



Likelihood of Breastfeeding Within the USDA's Food and Nutrition Service Special Supplemental Nutrition Program for Women, Infants, and Children Population

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This is a postprint of an article that originally appeared in [Journal of Human Lactation](https://doi.org/10.1177/0890334416679619) on December 15, 2016. The original article can be found here, <https://dx.doi.org/10.1177/0890334416679619>.

Houghtaling, Bailey, Carmen Byker Shanks, and Mica Jenkins. "Likelihood of Breastfeeding Within the USDA's Food and Nutrition Service Special Supplemental Nutrition Program for Women, Infants, and Children Population." *Journal of Human Lactation* 33, no. 1 (February 2017): 83-97. DOI: 10.1177/0890334416679619.

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Journal Title: Journal of Human Lactation

Article Number: 679619

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Likelihood of Breastfeeding Within the USDA's Food and Nutrition Service Special Supplemental Nutrition Program for Women, Infants, and Children Population: A Systematic Review of the Literature

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Abstract

Background: Breastfeeding is an important public health initiative. Low-income women benefiting from the U.S. Department of Agriculture's Food and Nutrition Service Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) are a prime population for breastfeeding promotion efforts.

Research aim: This study **aimed** to determine factors associated with increased likelihood of breastfeeding for WIC participants.

Methods: The Preferred Reporting Items for Systematic Reviews and Meta-Analysis statement guided the systematic review of literature. Database searches occurred in September and October 2014 and included studies limited to the previous 10 years. The following search terms were used: *low-income; WIC; women, infants, and children; breastfeeding; breast milk; and maternal and child health*. The criterion for inclusion was a study sample of women and children enrolled in the WIC program, thereby excluding non-United States–based research.

Results: Factors that increased the likelihood of breastfeeding for WIC participants included sociodemographic and health characteristics ($n = 17$); environmental and media support ($n = 4$); government policy ($n = 2$); intention to breastfeed, breastfeeding in hospital, or previous breastfeeding experience ($n = 9$); attitudes toward and knowledge of breastfeeding benefits ($n = 6$); health care provider or social support; and time exposure to WIC services ($n = 5$).

Conclusion: The complexity of breastfeeding behaviors within this population is **noted**. Results **provided** multisectoral insight for future research, policies, and practices in support of increasing breastfeeding rates among WIC participants.

Keywords

breastfeeding, breastfeeding promotion, infant nutrition, public health nutrition, Special Supplemental Nutrition Program for Women, Infants, and Children

Background

Breastfeeding is a top public health priority due to its unparalleled, favorable health outcomes affecting infants, mothers, and entire communities (American Academy of Pediatrics [AAP], 2012; National WIC Association, 2013; U.S. Department of Health and Human Services [HHS], 2011). For this reason, the AAP recommends that breastfeeding continue for at least 1 year and exclusively for the first 6 months (AAP, 2012). Comprehensive breastfeeding data show that widescale promotion has the potential to reduce health care costs in the United States by \$13 billion annually (Bartick & Reinhold, 2010), increase economic input (Victora et al., 2015), and decrease the use of natural

and fiscal resources required to produce and use human milk alternatives (HHS, 2011).

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Date submitted: July 24, 2016; Date accepted: October 24, 2016.

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The U.S. Department of Agriculture's (USDA) Food and Nutrition Service Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) continues to be integral to American public health (National WIC Association, 2013). Since pilot initiation in 1972, WIC has supplemented low-income women, infants, and children with nutrition, education, and breastfeeding support to address population-specific health concerns. Today, the reach of WIC is significant, extending to nearly one half of all infants born in the United States (USDA, 2012).

Special Supplemental Nutrition Program for Women, Infants, and Children packages include full, partial, or no breastfeeding, with full breastfeeding inclusive of a greater multitude of food offerings for the mother and less formula issuance overall. A full breastfeeding mother enrolled in WIC is eligible to receive food package offerings up to 1 year after delivery, an incentive not offered to women choosing partial or no breastfeeding. Furthermore, a full breastfeeding package recipient receives \$10 vouchers for fresh fruits and vegetables, whereas all other package participants receive \$8 (USDA, 2014).

Despite efforts to encourage breastfeeding, mothers participating in WIC continue to display lower rates of breastfeeding on a national scale in comparison with nonparticipants (Deming, Briefel, & Reidy, 2014; Jacknowitz, Novillo, & Tiehen, 2007; Jensen, 2012; Oliveira, 2002; Ponza, Devaney, Ziegler, Reidy, & Squatrito, 2004; Ryan & Zhou, 2006; USDA, 2012; Ziol-Guest, 2010). A recent review highlighted specific barriers to breastfeeding within the WIC population: lack of social and provider support, return to work and work-site barriers, lactation issues, WIC program and policy issues, and social or cultural hindrances (Hedberg, 2013). Another review studied the effect of the recent 2009 WIC food package revisions on participants' dietary intake, access to healthy food and beverages, and breastfeeding (Schultz, Byker Shanks, & Houghtaling, 2015).

This systematic review of the literature examines factors associated with an increased likelihood of breastfeeding among WIC participants, a scope lacking in the literature. The literature search was narrowed to WIC participants only, as evidence demonstrates demographic differences between those who participate and those who abstain from the WIC program, despite eligibility (USDA, 2012).

Methods

Design

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009) statement guided methodological parameters. Articles in this search were extracted from PubMed, CINAHL, and ScienceDirect. The search for publications was conducted in September and October 2014. The

Key Messages

- Factors influencing the likelihood of breastfeeding within the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) population are important to understand in order to increase breastfeeding rates.
- Seven themes were identified to increase the likelihood of breastfeeding within the WIC population, spanning multiple sectors of influence.
- Research, policy, and practice applications at the individual, social, environmental, and policy sectors are warranted to increase WIC breastfeeding rates.

following keywords were used to yield articles: *low-income; WIC; women, infants, and children; breastfeeding; breast milk; and maternal and child health*. A lack of literature addressing opportunities to breastfeed (as opposed to barriers) prompted authors to include all relevant articles published since January 2004. The year 2004 was selected because WIC initiated the Breastfeeding Peer Counseling initiative that year, a major program shift in support and education for the agency (USDA, 2016).

This review was exempt from institutional review board review; no human participants were involved in the research.

Sample

Articles written in English, based in the United States, observing WIC participants, and focused on breastfeeding practices were included for a review of titles and abstracts. Articles were excluded if a publication focused on a low-income population not exclusively consisting of WIC participants, health outcomes or nutrient analyses related to infant consumption of human milk, or a comparison of WIC populations and non-WIC populations. Furthermore, manuscripts that presented any data about the factors that determined the likelihood of breastfeeding were included. Manuscripts that focused only on barriers to breastfeeding were excluded, as that topic has already been extensively researched and documented in current literature.

See Figure 1 for the PRISMA Flow Diagram demonstrating the search process and article exclusions. Full-text screening resulted in the removal of 70 articles for the following reasons: no data about factors that determine increased likelihood of breastfeeding ($n = 55$), participant recruitment was vague and implied a sample not exclusively consisting of WIC participants ($n = 11$), and study primarily assessed the early introduction of solid foods with no focus on breastfeeding ($n = 4$). Remaining articles ($n = 32$) were organized into areas of research by emergent themes.

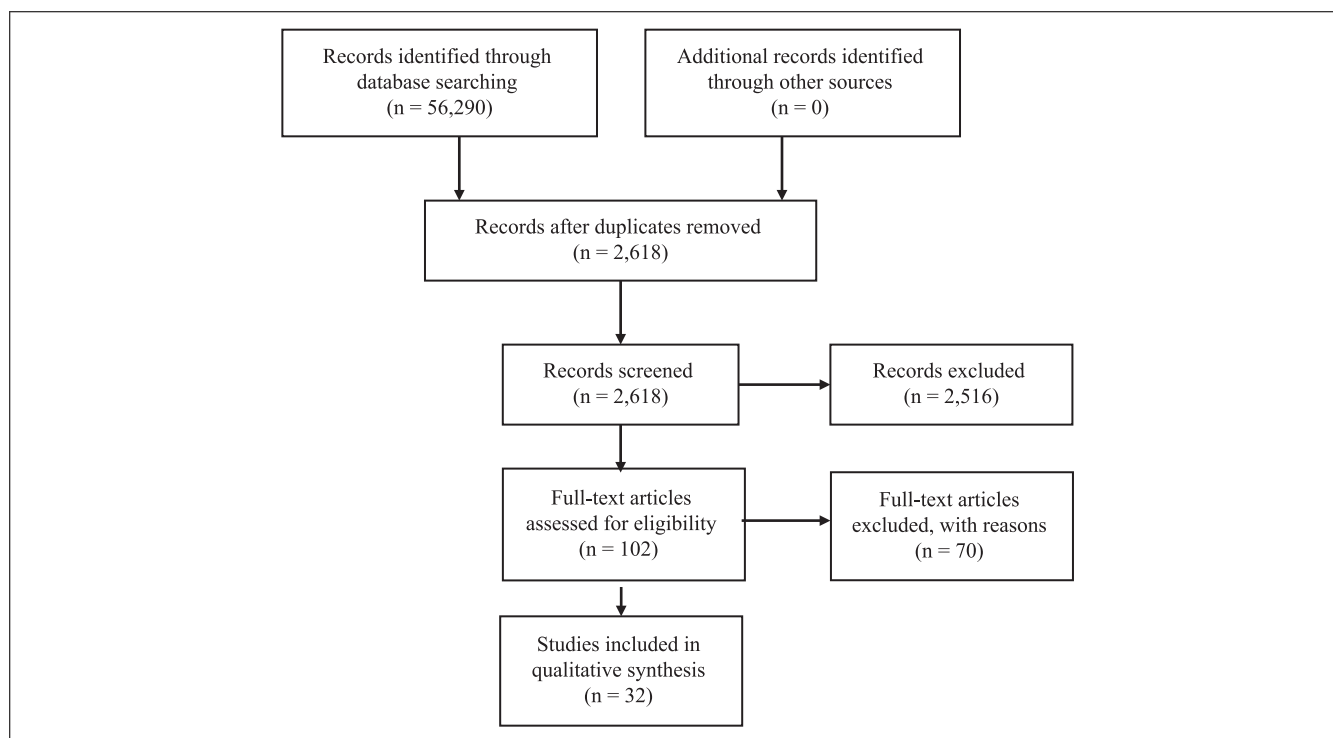


Figure 1. PRISMA 2009 flow diagram.

Data Collection

The Cochrane Collaboration's tool for assessing risk of bias (Julian et al., 2011) was applied in the following ways: a total of three authors were involved in verification of inclusion versus exclusion criteria for all screened articles, including full-text review; articles were considered appropriate for analysis if all data of interest were specified within the study. Application of the Cochrane tool ensured a comprehensive analysis of resulting studies and ability to compare results across studies. Data of interest extracted from each publication are displayed in tables.

Data Analysis

After data were extracted from each article, authors met to discuss all of the factors identified in the research that support the likelihood of breastfeeding among WIC participants.

Authors organized factors into themes.

Results

See Table 1 for references supporting each identified theme and Table 2 for characteristics of included studies.

Sociodemographic and Health Characteristics

Seventeen studies found specific sociodemographic and health characteristics that predicted the likelihood of

breastfeeding (see Table 3), including absence of depression ($n = 1$), age ($n = 8$), decreased body mass index ($n = 2$), decreased time spent in the United States ($n = 3$), delayed return to work ($n = 1$), increased income ($n = 2$), larger weight infants ($n = 1$), geographic location ($n = 1$), cohabitation with child's father ($n = 1$), lower birth-weight infants ($n = 1$), marriage ($n = 2$), more years of education ($n = 6$), not receiving food stamps ($n = 1$), nonsmoking ($n = 1$), number of prior children ($n = 3$), planned pregnancies ($n = 1$), prenatal care ($n = 1$), Spanish speaking ($n = 4$), taking multivitamins ($n = 1$), unemployed or working part-time ($n = 1$), and urban residency ($n = 2$).

In addition, white or Hispanic women were documented as being more likely to breastfeed than non-Hispanic black or American Indians/Alaska Natives ($n = 10$).

Environmental and Media Support

Four articles targeted the WIC participant's environment ($n = 3$) and media promotion ($n = 1$) (see Table 4).

One study focused on changing the normative formula-feeding method for urban black women enrolled in WIC. Posters that promoted breastfeeding were influential overall and persuasive to one WIC participant who chose breastfeeding. In addition, positive social interactions between WIC staff and participants facilitated breastfeeding discussion and increased breastfeeding initiation.

Another study found that changing the social and physical WIC clinic environment promoted breastfeeding efforts.

Table 1. Articles Contributing to Emerged Thematic Results in Systematic Review Assessing Factors Associated With Increased Likelihood of Breastfeeding Among Participants of WIC.

Thematic result	Citations
Sociodemographic characteristics (<i>n</i> = 17)	Campbell, Wan, Speck, & Hartig, 2014; Darfour-Oduro & Kim, 2014; Dodgson, Codier, Kaiwi, Oneha, & Pagano, 2007; Gross et al., 2009; Haughton, Gregorio, & Perez-Escamilla, 2010; Hildebrand et al., 2014; Hurley, Black, Papas, & Quigg, 2008; Jacobson et al., 2015; Langellier, Chaparro, Wang, Koleilat, & Whaley, 2014; Langellier, Chaparro, & Whaley, 2012; Ma & Magnus, 2012; McKechnie, Tluczek, & Henriques, 2009; Mickens, Modeste, Montgomery, & Taylor, 2009; Murimi, 2010; Reeder, Joyce, Sibley, Arnold, & Altindag, 2014; Tenfelde, Finnegan, & Hill, 2011; Vaaler, Stagg, Parks, Erickson, & Castrucci, 2010
Environmental and media support (<i>n</i> = 4)	Cricco-Lizza, 2005; Hildebrand et al., 2014; Meehan et al., 2008; Sayegh, Erickson, Fortenberry, & Castrucci, 2007
Government policy (<i>n</i> = 2)	Langellier et al., 2014; Whaley et al., 2012
Intention to breastfeed, breastfeeding in hospital, or previous breastfeeding experience (<i>n</i> = 9)	Dodgson et al., 2007; Jacobson et al., 2015; Langellier et al., 2012; Lovera, 2010; McKechnie et al., 2009; Mickens et al., 2009; Murimi, 2010; Tender et al., 2009; Tenfelde et al., 2011
Attitudes toward and knowledge of breastfeeding benefits (<i>n</i> = 6)	Cricco-Lizza, 2004; Fornasaro-Donahue, Tovar, Sebelia, & Greene, 2014; Mickens et al., 2009; Mistry, 2007; Murimi, 2010; Vaaler et al., 2010
Health care provider or social support (<i>n</i> = 15)	Campbell et al., 2014; Cricco-Lizza, 2005; Cross-Barnet, Augustyn, Gross, Resnik, & Paige, 2012; Gross et al., 2009; Haughton et al., 2010; Hildebrand et al., 2014; Langellier et al., 2012; Lovera, 2010; Ma & Magnus, 2012; Mickens et al., 2009; Olson, Haider, Vangjel, Bolton, & Gold, 2010; Reeder et al., 2014; Stremler & Lovera, 2004; Whaley et al., 2012; Yun et al., 2010
Time exposure to WIC services (<i>n</i> = 5)	Jacobson et al., 2015; Joyce, Racine, & Yunzal-Butler, 2008; Metallinos-Katsaras, Brown, & Colchamiro, 2015; Tenfelde et al., 2011; Yun et al., 2010

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *N* = 32. In many cases, articles were categorized into multiple research foci, due to the frequency of association with several identified themes (*n* = 16).

Intervention tactics included staff training to align communication styles to WIC principles and increased visual promotion efforts of breastfeeding. Furthermore, visual and audio breastfeeding advertisements through a media campaign in rural Texas resulted in increased inquiries about breastfeeding practices to health care providers. Last, one study associated ease of access to breast pumps in the WIC participant's environment with longer breastfeeding duration of WIC participants.

Government Policy

Recent changes in policy regarding the WIC food package contents positively influenced participant breastfeeding rates (see Table 5). One study compared pre-2009 and post-2009 revision package choices. More participants chose full breastfeeding packages postrevision and extended the duration of exclusive breastfeeding, although regional differences were observed.

Another study increased staff training and participant education at various WIC agencies in order to promote the full breastfeeding package option corresponding with 6 months pre-implementation of 2009 WIC food package content changes. These efforts increased initiation and duration of breastfeeding measured at 2 and 6 months, with

an additional increase postimplementation of food package revisions.

Intention to Breastfeed

Nine articles indicated intention to breastfeed as a predictor of breastfeeding (see Table 6). Three studies specifically identified intention to breastfeed as being predictive of exclusive breastfeeding and one identified increased odds of longer duration to 3 and 6 months. Breastfeeding in hospital and previous breastfeeding experience were defined as intent to breastfeed, based on the conclusion of two studies within this data set.

One study identified participation in a prenatal breastfeeding education class as influential on exclusive breastfeeding in hospital. Exclusive breastfeeding initiation in the hospital led to higher breastfeeding duration rates for WIC participants to at least 6 (*n* = 4), 12 (*n* = 1), and 24 months (*n* = 1).

Knowledge and Attitudes Toward Breastfeeding

Six articles noted the positive effect of knowledge of breastfeeding and its benefits (see Table 7) on likelihood of breastfeeding. Informed decision making based on increased knowledge of mother and infant health benefits (*n* = 4) and

Table 2. Variables of Included Research for Systematic Review Identifying Predictors of Increased Likelihood of Breastfeeding Within the WIC Population.

First author, year	Research design	Participant characteristics	State	Study description	Data collection
Campbell, 2014	Cross-sectional	WIC participants: no prior breastfeeding experience	TX	Determined PC contact with breastfeeding initiation rates among primiparas and women with no prior breastfeeding experience	Infant Feeding Practices Survey
Cricco-Lizza, 2004	Ethnographic	WIC participants and their relatives or friends	NY	Explored context of infant-feeding decisions in an urban WIC clinic	Participant observation; interviews; key informants
Cricco-Lizza, 2005	Ethnographic	WIC participants and their relatives or friends	NY	Explored context of infant-feeding decisions in an urban WIC clinic	Participant observation; interviews; key informants
Cross-Barnet, 2012	Qualitative	WIC participants: with infants; met at least once with PC	MD	Explored infant-feeding education and support experiences of mothers	Semistructured interviews
Darfour-Oduro, 2014	Cross-sectional	WIC participants: mother–infant dyads; biological mothers	IL	Understanding of mothers' social environments and well-being in postnatal period, including breastfeeding initiation and duration to 3 months	Survey
Dodgson, 2007	Retrospective	WIC participants: postpartum; initiated breastfeeding	HI	Description of breastfeeding patterns of women who had initiated breastfeeding	WIC participant data
Fornasaro-Donahue, 2014	Mixed methods descriptive	WIC participants: pregnant or nonbreastfeeding women with infant age 1-4 months	RI	Assessed cost of formula as a motivator and deciding factor in breastfeeding decision	Surveys; interviews
Gross, 2009	Cross-sectional	WIC participants	MD	Determined rates of breastfeeding initiation by PC program participation	Electronic data
Haughton, 2010	Retrospective	WIC participants: breastfed at least one child who was younger than 5	CT	Identification of factors associated with breastfeeding duration	Survey; self-completed or administered
Hildebrand, 2014	Two-part quasi-experimental	WIC participants: parents and caregivers of children (birth–3 years); WIC clinics	OK	Changes in physical and social environment in four WIC clinics determined perception of WIC experience and breastfeeding initiation	Computerized survey; secondary breastfeeding data
Hurley, 2008	Cross-sectional	WIC participants	MD	Examined how breastfeeding behaviors, perceptions, and experiences vary by race/ethnicity in the United States	Telephone survey
Jacobson, 2015	Cross-sectional	WIC participants	KS	Sought insight into maternal characteristics associated with breastfeeding among urban and rural women	Pregnancy Nutrition Surveillance System data set
Joyce, 2008	Cross-sectional	WIC participants: enrolled during pregnancy and continued enrollment postpartum	FL, GA, IN, MI, MO, NJ, NC, OH, VA	Tested exposure to WIC and associated outcomes with smoking, weight gain during pregnancy, birth outcomes, and likelihood of breastfeeding	Pregnancy Nutrition Surveillance System data set

(continued)

Table 2. (continued)

First author, year	Research design	Participant characteristics	State	Study description	Data collection
Langellier, 2012	Cross-sectional	WIC participants: biological mother of child in WIC	CA	Measured effect of in-hospital breastfeeding, receiving of formula discharge pack, and maternal return to work on breastfeed duration	Survey data from 2008; telephone interview
Langellier, 2014	Cross-sectional; pre/post design	WIC participants: English or Spanish speaking	CA	Effect of 2009 WIC changes on breastfeeding outcomes	Survey questionnaire; interview
Lovera, 2010	Cohort; intervention	WIC participants: mothers and spouses; initiated breastfeeding	TX	Pilot <i>Peer Dad Program</i> based on theory of planned behavior aimed toward fathers to promote support of breastfeeding through peer counseling	Structured interviews
Ma, 2012	Cross-sectional	WIC participants: first-time mothers	LA	Application of positive deviance concept to explore characteristics of positive deviants for breastfeeding	LaPRAMS from 2000-2004
McKechnie, 2009	Retrospective	WIC participants	WI	Examined exclusive versus partial breastfeeding relating to breastfeeding duration and determined association of demographic characteristics	Maternal records from existing database
Meehan, 2008	Cross-sectional; pre/post design	WIC participants: English or Spanish speaking	CA	Electric pump loan program determined facility of breastfeeding for mothers returning to work	Survey questionnaire; interview
Metallinos-Katsaras, 2015	Longitudinal	WIC participants: prenatal and postpartum; singleton live births	MA	Association between length of exposure to WIC and breastfeeding initiation and duration	WIC breastfeeding data
Mickens, 2009	Cross-sectional	WIC participants: any stage of pregnancy	CA	Identification of effect factors for low-income women's infant-feeding decisions	Structured survey questionnaire
Mistry, 2007	Quantitative	WIC participants	CA	Breastfeeding PC used the theory of planned behavior to assess intentions, attitudes, and norms toward breastfeeding	Structured survey questionnaire
Murimi, 2010	Cross-sectional	WIC participants: rural residency	LA	Determined factors that have largest effect on breastfeeding and effect of formula provision by WIC on breastfeeding	Adapted questionnaire validated by Szcudronski and Dobson, 2002 [AQ: 6]
Olson, 2010	Quasi-experimental	WIC participants	MI	Examined effectiveness of a PC program	Administrative and survey-based sources
Reeder, 2014	Stratified, randomized	WIC participants: indicated intention or indecisiveness to breastfeed	OR	Effectiveness of a telephone PC program for increased breastfeeding initiation, duration, and exclusivity	Data retrieved from OR WIC Information System Tracker (TWIST)
Sayegh, 2007	Pre/post intervention	WIC participants: rural; expectant or new mothers	TX	Piolet [AQ: 5] media breastfeeding outreach campaign (posters, billboard, radio, TV, newspaper, magazine ads, community presentations, gift basket distribution)	Interviews

(continued)

Table 2. (continued)

First author, year	Research design	Participant characteristics	State	Study description	Data collection
Stremler, 2004	Intervention	WIC participants: fathers of enrolled infants and children	TX	Father peer support program development from documented success from PC and research identifying father's attitude as important influence on breastfeeding	Exit interviews
Tender, 2009	Retrospective	WIC participants	DC	Identified reasons that breastfeeding mothers begin in-hospital formula supplementation and risk factors associated with supplementation	Orally administered survey
Tenfelde, 2011	Cross-sectional	WIC participants: initiated breastfeeding and responded to a question on breastfeeding exclusivity	IL	Examined predictors of breastfeeding exclusivity in hospital in an urban area	Clinical and administrative data
Vaaler, 2010	Cross-sectional	WIC participants: mothers of young children	TX	Influences of demographic characteristics, breastfeeding in public, attitudes to infant feeding, and use of formula on breastfeeding	Infant Feeding Practices Survey
Whaley, 2012	Pre/post data analysis	WIC participants	CA	Effect of 2009 WIC food package changes with increased staff training and education on breastfeeding package issuance rates	WIC data on breastfeeding and infant-feeding packages issued
Yun, 2010	Cross-sectional	WIC participant data: all 118 WIC agencies	MO	Effectiveness of PC programs on breastfeeding initiation and identification of factors to facilitate breastfeeding initiation	2006 Pregnancy Nutrition Surveillance System, birth certificate data

Note. PC = peer counselor; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *N* = 32.

bonding with child through breastfeeding (*n* = 1) were important factors influencing the decision to breastfeed for WIC mothers. In addition, stronger beliefs about breastfeeding's benefits (*n* = 2) and positive attitudes toward breastfeeding a child and breastfeeding in public were important determinants (*n* = 1).

Health Care Provider and Social Support

Fifteen studies contributed to the theme of health care provider and social support (see Table 8). Support from health care professionals (*n* = 6), peer counseling (*n* = 6), and family support (*n* = 2) increased the likelihood of breastfeeding.

Health care professional support varied among the following: conveying feelings of empathy (*n* = 2); positive, consistent interactions with clients (*n* = 1); utilization of WIC staff or lactation consultants for breastfeeding barriers (*n* = 1); providing any breastfeeding information (*n* = 1); and

increased staff training on 2009 WIC food package changes for breastfeeding promotion (*n* = 1).

Group support through peer counseling had a greater effect than education efforts in breastfeeding (*n* = 1). Overall, any involvement in a peer counseling group had positive outcomes for breastfeeding (*n* = 3), with implications of prenatal involvement or in-hospital peer counselor support being even more beneficial to the likelihood of breastfeeding (*n* = 1). A telephone-based counseling support network primarily for Spanish-speaking participants was successful in increasing likelihood of breastfeeding. Furthermore, two studies focused on peer dad interventions in Texas with a primarily Hispanic population.

Time Exposure to WIC

Five articles are associated with the theme of time exposure to WIC (see Table 8). Participants enrolled in WIC during the

Table 3. Sociodemographic and Health Characteristics as a Predictor of Increased Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Campbell, 2014 ^a	More than a high school education; Hispanic women; first-time pregnant women when compared with women who did not breastfeed in prior pregnancies
Darfour-Oduro, 2014	Married mothers 3.47 times more likely to initiate breastfeeding and 4.08 times more likely to continue through 3 months. Not receiving food stamps; not diagnosed with postpartum depression or not depressed (not statistically significant)
Dodgson, 2007 ^a	Multiparous; older age (not significant)
Gross, 2009 ^a	Hispanic participants had highest breastfeeding rates in all categories; larger infants in comparison with low-birth-weight infants
Haughton, 2010 ^a	Additional year of maternal age, less time spent in United States associated with breastfeeding at 6 months; planned pregnancies 2 times as likely to breastfeed for at least 6 months
Hildebrand, 2014 ^a	White women more likely to breastfeed compared with American Indians/Alaska Natives; women with one child in comparison with women with two or more children; age 28 or older
Hurley, 2008	Hispanic mothers more likely (91%) than African American (65%) or white (61%) to initiate; maternal age; decreased infant age; more than high school education
Jacobson, 2015 ^a	Urban women: Hispanic; 18-19 years old; more than a high school education; earning more than \$10,000 per year; prenatal care early in pregnancy; nonsmoking; use of multivitamins. Not variable within rural population (age, income, prenatal care, WIC enrollment timing not statistically significant predictors)
Langellier, 2012 ^a	Non-Hispanic white mothers had 2.9 times the odds of Hispanic mothers to breastfeed exclusively at 6 months; foreign-born mothers more likely to breastfeed at 6 and 12 months; Spanish-speaking mothers more likely to breastfeed at 6, 12, and 24 months; mothers living with child's parent 21% increased odds of breastfeeding at 6 months and 31% increased odds at 12 months; mothers returning to work after 7 months postpartum more likely to breastfeed at 6, 12, and 24 months
Langellier, 2014 ^a	Latinas in comparison with blacks more likely to initiate breastfeeding but less likely to exclusively breastfeed at 6 months; white mothers more likely than Latinas to exclusively breastfeed at 3 and 6 months; children's age, mother's education, foreign nativity, and Spanish speaking
Ma, 2012 ^a	White: increased breastfeeding initiation by maternal age and education, more likely to initiate breastfeeding when compared with black mothers. Black: married, 13 years or more of education, urban residence, and low-birth-weight infants. Positive deviants were more likely to have a job prior to delivery.
McKechnie, 2009	Exclusive breastfeeding associated with older mothers and mothers with lower body mass index
Mickens, 2009 ^a	Income greater than \$18,000
Murimi, 2010 ^a	White; unemployed or part-time work; married
Reeder, 2014 ^a	Nonexclusive breastfeeding duration greater at 6 months for Spanish speakers only; likelihood of exclusive breastfeeding cessation less among Spanish speakers
Tenfelde, 2011 ^a	Women not classified as overweight or obese 50% more likely
Vaaler, 2010 ^a	Higher education; older age; Spanish-speaking Hispanic; metropolitan residence; not living near the Texas-Mexico border

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *n* = 17.

^aData are also displayed in other table(s).

Table 4. Environmental and Media Support as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population

First author, year	Results indicating increased likelihood of breastfeeding
Cricco-Lizza, 2005 ^a	Clinic environment with culturally appropriate posters with relevant messages potentially influential of infant-feeding decisions; encouraged women to breastfeed or think about breastfeeding more
Hildebrand, 2014 ^a	Women 1.5 times more likely to initiate breastfeeding in influence model when compared with traditional services
Meehan, 2008	Mothers receiving pump as soon as requested did not request formula supplementation until 8.8 months on average and 5.5 times more likely to not request formula at 6 months
Sayegh, 2007	Postcampaign, providers reported more breastfeeding-specific questions being asked; intention to breastfeed

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *n* = 4.

^aData are also displayed in other table(s).

Table 5. Government Policy as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Langellier, 2014 ^a	Participants receiving new food package had 2.2 times the odds of breastfeeding initiation, 1.7 times the odds of exclusive breastfeeding at 3 months, and 3.1 times the odds of exclusive breastfeeding through 6 months.
Whaley, 2012 ^a	Full breastfeeding package issuance increased by 86%; increase of exclusive breastfeeding at 2 and 6 months

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. $n = 2$.

^aData are also displayed in other table(s).

first ($n = 2$) and second trimesters ($n = 3$) are more likely to breastfeed than participants enrolled later.

Discussion

To the authors' knowledge, this systematic review of the literature is the first to highlight positive factors that increase the likelihood of breastfeeding in the WIC population. Our review identified 32 articles that described seven distinct factors. Below, we provide guidance on adapting strategies in research or practice with WIC populations to promote breastfeeding. The discussion is based on promoting breastfeeding strategies with the WIC population at the individual, social, environmental, and policy levels around the seven identified factors. A co-interaction of the determined factors is conceptually portrayed in Figure 2.

Individual Level Strategies

Nationally, demographic characteristics such as income, education, and race/ethnicity are well documented as factors increasing the likelihood of breastfeeding (HHS, 2011). Persons classified in lower socioeconomic groups, with less education, or of minority race/ethnicity are often less likely to initiate and sustain breastfeeding (HHS, 2011). Overall, findings provide important information about tailoring WIC services to different sociodemographic audiences with particular health outcomes and behaviors. For example, inclusion of weight management counseling, coping skills, couple counseling, smoking cessation support, workplace breastfeeding, and family planning may be important additions to breastfeeding interventions for specific populations and warrant further research specific to the WIC population.

Breastfeeding science should offer meaningful insights into deeper and more personal barriers to breastfeeding moving forward. For example, lack of depression increased likelihood of breastfeeding (Darfour-Oduro & Kim, 2014). Many low-income women throughout the United States

suffer from substance abuse or dependence, domestic violence, and depression (Lawrence, Chau, & Lennon, 2004), which are not listed or studied as barriers to breastfeeding in recent literature. Future research needs to determine the role of the aforementioned factors as potential barriers to breastfeeding among WIC participants.

Resonation of differing education methods should be tested with ethnically and racially diverse WIC mothers and respective educators. The *WIC Nutrition Services Standards* provide some insight into education requirements of staff members, highlighting multicultural awareness training (USDA, 2013[AQ: 7]). Likewise, education guides for multicultural WIC communities exist (Food and Research Action Center, 2009). Perhaps, further tailoring of these resources through site-specific, direct feedback from clientele would be helpful moving forward.

The infant-feeding method that the mother determines during pregnancy strongly aligns with the infant-feeding method used when the infant is born (Mistry, 2007), indicating that prenatal intention to breastfeed is predictive of breastfeeding. Considering that 10.1% of WIC participants are prenatal (Johnson et al., 2013), stronger efforts to promote breastfeeding among this group would be beneficial.

Information about breastfeeding and time exposed to the WIC program is conflicting to date. A study including a national representation of WIC participants determined that participation in WIC during the first and second trimesters is associated with decreased likelihood of breastfeeding (Ziol-Guest, 2010). Possibly confounding variables, such as resources allocated and breastfeeding promotion techniques at individual WIC clinics, as evidenced by this review, are more influential on infant-feeding decisions than are time exposure. Perhaps, allocated resources beyond the minimum breastfeeding promotion standards have an increased benefit to breastfeeding when combined with variables such as time exposure to government services.

Social Level Strategies

Social support is strongly related to the likelihood of breastfeeding, and lack thereof is a known barrier to breastfeeding in the WIC population (Hedberg, 2013). A recent publication identified the necessity to offer peer counseling support to every WIC participant, highlighting the limited funding available for such programs (Baumgartel & Spatz, 2013). Allocated WIC resources for formula purchases are 25 times higher than breastfeeding promotion efforts, even when peer support programs supported by WIC are lacking throughout much of the country (Baumgartel & Spatz, 2013).

Peer counseling for WIC fathers and the effectiveness of such an intervention likely rely on cultural appropriateness. One study inclusive of Puerto Rican males demonstrated their willingness to provide support to a woman in the breastfeeding decision (Rivera Alvarado, Vázquez García, Dávila Torres, & Parrilla Rodríguez, 2006). Conversely, ongoing

Table 6. Intention to Breastfeed, Breastfeeding in Hospital, or Previous Breastfeeding Experience as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Dodgson, 2007 ^a	Mothers exclusively breastfed at initiation weaned significantly later and more likely to breastfeed for 6 months
Langellier, 2012 ^a	Exclusive breastfeeding in hospital 9.9 times more likely to breastfeed for 6 months, 8 times the odds of breastfeeding at 12 months, and 5.7 times the odds of breastfeeding at 24 months; mothers reporting prenatal intention to breastfeed had 3.6 times the odds of breastfeeding at 6 months with 7.4 times the odds of exclusive breastfeeding
Langellier, 2014 ^a	Intention to breastfeed: 12 times the odds of initiation, 3 or more times the odds of any breastfeeding at 3 and 6 months, and 4 or more times the odds of exclusive breastfeeding at 3 and 6 months. Exclusive breastfeeding in hospital: about 10 times the odds of any breastfeeding at 3 months and at least 6 times the odds at 6 months.
Lovera, 2010 ^a	Mothers who previously breastfed 2 times more likely to breastfeed for 6 months or longer
McKechnie, 2009	Those who initiated exclusive breastfeeding and continued past 6 weeks breastfed significantly longer.
Mickens, 2009 ^a	Previous breastfeeding experience related to increased intent to breastfeed
Murimi, 2010 ^a	Mothers breastfed as infants more likely to breastfeed their infants
Tender, 2009	Participation in prenatal breastfeeding class sole factor significantly associated with exclusive breastfeeding in hospital
Tenfelde, 2011 ^a	Women intending to breastfeed (determined by prenatal visit) about 4 times more likely to breastfeed exclusively

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. $n = 9$.

^aData are also displayed in other table(s).

Table 7. Attitudes Toward and Knowledge of Breastfeeding Benefits as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Cricco-Lizza, 2004	Women who chose breastfeeding reported that health benefits, advantages of breastfeeding, and close bond with baby are what interested them in the process.
Fornasaro-Donahue, 2014	Primary reason to choose breastfeeding was health benefits to infant; cost of formula not influential on breastfeeding decision, but considered additional motivation for women who chose breastfeeding
Mickens, 2009 ^a	Knowledge of breastfeeding and fewer negative beliefs of breastfeeding
Mistry, 2007	Stronger beliefs supporting breastfeeding
Murimi, 2010 ^a	39% of breastfeeding women reported breastfeeding benefits for baby as most important reason for breastfeeding; 96% of participants reported that breastfeeding benefits given at WIC were clear and helped in decision to breastfeed
Vaaler, 2010 ^a	Positive attitudes to breastfeeding benefits and breastfeeding in public more likely to breastfeed exclusively for 1 year

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. $n = 6$.

^aData are also displayed in other table(s).

tribal research demonstrates breastfeeding as primarily a woman's role with limited male support. In this specific research, a greater focus on female family members in providing breastfeeding support is more appropriate (Blinded, In preparation). Translation of peer or partner breastfeeding support across WIC should focus on building different frameworks based on differing cultural contexts.

Partner support in breastfeeding specific to Hispanic fathers of WIC dyads is acknowledged in this review. Culture is influential on behavior and health outcomes (Abraído-Lanza, Chao, & Flórez, 2005). Increased emigrant duration in the United States (acculturation) in recent years has influenced the integration of Americanized beliefs and practices with traditional knowledge (Abraído-Lanza et al., 2005).

This transition affects breastfeeding initiation and duration, documented within the Hispanic or Latina populations as having a greater likelihood of breastfeeding when less assimilated (Chapman & Pérez-Escamilla, 2013).

Environmental Level Strategies

Public health nutrition focuses on environmental factors and their potential to contribute to obesity and chronic diseases (Glanz, Sallis, Saelens, & Frank, 2007). **[AQ: 8]** For example, food environments have the potential to influence health behavior and influence dietary choices (Glanz et al., 2007) and school lunchroom layouts by influencing positive dietary intake (Wansink, 2004; Wansink, Just, Payne, & Klinger,

Table 8. Health Care Provider or Social Support as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Campbell, 2014 ^a	PC contact during pregnancy or after delivery more likely to initiate breastfeeding; receiving PC contacts during pregnancy and hospitalization highest percentage of breastfeeding initiation
Cricco-Lizza, 2005 ^a	Attentiveness, kindness, and empathy of WIC staff in culturally appropriate interactions seemed to encourage women to be more open to the promotion of breastfeeding
Cross-Barnet, 2012	One mother in sample reported positive, consistent support and information from health care provider and was only mother who breastfed exclusively for at least 10 months
Gross, 2009 ^a	Odds of breastfeeding initiation 21% greater for PC-exposed infants
Haughton, 2010 ^a	Women who consulted with lactation consultants or WIC staff with breastfeeding issues
Hildebrand, 2014 ^a	Women 1.5 times more likely to initiate breastfeeding in influence model when compared with traditional services
Langellier, 2012 ^a	Mothers not receiving discharge formula pack more likely to breastfeed exclusively for 6 months
Lovera, 2010 ^a	<i>Peer Dad Program</i> participation resulted in 63.4% of women breastfeeding for 6 months or longer compared with 54.6% of nonprogram participants (not statistically significant).
Ma, 2012 ^a	Positive deviants more likely to have received information about breastfeeding from staff
Mickens, 2009 ^a	Regardless of breastfeeding knowledge or beliefs, women who attended support group 2 or more times more likely to intend to breastfeed
Olson, 2010	Estimated PC increased breastfeeding initiation by 27% and increased mean duration of breastfeeding by 3.6 weeks.
Reeder, 2014 ^a	Treatment group breastfeeding nonexclusively for at least 3 months was 22% greater than control.
Stremmer, 2004	Initiation of breastfeeding increased at clinics employing peer dads.
Yun, 2010 ^a	Breastfeeding initiation rate in PC agencies 2.3% higher than non-PC agencies. Increased breastfeeding initiation rates: agencies with more years of PC experience; PC who had other positions within organization; PC coordinator as Breastfeeding PC Task Force member
Whaley, 2012 ^a	Staff training and participant education (WIC changes and breastfeeding decisions) increased full breastfeeding package rates and exclusive breastfeeding to 2 and 6 months before policy change.

Note. PC = peer counselor; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *n* = 15.

^aData are also displayed in other table(s). **TAQ: 91**

Table 9. Time Exposed to WIC Services as a Predictor of Increasing the Likelihood of Breastfeeding Within the WIC Population.

First author, year	Results indicating increased likelihood of breastfeeding
Jacobson, 2015 ^a	Urban women enrolling in WIC during first trimester had increased odds of initiating breastfeeding; not statistically significant for rural women
Joyce, 2008	Whites: enrolled in WIC during first trimester (2.2%) and second trimester (1%) more likely to breastfeed when compared with whites enrolled during third trimester. Blacks: enrolled in WIC prenatally (3.1%), during first trimester (3.9%), and during second trimester (3.7%) more likely to breastfeed when compared with blacks enrolled during third trimester. Hispanics: enrolled in WIC prenatally (4.6%), during first trimester (5.7%), and during second trimester (4.7%) more likely to breastfeed when compared with Hispanics enrolled during third trimester
Metallinos-Katsaras, 2015	Women entered into WIC in first trimester more likely to breastfeed for 3 months (15%), 6 months (25%), and 12 months (33%) than women enrolled in third trimester; associations differed upon whether mother had previous live birth
Tenfelde, 2011 ^a	Women entering care during first trimester 2 times as likely to exclusively breastfeed
Yun, 2010 ^a	Both PC and non-PC agencies: women enrolled in WIC prior to last 3 months antepartum were more likely to initiate breastfeeding; longer duration correlated with time of WIC enrollment

Note. PC = peer counselor; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. *n* = 5.

^aData are also displayed in other table(s).

2012; Wansink, Just, & Smith, 2011). Evidence of how the WIC clinic environment influences breastfeeding behavior is limited in published research.

The *WIC Nutrition Services Standards* (USDA, 2013 **TAQ: 101**) address the need for the clinic's environment to

be conducive to breastfeeding success. Strategies include limiting formula advertisements and being respectful of breastfeeding mothers in the waiting area or providing private accommodations (USDA, 2013). Research is needed to determine the effect of an increasingly supportive WIC

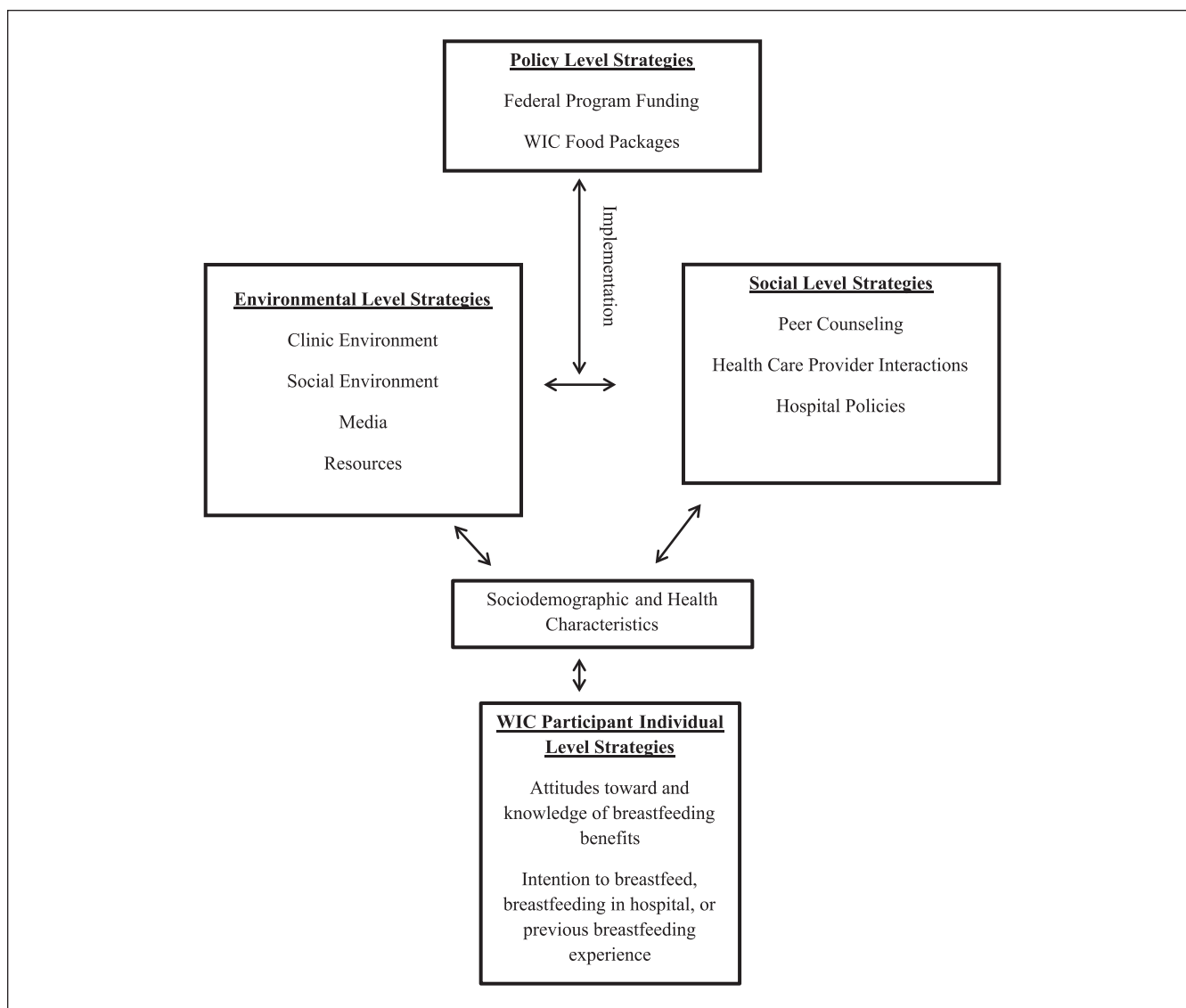


Figure 2. Individual, social, environmental, and policy level strategies based on clientele sociodemographic and health characteristics: Important factors in increasing the likelihood of breastfeeding in the Special Supplemental Nutrition Program for Women, Infants, and Children population.

environment on breastfeeding rates. Results could guide specific policy guidelines about facility layouts for health promotion. For example, Baby-Friendly Hospital Initiatives provide a framework for extended health care provider support to new mothers (HealthDay News, 2015). Learning from such initiatives and modifying to create optimal WIC environments and provider support networks may increase breastfeeding practices.

Policy Level Strategies

In 2009, the USDA implemented an interim rule adjustment in WIC program policies, recommended by the Institute of Medicine (2006), part of which incentivized breastfeeding for enrolled mothers in promotion of breastfeeding according to

the AAP recommendations (AAP, 2012). The new food packages had positive effects for breastfeeding mothers (Langellier, Chaparro, Wang, Koleilat, & Whaley, 2014; Whaley et al., 2012). Issuance rates of full breastfeeding packages increased in a study of 10 states' WIC administrative records (Wilde, Wolf, Fernandes, & Collins, 2012); however, partial breastfeeding packages also increased and initiation rates of breastfeeding remained largely unchanged, implying no substantive evidence of increased likelihood of breastfeeding (Wilde et al., 2012).

Policy changes can provide guidelines for breastfeeding improvement. Important to consider for success is the method of local implementation and potential regional differences. Further research identifying the weight of differential population and regional factors alongside new policy

implementations in support of breastfeeding within the WIC population is justified.

Limitations

Researchers did not include negative or neutral results within the scope of this literature review; this represents a large limitation, as this information is also necessary in informing breastfeeding science and policy. Review parameters were chosen to emphasize positive associations of breastfeeding within the WIC population, as much of the literature to date has focused on barriers that are now well understood. The authors included articles over a 10-year span, since 2004 when a peer support model was introduced to WIC. This is a clear limitation, as changes in breastfeeding practices and WIC policies during this time potentially influenced study results and are not addressed.

Methodological limitations include the following: Terms and databases used for the literature search may not have resulted in a comprehensive list of studies; inclusion of only peer-reviewed articles may have excluded work such as theses, dissertations, or government documents; a lack of specified quality parameters for study inclusion may limit the merit of results with potential for a large variation in quality among included studies; and a limited number of articles per theme necessitates further investigations into each described outcome.

Conclusion

Recent policy reform increased incentives for WIC breastfeeding participation, though the distribution of infant formula remains controversial and a barrier to breastfeeding (Hedberg, 2013). The ability of the WIC program to supplement formula for mothers unable to initiate or continue to breastfeed will likely always be necessary; however, continuing to improve program incentives and federal spending in support of increasing likelihood of breastfeeding is paramount in effecting positive change in maternal and child health among WIC participants.

Authors' Note

A similar version of this article was accepted in thesis format by Montana State University in November 2015. Former graduate student and primary author Bailey Houghtaling has requested that publication of the manuscript to the university ScholarWorks be withheld for 1 year.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article:

Research reported in this publication was partially supported by the National Institute of General Medical Sciences of the National Institutes of Health under Award Number P20GM103474. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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