

BMJ Open Documenting and characterising gestational weight gain beliefs and experiences among Marshallese pregnant women in Arkansas: a protocol for a longitudinal mixed-methods study

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ABSTRACT

Introduction Arkansas has the largest population of Marshallese Pacific Islanders residing in the continental USA. The Marshallese have higher rates of obesity, type 2 diabetes, pre-term births, low birthweight babies, infant mortality, and inadequate or no prenatal care. Despite the high rates of cardiometabolic and maternal and child health disparities among Marshallese, there are no studies documenting gestational weight gain or perceptions about gestational weight gain among the Marshallese population residing in the USA.

Methods and analysis This paper describes the protocol of a mixed-methods concurrent triangulation longitudinal study designed to understand gestational weight gain in Marshallese women. The mixed-methods design collects qualitative and quantitative data during simultaneous data collection events, at both first and third trimester, and then augments that data with postpartum data abstraction. Quantitative and qualitative data will be analysed separately and then synthesised during the interpretation phase.

Ethics and dissemination The study used a community engaged approach approved by the University of Arkansas for Medical Sciences Institutional Review Board (#228023). The research team will disseminate results to study participants, research stakeholders (clinics, faith-based organisations and community-based organisation), the broader Marshallese community and fellow researchers. Results will be disseminated to study participants through a one-page summary that show the aggregated research results using plain language and infographics.

INTRODUCTION

Arkansas has the largest population of Marshallese Pacific Islanders residing in the continental USA.^{1 2} Marshallese have several chronic health disparities, including higher rates of obesity, diabetes and hypertension.^{3 4} The Marshallese community is also disproportionately burdened by poor maternal health outcomes in comparison with other racial and ethnic groups. Specifically, the Marshallese

Strengths and limitations of this study

- This will be the first study to document gestational weight gain and perceptions about gestational weight gain among the Marshallese population residing in the USA.
- To address the health disparities experienced by the Marshallese community, the authors are using a community-based participatory research approach.
- This mixed-methods concurrent triangulation longitudinal design will allow the researchers to overcome the inherent weaknesses of using a singular, cross-sectional, qualitative or quantitative methodology.
- This study will be used to culturally tailor interventions to help Marshallese women achieve recommended gestational weight gain and reduce maternal and infant health disparities in Marshallese communities.
- The results of this study may or may not be generalisable to other Pacific Islander communities residing outside Arkansas.

have higher rates of pre-term births, low birthweight babies, infant mortality, and inadequate or no prenatal care.^{5 6}

Excessive gestational weight gain (GWG) increases medical complications for the mother,^{7–9} and is associated with impaired glucose intolerance,^{10–12} delivery complications, increased healthcare costs,¹³ greater postpartum weight retention,^{14 15} higher incidence of obesity later in life^{16–19} and metabolic disease risk later in life.²⁰ There is a strong association between excessive GWG and gestational diabetes mellitus (GDM).^{10 21} The prevalence of GDM among Pacific Islander communities has not been well documented in the current literature. The limited studies conducted have documented that Pacific Islanders residing in Samoa, Republic of the

Marshall Islands (RMI), Hawaii, Washington and California have higher rates of GDM compared with other racial/ethnic demographics. These studies have documented rates of GDM as high as 13.7% in Pacific Islanders compared with 5.8% for the general population in the continental USA.^{22–30}

Excessive GWG increases obesity and negative health outcomes in the offspring.³¹ Children born to mothers with obesity are more likely to develop obesity later in life and suffer metabolic impairment.³² Children born to mothers with excessive GWG are at higher risks of rapid weight gain, obesity and hypertension later in life.^{33–37}

There is limited literature documenting GWG in Pacific Islanders. Hawley *et al* found that 78% of Samoan women (of whom 86% were overweight or obese) exceeded GWG guidelines. This study documented that greater GWG was associated with increased odds of caesarean section delivery and overweight/obese infants by age 12 months.³⁸

Despite the high rates of obesity, diabetes and hypertension,³ and the high rates of maternal and child health disparities among Marshallese, there are no studies documenting GWG or perceptions about GWG among the Marshallese population residing in the USA.

Health disparities among the Marshallese are rooted in a complex history between the USA and the Marshallese. The USA military conducted nuclear testing in the Marshall Islands between 1946 and 1958, detonating 67 fission and thermonuclear devices equivalent to 7200 Hiroshima-sized bombs.³⁹ As a result, areas of the Marshall Islands were contaminated, disrupting their dominant food sources of fish and locally grown plants.⁴⁰ The Marshallese diet and lifestyle in the RMI shifted to a Western diet high in fat and simple carbohydrates, and a more sedentary lifestyle after the nuclear testing.⁴¹ Some studies document higher rates of miscarriage, pre-term birth and birth defects immediately after the nuclear contamination.³⁹ In addition, GWG research is constrained by Marshallese distrust of the healthcare system and scientific research.^{42 43}

To overcome these barriers and address the health disparities experienced by the Marshallese community, the authors will use a community-based participatory research (CBPR) approach. CBPR is a research approach seeking to involve community partners in all aspects of the research process.⁴⁴ This type of research is uniquely suited for engaging indigenous and/or immigrant populations to overcome historical trauma. As part of the CBPR collaborative, the research team has spent the past 5 years meeting with Marshallese community members to determine and prioritise the community's primary health concerns. Maternal health was identified as a top priority.

METHODS AND ANALYSIS

This study has been approved by the University of Arkansas for Medical Sciences Institutional Review Board (#228023).

Patient and public involvement

No patient involvement.

Study aims

The aims of this study are to document and characterise GWG among Marshallese in Arkansas via ten domains: (1) pregnancy experience; (2) diet during pregnancy; (3) physical activity during pregnancy; (4) perceptions of appropriate GWG; (5) information sources about GWG; (6) weight control behaviour; (7) tools and resources for GWG management; (8) doctor-patient communication; (9) GWG goal setting and (10) basic demographics.

Approach

A CBPR approach will be used in the design and implementation of this study. The study will be guided by the Healthy Start Community Action Network (CAN) that includes both local healthcare professionals as well as Marshallese community members; and an interprofessional research team that includes quantitative and qualitative researchers, as well as Marshallese community health workers (CHWs) to provide accurate translation of study materials and input on how to modify the study materials and protocol to be culturally appropriate for Marshallese participants.⁴⁵

Study design

The study will use a mixed-methods concurrent triangulation longitudinal design.⁴⁶ This design collects both qualitative and quantitative data during data collection events, at both first (6–12 weeks' gestation) and third trimester (30–36 weeks' gestation), and then augments that data with postpartum data abstraction. All participants will participate in both data collection events. Quantitative and qualitative data will be analysed separately and then synthesised during the interpretation phase. This mixed-methods concurrent triangulation longitudinal design will allow the researchers to overcome the inherent weaknesses of using a singular qualitative or quantitative methodology.^{47 48} Further, as knowledge and behavioural components can change over time during the course of the pregnancy, we will be able to capture these changes by using a longitudinal design via multiple time points of data collection.

Data collection

Data collection is anticipated to begin October 2020. Quantitative and qualitative (see the Instruments section) data will be collected at first and third trimester during the same data collection event by a female bilingual CHW. Height and weight measurements will be taken during first and third trimester data collection events. Participants will also be provided the option to sign a Health Insurance Portability and Accountability Act (HIPAA) release to access their maternal and neonatal medical records which will be obtained to abstract clinical information after the mother gives birth at 6 weeks post partum.

Instruments

The quantitative surveys, qualitative interview guides, and abstraction and biometric templates were developed with intensive input from Marshallese stakeholders. After the instruments were initially drafted with stakeholders, the CBPR team met monthly with three female bilingual CHWs who will be implementing the data collection in-language with the participants. The CHWs reviewed the questions and discussed revisions. Both the first and third trimester surveys went through four revisions. The first trimester interview guide went through three revisions and the third trimester interview guide went through two revisions.

Quantitative surveys

The quantitative survey was adapted from The Glowing Study to be appropriate for Marshallese participants.⁴⁹ The surveys will be implemented using Research Electronic Data Capture.⁵⁰ Each survey will take approximately 30 min to complete. Surveys are divided into four domains that will measure: (1) basic demographics; (2) perceptions of appropriate GWG; (3) GWG goal setting and (4) weight control behaviours.

Qualitative interview guides

Interview guides are divided into eight domains: (1) pregnancy experience; (2) diet during pregnancy; (3) physical activity during pregnancy; (4) perceptions of appropriate GWG; (5) information sources used to make decision on GWG; (6) weight control behaviour and (7) tools and resources for GWG management. The third trimester has one additional domain: (8) doctor–patient communication.

Biometric and abstracted data

Height and weight will be measured during first and third trimester data collection events. The height and weight taken at first trimester will be used as a proxy for pre-pregnancy weight and will be used in conjunction with the height and weight taken and third trimester to calculate GWG. In addition, the research team will abstract medical record information about the mother and infant. The data abstracted from the mother will include: (1) date of first prenatal care; (2) number of prenatal care visits; (3) fasting glucose; (4) blood pressure; (5) gestational weeks at delivery; (6) complications; (7) GDM test results; (8) mothers' pre-maternal weight status; (9) the amount of weight gained (both cumulatively and per trimester); (10) timing of weight gained and (11) infant feeding intentions. For infants, data abstraction will include: (1) weight and height of infant and (2) birth/medical complications.

Once data collection instruments were confirmed, CHWs translated them into the Marshallese language. After the data documents were translated, the CBPR team met with the female bilingual CHWs and conducted mock data collection events monthly over the course of 3 months. These mock data collection events served as

training for the CHWs and allowed the team to evaluate any challenges in cultural nuance, comprehension and translations.

Recruitment, consent and retention

All study documents used for recruitment, consent and retention were developed in collaboration with Marshallese stakeholders (CAN and CHWs) using a CBPR approach. Participants will be recruited by female bilingual CHWs with extensive research training and trust within the Marshallese community. Fifty women will be recruited by the female bilingual CHWs, who will recruit at local clinics, faith-based organisations and community-based organisations. The target of 50 was chosen because it will allow us to reach saturation across a diverse group of Marshallese women in Arkansas.^{38 51} Data saturation refers to the quality and quantity of information. Saturation occurs when redundancy is reached in data analysis and signals to researchers that data collection may cease.⁵² Our previous work with Marshallese female participants has used 50 as a target enrolment number and this has demonstrated effective in reaching saturation.^{43 51 53} Further, our team works closely with a biostatistician who has verified this is an appropriate target enrolment number for exploratory analyses. If saturation is not achieved among these 50 women, the CBPR team will recruit additional participants. The inclusion criteria are: (1) women who self-report as Marshallese; (2) 18 years of age or older and (3) pregnant. Exclusion criteria are: (1) conception with the use of fertility treatments; (2) multiple gestations and (3) use of medications known to influence fetal growth (eg, glucocorticoids, insulin, thyroid, hormones). Exclusion criteria were chosen as these components would qualify the participants as potential high-risk pregnancies.

Potential participants who meet the inclusion criteria will be offered the opportunity to join the study and complete the consent process. Trained female bilingual CHWs will provide each participant a copy of the consent for medical records in either/both English and Marshallese. The consent forms will use plain language. The female bilingual CHWs will read the consent aloud to the participants in the participant's language of choice (English or Marshallese).

The CBPR team will use an engaged approach to collaboratively develop a retention plan with Marshallese stakeholders. The retention plan specifies that all female bilingual CHWs responsible for recruitment and retention will be bilingual (Marshallese/English). Female bilingual CHWs will obtain each participant's contact information and preferred method of contact. Female bilingual CHWs will also collect contact information for at least two relatives and ask participants for permission to contact their relatives if needed. Confidentiality rules will be followed, and no participant information will be provided to relatives. Before each data collection visit, female bilingual CHWs will contact study participants about the upcoming data collection visit. If a participant

withdraws, the study team will document who withdrew and why they withdrew. Marshallese participants will receive a \$40 gift card at each data collection event. The CBPR team has previously demonstrated the ability to recruit and retain more than 400 participants in a 3-year study with four data collection events over 14 months and maintain a retention rate of over 90%.⁵⁴

Data analysis

Abstraction and biometric

Maternal and neonatal data for all participants will be abstracted at 6 weeks post partum. Gestational weight gain will be derived using weight at delivery minus earliest prenatal care visit weight and categorised as below, within or above the Institute of Medicine guidelines. Maternal and infant outcomes will be compared among women across the GWG categories in adjusted and unadjusted analyses with ORs and 95% CI reported. Covariates will include parity, prior caesarean birth and pregestational diabetes.

Data quality control

Once all data have been analysed, a data quality control meeting will take place with all female bilingual CHWs to validate the interpretation of the qualitative and quantitative findings of the study.

Quantitative

While the primary purpose of collecting quantitative data will be to support and triangulate the qualitative data, exploratory analyses of the quantitative data will be conducted to contextualise the role of the perceptions, attitudes and behaviours of GWG in Marshallese pregnant women. Quantitative data analysis of the survey results will use descriptive as well as inferential statistical techniques including analysis of variance, X^2 tests, correlations, and logistic or linear regressions. The descriptive analyses will use frequencies and proportions to summarise the four domains: (1) basic demographics, including age, marital status, household size, education, employment status and place of birth; (2) perceptions of appropriate GWG; (3) GWG goal setting and (4) weight control behaviours. Inferential analyses will focus on assessing the relationship between Marshallese mothers' perceptions and behaviours toward GWG, including weight gain expectations, child feeding, perceptions of body size, locus of control in weight management, healthy eating, physical activity, and family support of diet and exercise practices. Inferential analyses will also examine mothers' perceptions and behaviours and associations with actual GWG and other health outcomes, such as blood pressure, complications at delivery, GDM test results and infant birth/medical complications. Demographic information will be considered for inclusion in any regression analyses conducted to adjust for the effects of age, socioeconomic status, and place of birth on perceptions, attitudes and behaviours toward GWG. Time-varying covariates and changes in those measures assessed during the

first trimester and third trimester data collection events will be considered as additional predictors in inferential models. Additionally, changes in perceptions and behaviours related to GWG throughout pregnancy will be documented. These analyses will use a standard alpha level of 0.05, two-tailed, and will report effect sizes where informative. For longitudinal analyses, only respondents who participated in both data collection events will be included. For all analyses, the number of respondents who provided valid responses will be presented.

Qualitative

Qualitative data from interviews will be audio recorded and transcribed verbatim in the language it was spoken by a female bilingual CHW. Then any information transcribed in Marshallese will be translated into English. Three researchers with qualitative interview experience will start with initial coding, which consists of naming each data segment with short summations. This process helps organise the data for focused codes. The focused codes that emerge will be used to identify and develop the most salient categories within the data.^{55 56} The research team will collaboratively discuss the themes in order to ensure scientific rigour and intercoder agreement. There will be two primary coders and one confirmation coder. Then, using standard qualitative analysis, an inductive process will be used to identify and code emerging themes. The qualitative analytic approach will integrate inductive and deductive techniques, and the codebook will include a priori thematic codes that represent themes from the interview guide and emergent codes that capture unanticipated categories of analysis.

Analysis plan

The analysis for this longitudinal study will be twofold: (1) a cross-sectional analysis will take place analysing the data collected at first and third trimester and (2) a comparative analysis will be implemented to compare and contrast the data collected from both data collection events.

STRENGTHS AND LIMITATIONS

This will be the first study to document GWG and perceptions about GWG among the Marshallese population residing in the USA. This study will be used to culturally tailor interventions to help Marshallese women achieve recommended GWG and reduce maternal and infant health disparities in Marshallese communities. This mixed-methods concurrent triangulation longitudinal design will allow the researchers to overcome the inherent weaknesses of using a singular, cross-sectional, qualitative or quantitative methodology. The results of this study may or may not be generalisable to other Pacific Islander communities residing outside Arkansas. However, establishing evidence-based interventions designed for Pacific Islanders may also inform work with other disenfranchised and indigenous populations who have strong

collectivist cultures, thus increasing the generalisability of the proposed research.^{57–61}

DISSEMINATION

Effective dissemination is crucial to achieving research impact, and is a key component to conducting CBPR. The research team will use the Agency for Healthcare Research and Quality's Dissemination Planning Tool as the framework for our dissemination.⁶² Specifically, we will disseminate results to study participants, research stakeholders (clinics, faith-based organisations and community-based organisation), the broader Marshallese community and fellow researchers. Results will be disseminated to study participants through a one-page summary that shows the aggregated research results using plain language and infographics. To extend the reach, this information will be reviewed in a town hall meeting and disseminated using social media. No individual participant information will be shared and all confidentiality procedures will be maintained. The data will be published in peer-reviewed journal articles and presented at academic conferences.

SUMMARY

Marshallese are disproportionately burdened by poor maternal and infant health outcomes. Excessive GWG is a key modifiable risk factor for maternal and infant health disparities. However, GWG in USA Marshallese communities has not been well understood. This study will be used to culturally tailor interventions to help Marshallese women achieve recommended GWG and reduce maternal and infant health disparities in Marshallese communities.

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Contributors BLA, AA and PAM conceptualised the design, acquisition of data and analysis, and formulated the research questions of the study. PAM and BLA wrote the manuscript. CAB, LH-D, AA and EB edited the manuscript. CAB, BLA and PAM will interpret and analyse the data once collected.

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Competing interests None declared.

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