Social determinants among Black people during pregnancy following a short interpregnancy interval

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BACKGROUND: Short interpregnancy interval has been shown to be a key contributor to infant mortality. Black pregnant people have a higher incidence of short interpregnancy interval than people of other races and ethnicities, as well as higher rates of infant mortality. Understanding the factors related to racial disparities in short interpregnancy interval and infant mortality are a public health priority.

OBJECTIVE: This study aimed to examine the relationship between social determinants of health and interpregnancy interval in Black pregnant people by comparing those with a short interpregnancy interval defined as <18 months with those with a referent interpregnancy interval defined as ≥18 months.

STUDY DESIGN: This was a nested case-control study from a prospective cohort analyzing social determinants of health in 576 postpartum patients at an urban medical center, 2011–2021. Sociodemographic, pregnancy, and maternal characteristic data were collected from participants' medical records. Structured interviews measured participants' health behaviors, physical environment, social support, health literacy, and structural drivers. Differences in social determinants of health among Black study participants were compared between those with a short interpregnancy interval (<18 months) and those with a referent interpregnancy interval (≥18 months). The odds ratios were calculated to assess the association between short interpregnancy interval and social determinants. Factors with significant differences between the short interpregnancy interval and referent interpregnancy interval groups in Black participants were compared with that of White groups for social context.

RESULTS: Black participants with a short interpregnancy interval were more likely to report financial support from the Special Supplemental Nutrition Program for Women, Infants, and Children (odds ratio, 2.4; 95% confidence interval, 1.2–5.1), negative feelings toward the pregnancy (odds ratio, 2.4; 95% confidence interval, 1.2–4.9), choosing not to breastfeed because they do not like it (odds ratio ,12.0; 95% confidence interval, 1.5–543.1), not receiving prenatal care as early as desired (odds ratio, 3.4; 95% confidence interval, 1.6–7.2) because of consid- eration of pregnancy termination (odds ratio, 5.2; 95% confidence interval, 1.2–30.5) and less likely to report low levels of social support (odds ratio, 0.3; 95% confidence interval, 0.1–0.8) than Black participants with a referent interpregnancy interval.

CONCLUSION: Social determinants of health that differed between participants with a short interpregnancy interval and those with a referent interpregnancy interval were Special Supplemental Nutrition Program for Women, Infants, and Children support, feelings toward the pregnancy, social support, breastfeeding intent, and delayed prenatal care because of consideration of abortion. Previous studies examining infant mortality risk factors used White people as the referent group when analyzing social determinants. Our study focused specifically on understanding the lives of Black pregnant people so that future public health initiatives focused on social determinants may attenuate the racial disparity of infant mortality in the United States.

Key words: abortion, infant mortality, preterm birth, racial disparity, racism, reproductive health, short interpregnancy interval

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The authors report no conflict of interest.

Funding for this project was provided by the Women's Health Medical Student Scholars Program in the Department of Obstetrics and Gynecology at the University of Cincinnati.

Patient consent is not required because no personal information or detail is included.

An abstract for this research was presented as a poster at the Society of Maternal-Fetal Medicine 42nd Annual Pregnancy Meeting, Orlando, FL, January 31, 2020, to February 5, 2022.

All identifying information has been removed.

Cite this article as: McFarland, KV, Hefelfinger LM, Mendez CV, et al. Social determinants among Black people during pregnancy following a short interpregnancy interval. Am J Obstet Gynecol Glob Rep 2023;XX:x.ex–x.ex.

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2666-5778/$36.00

http://dx.doi.org/10.1016/j.xagr.2023.100279

AJOG Global Reports at a Glance

Why was this study conducted?

This study was conducted to bring to light the social determinants related to a short interpregnancy interval, a risk factor for infant mortality.

Key findings

Black participants with a short interpregnancy interval (IPI) were more likely to report high perceived social support, negative feelings toward the pregnancy, and not having received prenatal care as early as desired because of consideration of pregnancy termination.

What does this add to what is known?

Although other studies have focused on comparing the different social determinants experienced by Black and White pregnant people, this study aims to describe the unique social determinants experienced by a group at high risk of infant mortality, Black pregnant people with a short IPI.

Introduction

The US infant mortality rate, defined by the number of infant deaths within the first year of life for every 1000 live births, exceeds those of other developed countries with comparable health systems.[1,2] The US infant mortality rate among the Black population is consistently higher than the infant mortality rate of the other races and ethnicities.[2] Preterm birth is a major contributor to infant mortality and is a key driver of this racial disparity.[3−6] One of the known factors associated with preterm birth is short interpregnancy interval (IPI), commonly defined as a pregnancy conceived within 18 months of a previous birth.[7−14] In addition, a short IPI has been shown to be a contributor to infant mortality independent of gestational age at birth.[9,15] Black people have a higher incidence of a short IPI than people of other races and ethnicities.[3,6] Because of the associated adverse health outcomes, the prevention of a short IPI is a public health priority in the United States, and the 2030 Healthy People project has set a target to reduce the percentage of pregnancies experiencing a short IPI from 33.8% to 26.9% by 2030.[16]

No study has attempted to investigate the unique social determinants during the perinatal period of Black pregnant people with a short IPI compared with Black pregnant people with a referent IPI. Previous studies that have examined contributing social factors to a short IPI are few, narrowly focused, have small sample sizes, and only compare Black people with White people.[15,17,18] Shedding an academic light on the lived experience of a Black person who experienced a short IPI and how that differs from the experience of a Black person with a referent IPI may be the best way to achieve equity. This study aimed to examine the relationship between social determinants of health and IPI in Black pregnant people by comparing those with a short IPI defined as <18 months with those with a referent IPI defined as ≥18 months.

Materials and Methods

This investigation is a nested case-control study from data obtained on social determinants of health within a prospective cohort of 576 postpartum people who delivered at a single academic medical center between 2011 and 2021. During daily screening of the postpartum unit, eligible participants were offered participation. Those who provided informed consent were administered a detailed questionnaire by trained study staff. Structured interviews were performed using questions related to the participants' experience with their physical, social, and emotional environments. Race and ethnicity were self-reported. Sociodemographic information, medical and pregnancy characteristics, and delivery outcomes were obtained from the medical records of participants. We used a mix of validated survey questions and constructed questions (Table 1). Participants were not compensated. This study was approved by the local institutional review board at the study institution.

The selection criteria for this nested study included only Black or African American multiparous participants with live births at the time of study enrollment. Primiparous participants and participants with missing data on IPI were excluded from this analysis (Figure 1). The case group was people who gave birth after a short IPI, and the control group was people who gave birth after a referent IPI. Short IPI was defined as a period of <18 months from the end of the previous pregnancy to conception of the most recent birth at the time of the survey (hereafter referred to as the index birth).[7−14] The ≥18 months category was chosen as the referent group based on previous data showing that an IPI of 18 months is associated with the lowest risk of preterm birth.[8,19] To calculate the IPI, we first determined the interval between previous pregnancy and index birth in weeks and then subtracted the gestational age of the index birth in weeks from the interval. We included all multigravida participants independent of whether the previous pregnancy ended in a live birth.[20] We defined preterm birth as any live birth that occurred at <37 weeks of gestation.

Using the chi-square test, differences in sociodemographic factors, pregnancy characteristics, and social determinants were compared between IPI groups. Crude odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to quantify the relationship between the outcomes and maternal variables. Significant differences were defined as comparisons with a P value of <.05 and a 95% CI not inclusive of the null value of 1.0. To provide social context and determine which determinants of health are unique to the Black short IPI group, those at higher risk of experiencing infant mortality, we analyzed the same

TABLE 1
Determinants of health regarding pregnancy characteristics, social environment, and health literacy by interpregnancy interval in Black participants (N=203)

Determinants of health	IPI of <18 mo (n=79)	IPI of ≥18 mo (n=124)	OR (95% CI)
Preterm birth	19 (24.1)	16 (12.9)	2.1 (1.0–5.3)
Previous miscarriage or spontaneous abortion	26 (32.9)	58 (46.8)	0.6 (0.3–1.0)
< 5 prenatal visits	20 (25.3)	25 (20.2)	1.3 (0.6–2.8)
Income of <$20,000	58 (78.4)	85 (71.4)	1.5 (0.7–3.1)
Received WIC during this pregnancy	64 (81.0)[a]	79 (63.7)[a]	2.4 (1.2–5.1)[a]
Food insecurity[b]	14 (17.7)	32 (25.8)	0.6 (0.3–1.3)
Own transportation	43 (55.1)	74 (61.2)	0.8 (0.4–1.5)
Lives in perceived dangerous neighborhood[c]	7(9.0)	5 (4.2)	2.2 (0.6–9.2)
Physical abuse during pregnancy	3 (3.9)	2 (1.7)	2.3 (0.3–28.5)
Does not know how to prevent SUID	26 (34.7)	29 (24.6)	1.6 (0.8–3.2)
Got most information about pregnancy from the Internet	14 (17.7)	14 (11.3)	1.7 (0.7–4.1)
Low perceived social support[d]	6 (7.9)[a]	27 (22.5)[a]	0.3 (0.1–0.8)[a]
Low happiness in the past year	5 (6.6)	15 (12.4)	0.5 (0.1–1.5)
Unintended pregnancy[e]	62 (80.5)	90 (73.8)	1.5(0.7–3.2)
Did not get prenatal care as early as desired	29 (37.7)[a]	18 (15.0)[a]	3.4 (1.6–7.2)[a]
Due to considering termination	9 (11.4)[a]	3 (2.4)[a]	5.2 (1.2–30.5)[a]
Negative feelings toward this pregnancy[f]	28 (36.4)[a]	23 (19.2)[a]	2.4 (1.2–4.9)[a]
Not planning to breastfeed	25(96.2)	46 (95.8)	1.1 (0.5–66.7)
Because they do not like it	7 (8.9)[a]	1 (<1.0)[a]	12.0 (1.5–543.1)[a]

Note: Participants who had an IPI of ≥18 weeks were the referent group. Data are reported as number (percentage), unless otherwise specified.

CI, confidence interval; *OR*, odds ratio; *SUID*, Sudden Unexpected Infant Death; *WIC*, Special Supplemental Nutrition Program for Women, Infants, and Children

[a] Statistically significant at $P<.05$; [b] Food insecurity is defined as answering "often" or "sometimes" to 2 of 3 questions from the US Department of Agriculture–validated survey designed to identify food insecurity: "How often do you feel that the food you buy does not last and you cannot afford to get more?," "How often do you feel that you cannot afford to eat balanced meals?," and "How often do you cut the size of your meals or skip meals because there is not enough money?" All others were classified as food secure; [c] Living in a perceived dangerous neighborhood was defined as answering 5 to the question, "On a scale of 1 to 5, 1 being the safest and 5 being the most dangerous, how would you rate the safety of your neighborhood?"; [d] Low perceived social support was defined by answering "sometimes," "rarely," or "never" to the question, "How often do you get the social and emotional support you need?"; [e] Participants were considered to have an unintended pregnancy if they answered "I wanted to be pregnant later," "I did not want to be pregnant then," "I did not want to be pregnant then or at any time in the future," or "I did not think about getting pregnant" to the question, "How did you feel about getting pregnant at that time?"; [f] Participants were considered to have negative feelings toward the pregnancy if they answered "very unhappy" or "somewhat unhappy" to the question, "How did you feel when you found out you were pregnant?"

McFarland. Social determinants of Black people with short interpregnancy interval. Am J Obstet Gynecol Glob Rep 2023.

social determinants between White short IPI and referent IPI groups (Figure 2).

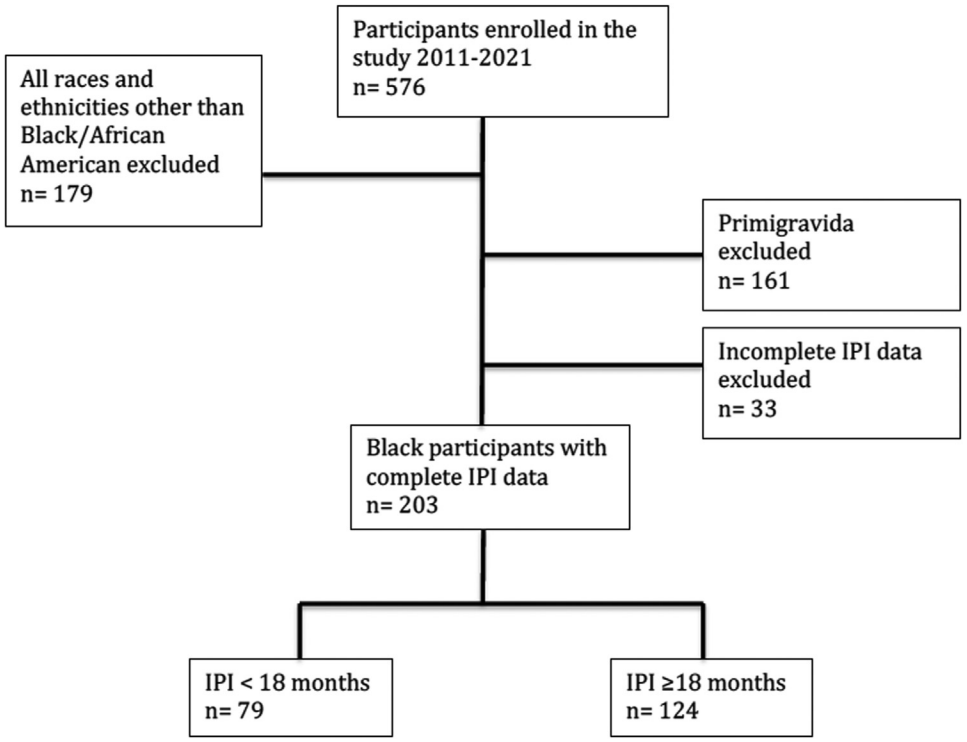
Data were managed with Research Electronic Data Capture, an online Health Insurance Portability and Accountability Act compliant survey and data storage tool and statistical analyses were performed using Stata software (version 16.1; StataCorp, College Station, TX).

Results

Table 2 shows sociodemographic, maternal, and obstetrical characteristics stratified by IPI in Black participants. Those with a short IPI (<18 months) were younger than the Black group with a referent IPI (≥18 months) (mean age: 25.9 vs 27.8 years, respectively; $P=.008$). In addition, the short IPI group had a higher incidence of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) enrollment, with 62 individuals (81.0%) in the short IPI group receiving WIC during their pregnancies compared with 79 individuals (63.7%) in the referent IPI group ($P=.008$). Black people with a short IPI had a higher rate of preterm birth than those with a referent IPI, with 24.1% (19) of pregnancies in the short IPI group vs 12.9% (16) of pregnancies in the referent IPI group resulting in births before 37 weeks of gestation ($P=.040$).

Social determinants of health differences between the Black short IPI and referent IPI groups are shown in Table 1. Black study participants in the short IPI group were 3.4 times more likely to report that they did not receive prenatal care as early as desired than those in the referent IPI group (OR, 3.4; 95% CI, 1.6–7.2). Of the participants who reported

FIGURE 1
Flow diagram of the study population



This figure illustrates the inclusion criteria for this study.

IPI, interpregnancy interval.

McFarland. Social determinants of Black people with short interpregnancy interval. Am J Obstet Gynecol Glob Rep 2023.

that they did not receive prenatal care as early as desired, the short IPI group was 5.2 times more likely to report that it was because they were considering terminating the pregnancy (OR, 5.2; 95% CI, 1.2−30.5). Although the short IPI group was 2.4 times more likely to report negative feelings toward their pregnancy (OR, 2.4; 95% CI, 1.2−4.9), this group was more likely to report social support (OR, 0.3; 95% CI, 0.1−0.8).

To provide social context and determine which determinants of health are unique to the Black short IPI group, those most at risk to experience infant mortality, we compared differences in the same social determinants between White short IPI and referent IPI groups. Of the factors that were seen to be significantly different between Black IPI groups, we found that only the incidence of WIC enrollment differed between White IPI groups. Otherwise, of the social determinants significantly associated with short IPI among Black births, the White groups did share other similar associations between short IPI and social determinants (Figure 2). Specifically, the White short IPI group did not differ in negative feelings toward the pregnancy, social support, choosing not to breastfeed because they do not like it, or a delay in prenatal care because of consideration of pregnancy termination comparison with the referent IPI group.

Discussion

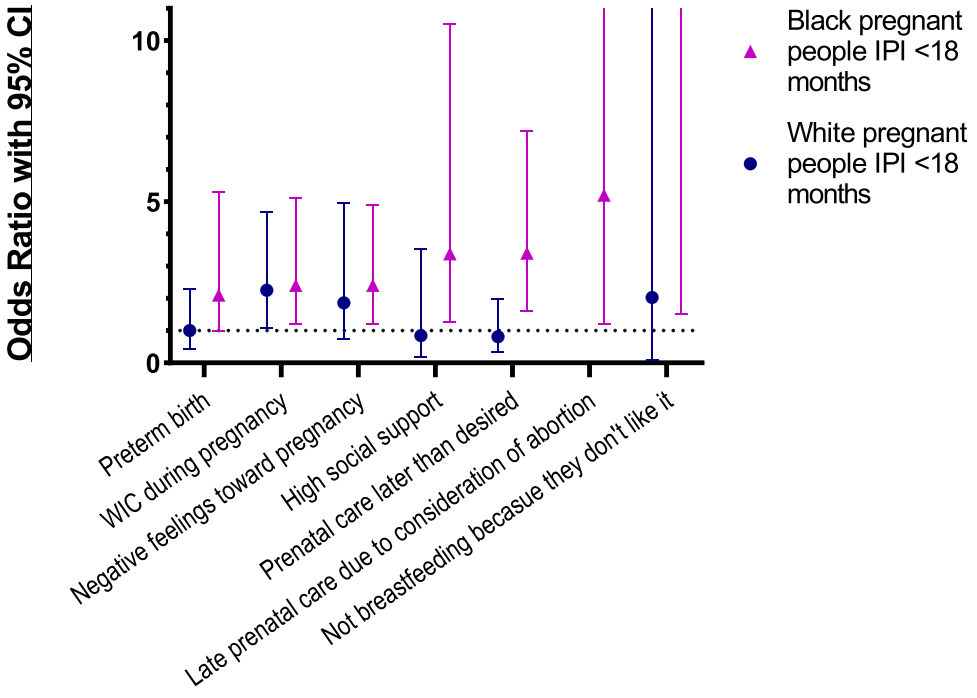
Principal findings

The social determinants of health associated with short IPI among Black births were negative feelings toward the pregnancy, choosing not to breastfeed because they do not like it, not having received prenatal care as early as desired, and receiving late prenatal care because of consideration of pregnancy termination despite being more likely to have high perceived social support and access to resources, such as WIC, during pregnancy. Similar to previously published data, we found that short IPI (<18 months) preceding births of Black pregnant people is associated with preterm birth.

Results in the context of what is known

Although there have been many studies focused on the biological underpinnings of short IPI as a risk factor in infant mortality, there have been few studies focused on the social determinants of health associated with IPI.[8,14] It was documented in 1 study with 97% Black participants that people currently experiencing intimate partner violence (IPV) were more likely to have previous pregnancies with short IPIs and that people with family social support were more likely to have IPIs of referent length, but the sample size was small (n=76).[21] Our results showed that low perceived social

FIGURE 2
Pregnancy characteristics of Black and White short IPI



This figure illustrates the difference in odds ratios for specific birth outcomes and social determinants between Black and White participants with a short IPI. It is shown that these groups differed significantly on negative feelings toward the pregnancy, high social support, prenatal care later than desired, late prenatal care because of considering pregnancy termination, and choosing not to breast feed because they do not like it.

IPI, interpregnancy interval.

McFarland. Social determinants of Black people with short interpregnancy interval. Am J Obstet Gynecol Glob Rep 2023.

support correlated with a referent IPI in Black participants, meaning it was more likely that participants felt high levels of social support if they had a short IPI. We found no relationship between IPV and IPI among Black participants.

We found no significant difference between the short IPI and referent IPI groups of the Black cohort concerning unintended pregnancy, although some studies have shown a correlation between a short IPI and an unintended index pregnancy.[22,23] After analyzing survey items related to birth control access and lapses, we found no relationship between birth control usage and short IPI in our study.[24]

A study on IPI and birth spacing education in both postpartum and pregnant people (n=125) reported that almost half of mothers (43%) believed an appropriate IPI was <18 months.[25] In the same study, less than a third of the participants reported ever having been educated about IPI. Similarly, in a qualitative analysis of birth spacing, it was found that few participants reported receiving guidance from their healthcare providers about birth spacing.[26] In another small study (n=25) of mothers with premature infants in the neonatal intensive care unit, only 2 of the participants were counseled about the risks of a short IPI.[27] We found no relationship between short IPI and survey items related to health literacy, such as knowing how to prevent sudden unexpected infant death syndrome, understanding health professionals, and having the knowledge to control reproductive health.

Clinical implications

Our study findings show that Black pregnant people who have a short IPI are more likely to have a preterm birth than Black people who have a referent IPI. Preterm birth is a main driver of infant mortality, which is known to be experienced by Black people more than people of any other race.[3–6] It is important that clinicians educate their patients on avoiding an IPI of less than 18 months, regardless of their race or coinciding social determinants of health.

The social determinants significantly associated with short IPI in Black pregnant people should be addressed during the prenatal care of these pregnancies. Specifically, receiving WIC during pregnancy, high perceived social support, negative feelings toward the pregnancy, not having received prenatal care as early as desired, receiving late prenatal care because of consideration of pregnancy termination, and choosing not to breastfeed because they do not like it. In

TABLE 2
Sociodemographic, maternal pregnancy, and birth-related characteristics stratified by interpregnancy interval in Black participants (N=203)

Pregnancy characteristics	IPI of <18 mo (n=79)	IPI of ≥18 mo (n=124)	Chi-square *P* value
Age (y) mean (SD)	25.9 (5.1)[a]	27.8 (4.9)[a]	.008[a,b]
Married	7 (8.9)	13 (10.7)	.678
High school diploma, GED, or less	49 (62.0)	69 (56.1)	.404
Enrolled in Medicaid	61 (77.2)	97 (78.2)	.866
Enrolled in WIC	64 (81.0)[a]	79 (63.7)[a]	.008[a]
Smoked before pregnancy	16 (21.1)	36 (30.0)	.167
Smoked during pregnancy	17 (21.8)	29 (23.8)	.746
Annual household income of <$20,000	58 (78.4)	85 (71.4)	.284
Gravida, median (IQR)	3 (3)	4 (2)	.894[b]
Para, median (IQR)	3 (2)	3 (2)	.627[b]
Previous preterm birth	20 (25.3)	31 (25)	.960
Previous miscarriage or abortion	26 (32.9)	58 (46.8)	.051
<5 prenatal visits	20 (25.3)	25 (20.2)	.389
Maternal prepregnancy BMI			.897
Underweight (<18.5 kg/m^2)	2 (2.5)	2 (1.6)	
Obese (≥30 kg/m^2)	33 (41.8)	53 (42.7)	
Preterm birth (<37 wk)	19 (24.1)[a]	16 (12.9)[a]	.040[a]
Cesarean delivery	32 (40.1)	41 (33.1)	.281

Participants who had an IPI of ≥18 weeks were the referent group. Data are reported as number (percentage), unless otherwise specified.

BMI, body mass index; *GED*, General Educational Development; *IPI*, interpregnancy interval; *IQR*, interquartile range; *SD*, standard deviation; *WIC*, Special Supplemental Nutrition Program for Women, Infants, and Children.

[a] Statistically significant at $P<.05$; [b] *T* test reported for means.

McFarland. Social determinants of Black people with short interpregnancy interval. Am J Obstet Gynecol Glob Rep 2023.

the context of what is known about preterm birth and infant mortality, the social determinants found to be in a higher incidence of those participants with short IPI in this study represent an opportunity for clinicians to address factors that are specifically unique to Black pregnant people with a short IPI.

Research implications

This study showed a significant difference in the reason why some participants did not intend to breastfeed. We found that the short IPI group was more likely to choose the explanation "I do not like it" for why they are not planning to breastfeed (Table 2). Other common answer choices provided for this question include the following: "I do not want to" and "It is too hard." Because of the lack of research on the relationship between short IPI and breastfeeding intent, more studies are needed to understand the reasons for choosing not to breastfeed.

We found no significant difference in perceived health literacy between Black pregnant people with a short IPI and those with a referent IPI. When taken into context with the findings from previous studies that show an ostensible lack of birth spacing education, our findings indicate that efforts by providers to increase IPI education could be useful for decreasing the occurrence of short IPI, regardless of the level of health literacy of the patients.[25–27] Additional research on health literacy and IPI is needed.

In addition, we found that Black participants were 5.2 times more likely to have received late prenatal care because of considering pregnancy termination if their birth was following a short IPI (Table 2). This differed from the White short IPI group where we found no association with delayed prenatal care and pregnancy termination compared with the White referent IPI. A study conducted in Ohio in June 2021 showed that participants who identified as Black women were more likely than other women to believe abortion to be illegal when it was accessible in Ohio.[28] This may point to an explanation for the higher number of Black pregnant people who delayed prenatal care because of considering abortion in our study; if they considered abortion but falsely believed abortion to be illegal, in the end, they may not access that care. There is a paucity of scientific literature on the association between consideration of pregnancy termination and short IPI. The results of our study indicate a need for future research to look deeper into how attitudes toward and access to abortion services affect pregnancies resulting after a short IPI.

Strengths and limitations

The limitations of our study should be noted. Of note, one limitation is the possibility of social desirability bias, which is intrinsic to a structured interview design. The study personnel directly administered the social determinant questions to participants, sometimes with family members in the room, which may have led to an underreporting of perceived negative factors, such as food insecurity, substance use, and physical abuse. This could contribute to an underestimate of the influence of these exposures. Second, our sample size was modest (N=203), which may have limited statistical power. Third, our sample may not be widely generalizable to other populations that differ significantly from the urban cohort we studied. Finally, we did not have a standardized measure of health literacy, and

the survey did not include questions related to specific education on IPI.

The strengths of this study are that it is administered through in-person interviews and includes data not obtainable through medical record review or vital statistics records. The comprehensive survey used in this study was designed to include a wide variety of questions with the intent of amplifying the voices of all pregnant people interviewed, including Black people. A strength of this study is the specific focus on uplifting the experience of Black pregnant people. By comparing within-race as opposed to between-race, we attempted to analyze the data in a manner that deconstructs a racial monolith in an effort to bring to light unique factors that may not be apparent when comparing Black individuals with White individuals.

Conclusions

Even as infant mortality is decreasing nationwide, significant racial disparity persists with Black infants more likely to die than infants of any other race and ethnicity.[2] The disparity is more pronounced in specific regions of the country, one such place with a historically large disparity gap is Hamilton County, Ohio. In Cincinnati, between 2015 and 2019, the infant mortality rate was 9.0, and the Black infant mortality rate was 15.8.[29] It has been previously shown that an IPI of <18 months is associated with a higher risk of infant mortality and that risk is even more pronounced with an IPI of <6 months.[9,15,30] It was found that 240 infant deaths in Ohio from 2007 to 2014 could have been prevented by eliminating IPIs of <12 months, indicating how important a target short IPI is in reducing infant mortality.[30]

The 2004 report "Unequal treatment: confronting racial and ethnic disparities in Healthcare" from the Institute of Medicine states that racism is one of the most critical factors that contribute to preventable causes of death in the African American population, including preterm birth.[31] Knowing there exists an inextricable link between racism and social determinants of health leads us to focus our study on the unique exposures of Black pregnant people who experience short IPI, a driver of infant mortality and one that has a marked racial disparity. Our results convey a need for public health initiatives that target short IPI, such as the 2030 Healthy People project, to focus efforts on specific social determinants of health. We found that Black persons who entered pregnancy after a short IPI were more likely to result in a preterm birth, a major risk factor for infant mortality. In addition, they were more likely to have negative feelings toward the pregnancy, to choose not to breastfeed because they do not like it, to not have received prenatal care as early as desired, and to have received late prenatal care because of consideration of pregnancy termination despite having high perceived social support and increased use of support services, such as WIC during pregnancy. Our findings are relevant to affecting change in provider practice patterns and state and federal policy in the effort to combat the racial disparity in infant mortality locally and across the nation.

Glossary

CI: Confidence interval

IPI: Interpregnancy interval (IPI) is the measure of time between the end of an individual's prior pregnancy to the conception of their subsequent pregnancy. To calculate the IPI, we first determined the interval between the end of the previous pregnancy and index birth in weeks and then subtracted the gestational age of the index birth in weeks from the interval. We included all multigravida participants independent of whether the previous pregnancy ended in a live birth.

IPV: Intimate partner violence

OR: Odds ratio

WIC: Special Supplemental Nutrition Program for Women, Infants, and Children ■

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