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Social Determinants Associated with Prenatal Visits at a Community Health Center

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INTRODUCTION

Community Health Centers (CHCs) serve diverse populations and provide important opportunities for under resourced groups to receive medical care including primary, pediatric, and prenatal services (Adashi et al., 2010). There are additional obstacles to accessing healthcare and factors that affect health outcomes for this patient population such as financial, cultural, and language barriers, that can be summarized as Social Determinants of Health (Cramer et al., 2007; World Health Organization, 2021). Many CHCs have started to collect data on the Social Determinants of Health of their patients to better understand how to provide competent healthcare and where to focus future health prevention efforts. One measure of the Social Determinants of Health is the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) toolkit, a survey that covers a variety of domains from emotional health to personal characteristics (National Association of Community Health Centers, 2019).

In this study, PRAPARE responses in January 2019 to December 2020 from pregnant women at a local CHC will be used to explore the associations between Social Determinants of Health and the number of and initiation of prenatal appointments. Prenatal care is extremely important to the health of the child and mother, and early initiation of care and ultrasounds can help prevent and anticipate many adverse diagnoses (EBCOG Scientific Committee, 2015). Prenatal care is also correlated with adequate care throughout the pregnancy and can therefore be used as an indicator of overall prenatal care quality (Osterman & Martin, 2016). As PRAPARE is a relatively new measure, few research studies of this kind exist. Findings of the proposed study will provide this CHC, Community Clinic, with insight into better serving their patients. Understanding the specific obstacles to antenatal care could also have implications on the future health of the community.

The purpose of this study is to investigate the association between PRAPARE score and the number of and initiation of prenatal care appointments prior to delivery. The PRAPARE score indicates the number of adverse SDoH the patient's background and life include, which could affect their access to care, including antenatal care (Weir et al., 2020). The outcomes of this research could identify specific barriers to health care in our target population to further influence outreach and prevention efforts, ultimately increasing consistency of and initiation of prenatal care early in pregnancy. In the clinic where data were collected, the population is majority Hispanic/Latino and Marshallese women. This population has unique obstacles including accessing care in language appropriate settings. Moreover, the Marshallese community had a permanent migrant status up until February of 2022 and did not qualify for Medicare or Medicaid outside of pregnancy. These are factors that make this population unique to study, and research is needed on how to better understand their health situation. The first step in public health prevention is to understand the needs of the target population to create a relevant, effective intervention. Ultimately, this research could guide improved quality of care for a large population of women. Beyond the mothers, bettering prenatal care affects birth outcomes and future generations in the community to come.

HYPOTHESIS

Given the evidence indicating connections between SDoHs and health, it is expected that there will be a positive correlation between PRAPARE risk score and delayed initiation of prenatal care (2^{nd} trimester or later). Looking into specific factors, positive associations are also expected between minority status, minimal education, and low income factors with delay of prenatal care.

BACKGROUND

Community Health Centers (CHCs) are federally qualified healthcare centers that serve 5% of the U.S. population (Adashi et al., 2010). These types of organizations are important to underserved and under resourced populations, as patients are not declined care based on ability to pay or lack of insurance. Because the clinics serve large populations of varying socioeconomic status, preferred language, location, race, culture, and many more, they provide opportunities to understand the health status of communities that make up the United States. One way that these health centers, like the Community Clinic of Northwest Arkansas, have aimed to understand their patient populations is through the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) toolkit.

With a series of questions, PRAPARE collects data on patients' Social Determinants of Health (SDoH) (National Association of Community Health Centers, 2019). The World Health Organization defines the SDoH as "the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life" (World Health Organization, 2021). These conditions can include education, food insecurity, housing security, access to affordable healthcare, and employment status (World Health Organization, 2021). Specifically, SDoH can affect 35-55% of a person's health outcomes- more than health care and lifestyle choices (World Health Organization, 2021).

This study will focus on pregnant women receiving prenatal care at a CHC. Prenatal care is important to the vitality of the fetus and continues from birth throughout the lifespan (EBCOG Scientific Committee, 2015). Some of the most common issues at birth are prematurity, fetal growth restriction, congenital abnormalities, and asphyxia which can be largely prevented or anticipated with regular antenatal visits (EBCOG Scientific Committee, 2015). The World Health Organization recommends eight prenatal contacts during each pregnancy: 1 during the

first trimester, 2 during the second trimester, and the remaining 5 during the third trimester (World Health Organization, 2016). This routine screening schedule has been shown to reduce morbidity and mortality (World Health Organization, 2016). Yet, in some populations there are obstacles to accessing antenatal care that can include language, cultural, educational, and economic barriers (Cramer et al., 2007).

Studies are needed to examine the link between which social determinants affect initiation of prenatal care. Multiple studies have determined that minority women, specifically Black and Hispanic women, delay prenatal care for longer than their white counterparts, which can potentially be attributed to racism and race-related stressors (Gadson et al., 2017). Others have established links between insurance status and prenatal care, finding that increasing Medicaid opportunities increased the proportion of populations seeking prenatal care at an early stage (Gadson et al., 2017). Yet, there is no uniform tool to establish overall status of risk based on SDoH that has been used uniformly at CHCs, nor analyzed to predict causes of health behaviors. The commonplace usage of the PRAPARE toolkit at CHCs is relatively new to the field of public health and medicine, therefore few studies analyzing PRAPARE response data and health outcomes exist. However, understanding these factors can help to direct prevention efforts and understand the origin of prevalent health outcomes in communities.

METHODS

Participants

Participants in this study are pregnant women that utilized prenatal care at least once at the CHC between January 2019 and December 2020. The CHC has 15 locations, and samples were collected from all locations. There was no exclusion based on age, primary language, or

insurance status. If a patient receives care at any clinic, their medical chart is updated from first prenatal visit through delivery and beyond. This study ends at the delivery date of each patient.

Measures

Response data was collected from the Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) survey. PRAPARE focuses on 5 core domains: Personal Characteristics, Family and Home, Money and Resources, Social and Emotional Health, and Other Measures such as domestic violence and incarceration history (National Association of Community Health Centers, 2019). The CHC in the study collects responses on all domains except for the optional "Other Measures" section because they do not offer in-house services to help patients with these circumstances. There are 15 multiple choice and open-ended questions where responses indicate presence or lack of SDoH risk (Luzius et al., 2021). A response coded as a "0" indicates no risk, while a number greater than 1 indicates risk in that domain. Responses from each question are added up to get an individual PRAPARE score (Figure 1), with a maximum of 22.

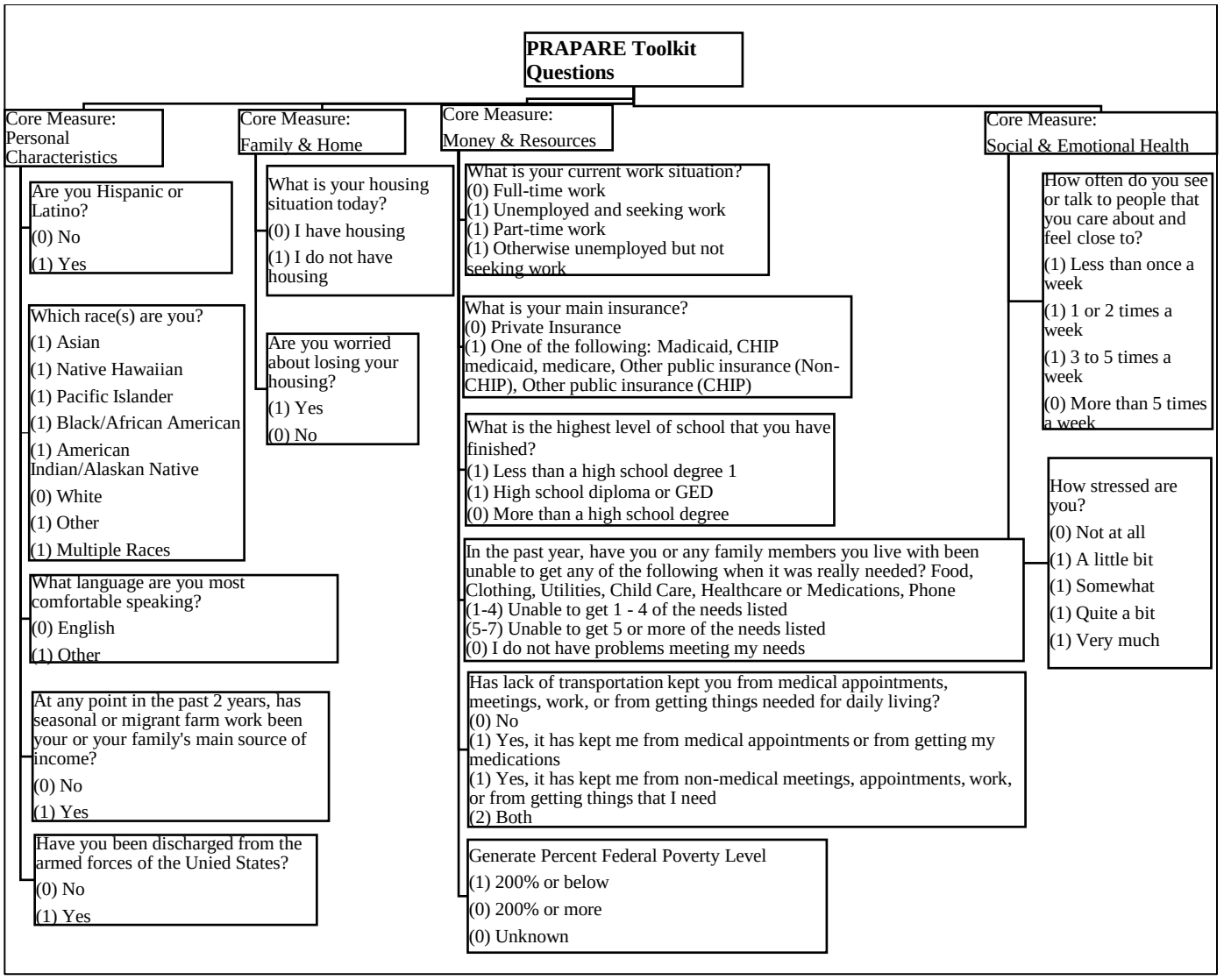

Figure 1 (Luzius et al., 2021)

Procedures

Patients answer PRAPARE questions, asked verbally by a nurse or nurse assistant during their first appointment at the clinic or filled out on a paper survey, and the results are entered into their Electronic Medical Records chart (eClinicalWorks, 2021). Paper and verbal surveys are administered in three languages: English, Spanish, or Marshallese. This is due to the CHC patient population in which 48.78% prefer a language other than English. The eClinical Works Electronic Health Records has a smart tool that allows researchers to calculate a patient's

PRAPARE score and automatically changes based on updates in a patient's situation. To maintain confidentiality all Patient ID numbers were removed by researcher once raw qualitative data was obtained.

Data Analysis

Once PRAPARE scores were assessed, individual risk scores were stratified using a guide based on the recommended process by the National Association of Community Health Centers et al. in 2019. This strategy uses the statistical mean of the total PRAPARE score as a reference point for normality and states 1 standard deviation above the mean as "moderate risk", 2 as "high risk", and 3 as "urgent risk" (National Association of Community Health Centers et al., 2019). The guide served as the interpretation of PRAPARE scores in future analyses of the data in the study. This score was broken down further into the 4 broad categories within PRAPARE of Personal Characteristics, Family & Home, Money & Resources, and Social & Emotional Health. The mean and standard deviation of each category was found to allow risk stratification and categorization to aid in future analysis and discussion. Social and Emotional Health only had 2 PRAPARE questions so an "urgent" risk level was not possible. Furthermore, individual question answers were quantitatively coded based on the numbers indicated on the PRAPARE survey in Figure 1 and summed in Table 1.

RESULTS

As shown in Table 1, the most common levels of SDoH risk for adverse health outcomes as determined by the PRAPARE tool was low to moderate with N=134 (38.8%) and N=120 (34.7%), respectively. Yet, ninety-one women scored a high or urgent score (26.3%). For the four subcategories of PRAPARE, Social and Emotional Health had the highest percentage of women with moderate and high risk at 79.7% (N=275). Family and Home had two hundred and

seventy-six women (80%) of participants in the low risk category. Personal Characteristics totaled to almost 100% of participants in the low and moderate categories with three hundred and twenty-two women (93.3%).

Overall, out of the three hundred and forty-five participants, 75.7% (N=265) preferred a language other than English, and 74.8% are either employed part-time or unemployed (N=258). Two hundred and thirty participants (66.7%) utilize a public insurance option to receive prenatal care, while ninety are uninsured or report an unknown insurance source (26.1%). Moreover, 62.7% (N=220) identify as Hispanic or Latino. To focus on prenatal care, only 11.6% (N=40) received an ultrasound during their first trimester. 53.3% (N=184) of the women were first-time mothers and 41.2% (N=142) had a parity of two or greater.

The bivariate logistical analysis indicated that participants with the highest PRAPARE risk score were 60% more likely to have an ultrasound in any trimester, as shown in Table 2. However, the 95% confidence interval does include 1.0 by a small margin.

Table 1: PRAPARE Data

Variable	**N=345**	**%**
Level of PRAPARE Risk		
Low	134	38.8
Moderate	120	34.7
High	59	17.1
Urgent	32	9.3
Personal Characteristics		
Low	145	42.0
Moderate	177	51.3
High	23	6.7
Urgent	0	0
Family & Home		
Low	276	80.0
Moderate	33	9.6
High	13	3.8

Urgent	23	6.6
Money & Resources		
Low	284	82.3
Moderate	48	13.9
High	8	2.3
Urgent	5	1.4
Social & Emotional Health		
Low	70	20.3
Moderate	138	40.0
High	137	39.7
Language		
English	80	23.2
Spanish/Marshallese/other	265	75.5
Employment		
Full time	66	19.1
Employed part-time/ unemployed	258	74.8
Unknown	21	6.1
Education		
More than High School Diploma	47	13.6
High School Diploma or less	262	75.9
Unknown	36	10.4
Insurance Status		
Private Insurance	25	7.2
Medicaid/AR Kids/other	230	66.7
Unknown	90	26.1
Ethnicity		
Not Hispanic or Latino	120	34.2
Hispanic or Latino	220	62.7
Unreported	11	3.1
Race		
Caucasian	166	47.3
All other	64	18.2
Unreported	121	34.5
Trimester of Ultrasound		
1st	40	11.6
2nd	194	56.2
3rd	10	2.89

Unreported	101	29.3
Number of Pregnancy		
1st	184	53.3
2nd or more	142	41.2
Unreported	19	5.5

Table 2: PRAPARE Risk vs Ultrasound in 2nd or 3rd trimester

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Logistic regression                             Number of obs   =        351
                                                LR chi2(1)      =       3.64
                                                Prob > chi2     =     0.0566
Log likelihood = -208.82573                     Pseudo R2       =     0.0086
```

ultra2	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
prisk	.6087157	.156999	-1.92	0.054	.3671758	1.009148
_cons	2.850746	.4047756	7.38	0.000	2.158226	3.765478

DISCUSSION

This study aimed to understand the association between SDoHs, as indicated by stratified risk classification using PRAPARE survey data, and the initiation of and number of prenatal care appointments at a CHC. This data gives an understanding of pregnant women's risk factors and barriers to prenatal care at a specific CHC, which is vital as understanding a target population is one of the first fundamental steps in developing health behavior interventions and improving health outcomes. Pregnant women, specifically, are an important group to public health because prenatal care is vital to not only the health of the mother, but also of the child, and early initiation into prenatal care in correlated with sustained care throughout the pregnancy (EBCOG Scientific Committee, 2015; Osterman & Martin, 2016). At the CHC studied, only 40 out of 345 women received their first trimester ultrasound- one of the eight recommended by the World Health Organization to ensure proper fetal development and maternal health (World Health

Organization, 2016). Most women in the study initiated their care during the 2nd trimester thus either missing one or two appointments; 10 women didn't have prenatal care until the 3rd trimester, missing 3 or more ultrasounds. The average number of women that initiated a prenatal appointment (and ultrasound) in the first trimester in the United States in 2016 was 77.1% of women and 68.4% of women in Arkansas, while it was only 11.6% of women in this study in (Osterman & Martin, 2016). Obviously, there is a distinct difference between the population studied and the average rates of women across the US and Arkansas in initiation of prenatal care that needs to be studied and understood. Reasons behind the initiation of prenatal care has limited prior studies, specifically with regards to finding causation between SDoH and certain tools to measure SDoH like PRAPARE.

Using the new PRAPARE tool, the majority of women in this study were in the low or moderate categories of risk, with 91 women in the high or urgent categories. No statistically significant link was found between PRAPARE risk and the trimester of prenatal care initiation, yet the women in the study had fewer prenatal visits and ultrasounds than the average pregnant woman in the United States. To better understand this gap, the 4 individual PRAPARE categories were analyzed and "Social and Emotional Health" was indicated to have the highest proportion of women, as compared to other categories, in the moderate and high risk categorizations. When breaking down the PRAPARE responses and looking at individual questions, the responses indicated risk factors that are consistent with literature on reasons to delay prenatal care. These reasons can include low levels of educational attainment, minority status due to potential perceived racism, unemployment, insurance status, and primary language spoken (Feijen-De Jong et al., 2012; Gadson et al., 2017; Osterman & Martin, 2016). Of the women studied, 62.7% identified as Hispanic or Latino and 74.8% worked part-time or were

unemployed. 66.7% were on a form of public insurance and 26.1% were unknown (which includes uninsured). 75.5% spoke a language other than English as their first language, and 75.9% had a high school diploma or less. Fundamentally, these are women meeting multiple of these literature-proven risks of delaying prenatal care, which is consistent with the low early-utilization numbers of this population.

Yet, PRAPARE did not indicate that this population was at risk. The PRAPARE tool is not designed to be used on a certain population; it can be used at any health clinic, public health office, etc for a group of health professionals to understand its population and their health risks to develop targeted interventions (National Association of Community Health Centers, 2019). Therefore, this study calls into questions the applicability of the broad toolkit to be used on this population of majority minority women speaking a language other than English at a predominately low-income CHC. Moreover, the PRAPARE tool does not include questions based on ability and available resources to recognize pregnancy, capability to and knowledge of making a doctor's appointment, and undesired pregnancy- all of which have been shown to influence initiation of prenatal care (Shah et al., 2018).

For this CHC, recommendations include focusing on the Social and Emotional aspects of their pregnant women as that category did indicate significant risk among the women. Stress during pregnancy, including racial and cultural stress and potentially exacerbated by unemployment and poverty, has been associated with impaired behavioral, psychological, and immune function for the mother and child across the lifespan (Coussons-Read Phd, 2013). An intervention could include the implementation of a mindfulness and gratitude program that has been shown in a study to reduce pregnant women's self-perceived stress level in diverse populations (Matvienko-Sikar & Dockray, 2017). Moreover, the CHC could use the individual

responses of this study in conjunction with the most widely accepted reasons of delaying prenatal care to develop interventions and design aid programs instead of using overall PRAPARE risk scores. This could include social programs to increase education around prenatal care when uninsured or underinsured, as increased education of resources has been shown to have a positive correlation with initiation and continuation of prenatal care to reduce postnatal complications (Shah et al., 2018). Furthermore, the CHC could provide more prenatal services in languages besides English such as Marshallese and Spanish, because language is fundamental to breaking down cultural barriers to receiving care and reducing health disparities (Webster & Sampangi, 2017).

There are some limitations to this. First, the population was somewhat small and homogenous in terms of demographic features like ethnicity, language, employment, and insurance status. Not only does this limit applicability of results and recommendations to other population groups, but it creates a mean with small margins of standard deviations that was used to stratify PRAPARE scores into risk categories. This could have prevented the study from having a baseline of women at no or very little risk to begin with and would categorize most women as low risk even if they are not compared to the general population of Arkansas and the US. Moreover, there is always a possibility of misinterpretation of questions upon communication between the patient and provider asking the questions. These misunderstandings could be exacerbated by language and cultural differences. Finally, all questions are subject to response bias due to the survey style method of data collection.

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