdom; CAIS = Complete Androgen Insensitivity Syndrome; HT = hormonal treatment; G = Galactagogues; IO = intranasal oxytocin; S = stimulation; SNS = supplemental nursing system; BF = breastfeeding; EBF = exclusive breastfeeding; mixed BF = BF and formula; hx = history.

Figure 1- Sample Selection Process

