



Social Risk of Pregnant Women at a Community Health Center: An Application of the PRAPARE Assessment Tool

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Abstract

Community health centers (CHCs) screen patients for social determinants of health (SDoH). The study's purpose was to assess the relationship between demographic factors and unmet social needs (SDoH risk) among pregnant mothers. Patient data from 345 pregnant women between January 2019–December 2020 assessed SDoH risk, using the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) tool. Chi-square analyses explored relationships between social needs and demographic factors, and a multivariate logistic regression examined associations between these variables controlling for covariates. Hispanic patients and those who preferred to speak Spanish had 2.35 and 5.39 times the odds, respectively as non-Hispanic Whites and English speakers of having moderate/high/urgent SDoH risks. Mothers who had not completed high school had increased odds (aOR = 7.38) of SDoH risk. By identifying indicators that increase social risk level, CHCs can connect patients to essential social services, improving the downstream health of mothers and children.

Keywords Social risk · Social determinants of health · Maternal health · PRAPARE · Community health center

Background

Community Health Centers (CHCs) provide a variety of healthcare services, both primary and preventative, to 1 in 12 residents in the US via clinical and non-clinical resources.¹ CHCs serve diverse populations that vary in socioeconomic status, culture, race, life experiences and living conditions with an emphasis on those most vulnerable, such as the homeless, refugees, veterans, migrant workers, and families living in public housing [1]. Many CHCs are designated federally qualified health centers, providing access to a wide range of healthcare services including affordable medical

care, mental health, and oral health services to those who would otherwise be hindered by geographic, economic, and cultural barriers [2].

Social determinants of health (SDoH) [3] are conditions that influence health outcomes [4]. These conditions can include employment status, housing conditions, food security, and social inclusion [5]. SDoH have been shown to have a larger impact on a person's overall health status than medical care and lifestyle choices combined [4]. Measuring SDoH data can allow healthcare providers to better understand and care for their patients. Additionally, understanding social needs can enable future health prevention efforts to be culturally and educationally appropriate [5]. For example, providing holistically competent care, such as language appropriate services, can help meet the individual needs of each sub-population [6]. Thus, providing care begins with assessing the needs of the community via the measurement of independent and overall SDoHs.

One instrument that measures SDoH is the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) toolkit. The National Association of Community Health Centers created this tool to assess patient's SDoH via items that measure core domains [5]. PRAPARE is designed to assess SDoH risk through stratification, providing a threshold of risk level. While this tool

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collects data about individual patients, few studies use PRAPARE responses to assess the associations found in individual factors and overall SDOHs from certain populations [7, 8]. Moreover, studies have examined race, ethnicity, and socioeconomic status in relation to maternal outcomes, but the limited scope of the SDOHs studied creates a need for research in all domains such as housing stability and food security [3]. For example, advanced maternal age (> 35 years) is a known risk-factor for adverse pregnancy outcomes such as stillbirths, and adolescent pregnancy (< 19 years) is associated with preterm delivery and low birth-weight [9, 10]; however, to date, little is known about the social needs of these pregnant women and if they differ by demographic.

Prenatal care, in general, is important to the vitality of the fetus, pre and postnatal maternal health, and therefore is important to the future of many communities [11]. Quality prenatal care could reduce or prevent maternal deaths and adverse birth outcomes such as stillbirths; in 2015, there were 303,000 maternal deaths due to pregnancy-related causes and 2.6 million stillbirths worldwide [12]. For example, Black pregnant women have been found to initiate prenatal care later than their white counterparts due to racism, an underlying social factor linked to health risks for both the mother and developing fetus [13, 14]. Further, research suggests migrant women's barriers to healthcare include language, ability to pay due to uninsured status, and cultural beliefs [15]. Although these studies employed SDOH to understand barriers to care in large, at-risk populations, they did not utilize a validated tool, such as the PRAPARE, to collect and respond to patient's identified SDOH. The purpose of this study is to analyze the relationship between SDOH and demographic factors among pregnant women at a CHC.

Methods

Participants

The CHC from where data were collected is located in a region of the country that is home to an estimated 15,000 Native Hawaiian/Pacific Islanders (NHPI), mostly Marshallese Islanders. This is the largest colony of Marshallese outside the Marshall Islands, a string of atolls in the Pacific Ocean. Care at the CHC is often utilized by this special population. The CHC also serves a large Hispanic population that makes up 37.6% of the local community [16].

Data Collection

For the current study, data were delimited to pregnant patients (N = 345) from a CHC who received prenatal care

and completed the PRAPARE tool. All data were collected between January 1, 2019, and December 30, 2020. Electronic Medical Records (EMR) were used to identify when the patient was seen at the CHC for a prenatal visit, through International Classification of Disease (ICD-10) coding. All data used in this study were deidentified and met the Health Insurance Portability and Accountability Act (HIPAA) standards, and the current study was exempt from review by the [Blinded for Review] Institutional Review Board.

PRAPARE items were integrated into the clinic workflow before the concept of this study took place. The PRAPARE tool was given to all patients as part of patient intake paperwork, but were informed that the completion of this was voluntary. This tool is designed as a “no wrong door approach” tool and can be administered in a variety of ways, outside of the patient paperwork, and can be collected by different levels of staff. All responses collected through conversation or through patient paperwork were input in the EMR into a template that generates the final PRAPARE score. All patients were given the option of completing the PRAPARE tool during the in-take process. Participants were informed that completion of the instrument was voluntary and informed consent was obtained before completing the PRAPARE tool items. The PRAPARE instrument is designed to be administered by both clinical and non-clinical staff, and to be administered in a variety of ways in order to collect patient information. This includes, but is not limited to in waiting rooms and exam rooms, during conversation with patient advocates and care coordinators through candid dialogue, or through a paper form (available in English and Spanish). Responses ascertained through conversation were recorded in an integrated template in the EMR, eClinical Works. The template serves as a live document that can be updated at any time, during any visit, assuring the most up-to-date responses from the patient. This template was used to generate the final PRAPARE score from the items collected from the patients, and the score was auto-populated in the EMR.

Measures

Demographic information identified from the EMR included age, preferred language, self-identified race and ethnicity. The age of the pregnant women was stratified into the following categories: adolescent pregnancy age (15–19 years), average pregnancy age (20–34), and advanced maternal age (above age 35). Race and ethnicity were combined and recoded as non-Hispanic White, non-Hispanic NHPI, Hispanic, and other (which included African American, Asian, American Indian and Alaskan Native, and mixed race/ethnicity). Patients were confirmed pregnant at the time of this prenatal visit, reported by the appropriate ICD-10 code in the EMR.

The 15-item PRAPARE tool measures social determinants of health by calculating a score based on respondents' risks. Scores ranging from 0 to 22, with 0 indicating the participant reported no social determinant of health risks and 22 indicating the participant reported all measured risks. The core domains measured in the PRAPARE include personal characteristics, family and home, finances and resources, and social and emotional health. The overall risk score produced from the PRAPARE tool was used to identify patients above "low" social risk for poor health outcomes. Full details about the PRAPARE instrument have been cited elsewhere [7, 17]. All PRAPARE items came from the national PRAPARE social determinants of health assessment protocol, developed and owned by the National Association of Community Health Centers, in partnership with the Association of Asian Pacific Community Health Organization, the Oregon Primary Care Association, and the Institute for Alternative Futures. For more information, visit www.nachc.org/prapare.

Analysis

Of the 345 CHC pregnant patients who completed the study, some did not complete all PRAPARE items. A score of zero for the individual social need was reported when the item was unanswered by the patient. Thus, the total PRAPARE score was computed by adding a zero for social needs not reported by the patient. The scores produced from the PRAPARE tool were used to stratify patients into risk tiers. After calculating the mean for the sample unmet social needs scores, each standard deviation above the mean score differentiated a rising level of risk: low risk (SD = 0), moderate risk (SD = 1), high risk (SD = 2), and urgent (SD = 3+). For the purpose of this study, these levels were dichotomized into low (0) and moderate, high, and urgent (1) due to distribution of frequencies; 38.8% of pregnant women exhibited low social risk (PRAPARE scores < 6); 35.1% had moderate risk (PRAPARE scores 6–7), 16.8% reported high risk (PRAPARE scores 8–9), and the remaining 9.3% reported urgent risk (PRAPARE scores > 9). Using these scores, chi-square analyses were first conducted to explore relationships between the level of risk and demographic factors (i.e., pregnant woman's age, race/ethnicity, educational attainment, and preferred language). Next, a multivariable logistic regression examined the association between each demographic factor and a CHC patients' overall SDoH risk (indicated as above low risk). Adjusted odds ratio (aOR) and 95% Confidence Intervals (95% CI) were used to report findings from the logistic regressions. Statistical significance was evaluated *a priori* based on an α of 0.05. All analyses were conducted using IBM SPSS 27 Software [18].

Results

The average age of women seen at the CHC for a prenatal appointment was 28 years (SD = 6.5 years); ages ranged from 15 to 44 years old. Only 7% of pregnant women were adolescent aged, 19% were advanced maternal age, and the remaining majority were of average age (20–34). Overall, 60% of the sample identified as Hispanic, 13% as NHPI, 16% as White, and the remaining as "Other". Almost half of the women (47%) preferred to receive care in Spanish, and 7% of the sample reported their preferred language as Marshallese. The remaining 46% of women spoke English. PRAPARE scores reported by the sample of pregnant women ranged from 0 to 15, with the average equal to 6.31 (SD = 2.36). For full demographic information, see Table 1.

Differences by Risk Level

Findings suggested there were relationships between the women's age during pregnancy, race/ethnicity, the patients' preferred language, and the patients' highest educational attainment and their SDoH Risk level (low and moderate/high/urgent). There was a significant relationship between risk level and age of pregnant patients, $\chi^2(1, N = 345) = 9.48, p < 0.01$; 77.6, 57.3, and 56.5% of those 35 years of age and older, 20–34 year-olds, and those 0–19 year-olds, respectively, indicated that they had moderate/high/urgent SDoH risks. Also, there was a significant relationship between SDoH risk levels and racial/ethnic groups, $\chi^2(1, N = 328) = 31.69, p < 0.01$; 72.7% of Hispanic persons, 52.3% of NHPIs, 42.9% of those identifying as 'other', and 35.2% of Whites had moderate/high/urgent risk scores. There was a significant relationship between preferred language and having a moderate/high/urgent SDoH risk score, $\chi^2(1, N = 345) = 59.77, p < 0.01$. Overall, 81.6% of Spanish speakers were found to have moderate/high/urgent unmet needs, while 64% of Marshallese and 39.5% of English speakers had moderate/high/urgent unmet needs. Finally, the level of education reported by a patient was associated risk scores, $\chi^2(1, N = 309) = 23.12, p < 0.01$. Overall, 83.5% of those who received less than a high school diploma or GED, 61.2% of those who completed a high school diploma/GED, and 42.6% of those who completed more than a high school diploma was found to have a moderate/high/urgent SDoH score. See Table 2 for frequencies reported across variables.

Associations Between SDoH Risks and Overall PRAPARE Scores

When controlling for other co-variates, those who were Hispanic and those who preferred to speak to their healthcare

Table 1 Chi square risk level and demographics (N=345)

	Total	Risk Level		p-value
		Low	Mod, High, Urgent	
	N=345	N=134	N=211	
	N (%)	N (%)	N (%)	
Age Category				
20–34 years	255 (73.9)	109 (81.3)	146 (69.2)	.009
0–19 years	23 (6.7)	10 (7.5)	13 (6.2)	
35+	67 (19.4)	15 (11.2)	52 (24.6)	
Race/Ethnicity				
Non-Hispanic White	54 (16.5)	35 (28.0)	19 (9.4)	< .001
Native Hawaiian/Pacific Islander	44 (13.4)	21 (16.8)	23 (11.3)	
Hispanic	209 (63.7)	57 (45.6)	152 (74.9)	
Other	21 (6.4)	12 (9.6)	9 (4.4)	
Preferred language				
English	157 (45.5)	95 (70.9)	62 (29.4)	< .001
Spanish	163 (47.2)	30 (22.4)	133 (63.0)	
Marshallese	25 (7.2)	9 (6.7)	16 (7.6)	
Highest education completed**				
More than high school diploma/GED	47 (15.2)	27 (24.3)	20 (10.1)	< .001
High school diploma/GED	183 (59.2)	71 (64.0)	112 (56.6)	
Less than high school diploma/GED	79 (25.6)	13 (11.7)	66 (33.3)	

**Missing Cases were excluded from this analysis

Table 2 Crosstabulations of item frequencies

	Age (years)			Race/ethnicity				Preferred language			Highest education completed		
	0–19	20–34	35+	NH White	NHPI	Hispanic	Other	English	Spanish	Marshallese	<than HS	HS/GED	> than HS
Age													
0–19 years	23												
20–34 years		255											
35+ years			67										
Race/Ethnicity													
NH White	3	49	2	54									
NHPI	2	36	6		44								
Hispanic	16	140	53			209							
Other	1	18	2				21						
Preferred language													
English	12	135	10	51	19	59	18	147					
Spanish	9	102	52	3	0	150	3		156				
Marshallese	2	18	5	0	25	0	0			25			
Highest education completed													
< than HS	9	51	19	10	5	58	2	19	55	5	79		
HS /GED	6	145	32	38	33	100	8	100	66	17		183	
> than HS	1	36	10	5	2	29	8	24	23	0			47

NH Non-Hispanic; NHPI Native Hawaiian/Pacific Islander; HS high school diploma

provider in Spanish had 2.35 (95% CI 1.07, 5.19) and 5.39 (95% CI 2.55, 11.42) times the odds, respectively, as non-Hispanic Whites and English speakers of having a PRA-PARE score that measured moderate/high/urgent risk levels of SDoH. Further, pregnant women who had not completed a high school diploma had 7.38 times the odds (95% CI 2.76, 19.71) of reporting moderate/high/urgent risk levels of SDoH, see Table 3 for full results. Pregnant women's age was not found to be significantly associated with SDoH risk.

Discussion

In the current study, we sought to understand the relationship between measured SDoH and demographic factors among a sample of pregnant women who sought care at a CHC. While there has not been much published work with the tool used in this study, healthcare systems are considering intervention techniques for identified social needs on a patient and community level [19]. Findings from this study are important because they can help CHCs identify factors that increase risks for unmet downstream social needs that can have long-term effects on the health of the mother and the developing fetus/newborn. Prior research suggests immigrant and ethnic populations, poverty, and inadequate education are associated with poor pregnancy outcomes [3, 20]. While we did not explore pregnancy outcomes, we found those who identified as Hispanic, preferred speaking Spanish, and who had attained a high school diploma/GED or

less, were at increased risk for unmet social needs, when compared to their counterparts. Thus, future research should explore associations with individual pregnancy outcomes and PRAPARE risk scores as well the impact possible interventions may have on patient-level determinants.

The Hispanic population makes up the majority of those served by the CHC in this study. Thus, many patients in the current study preferred another language besides English when seeking care. Given the risks among the Hispanic population and those who preferred to speak Spanish with their healthcare provider, we recommend that health teams, particularly those at CHCs that serve diverse populations, provide appropriate communication about programs that can help meet the needs of the unique population. Healthcare quality and accessibility equity are directly impacted by the preferred language spoken by the patient, and the impact of language barriers themselves have been shown to have detrimental effects on patient safety, satisfaction, trust and their overall health outcomes [21]. By measuring the preferred language, employing fluent speakers, and providing care in the language most understood by the patient, CHCs can provide the level of care that meets the needs of the patients. As mentioned earlier, strategies utilized by the CHC from which data were collected, include hiring medical staff and community health workers from the communities that seek care of the CHC in order to eliminate language barriers that can increase patient trust with their provider team. These community health workers can help to identify additional unmet social needs not identified during a normal intake medical process to create a comprehensive and holistic approach to care. Educating community health workers about the relationship between demographic factors and social needs can help these patient-advocates be aware of disparities within vulnerable populations, particularly pregnant women.

Consistent with the literature, a strong association exists between low levels of education and poor health outcomes [22, 23]. Research suggests that educational attainment is a strong predictor of a persons' lifestyle (e.g., diet, exercise, smoking behaviors) [24], which is especially important during gestation. Further, despite research that shows minority populations have inequitable educational attainment, particularly in older populations [25], past research has found that minority populations do not reap the same health benefit from educational attainment as their white counterparts; given the same education, disadvantaged and marginalized groups are at an increased risk for unhealthy behaviors and health outcomes when compared to whites [26]. Previous research has found that lower educational attainment was associated with lower health literacy levels, especially among minority populations [27], further demonstrating the importance of identifying those with low levels of education and its connection with one's health literacy and health outcomes. These health inequities may be

Table 3 Social determinant factors associated with (PRAPARE) risk score

Variable	Moderate/high/urgent risk OR (95% CI)
Race/Ethnicity	
Non-Hispanic White	1.00
NHPI	1.47 (0.47, 4.59)
Hispanic	2.35 (1.07, 5.19)
Other	2.12 (0.65, 6.88)
Education attainment	
More than high school diploma	1.00
Less than high school diploma /GED	7.38 (2.76, 19.71)
High school diploma /GED	3.57 (1.59, 8.02)
Language	
English	1.00
Spanish	5.39 (2.55, 11.42)
Marshalllese	2.52 (0.66, 9.58)
Age	
20–34 years	1.00
0–19 years	0.89 (0.25, 3.12)
35+ years	1.21 (0.54, 2.72)

due to underlying social determinants that are exacerbated among minority populations, such as racial discrimination and lack of access to other social resources. However, those with lower educational attainment have also been found to have elevated risk for poor prenatal screening/compliance, and adverse neonatal and newborn outcomes [23]. Thus, it is important for CHCs to be aware of social factors, such as educational attainment, that may impede their pregnant patients' access to care and ultimately health outcomes. To meet the unique needs of this population, CHC can integrate patient advocates and other navigators into the care process for expectant mothers to explain health services offered by CHC and the importance of prenatal screenings and medical check-ups to ensure the best health outcomes for both the mother and developing fetus/child.

Prenatal pathway programs at CHCs were developed to alleviate burdens of expectant mothers who forego prenatal care due to social barriers by increasing access and convenience of healthcare at a reduced cost; however, particular populations are at an increased risk of additional unmet needs that may make it more difficult for them to attend these prenatal healthcare visits or may have additional health implications outside of these visits. Thus, CHCs can provide pregnant women with the social resources and education they need to take autonomy over their own healthcare and ultimately improve their quality of life and health outcomes for the mother and child [28]. The integration of a tool that identifies and records certain SDoHs is merely the first step in improving the care provided to these mothers, but an EMR system that flags and notifies care teams of a suggested workflow for the particular responses would help streamline the continuum created by using a SDoH tool and then acting upon its results. It is important that tools for measuring and collecting social determinant data are not overlooked as yet another step in the patient care workflow but fully utilized by healthcare teams. Upon identifying urgent needs for a patient, patient advocates or social workers embedded in the clinic system can be the touch point for providing immediate access to resources before a patient leaves the clinic. By utilizing instruments such as the PRAPARE tool, patient care teams can assess all risk factors that may endanger their pregnant patients' health. By being mindful of expectant mothers' medical and social needs when seeking prenatal care, healthcare professionals can better address the whole person [11]. Expectant mothers could be facing a number of issues such as domestic violence, social deprivation, unemployment, addiction, etc., all of which can be identified by the utilization of the PRAPARE tool. Helping link this vulnerable population to such resources could improve generations of collective health. Further, this instrument has been used in a similar study that examined social risk related to the COVID-19 pandemic [7]. The PRARARE tool can be used to examine social needs among a wide range of

populations, and associations between this instrument and a variety of health conditions or outcomes can be explored. Universal screenings using instruments such as PRAPARE have been utilized by some CHCs. While they can create impactful changes in the lives of its patients, they may also strain resources. Ultimately, funding to support time and capacity for growing patient loads to social workers and patient advocates are needed.

There are limitations to this study. The cross-sectional nature of the data prohibits the study's findings from determining causation; however, the findings do provide generalizable findings for the particular population from which they were drawn. However, we recognize there was a small sample size of Marshallese Islanders, which may limit statistical power for findings regarding this population. While several measures are taken to ensure quality assurance of data collected, including bilingual staff and translators, misinterpretation of questions and answers are possible. Additionally, all self-reported items are subject to question of reliability. Clinical implications from this study revolve around eliminating potential barriers although, further studies are needed to identify what specific outcomes could be affected by the domains measured in this tool. According to European Board and College of Obstetrics and Gynecology Scientific Committee (2015), for CHCs to address medical and social issues, their services need to use a targeted multidiscipline approach [11]. Future studies should focus on evaluating the most effective strategies and resources in addressing relevant social needs, improving health literacy, and positive health outcomes. Also, associations between some demographic variables may be conflated due to their inclusion in the PRAPARE instrument. Finally, the current study's population consisted of a large portion of Hispanic and Marshallese people, therefore, our findings may not be applicable to other populations.

Conclusion

CHCs offer access to care for many vulnerable populations. Those with programs that seek to improve prenatal outcomes should assess unmet social needs of their patients using instruments such as the PRAPARE tool. Health care teams can utilize this information by connecting their patients with appropriate social services that will support both the immediate need and help to reduce downstream adverse health outcomes. Employees and volunteers can help to identify social needs of their patients by fostering cultural competence and connecting with the patients beyond the basic level of care. Providing additional case management, community health workers, and administrative support for patients could be beneficial for patients and CHC staff alike. Screening and assessing pregnant women's social needs is important

for CHCs that deliver patient-centered care. Thus, identifying additional factors associated with moderate, high, and urgent risk of unmet needs may help providers identify these patients more quickly and connect them with resources that can help improve their downstream social needs.

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