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Perspectives From Community-Based Doulas and Mothers: Neighborhood Context and Pregnancy

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ABSTRACT
Objectives: Limited research explores the potential pathways by which neighborhoods influence pregnancy or how community members conceptualize and interpret how neighborhood contexts and living environments influence pregnancy and birth.
Study Design: We applied participatory Concept Mapping and a series of focused discussions with community-based doulas and mothers.
Methods: We collaborated with a community-based doula program to investigate how mothers and community doulas perceived the neighborhood to influence reproductive health. We conducted a series of focused discussions including 'Brainstorming' to uncover key themes related to how neighborhood context influenced pregnancy, 'Sorting and Rating' of key themes in association with pregnancy and birth outcomes, and further discussion to uncover potential relationships. Data from the 'Sorting and Rating' activities were entered into Concept Systems software to generate concept maps of the themes and ideas discussed.
Results: The women identified 79 key themes/items related to the neighborhood context that they thought were important for pregnancy and birth. Participants ranked most of the neighborhood factors as moderate or high in importance in influencing pregnancy health and birth. These 79 items were further aggregated to develop 9 clusters related to various themes such as 'Access/Potential Barriers to Adequate Care,' 'The Environment and Infrastructure,' 'Neighborhood History, Demographics and Dynamics,' 'Community, Relationships, and Autonomy.' The group further discussed how neighborhood contexts have a particularly influence on individual behaviors such as physical activity; and how key infrastructure issues such as transportation may impede or facilitate access to resources important for health.
Conclusion: This study provides additional insight into how neighborhoods may influence pregnancy and birth and how multiple neighborhood factors may act synergistically to influence health. Concept mapping and community perspectives reinforce the importance of participant and community input in developing future research and interventions.

  Keywords: birth; pregnancy; doulas; neighborhood; community; concept mapping

INTRODUCTION

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Pregnancy and birth outcomes, similar to many other health outcomes, are socially and geographically patterned, demonstrating the influence of context in understanding disease and health (Hogan et al., 2013). The neighborhood residential environment has been explored as fundamental in understanding pregnancy and birth, particularly the racial/ethnic disparities (Braveman, Egerter, & Mockenhaupt, 2011; Culhane & Elo, 2005; Hogan & Ferre, 2001; Kaufman, Dole, Savitz, & Herring, 2003; Messer, Buescher, Laraia, & Kaufman, November 2005; Kate E. Pickett, Collins, Masi, & Wilkinson, 2005; K. E. Pickett & Pearl, 2001). Adverse neighborhood environments may be likely causes of stress for pregnant women through differential access to health-promoting resources (e.g., grocery stores or quality healthcare), exposure to harmful social and physical conditions (crime, toxicants), and differences in social support to deal with adverse exposures (Braveman et al., 2011; Culhane & Elo, 2005). Second, neighborhoods may influence health behaviors such as diet and exercise or individual life opportunities through access to employment or educational opportunities (Culhane & Elo, 2005). Furthermore, neighborhoods may differ in the degree of political isolation, connections or power to make change or maintain a healthy neighborhood environment, also influencing health and well-being (Culhane & Elo, 2005; Laveist, 1993).

Although various neighborhood factors have been associated with pregnancy and birth outcomes, the pathways are not well understood. Additionally, most research focuses on adverse neighborhood risks and not factors that may be protective for pregnancy health and birth outcomes, limiting the conceptualization and measurement of the neighborhood context. In order to address these research gaps, we explored the conceptualization and relationship of neighborhood context with preconception health, pregnancy health, postpartum health, and birth outcomes among pregnant women, new mothers, and community-based doulas.

In this study, we used a concept mapping approach to:

1) Identify neighborhood factors that influence pregnancy and birth among mothers and community-based doulas;

2) Examine the relative importance of various neighborhood factors and pregnancy/birth;

3) Explore potential pathways or explanations for how neighborhoods are related to pregnancy/birth.

METHODS

Concept Mapping Overview

Concept mapping is a participatory research method developed to explore a group's perceptions or views about a particular topic (Trochim, 1989). It applies a data collection process that combines qualitative and quantitative methods and integrates a wide range of participant-generated ideas to gain an in-depth understanding about topic. Concept mapping also uses quantitative analytic tools to create cluster maps, which is a visual display of ideas and relationships between ideas. The process allows researchers to collect data to gain a collective representation of participants' perspectives of a phenomenon. Concept mapping has historically been used in program evaluation and development but has gained momentum in public health research and has brought insight in understanding health phenomena (Bressington, Wells, & Graham, 2011; J. Burke, O'Campo, Salmon, & Walker, 2009; O'Campo, Burke, Peak, McDonnell, & Gielen, 2005; Risisky et al., 2008; Snider, Kirst, Abubakar, Ahmad, & Nathens, 2010; Walker & Kawachi, 2012). Further explanation and details concerning this method are described elsewhere (J. G. Burke et al., 2005).

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Study Population and Recruitment

Researchers collaborated with a community-based doula agency to recruit study participants (doulas and recipients/former recipients of services) from the Pittsburgh, Pennsylvania area. The community-based doula agency provides services to low income pregnant women, serving over 300 women per year. Many women receive services through a medical assistance insurance program. Community-based doulas are trained women from the community who provide several services, including labor and delivery support, childbirth education, nutrition education, and breastfeeding support. The doulas provide services throughout the pregnancy and after. We used flyers and word of mouth to try and recruit participants. A researcher screened potential participants by phone; those who met inclusion criteria were invited to participate and given details about the concept mapping sessions. Inclusion criteria included: 1) community-based doulas or recipients of doula services, 2) aged 18 or older, 3) and currently living in the study area.

Data Collection and Concept Mapping Process

Data collection involved a three-part series of concept mapping sessions: Part 1, brain storming; Part 2, a sorting and rating activity; and Part 3, a final interpretation session. Two separate brainstorming sessions were held to generate ideas surrounding the focal question "What are the characteristics of the neighborhood (both good and bad) that are related to pregnancy health (before, during and after pregnancy)?" The participants were asked to consider the focal question and share with the group based on either their own personal experience or based on what they have witnessed or heard from other community members. While the participants engaged in brainstorming, researchers recorded all ideas. A total of 84 unique ideas or items were generated from the first meeting; 96 items generated from the second meeting; and 23 items generated from researchers' review of literature and previous work. The final list included 79 unique items (Table 1) and was used for subsequent concept mapping sessions.

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Table 1. Items and corresponding ratings generated by participants during the concept mapping sessions

Cluster/ item name (item number)	Pre-Pregnancy	Pregnancy	Post-Partum	Birth
Cluster 1: Resources Available for Pregnancy and Beyond				
Access and Availability of Educational Programs and Materials (i.e., nutrition, parenting classes, breastfeeding, prenatal services) (1)	High	High	High	High
Cost of Transportation (4)	Moderate	High	High	Moderate
Resources in native language (i.e., educational materials, clinical workers/doctors, leases/housing agreements) (17)	High	High	High	High
Breastfeeding services, visibility & acceptance of breastfeeding in public (24)	Moderate	High	High	High
Resources, support and services for mothers and children (36)	Moderate	High	High	High
Accessible and available WIC programs (41)	Moderate	High	High	High
Availability and access to doulas and lay health advisors in neighborhood (70)	Moderate	High	High	High
Services and Resources for those with a criminal record (75)	Moderate	High	High	Moderate
Cluster 2: Access/Potential Barriers to Adequate Care				
Access and quality of doctor/health provider/healthcare setting (including continuity of care, # of providers a woman sees throughout her pregnancy) (22)	High	High	High	High
Availability of mental health services (as well as home visiting mental health services) (25)	High	High	High	High
Education of physicians and other health providers (including cultural competency training) (31)	High	High	High	High
Having a sufficient wage or salary (39)	High	High	High	High
Availability and quality of health insurance (42)	High	High	High	High
Access to "Women Centered" care (including midwifery services and home birth) (44)	High	High	High	High
Work obligations/Flexibility of employers for pregnant women (work load, appointments) (45)	Moderate	High	High	High
Maternity and Paternity Leave (Parental Leave and Time off Work) (64)	Moderate	High	High	High

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Cluster/ item name (item number)	Pre-Pregnancy	Pregnancy	Post-Partum	Birth
Quality of Jobs (73)	High	High	High	High
Cluster 3: Services Related to Health Behaviors and Lifetime Habits				
Access to health (nutritious) food (2)	High	High	High	High
Cost of healthy food (19)	High	High	High	High
Access to food outlets (e.g., grocery store, farmer's market) (20)	High	High	High	High
Public Schools (21)	Moderate	Moderate	High	Low
Daycare options or drop in care (23)	Moderate	Moderate	High	Moderate
Affordable quality housing (26)	High	High	High	High
Availability to move to a new place of residence (27)	High	High	High	High
Resources & Support for Fathers (28)	Moderate	High	High	High
Accessible and affordable stores/shopping (29)	Moderate	High	High	Moderate
Accessibility and Availability of Libraries (30)	Moderate	Moderate	High	Moderate
Access to Jobs (38)	High	High	High	High
Access and availability of transportation (e.g., public transportation) (59)	High	High	High	High
Cluster 4: Institutions and Family				
Air quality and fumes from factories (5)	High	High	High	High
Role of family (extended family, nuclear family, elder family members) (15)	High	High	High	High
Someone to help at house and home visiting (18)	Low	High	High	High
Large institutions take away land and resources of smaller neighborhoods (66)	Moderate	Moderate	Moderate	Moderate
Societal view of medicine, health care, and social services as "disaster prevention" (68)	High	High	High	High
Bureaucracy, policies, and practices in obtaining services (69)	High	High	High	Moderate
Accessible and accountable politicians (76)	Moderate	Moderate	Moderate	Moderate

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Cluster/ item name (item number)	Pre-Pregnancy	Pregnancy	Post-Partum	Birth
Cluster 5: The Environment and Infrastructure				
Availability and timing of health information given (9)	High	High	High	High
Health and social services specific to needs of residents in neighborhood (33)	High	High	High	High
Healthcare providers and service providers respect for community and clients (e.g., age, race, culture, etc.) (43)	High	High	High	High
Availability of parking (46)	Low	Moderate	Moderate	Moderate
Policies and practices that target communities for hazards (47)	Moderate	High	Moderate	Moderate
Water quality (54)	High	High	High	High
Physical appearance of healthcare, social service, and resource settings (57)	Moderate	Moderate	Moderate	Moderate
Sufficient funding for services and resources (e.g., healthcare, social support services, community services) (63)	High	High	High	High
Environmental hazards/toxins in materials (i.e., paints, walls, homes) (67)	High	High	High	High
Land/soil quality (71)	High	High	High	High
Cluster 6: Neighborhood History, Demographics and Dynamics				
Socioeconomic characteristics (e.g., income, wealth, poverty) of the neighborhood (3)	High	High	High	High
Level of education of neighborhood residents (6)	Moderate	Moderate	Moderate	Moderate
Racial, Ethnic, and Cultural Diversity of Neighborhood (34)	Moderate	Moderate	Moderate	Moderate
Trash in neighborhood (48)	Moderate	Moderate	Moderate	Low
History of neighborhood (49)	Low	Low	Low	Low
Neighborhood Violence (50)	High	High	High	High
How neighborhood or society treats mothers and motherhood/perception of motherhood (52)	High	High	High	High
Neighborhood pride/positive aspects of community (61)	Moderate	Moderate	Moderate	Moderate
Noise in neighborhood (77)	Moderate	Moderate	High	Moderate
Neighborhood Crime (79)	High	High	High	High

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Cluster/ item name (item number)	Pre-Pregnancy	Pregnancy	Post-Partum	Birth
Cluster 7: Community Assets				
Active neighborhood organizations/neighborhood involvement (10)	High	Moderate	High	Moderate
Neighborhood Gardening/green space (12)	Moderate	Moderate	Moderate	Low
Neighborhood support and connections (13)	High	High	High	High
Residents taking responsibility for neighborhood (58)	Moderate	High	Moderate	Moderate
Neighborhood Parks (74)	High	High	High	Moderate
Neighborhood events and festivals (78)	Moderate	Moderate	High	Low
Cluster 8: Social Attributes of Neighborhood				
Community and Recreation Center (8)	High	Moderate	High	Moderate
Safety of neighborhood (11)	High	High	High	High
Policing of Neighborhood (32)	Moderate	Moderate	High	Moderate
Having resources in walking distance/having local resources (40)	High	High	High	Moderate
Resources for exercise (e.g., gym) (51)	Moderate	Moderate	Moderate	Moderate
Reputation of the neighborhood/perceptions about the neighborhood (55)	Moderate	Moderate	Moderate	Low
Free resources and services in the community (60)	High	High	High	High
Churches and other places of worship (72)	Moderate	High	High	Moderate
Cluster 9: Community, Relationships, and Autonomy				
Trusted sources of information (7)	High	High	High	High
Social Relationships and Networks (14)	High	High	High	High
Sidewalks and Pedestrian-friendly environments (16)	Moderate	High	High	Moderate
Toy-Coop/Sharing of toys and Baby Items (35)	Low	Moderate	High	Low
Being overwhelmed by environment/stressful environment or neighborhood (37)	High	High	High	High

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Cluster/ item name (item number)	Pre-Pregnancy	Pregnancy	Post-Partum	Birth
Important resources in the neighborhood are eliminated or leave (i.e., hospitals, doctors or community center) (53)	High	High	High	High
Whether something can be done (to improve or change neighborhood)/people "fight" and still lose (56)	Moderate	Moderate	Moderate	Moderate
Sharing of information within the community and "ambassadors" to share accurate information (62)	High	High	High	High
Neighborhood going through transitions and change/people moving in and out (65)	Moderate	Moderate	Moderate	Low

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The next session (Part 2) involved a sorting and rating activity. During this session, participants were asked to sort the 79 individual items from the master list into similar piles based on their individual interpretation of the meaning of the items. Each participant was given a packet that contained the items on separate index cards. A single phrase or idea (item) was typed on each card. The brainstormed items were numbered 1-79, with numbers generated by the computer software program and assigned in no particular order. Once the items were sorted into piles, participants gave each pile a label (word or phrase) that they thought described the pile. The participant labels captured the theme of the piles and were examined during data analysis.

During the same session, participants were also asked to rate each item relative to four questions:

1. How IMPORTANT is each item as it relates to a woman's health before pregnancy?
2. How IMPORTANT is each item as it relates to a woman's health during pregnancy?
3. How IMPORTANT is each item as it relates to at a woman's health after pregnancy?
4. How IMPORTANT is each item as it relates to a baby being born too early (i.e., preterm birth)?

For these ratings, participants used rating sheets that each addressed a different stage of pregnancy. The participants were asked to rate the items on a scale of 1-5, with one being 'not at all important' and five being 'extremely important'. The researchers stressed to the participants the importance of rating the factors on a continuum (not all 1's or all 5's). For example, participants were to rate how "Affordable quality housing" influenced their health before pregnancy, during pregnancy, after pregnancy, and the health of their infant in regards to being born too early (i.e., preterm). We categorized the average rating for each item and their corresponding cluster into high (3.8 and higher), moderate (2.9-3.7), and low (2.8 and lower) based on previous studies that have applied concept mapping approaches in the public health context (O'Campo et al., 2005; O'Campo, Salmon, & Burke, 2009).

The information generated from the sorting and rating activity was entered into The Concept Systems Core Software (Ithaca, NY). Hierarchical cluster analysis techniques included in the software generated figures, known as concept maps, reflecting the participants' views about unique concepts. In this particular analysis, the concepts or clusters were based on the various neighborhood items described previously. Concept maps show all individual participant data collectively. The researchers reviewed the data and decided upon a 9 cluster map, which capture 9 unique concepts or clusters/themes related to neighborhood factors. These 9 clusters were determined based on a solution that balanced differences between concepts or clusters as well as similarities within each concept or cluster. These final clusters were presented to participants for feedback and final determination. Finally, the individual participants' rating data produced overall ratings of the importance of each neighborhood item in relation to pregnancy.

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Figure 1. Cluster map for the relationship between neighborhoods and perinatal health, nine cluster solution[a].
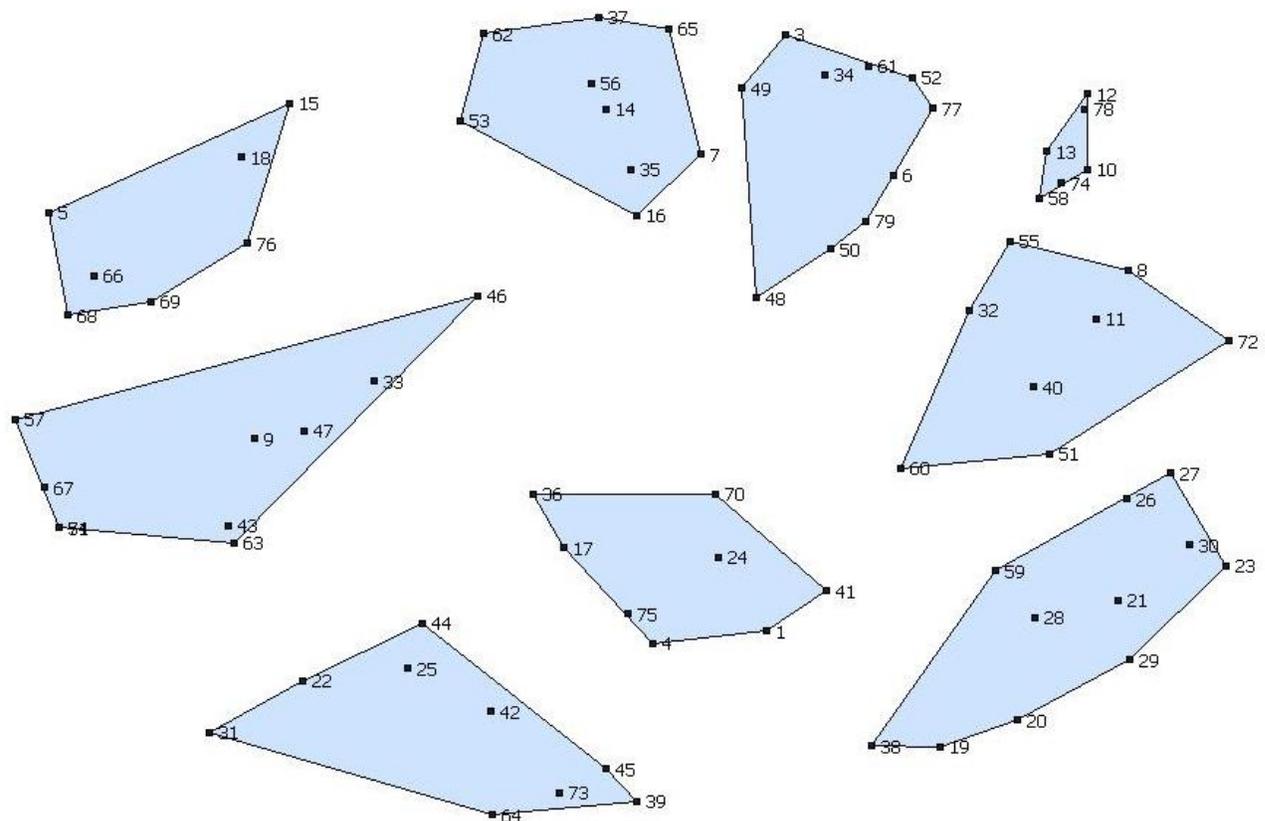
a. Cluster 1: Resources Available for Pregnancy and Beyond; Cluster 2: Access/Potential Barriers to Adequate Care; Cluster 3: Services Related to Health Behaviors and Lifetime Habits; Cluster 4: Institutions and Family; Cluster 5: The Environment and Infrastructure; Cluster 6: Neighborhood History, Demographics and Dynamics; Cluster 7: Community Assets; Cluster 8: Social Attributes of Neighborhood; Cluster 9: Community, Relationships, and Autonomy

The final interpretation session (Part 3) was a focused group discussion, which allowed the participants to interpret the concept maps and discuss the possible relationships between the clusters/items and pregnancy-related outcomes. We first developed the cluster maps based on the data collected in the prior sessions. Then we reviewed and processed the clusters and then displayed them to the group for discussion during the interpretation session.

Informed consent was obtained for all participants in the study. Each participant also completed a demographic survey before each session. The first three sessions (Parts 1 and 2) were conducted at the community-based doula program offices and the final interpretation session (Part 3) was conducted at a local church used by the organization for larger meetings and events. Each session lasted about 1.5 to 2 hours and was conducted in English. The research team provided food/refreshments and each participant received $20 for their time for each session.

RESULTS

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Study Population

A total of 18 people participated in the study. There were 17 women and 1 man. The one male participant was the partner of a woman who received services while pregnant. Ten of the participants were doulas and the remaining were current or past participants in the doula program. Fifty five percent were white, fifty percent had a college degree or higher, 44 percent were between the ages of 31 to 44, and 78 percent reported that their family's income met their basic needs. Ten out of the 18 participants were community-based doulas or staff.

Table 1 includes a final list of the 79 neighborhood items that were identified by participants during the brainstorming sessions. The items in the table are numbered and correspond to the same numbers in the cluster map (Figure 1). The table also includes the ratings for each item, which were on a five-point scale ranging from 1=not important at all to 5= extremely important as it relates to health during pre-pregnancy, pregnancy, post-partum, and for birth outcomes. Items 59 and 44, "Access and availability of transportation (e.g., public transportation" and "Access to 'Women Centered' care" were rated as being highly important for health during pre-pregnancy, pregnancy, post-partum, and for birth outcomes. However, item 21, "Public Schools" was rated as moderately important for health during pregnancy and pre-pregnancy, highly important during postpartum, and least important as it related to birth outcomes. On the other hand, "Resources for exercise (e.g., gym)" (Item 51) was rated as moderately important for each stage of pregnancy. Overall, most participants rated the various neighborhood items as either highly or moderately important for all stages (pre-pregnancy, pregnancy, post-partum, birth outcomes).

There were also some trends within and across groupings or clusters. A general trend across the clusters was that most items were rated as high or moderate; however, when items were rated low, they were more likely related to pre-pregnancy or birth outcomes or had low ratings across all 4 outcomes. A nine-cluster solution was chosen because it captured separate neighborhood constructs while also maintaining homogeneity within each cluster. For clusters 1, 2, 7, and 8 the majority of these factors were rated as highly important across all stages, except for a few factors, which were rated as moderately important. "Services related to health behaviors and lifetime habits" included items such as access to healthy foods, libraries, and public transportation. All items were rated as moderate or high except for access to public schools, which was related low as far as its importance for birth outcomes. The "Institutions and Family" cluster (4), "Environment and Infrastructure" (5) clusters each had only one item, "assistance or home visiting" and "availability of parking" that rated as low in relation to pre-pregnancy. Finally, in cluster 9, the majority of the factors were rated as high or moderate in importance except for the Toy-Coop in relation to pre-pregnancy and birth outcomes.

Figure 1 shows a cluster map with a total of nine clusters for the relationship between neighborhoods and pregnancy/birth. This cluster map is generated from the sorting activity where each participant grouped the neighborhood items into similar piles. The number for each item in the cluster map also corresponds to the item number listed in Table 1. Each cluster shares a common theme, and the items within the cluster are more closely related to one another based on the multidimensional scaling analyses. For example, in cluster 1, Item 1 (Access and Availability of Educational Programs and Materials (i.e., nutrition, parenting classes, breastfeeding, prenatal services)) is closely related to Item 24 (Breastfeeding services, visibility & acceptance of breastfeeding in public) while Item 76 (Accessible and accountable politicians (Accessible and accountable politicians) from cluster 4 is further away.

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During the final concept mapping session, participants discussed and interpreted the concept maps in smaller groups, and some groups developed diagrams describing the pathways between specific neighborhood factors and pregnancy/birth. There were several themes captured during the smaller group discussion. The participants were specifically responding to some of the key items generated from the earlier concept mapping sessions and how those items may relate. Two major themes that were discussed during the final interpretation sessions related to transportation costs/available and neighborhood safety and exercise, and some of the verbatim quotes from those discussions are presented.

Transportation Cost and Availability:

Participants shared about the challenges they faced with transportation, particularly how transportation related to accessing resources that may not have been within their own communities. The discussions related back to challenges as a result of pending cuts in public transportation, potentially making it more difficult to access transportation and a variety of other services and resources than previously. The following discussion centered on how transportation was a challenge after giving birth and needing to access services for the mother and baby.

> Person 1: *"We came up with that transportation would be a big part of it because um we were saying that most women post-partum lose their insurance six weeks out and so the ACCESS insurance won't cover their transportation anymore so they can't get to appointments or WIC or anything like that."*
>
> Person 2: *"…But a lot of these things you can't get them if you can't get out. So that the transportation is like the number one thing in whether or not you have these resources available to you or not…and especially post-partum. She was [Person 1] really saying that it feels like you sorta drop of a cliff after your baby comes. Like that there's a lot available for you while you're pregnant then it ends or there is just a big void of services post-partum… And like cost of transportation is listed here, but it goes beyond cost into like actual existence of transportation. Like is there actually a bus that goes past your house? Whether or not you can afford the bus, its…in certain neighborhoods around now there isn't a bus that goes past your house."*

Neighborhood Safety and Exercise

Another key theme discussed was the relationship between perceptions of safety within the neighborhood and opportunities for physical activity. A participant describes challenges with exercising or being physically active as a result of lack of an environment or resources that would make it conducive for her to exercise. She describes the disconnection between the medical advice provided by her physician and the reality of carrying out that advice.

> Person 4: *"My doctor was asking me, 'well were you getting enough exercise?' A) it was the middle of winter, B) I live in low-income housing. If anyone is familiar with the [district where I live]… As I explained to my doctor, I love him to death, that's not the kind of neighborhood that you just want to be walking around with a stomach. Not with the things that was going on around me, week in and week out. So, um he said to me "isn't there an exercise facility?" I said "oh yeah, you mean the multimillion dollar YMCA they're building us, its not built yet doctor, but that's a good idea! I'm sorry I don't have a membership to Gold's Gym, but you know, I do the best that I can. I walk to the bus stop. Hey, what can I say? Let's be a little realistic here." So…I just…those are things that you gotta*

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hammer out with your doctor. They mean well, but unless you tell them, they don't know. All neighborhoods are not Desperate Housewives neighborhoods. (everyone laughing)…. Yeah, we all live on Wisteria Lane. All picket fences are not white…"

DISCUSSION

We applied concept mapping as an approach to understand how neighborhood contexts influence pregnancy and birth from the perspectives of pregnant/child-bearing women and the community-based doulas who serve women and children. Participants identified almost 80 unique neighborhood factors that they felt were related to pregnancy or birth. We found that the neighborhood factors were generally rated highly for each outcome, and there were moderate differences in the relationship between neighborhood and each outcome.

The factors ranged from the demographics of the neighborhood, access to healthy foods, housing quality, and environmental toxins, many of which have been cited in the literature in relation to pregnancy and birth (Buka, Brennan, Rich-Edwards, Raudenbush, & Earls, 2003; Culhane & Elo, 2005; Elo et al., 2009; Janevic, Borrell, Savitz, Herring, & Rundle, 2010; Lane et al., 2008; Miranda, Messer, & Kroeger, 2012). Many of the neighborhood factors capture elements of the social, service, and physical environment hypothesized to influence reproductive health through several pathways such as exposure to chronic stress, availability of social support, means of adapting and coping, the power or ability to make healthy choices or demand services to improve choices (Culhane & Elo, 2005). For example, cluster 1, "Resources available for pregnancy and beyond," relate to specific services women may have available to them within their neighborhoods and the implications for various stages of pregnancy. In the case of 'resources in native language' (factor 17), a service could be available in close proximity but not cater to their needs making it readily accessible for all people within the area. Clusters 6 and 8, both related to the social environment, relate to how socioeconomic characteristics and the structure of opportunities through other institutions such as schools may influence health. Finally, the physical environment, as demonstrated in some of the factors included in cluster 5 (e.g., water quality, environmental hazards) may include exposures and toxicants that have physical and/or health ramifications.

During the interpretation session, we were able to develop a more nuanced understanding of perceived relationships between neighborhood contexts and pregnancy and birth. This study points to the intersection between neighborhood context and individual initiative in influencing healthy behavior or health-seeking activity. Despite increased understanding of the importance of exercise and nutrition during pregnancy, participants described barriers related to their neighborhood context in being able to exercise (crime and lack of facilities) and to improved nutrition (lack of fresh produce, grocery stores and inadequacy of public transportation). The discussion of exercising during pregnancy coincides with current literature that discusses how important health behaviors are linked to neighborhood environments, particularly in the context of pregnancy (Bell, Zimmerman, Mayer, Almgren, & Huebner, 2007; Culhane & Elo, 2005; B. Laraia, Messer, Evenson, & Kaufman, 2007; B. A. Laraia, Siega-Riz, Kaufman, & Jones, 2004; Schempf, Strobino, & O'Campo, 2009; Vinikoor-Imler, Messer, Evenson, & Laraia, 2011). Another important aspect of the discussion that has been underexplored in the context of pregnancy is how transportation access in certain neighborhood contexts influence access to resources and ultimately influences reproductive health. Transportation was cited as a barrier to accessing resources important for health and other needs, and other work conducted in the study

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area found that a reduction in access to public transportation due to strikes resulted in a significant decrease in prenatal care visits, particularly among black mothers (Evans & Lien, 2005). These findings demonstrate the need for interventions seeking to improve pregnancy outcomes to investigate and take into account the neighborhood context and its potential impact on behaviors often seen to be within the individual's control, such as diet and exercise.

This is a mixed methods study, applying focus group discussions and concept mapping among a small, local population limiting the generalizability of this study. However, the purpose of this study is not to generalize to all populations, but to gain additional insight into potential relationships and mechanism between neighborhoods and pregnancy and birth for future research and interventions. Since we were interested in understanding perceptions among doulas and mothers, our sample did not include adults who were not pregnant (or were pregnant in the past) or providing services in the context of pregnancy. However, the participants' responses provide insight about the influence of neighborhoods in the context of pregnancy and birth, which is a strength of this study. Additionally, this study provides insight into the perceptions of community members on the factors that impact health before during and after pregnancy in their *own neighborhoods*. Because the scope of the study was limited to describing these perceptions and using the concept mapping technique, it did not investigate participants' ideas for interventions or solutions, although it points to clear need for including community members in further investigation to inform and develop interventions or policy.

Results from this study will be useful in understanding important community and neighborhood factors that are relevant to pregnancy and birth and health disparities. The finding from this study can be used to inform interventions and generate new hypotheses in future studies investigating neighborhood context and pregnancy and birth. Future research should also centralize the perspectives of the populations most affected, including pregnant and childbearing women, related to how neighborhood and community factors influence their pregnancies and birth.

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