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Mind the Gap: Assessing the Disconnect Between Postpartum Health Information Desired and Health Information Received

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A B S T R A C T

Introduction: Seeking and receiving health information are critical aspects of prenatal and postpartum care; however, many informational sources lack postpartum content. This study explores the gaps between information desired and information received postpartum and identifies the sources women use for health information seeking, with an emphasis on emergent online and mobile phone-based resources.

Methods: Participants were recruited from our community partners' client base for a cross-sectional study. Mothers ($n = 77$) of a child 48 months or younger completed a survey on health information seeking, health information needs, and technology use. Postpartum health information gaps were defined as topics about which a participant indicated that she wanted information, but did not receive information. Bivariate analyses assessed the association between demographic characteristics, sources of health information used during pregnancy, and postpartum information gaps. **Results:** Health care providers, Internet-based resources, and mobile applications were common sources of health information during pregnancy. Mental and sexual health were the most common types of postpartum health information gaps. In bivariate analyses, higher income and education were associated with postpartum information gaps in mental health and sexual health, respectively ($p < .05$).

Conclusions: Postpartum health information gaps were common in this sample, particularly for topics in mental and sexual health. Unexpected associations between higher levels of education and income and postpartum health information gaps were observed in bivariate analyses. Health educators have the opportunity to capitalize on high rates of Internet information seeking by providing health information online. Health care providers must incorporate mental and sexual health into routine postpartum care.

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Throughout the transition to motherhood, prenatal and postpartum health information is a powerful resource. Health knowledge enables a new mother to effectively communicate with health care providers, better use preventative care, and improve both infant care and self-care (Shieh & Ke, 2009). As such, receiving health information is a fundamental part of prenatal and postpartum care (Youash, Campbell, Avison, Penava, & Xie, 2012). Likewise, the act of information seeking by women during pregnancy and the early postpartum period is a critical part of the major life transition into motherhood (Mercer, 2010).

During pregnancy, women are inundated with health information. Some information is received face to face through visits with health care providers (doctors, nurses, midwives, doulas, etc.), childbirth class instructors, and advice from friends and family members. Increasingly, women also receive health information from high-tech sources like websites, blogs, forums, and mobile applications. However, many informational resources do not extend significantly into the postpartum period to cover topics on infant care and self-care. Thus, although women have received much information about pregnancy, labor, and delivery, an informational deficit arises about the daily postpartum realities of life with a newborn (Kanotra et al., 2007; Cheng, Fowles, & Walker, 2006).

The early postpartum period is a critical time both for disseminating information to new mothers and for supporting their healthy behaviors (Sines, Syed, Wall, & Worley, 2007). A lack of preparedness for motherhood is linked with maternal

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stress and frustration, the development of poor health behaviors, and postpartum depression. Estimates of postpartum depression prevalence in the United States range from 13% to 19% among new mothers (O'Hara & McCabe, 2013). Howell, Mora, Chassin, and Leventhal (2010) detailed that mothers who report inadequate preparation for the postpartum period are more likely to report depressive symptoms and physical limitations postpartum. Maternal postpartum depressive symptoms are associated with a variety of adverse effects on infant physical health (Gress-Smith et al., 2012), infant sleep cycle (Gress-Smith et al., 2012), mother–infant interaction (Væver, Krogh, Smith-Nielsen, Christensen, & Tharner, 2015), and mother–infant bonding (Moehler, Brunner, Wiebel, Reck, & Resch, 2006).

Information seeking during pregnancy has been widely reported (Larsson, 2009; Shieh & Ke, 2009; Rodger et al., 2013). However, less research addresses informational needs during the early postpartum period, and the information gaps between information desired and information received postpartum. Describing the informational needs of women during pregnancy is valuable; however, maternal role attainment and informational needs extend beyond delivery and into the postpartum period, when mothers must balance infant care and self-care. To appropriately target public health messaging and health education, a better explanation of postpartum information needs and information gaps is essential to prevent maternal lack of preparedness and associated depressive symptoms postpartum.

Objectives and Hypotheses

We developed the following research objectives:

- Describe sources of health information used during pregnancy and health information needs during the early postpartum period.
- Relate postpartum health information gaps to demographics.
- Relate postpartum health information gaps to sources of information used during pregnancy.
- Explore the role of technology (particularly online sources and mobile applications) in information seeking during pregnancy.

Building on existing research in the role of demographic and socioeconomic factors (Sword & Watt, 2005; Youash et al., 2012) and interpersonal communication with health care providers (Alexander, Hearld, Mittler, & Harvey, 2012; Sørensen et al., 2012) on the capacity to seek and understand health information, we developed the following hypotheses to address the listed objectives:

- H₁: Participants with lower levels of education and/or income will be more likely to experience postpartum health information gaps compared with those with higher education and/or income.
- H₂: Participants who used health care providers as a source of health information during pregnancy will be less likely to experience postpartum health information gaps compared with those who did not use health care providers.

Methods

Through a community-informed research partnership, we conducted a quantitative–qualitative study of health information

seeking and technology use among mothers of young children (age 48 months or younger) in Monroe County, Indiana. The results of the in-depth qualitative analysis of low-income mothers from the sample are reported elsewhere (Guerra-Reyes, Christie, Prabhakar, Harris, & Siek, 2016). Here, we report primarily on the quantitative survey results of the study. This study was approved by the Indiana University Institutional Review Board. All participants provided consent for all data collection methods.

Participants were recruited online and in person among the client base of community partners as part of a research agreement. Community partners included the Monroe County, Indiana Women, Infants and Children (WIC)¹ and Bloomington Area Birth Services, a nonprofit organization promoting maternal and child health in the community. Participants were women currently residing in Monroe County with at least one biological child aged 48 months or younger.

Participants recruited in person at the offices of community partners completed paper-based surveys, and participants recruited online via community partners' social media pages completed an electronic version of the survey, administered via Qualtrics. The survey consisted of 55 questions and included the following sections: demographics, pregnancy, birth experience, postpartum experience, and technology use. Participants reported on sources of health information used during pregnancy, the health information they received postpartum, the health information they desired postpartum, and their patterns of technology use. A total of 82 surveys were initiated, and 77 surveys were completed (26 in-person surveys and 51 online surveys).

Demographic variables collected included participant age, race, ethnicity, highest level of education, use of Medicaid, current relationship status, age of most recent child (in months), number of lifetime pregnancies, and number of people cared for (excluding self). Participation in Medicaid was used as a proxy for low income (Chaudron, Kitzman, Szilagyi, Sidora-Arcoleo, & Anson, 2006). In Indiana, a family of four with a monthly pretax income of \$4,134 or less qualifies for Medicaid (Centers for Medicare and Medicaid Services, N.D.). Education was collapsed into three levels following Radey and Randolph (2009): high school or less, some college, and bachelor's degree or more. Participants' parity was categorized as either primiparous (first time giving birth) or multiparous (have already given birth one or more times).

To assess sources of health information used for their most recent pregnancy, participants selected all applicable sources from the following categories: websites, social media, online forums, blogs, doctor or nurse, friends and family, books, videos, childbirth education classes, doula, none, and other. Participants also reported on their use of mobile phone applications for health information. Additionally, participants answered technology use questions to report details on mobile phone ownership and use. Data on mobile phone ownership serves as an indicator of access to information and provides insight into the role of technology in health information seeking by new mothers.

To assess information desired postpartum and information received postpartum, participants answered these questions, "What information did you want after your pregnancy?" and "What information did you get after the birth of your child?," by selecting all applicable topics from the following: after birth

¹ In 2015, Monroe County, IN WIC reported an enrollment of 1,091 adult women (Kids Count Data Center, N.D.).

health care for you, baby care information, breastfeeding, bottle feeding, sexuality issues, mental health, none, and other. These eight health care information categories were adapted from existing literature on maternal information needs (Sword & Watt, 2005) and slightly modified to provide relevant data to our community partners. The presence of postpartum information gaps was identified for each topic about which a participant indicated that she wanted information, but did not receive information. Information gaps were coded as a binary variable (yes/no).

Bivariate analyses were completed using the χ^2 test for categorical variables (or Fisher's exact test for observed values of <5) and t tests for continuous variables to assess the association between postpartum information gaps and demographic characteristics, sources of health information used during pregnancy, and technology use for health information seeking. Given the limited sample size and the similar nature of certain sources of health information, related sources were grouped into larger categories for analysis. Such source categories included "online sources" (websites, social media, online forums, and blogs) and "health care providers" (doctor or nurse, doula). Bivariate analyses were also completed for the two most common types of postpartum health information gaps, namely, sexuality issues and mental health. All computations were performed using SAS software version 9.4 (SAS Institute Inc., Cary, NC).

Results

Demographics

Participant demographics are listed in Table 1. The majority of participants (74%) were White. Approximately 71% of participants had attended at least some college. About 43% of participants were low income, as evidenced by their participation in Medicaid. Most women (75%) were married or currently living with their partner. Participants reported caring for a range of one to five other individuals, excluding themselves. About one-half of participants were first-time mothers. The age of participants' youngest child ranged from newborn to 43 months, but the majority (56%) were younger than 12 months old.

The demographics among this sample of participants align with the demographics of Monroe County, Indiana, in general. The majority of Monroe County residents (87.8%) are White and the median female age is 28.7 years. Approximately 69% of Monroe County residents have completed at least some college (United States Census Bureau, 2016).

Sources Used

The most common source of health information used during pregnancy was a doctor or nurse (84%), followed closely by websites (82%; Table 2). Some examples of websites used for health information included WebMD, BabyCenter, and The Bump. More than one-third of participants (36%) reported using social media sites like Twitter, Facebook, and Instagram for health information seeking.

Of participants, 95% reported owning a mobile phone, the majority of which (81%) were smart phones or Internet-enabled mobile phones with advanced operating systems. Nearly one-half of participants (48%) used mobile applications for health information seeking about self-care and infant care (Figure 1). Mothers reported using a wide variety of mobile applications for health information, the most common of which were BabyCenter (69%), BabyBump (33%), and Gerber Pregnancy Calendar (17%).

Table 1
Participant Demographics ($n = 77$)

	<i>n</i> (%)
Participant age (mean \pm SD)	29.5 \pm 5.1
Age of youngest child (mo)	
<12	43 (55.8)
12–24	28 (36.4)
25–36	4 (5.2)
37–48	2 (2.6)
Race	
American Indian or Alaska native	1 (1.3)
Asian	5 (6.5)
Black or African-American	4 (5.2)
White	57 (74.0)
More than one race	4 (5.2)
Not reported	6 (7.8)
Ethnicity	
Hispanic or Latino	3 (3.9)
Not Hispanic or Latino	66 (85.7)
Unknown or not reported	8 (10.4)
Education level	
High school or less	16 (20.8)
Some college	22 (28.6)
Bachelor's or higher	33 (42.9)
Not reported	6 (7.8)
Income level	
Low income (Medicaid)	33 (42.9)
High income	44 (57.1)
Marital status	
Single	13 (16.9)
Married or living with partner	58 (75.3)
Not reported	6 (7.79)
Parity	
Primiparous	41 (53.2)
Multiparous	34 (44.2)
Not reported	2 (2.6)
Number of people cared for (excluding self)	
1	26 (33.8)
2	30 (39.0)
3	9 (11.7)
4	4 (5.2)
5	2 (2.6)
Not reported	6 (7.8)
Services used	
WIC	41 (53.2)
BABS	41 (53.2)

Abbreviations: BABS, Bloomington Area Birth Services; WIC, Women, Infants, Children.

Note: Because of rounding, columns may not add up to 100%.

Gaps in Information

The most common health topic about which participants wanted information postpartum was breastfeeding, followed by self-care, infant care, mental health, sexuality issues, and bottle

Table 2
Sources for Health Information Seeking During Pregnancy ($n = 77$)

Source of Information	<i>n</i> (%)
Doctor/nurse	65 (84.4)
Websites	63 (81.8)
Friends and family	49 (63.6)
Books	48 (62.3)
Childbirth education classes	37 (48.1)
Doula	33 (42.9)
Social media	28 (36.4)
Online forums	24 (31.2)
Videos	18 (23.4)
Blogs	14 (18.2)
Other	8 (10.4)

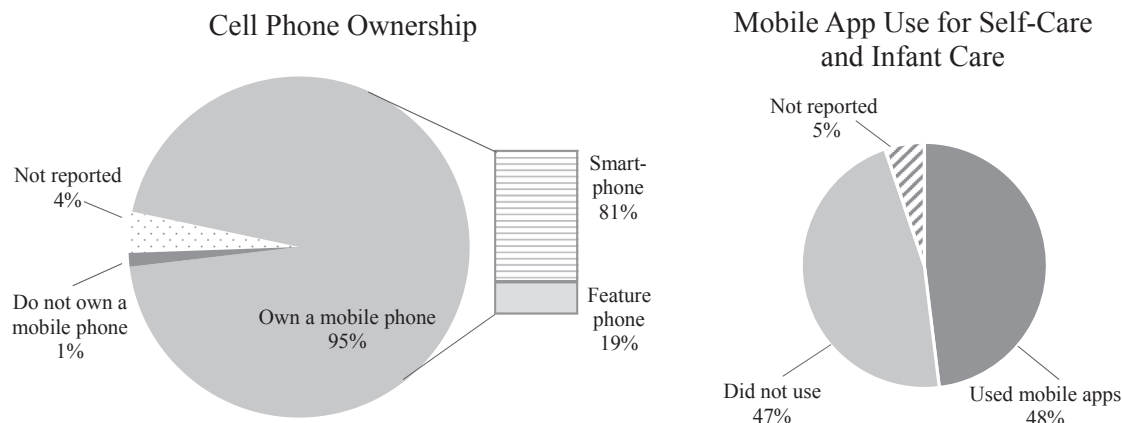


Figure 1. Cell phone ownership and mobile app usage for health information seeking. A smartphone is an Internet-enabled mobile phone with advanced operating system. A feature phone is a flip phone or keyboard mobile phone lacking an advanced operating system.

feeding. Table 3 shows the health topics about which participants wanted information postpartum as well as the health information gaps reported.

Thirty-four participants (44%) reported at least one postpartum health information gap. The two most common health topics for which participants reported postpartum information gaps were sexuality issues and mental health. Of the 19 participants who wanted information about sexuality issues postpartum, 14 (74%) reported gaps. Thirty-seven percent of participants who wanted information about mental health postpartum reported gaps (See Table 3).

Predictors of Gaps

In bivariate analyses, mothers who reported postpartum information gaps in sexual health were more likely to have a higher education level (71.4% vs. 36.5%, respectively; $p < .05$) and more likely to search for health information using friends or family (92.9% vs. 57.1%; respectively, $p < .05$) or books (92.9% vs. 55.6%, respectively; $p < .05$) than those who did not report gaps. Mothers who reported postpartum information gaps in mental health issues were more likely to have higher income than those who did not report gaps (92.3% vs. 50%, respectively; $p < .01$). No categories of sources used for health information were associated with postpartum information gaps in mental health. Neither race, ethnicity, marital status, nor age were associated with postpartum health information gaps (Table 4).

Discussion

Here, mothers of young children (age 48 months or younger) reported high information need for health resources during the

postpartum period, especially for topics related to breastfeeding. Mothers reported a wide range of health information-seeking strategies during pregnancy. Reports of the use of mobile phone-based resources and online sources were common among participants. Indeed, websites were cited as a source of health information almost as commonly as a doctor or nurse. Despite the use of varied sources of health information during pregnancy, 44% of participants experienced one or more postpartum gaps in health information.

The two most common types of postpartum health information gaps among this group—sexuality issues and mental health—were associated in bivariate analyses with higher education and higher income, respectively. This result does not support our first research hypothesis, which stated that participants with lower levels of education and/or income will be more likely to experience postpartum health information gaps compared with those with higher education and/or income. Further, the bivariate association between higher education and income and postpartum information gaps in sexuality issues and mental health does not align with previous findings that women of lower socioeconomic status are more likely to have postpartum deficits in health information (Sword & Watt, 2005; Youash et al., 2012). A possible explanation for the observed positive bivariate association is that mothers with higher education or income may desire health information in greater quantity or detail than participants with lower levels of education or income. Previous research among patients with a chronic disease has shown a positive association between a desire for more detailed health information and higher education (Galarce et al., 2011; Protière, Moumjid, Bouhnik, Soriano, & Moatti, 2012; Stewart et al., 2000) and higher income (Walsh et al., 2010). However, the quantity and quality of health information desired were not assessed here.

Another possible factor is that previously reported divides in access to health information by socioeconomic status have decreased among this sample of participants, for whom mobile phone ownership (especially of Internet-enabled smartphones) is nearly ubiquitous, regardless of income level. Indeed, the qualitative arm of this study reported that low-income participants almost exclusively searched for health information about self-care and infant care on the Internet using their mobile phones (Guerra-Reyes et al., 2016). In 2015, 64% of American adults reported owning a smartphone (Smith,

Table 3
Health Information Wanted Postpartum and Postpartum Information Gaps

Health information Topic	Participants Who Wanted Information (<i>n</i>)	Participants Reporting Gaps in Information, <i>n</i> (%)
After birth health care for you	52	4 (7.7)
Baby care information	52	4 (7.7)
Breastfeeding	58	3 (5.2)
Bottle feeding	19	4 (21.1)
Sexuality issues	19	14 (73.7)
Mental health	35	13 (37.1)

Table 4
Bivariate Association of Postpartum Health Information Gaps with Participant Demographics and Sources Used for Health Information Seeking during Pregnancy

Variable	Any Type of Health Information Gap, <i>p</i> value	Mental Health Information Gap, <i>p</i> value	Sexual Health Information Gap, <i>p</i> value
Race	.336	.425	.562
Ethnicity	.788	.581	.746
Marital status	.365	.197	.107
Education	.230	.113	.023*
Income	.791	.005**	.371
Parity	.112	.36	.073
Mean age	.458	.320	.262
Sources used for health information			
Online sources	.850	.263	.073
Health care providers	.272	.384	.368
Mobile applications	.913	.802	.515
Friends/family	.862	.863	.013*
Books	.927	.756	.013*
Videos	.978	.978	.728
Childbirth class	.761	.881	.076
Other	.690	.616	.660

**p* < .05.

***p* < .01.

2015); however, in this sample, 77% of all participants reported smart phone ownership, independent of income and education level. In the pre-Internet era, individuals with low levels of education and low income were classified in health communication literature as “information poor” owing to their restricted access to health information (Thompson & Afzal, 2011). The results in this sample suggest that disparities in ready access to health information for new mothers may have been reduced in part by what Thomas Friedman called the “democratization of technology” (Friedman, 2000). Technology has facilitated an unprecedented exchange of ideas and access to information for people worldwide, including mothers of young children.

Our second research hypothesis stated that participants who used health care providers as a source of health information during pregnancy will be less likely to experience postpartum health information gaps compared with those who did not use health care providers. However, in this study, mothers who reported using health care providers as a source of health information during pregnancy were no less likely to experience postpartum health information gaps than those who did not use health care providers as a source of health information. This result is unexpected based on existing literature that highlights the importance of patient–provider interactions in developing health literacy, an individual's capacity to seek, access, and understand health information to make effective health decisions (Nijman, Hendriks, Brabers, de Jong, & Rademakers, 2014; Sørensen et al., 2012). Based on these previously reported relationships between interpersonal exchanges between patients and health care providers and patient health literacy, we expected that participants who had access to a health care provider during pregnancy and reported using that provider as a source of health information would be less likely to experience postpartum gaps in health information. However, such an association was not observed here.

Thus, despite actively seeking health information during pregnancy, many women still experienced gaps in health

information postpartum regardless of their education, income, demographics, and information-seeking strategy. How then, can the observed prevalence of postpartum health information gaps be explained? The results from the qualitative arm of this study suggest that, although women actively seek health information, many of the resources they access lack relevant content for the postpartum period. Further, women lacking in health literacy may not understand the health information they find regarding self-care and infant care, leading to information gaps. An opportunity for health information gaps also arises when women receive information from medical professionals. Providers often disseminate health information based on topics they perceive a patient to need, which may not accurately reflect the patient's needs (Carolan, 2007).

An important limitation of this research is generalizability. This sample included mostly White women with a higher education level than average for the state (United States Census Bureau, 2016), likely owing to the presence of a large, public research university within the county (Indiana University–Bloomington). The small sample size provided limited statistical power, particularly for the bivariate analyses of the smaller subgroups of participants experiencing postpartum health information gaps in mental health and sexuality issues. This research addressed the sources of health information used during pregnancy, but did not capture any additional sources of health information used postpartum that were not used during pregnancy. Additionally, based on the survey instrument, the amount or detail of information desired by participants postpartum is not clear; rather, only the binary outcome of the presence of postpartum health information gaps is available. Finally, the broad inclusion criterion of having a child 48 months or younger could have resulted in recall bias among participants whose children were at the older end of the age range at the time of survey.

Implications for Practice and/or Policy

From a public health perspective, these results reveal an opportunity for health education and health promotion among mothers of young children. During pregnancy, women are actively searching for health information. In the postpartum period, new mothers display a high need for health information. New mothers need easy-to-understand, readily available health information about self-care and infant care. Given the high rate of Internet-enabled smartphone ownership and the use of mobile applications in the postpartum period among this sample, community partners and public health entities should consider novel ways to engage with mothers online—through websites, social media accounts, and mobile applications.

Implications for medical providers center on the high prevalence of postpartum health information gaps generally, as well as the high prevalence of health information gaps for sexuality issues and mental health specifically among this sample of Indiana women. Although this result is based on a small sample of clients of our community health partners, the inadequate focus on mental health in postpartum care has been reported elsewhere. In a national survey, nearly one-half of new mothers were never asked by their provider about postpartum depression, despite two-thirds of participants experiencing postpartum depressive symptoms (Declercq, Sakala, Corry, & Applebaum, 2007). Women's postpartum sexual health remains largely underresearched. Because the majority of participants in this study who wanted postpartum health information on sexuality

issues did not receive it, high degrees of unmet learning needs on this topic persist in this community. Mental and sexual health may be considered by some medical providers to be uncomfortable or sensitive topics of discussion postpartum; however, a demonstrated need for more information on such topics exists for some new mothers. As models of medical care shift from caring for and treating the physical body to caring for the whole person, providers must work to incorporate mental and sexual health into routine postpartum care.

Conclusions

Postpartum health information gaps were common among mothers of young children in Monroe County, Indiana. Medical providers, public health entities, and community partners must work to close these postpartum health information gaps by providing readily available information to new mothers based on their actual information needs, not the information needs health practitioners perceive them to have based on their education or income. Special attention is warranted for topics in postpartum mental and sexual health, the two topics for which postpartum health information gaps were most commonly reported in this group. Health information intended for new mothers should be easily accessible and tailored to meet varying levels of health literacy. Public health agencies, health care providers, and community partners have the opportunity to capitalize on high rates of Internet-enabled smartphone ownership, mobile application usage, and online health information seeking to disseminate health information about self-care and infant care postpartum that women can access quickly and easily.

Future studies with a larger and more diverse sample should further explore the associations between demographics and information-seeking strategy with postpartum health information gaps. Additionally, research exploring the quantity and quality of information desired by new mothers would help provide a more detailed examination of postpartum health information gaps. Last, future studies should seek to identify how new mothers work to bridge gaps between health information desired and information received postpartum to enable the development of more targeted public health intervention.

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