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Evaluating Garment Fit Perception for Pregnant Women during 1st, 2nd, or 3rd Trimesters

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Evaluating Garment Fit Perception for Pregnant Women during 1st, 2nd, or 3rd Trimesters

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by

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This thesis is approved for recommendation to the Graduate Council.

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Abstract

During pregnancy, women experience diverse physical body changes as the pregnancy progresses through different periods. It has been noted that anthropometric changes occur during pregnancy in a non-linear manner and can be measured using 3D body scanners at various stages of pregnancy. The changes are diverse, and impact pregnant women's garment fit differently as the pregnancy progresses through each trimester. Pregnant women have experience in dressing their pre-pregnant bodies in stylish garments and would similarly want to dress fashionably when pregnant. This has led to the need for garments that can accommodate body changes comfortably and fashionably without losing the body's identity. While several studies have shown that bodily changes during pregnancy influence the garment fit of pregnant women, no documented research has evaluated the changes at different stages of pregnancy in relation to garment fit. The focus of the study was on whether physical body changes during pregnancy affect maternity wear fit, whether pregnant women perceive physical changes in relation to maternity wear fit, and whether maternity wear fit influences maternity wear purchasing. Therefore, the study aimed to answer the following research questions: (a) Do the physical changes at the bust, waist, and hip during trimesters one, two, or three influence the need for clothes to accommodate these changes? (b) Do the physical changes at the bust, waist, and hip in trimesters one, two, or three influence maternity wear fit? (c) Do pregnant women perceive maternity wear fit according to the physical changes? and (d) Does maternity wear fit influence maternity wear purchase? Lack of body scanning data prohibited the researcher from using the body scanning method. A survey was therefore used to collect data which was analyzed using the Statistical Package for Social Sciences (SPSS). The collected data proved valuable to the foundation of the research area.

Acknowledgement

I am highly grateful to my advisor Dr. Laurie Apple. Her scholarly guidance, thoughtfulness, and patience throughout this project are invaluable, may God bless you. I appreciate my committee members, Dr. Leigh Southward and Dr. Abigail Schmitt for their guidance in this study.

Special gratitude goes to my husband Emmanuel Wangila, for his moral and financial support. Thanks to our children Harry, Jether, and Netanya for trying to understand the importance of Mom's work. My heartfelt gratitude goes to my colleagues and friends for their support.

Dedication

To my late uncle Samson Barasa, for his encouragement and commitment to ensuring that his siblings advance higher academically. I am forever grateful for his sacrifice to finance my education.

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CHAPTER ONE

Introduction

Pregnancy is a period in the human life cycle within which specific clothing is required to accommodate the varied physical body changes that take place (Shamsaei et al 2022). Previously, Miller-Spillman and Rilley (2019) reported that one of the functions of clothing is to meet an individual's needs in specific periods of their lifetime. Presently, expectant women consider the pregnancy period as a time when their specific need of maintaining their pre-pregnant body image and looking fashionable must be met through maternity wear (Barasa, 2020). As a result, the aptness of maternity wear has been perceived differently among pregnant women (Krisjanous et al., 2020) thus influencing the kind of maternity wear fit required. For instance, some pregnant women believe that maternity wear that reveals their bump and maintains their pre-pregnancy shape is appropriate (Sohn & Bye, 2012). Similarly, some women believe that the garment fit that improves their self-image and provides a professional appearance will be suitable (Balasubramanian & Robinette, 2018). Other women feel that suitable apparel during pregnancy should be close-fitting, comfortable, and be used after pregnancy (Kendra & Chanjuan, 2022). Therefore, to meet this specific period's garment fit need, it may be necessary for researchers to evaluate the garment fit for pregnant women thus suggesting the need for this study.

Background of Study

Pregnant women experience diverse bodily changes which influence the fit of their garments as the pregnancy progresses through different trimesters (Yadav & Chanana, 2021). The physical changes during pregnancy occur in the body shape, weight, and posture (Barasa, 2016) causing an alteration in the body size (Komarkova & Glombikova, 2013). Similarly, Hurst

(2013) reports that the bodily changes during pregnancy cause a disproportionate change in the body size of women which impacts the garment fit differently as the pregnancy progresses through various periods. In particular, Balasubramanian and Robinette (2020) state that the bust, waist, and hips are the main areas that experience an increased change in body size which affects pregnant women's garment fit. Beforehand, Watson et al (2016) indicated that pregnant women perceived these physical body changes as complex and dynamic. Pregnant women seem to be concerned with how the garment fits around the bust, waist, and hip. A study by Rodriguez et al (2017) reports that women are experienced in dressing their pre-pregnant bodies in stylish garments and would similarly want to dress fashionably when pregnant. With exposure to many style alternatives offered by non-pregnant garments, pregnant women have various expectations about the garment fit of maternity clothing.

Maternity wear can be defined as clothing that is intended to fit the pregnant body without compromising health and fashion (Barasa, 2020). Formerly, Kilic et al (2014) demonstrated that maternity wear was meant to conceal the pregnant body in the past. Later, Bernard (2018) informed that maternity wear is meant to show the pregnant body stylishly. Earlier, a study by Faust (2013) recounted that most pregnant women consider the size and fit of the garments as their first criterion for selecting maternity wear. Later, Cha (2019) demonstrated that the idea of pregnant women perceiving the pregnancy period as a time to look fashionable has led to a drastic shift in the specific maternity wear fit requirements among women. Given the status of the modern pregnant woman, maternity wear fit in this study is therefore described as the conformity of the garment to the body contours during pregnancy.

Limited studies focusing on anthropometric body changes during pregnancy have been done to help improve body size and fit. The introduction of 3D body scanning in the apparel

industry has led to the development of sizing systems based on anthropometric body measurements of a specific population (Barasa, 2016). Since fashion is dynamic, a shift in maternity wear fit requirements among pregnant women is evident. The maternity wear market size report (2019) demonstrates that changes in social and cultural perceptions with development in technology have created a demand for maternity clothing that can bring out an "ideal" or "real" body of the user. Maternity wears fit preference among pregnant women is dynamic due to changes in fashion trends and the influence of celebrities on social media and fashion magazines.

Currently, pregnant women are more active during pregnancy, and some would love to work until the end of their pregnancy (Cha, 2019). Pregnancy has also seized from a notion of being hidden to a condition of being embraced and confident. This has made modern pregnant women perceive pregnancy time as an opportunity to look stylish and at the same time try to keep their original body when they are not pregnant (Oluwayelimu, 2022). This makes it necessary to gain an insight into physical body changes during pregnancy, their effect on maternity wear fit, and whether pregnant women perceive these changes according to maternity wear fit at various stages of pregnancy. Hence the need for this study is aimed at evaluating garment fit for pregnant women at trimesters one, two, or three. Lack of body scanning data prohibited the researcher from using body scanning. Thus, survey data was collected and proved valuable to the foundation of the research area.

Problem Statement

Researchers demonstrate that women experience diverse physical body changes during pregnancy (Yadav & Chanana, 2021; Rodriguez et al., 2017; Jang & Park, 2015; Komarkova & Glombikorva, 2013). This has led to the need for garments that can accommodate changes comfortably and fashionably without losing the body's identity. Many studies have been done to

solve fit problems experienced by pregnant women as they use maternity wear available in the market (Rodriguez, 2019; Oluwaleyimu, 2022;). Previously, Balasubramanian et al (2013) demonstrated that women's clothing size during pregnancy is the same as their normal clothes used when not pregnant. While the use of maternity wear that does not constrict the body is necessary for improving the quality of life for the mother and fetus (Takehara, et al., 2015), expectant women are not satisfied with the fit of maternity wear available in the market (Kendra & Chanjuan, 2022). It's unfortunate that expectant women are still struggling with finding maternity garments that conform to their body contour (Saniya & Maheshwari, 2021). This study, therefore, tries to gain an insight into physical body changes during pregnancy, their effect on maternity wear fit, and whether pregnant women perceive these changes according to maternity wear fit at various stages of pregnancy.

The aptness of maternity wear has been perceived differently by pregnant women thus influencing the kind of maternity wear fit required (Krisjanous et al., 2020). Today's trend in maternity apparel is stylish compared to maternity wear 20 years ago when "tent" dresses were the norm. The modern woman is always active throughout the pregnancy period. The change reflects consumers' need to feel better about themselves and their desire to have garments that fit well even though they are pregnant. Hence the need to evaluate the maternity wear fit at different stages of pregnancy to bridge the gap in dissatisfaction with available maternity wear in the market.

Purpose of the Study

This study aims to identify fit issues in women pregnant in trimesters one, two, or three. The focus will be on whether changes in the body during pregnancy affect maternity wear fit,

how pregnant women perceive physical changes in maternity wear fit and whether maternity wear fit influence maternity wear purchasing.

Research Questions and Objectives

The study aims at addressing the following:

i. Does the physical change in the bust, waist, and hip during trimesters one, two, or three influence the need for clothes that accommodate these changes?

ii. Do the physical changes at the bust, waist, and hips in trimesters one, two, or three influence maternity wear fit?

iii. Do pregnant women perceive maternity wear fit according to the physical changes?

iv. Does maternity wear fit influence maternity wear purchase.

To answer the questions, the following objectives were formulated:

i. To determine whether physical changes at the bust, waist, and hip during trimesters one, two, and three influence the need for clothes that accommodate these changes.

ii. To determine whether the physical changes in trimesters one, two, and three influence maternity wear fit.

iii. To determine whether pregnant women perceive maternity wear fit according to the physical changes.

iv. To determine whether maternity wear fit influences maternity wear purchase.

Hypothesis

Hypothesis 1 (H1) Pregnant women's physical changes at the bust, waist, and hip during trimesters one, two, or three influence the need for clothes that accommodate these changes.

Hypothesis 2 (H2) Pregnant women's physical changes in trimesters one, two, or three influence maternity wear fit.

Hypothesis 3 (H3) Pregnant women perceive maternity wear fit according to the physical changes.

Hypothesis 4 (H4) Maternity wear fit influence pregnant women's maternity wear purchasing.

Significance of the Study

The information gathered from the study will be useful to the apparel industry in the United States to improve the fit of maternity wear during production. Within the scope and size of the study, it is also anticipated that the outcomes of the study will provide knowledge to the apparel industry on how pregnant women perceive physical body changes about maternity wear fit and specific fit areas pregnant women focus on when purchasing maternity wear.

Conceptual Framework

In this study, Ashdown's (2007) framework will be used to demonstrate an interactive approach to the various pivotal factors affecting apparel sizing and fit. The major focus will be on the evaluation of fit from the subject's perspective. Therefore, for this study, the interaction between independent and dependent variables aids in the evaluation of garment fit for pregnant women at trimesters one, two, and three. For example, physical changes at trimesters one, two, and three are mainly evident at the bust, waist, and hip. Evaluation of garment fit will be dependent on the changes in these areas. This will be evaluated in terms of whether the physical changes influence the need for clothing to accommodate them, whether the physical changes influence the maternity wear fit, whether pregnant women perceive maternity wear fit according

to the physical changes, and whether maternity wear fit influence maternity wear purchasing. This has been illustrated in Figure 1 below.

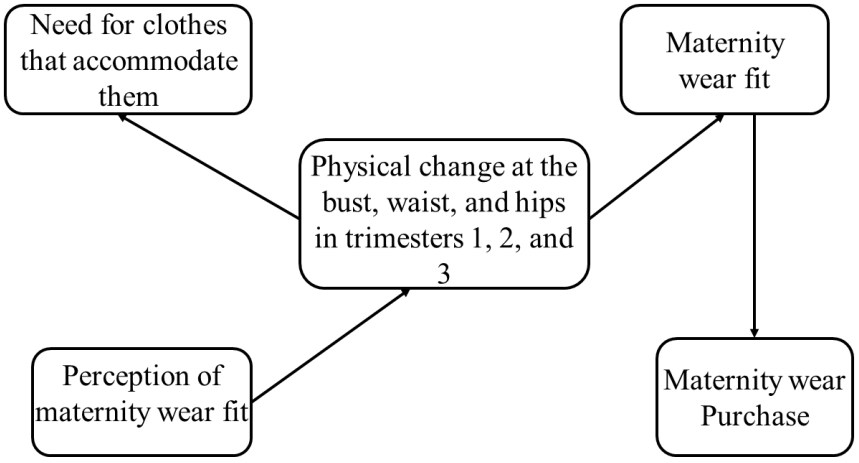

Figure 1: Conceptual Framework for this Study

CHAPTER TWO

Literature Review

The literature will be reviewed to provide a theoretical basis for this study. Topics to be covered will include the concept of pregnancy; physical body changes during pregnancy: maternity wear clothing; garment fit; the relationship between physical body changes during pregnancy and maternity wear fit; pregnant women's perception of garment fit and their physical body changes.

The Concept of Pregnancy

Pregnancy is a period between which the fertilized ovum implants itself in the uterus until delivery (Sarkar & Rasel, 2017). The period is divided into three trimesters in which pregnant women experience different physical body changes at each trimester (Enes, 2013). According to Oh and Heesun (2018), trimester one is the period between the last menstruation cycle to the 12th week of pregnancy whereby minimal physical body changes are experienced at this stage. The second trimester lasts from the 13th to the 27th weeks of pregnancy and is a stage when pregnant women experience a drastic change in their physical body. Lastly, the third trimester is the period between the 28th and 40th weeks of pregnancy when pregnant women still experience varied changes in their physical bodies. Therefore, to produce maternity wear that fits the pregnant body and is fashionable, physical body changes during each trimester need to be considered. Hence the need to evaluate garment fit for pregnant women at trimesters one, two, and three.

Physical Changes during Pregnancy

Researchers demonstrate that during pregnancy, women experience vibrant changes in their physical body (Komarkova & Glombikova, 2013; Sohn & Bye, 2012; Barasa, 2016;

Rodriguez, 2019). Yadav and Chanana (2021) indicate that body changes vary among pregnant women due to variations in the Biometric Index (BMI) among women. During the first trimester, some women experience body changes while in others they are visible from the second trimester (Heeyoung & Oh, 2018). Ciesla et al., (2020) demonstrated that in the first trimester women experience minimal body changes to the warranty need for maternity wear. In the second and third trimesters, the body changes are vivid thus leading to the need for apparel that will accommodate the changes and provide proper size, comfort, and fit (Saniya & Maheshwari, 2021).

Therefore, Takehara et al (2015) suggested the need for pregnant women to use maternity wear that does not constrict the body to improve the quality of life for the mother and fetus. While this need to be put into consideration by pregnant women when purchasing maternity clothes, for many it's not the case since they want to show their pregnant body. As a result, most women are not satisfied with the fit of maternity wear available in the market (Balasubramanian & Robinette, 2018). This, therefore, creates the need to evaluate garment fit for pregnant women. This will help uncover the mystery behind the fit of maternity wear, determining whether physical body changes influence maternity wear fit and whether pregnant women perceive these changes in maternity wear fit.

In an anthropometric study by Balasubramanian et al (2013), it was evident that most of the physical body changes during pregnancy are non-linear and needed to be included in the production process of maternity wear. Rodriguez at al (2017) reported that the bust, waist, and hips are the main areas that experience a high increase in anthropometric changes that affect the size and fit of maternity wear. Although changes in the body differ among women, most pregnant women experience drastic changes during the last two trimesters of pregnancy (Sohn &

Bye, 2012). These bodily changes at the waist, hip, and bust of pregnant women lead to changes in body shape that demand clothing that could conform to the body shape and are stylish (Noopur, 2012). Currently, pregnant women are more active during pregnancy, and some would love to work until the end of their pregnancy (Cha, 2019). In addition, pregnancy has also seized from a notion of being hidden to a condition of being embraced and confident (Oluwayelimu, 2022). This has made modern pregnant women perceive pregnancy time as an opportunity to look stylish and at the same time try to keep their original bodies when they are not pregnant.

Maternity Wear

Maternity wear as one of the niche products is not a prevalent topic in apparel literature. According to Weigle and McAndrews (2021), a handful of manuscripts have investigated maternity clothing from a consumer perspective. Despite the category's little research, its market growth in style, brand, and sales is evident (Krause, 2019). According to the maternity wear market size report (2019), changes in social and cultural perceptions with development in technology have created a demand for maternity clothing that could bring out an "ideal" or "real" body of the user. The report further demonstrates that a shift from the traditional depiction of maternity wear being used to hide the baby bump irrespective of the fit has made pregnant women aware of the fit of apparel. In addition, Mayoh (2019) indicates that fashion consciousness among young pregnant women has led to an increase in the demand for maternity wear in various categories. Consequently, this amounts to lots of pressure among pregnant women to look for maternity wear that conforms to the body contours to flatter the rapidly changing body physically. Hence, maternity wear is now highly differentiated based on consumer preferences and occasions.

To improve maternity wear fit, a study by Balasubramanian and Robinette (2020) found that tracking anthropometric changes of pregnant women for the entire period using 3D body scanning provides standard maternity wear size charts that address fit problems. This was to correct the shortcomings experienced by the American Standard Testing and Materials (ASTM) which was the only size chart being used in the production of maternity wear by then. Previously, Balasubramanian and Robinette (2018) had come up with a predictive model estimating anthropometric measurement changes in pregnant women. This was aimed at solving fit problems encountered by expectant women due to the lack of updated anthropometric data used in the production of maternity wear.

Even after the studies by Balasubramanian and Robinette have been done, pregnant women still are not satisfied with the fit of maternity wear available in the market as demonstrated by Lapolla and Chen, (2022). Initially, Ogle et al (2013) reported that pregnant women were not satisfied by the fit of the maternity wear available in the market because it didn't provide them with the body appearance they wanted. Hence the need for this study to evaluate maternity wear fit at different stages of pregnancy using 3D body scanning. This will provide an insight into what informs the appearance of pregnant women in terms of their physical body changes and specific fit areas they focus on during purchasing maternity wear.

Garment Fit for Pregnant Women

Garment fit is the relationship between the garment and the body in terms of how the two conform to one another (Phasha, 2016). The author further describes garment fit as the space between the three-dimensional human body, and the fabric as it follows the body contours. Garment fit among pregnant women is guided by factors like individual perceptions, garment style, and function (Balasubramanian et al., 2013) and is regarded by many consumers as the

main element that guides their garment preference and satisfaction (Phasha, 2016). However, figure variations in body contour, posture, and proportion complicate the strive for pregnant women to acquire garments with a good fit (Jaiswal, 2022).

Similarly, Popescu et al (2020) indicate that the lack of standardized and updated sizing systems for pregnant women also contributes to the fitting problems of maternity apparel. Indeed, updated data on anthropometric measurements of pregnant women tend to be necessary for achieving the required garment fit. Currently, pregnant women need clothes that fit their pregnant bodies properly to showcase the pregnant bump (Ciesla et al., 2020). Therefore, garment fit for pregnant women may depend on how women perceive the changes.

According to Oh and Heesun (2018), changes in the physical body during pregnancy, lead to variations in body size and shape of women as they progress through the three trimesters of pregnancy. Currently, pregnant women need clothes that fit their pregnant bodies properly to showcase the pregnant bump (Ciesla et al., 2020). A study by Faust (2013) examined the designing of maternity wear in consideration of the physical changes that occur at different stages of pregnancy. The findings indicated that indeed physical changes at different periods of pregnancy are different and require different apparel in terms of size and fit. It was further observed that the main factor that women consider when selecting maternity wear was size and fit of the garment.

In an article by Hurst (2013) on the need for retailers to resize maternity wear, it's evident that the body size of pregnant women changes disproportionately during pregnancy. The article further advises retailers to consider resizing pregnant women from the fifth month of pregnancy to eradicate garment fitting problems. It can be deduced from the two findings that evaluating garment fit of pregnant women at different periods of pregnancy is significant as it

provides an insight on the disproportionate body changes and how they impact the garment fit of pregnant women.

Pregnant Women's Perception of Physical Body Changes and Maternity Wear Fit

Women experience a vast range of physical body changes during pregnancy that impact the way they perceive their body appearance (Mayoh, 2019). According to Watson et al (2016) tripartite influence model and objectification theories influence women's perception of their body thus promoting body appearance through clothing as an important factor than functionality. Previously, Priporas and Fotiadis (2017) indicated that technological development in the fashion industry has led to a transition in body types and appearance. Beauty standards exert intense pressure and have major psychological consequences for both fashion models in the industry and "real" women outside of the industry (Tiggemann & Anderberg, 2020)). Portraying of the western cultural values of beauty and appearance are constant throughout media. This has led to most women aspiring to have flawless, unrealistic, and thin body types (Miller-Spillman & Rilley, 2019). These are the same women who get pregnant and with the changes in their physical body, they develop much pressure on how to maintain such a flawless and unrealistic body prepregnant body.

During pregnancy, the major issue especially from the second trimester has been women accepting and responding to the physical body changes positively (Sultana & Tabraz, 2017). Despite the application of different theories to achieve a thin ideal body for women, the pregnancy period is an exception to body manipulation theories due to rapid physical body changes through the period (Watson et al., 2016). Krisjanous et al (2020) demonstrated that pregnant women find it difficult to switch from their fashionable prepregnant clothes to maternity wear. The author states further that maternity clothes do accommodate the physical

body changes as one accepts to deviate from the normal shape. Ogle et al (2013) and Sohn and Bye (2015) demonstrated that in addition to the physical body changes, the feeling of how one perceives their body image affects the adoption of maternity wear during pregnancy.

To help pregnant women achieve a good appearance comfortably and fashionably, there is a need to determine the occurrence of physical body changes during pregnancy and its effect on maternity wear fit at different stages of pregnancy. The need to determine the women's perception of the physical body changes in maternity wear fit is also necessary. This, therefore, makes this study necessary as it aims to improve maternity wear fit.

Three Dimension (3D) Body Scanning

The development of 3D body scanning technology allows for the quick and consistent extraction of body measurements that are very useful in apparel production (Kim, 2015). The accuracy of the measurements obtained using this technology gives it an upper advantage compared with the traditional physical body measuring process. For the clothing industry, scanners capture an accurate 3D representation of a garment's relationship to the body while minimizing visual distraction (Phasha, 2016). Daanen and Psikuta (2018) demonstrate that 3D body scanning technology may prove to be useful in reducing the number of returns in clothing web shops. Though body scanning is a good method to capture and track anthropometric changes during pregnancy, it's proving difficult to get pregnant women to accept to be body scanned.

Summary of the Literature

Research indicates that bodily changes during pregnancy are diverse and influence garment size and fit for pregnant women. Pregnant women's perceptions towards these changes tend to vary throughout the pregnancy period. Women are experienced in dressing their pre-pregnant body and thus would have different perceptions toward the fit of maternity apparel. To

address this issue of maternity apparel fit, studies have suggested the need to use current anthropometric data collected using 3D body scanning technology to produce garments for pregnant women. Since none of the reviewed literature evaluated the garment fit perceptions of pregnant women at different stages of pregnancy, this study, therefore, seeks to fill the gap by evaluating the garment fit of pregnant women at trimesters one, two, or three.

CHAPTER THREE

Methodology

Research Design

To answer the research questions, fulfill the objectives, and test the hypotheses, a survey was utilized to evaluate the fit of garments on pregnant women in trimesters one, two, or three. Ary et al (2019) noted that surveys enable researchers to have access to primary, usable data directly from the individuals who have been identified in their goals. This will enable the researcher to determine pregnant women's perceptions of garment fit in relation to physical changes at the bust, waist, and hips.

Selection of Participants

The study targeted pregnant women aged 18 years and above, of all ethnicities. These are women who are young, productive, and very conscious of fashion. The study utilized a purposive and convenient sampling method to select at least 63 pregnant women in trimesters one, two, and three to take part in the study. These are non-probability methods of sampling suitable for identifying respondents who are available and willing to take part in the study.

Research Instruments

Participants were recruited through fliers (Appendix B) distributed via Newswire and social media. A first email was sent to participants in response to recruitment fliers explaining the different research schedules and what to expect during the study. A questionnaire was utilized to collect data for this study (Appendix C). To ensure the clarity and consistency of the items covered, the questionnaire was developed with Qualtrics and pretested on a few respondents. The questionnaire gathered information on the demographic characteristics of the participants in trimesters one, two, or three (e.g. age, marital status, trimester, first or subsequent

pregnancy, ethnicity, and level of education). Similarly, the questionnaire collected data on pregnant women's garments fit in trimesters one, two, or three. The questionnaire consisted of open-ended and closed-ended items that collected data on (a) body measurement changes at three stages of pregnancy (trimesters one, two, and three), (b) pregnant women's perceptions of maternity wear fit according to physical changes, and (c) maternity wear fit and purchase. This study utilized measurements taken from Phasha (2016) that were adapted to the field of this study by making necessary adjustments. To measure the items, a 5-point Likert scale ranging from "extremely related" (1) to "extremely not related" (5); and "extremely fitting" (1) to "extremely loose" (5) was used. Clarity was achieved by eliminating ambiguities in the questionnaire.

Data Collection Techniques

A research approval was obtained from the University of Arkansas Institutional Review Board (IRB) (Appendix D). A flier with a link to the survey was then posted on Newswire and social media platforms for 21 days from October 10th to 31st 2023. As a result, the study was open to women who were 18 years of age or older, of any race, as well as pregnant.

Data Analysis and Presentation

The data collected was summarized and analyzed statistically to address the research questions, objectives, and hypotheses of the study utilizing the Statistical Software Package for Social Sciences (SPSS). The quantitative data were analyzed to provide both descriptive and inferential statistics. Data obtained was summarized using descriptive statistics such as mean, standard deviation, frequencies, and percentages. Analysis of variance (ANOVA) was utilized to establish the difference between the means of the collected data of participants in trimesters one

and two, two and three, and one and three. To test hypotheses about group differences, post hoc analysis was also performed.

CHAPTER FOUR

Results

In this chapter, findings on the evaluation of garment fit for pregnant women in their first, second, and third trimesters are presented. This study aimed at determining apparel fit issues encountered by pregnant women in trimester one, two, or three. The focus was to determine whether maternity wear fits differently during pregnancy, whether pregnant women perceive physical changes in maternity wear fit, and what pregnant women focus on when selecting maternity clothing. A survey was used to collect data, which was summarized and analyzed using SPSS (Statistical Package for Social Sciences) to address the research questions, objectives, and hypotheses.

As part of the data summarization process, descriptive statistics such as mean, standard deviation, frequencies, and percentages were also used. To determine if the means of the collected data differed between trimesters one and two, two and three, and one and three, a one-way analysis of variance (ANOVA) was performed. The F ratio was used to compare observed differences with the error term to test hypotheses regarding group differences. Results of the study were classified under the following subtopics: sample characteristics of pregnant women and hypothesis testing.

Hypotheses included:

Hypothesis 1 (H1): Pregnant women's physical changes at the bust, waist, and hips in trimesters one, two, and three influence the need for clothes to accommodate these changes.

Hypothesis 2 (H2): Pregnant women's physical changes in trimesters one, two, and three influence maternity wear fit.

Hypothesis 3 (H3): Pregnant women perceive maternity wear fit according to the body measurement changes.

Hypothesis 4 (H4): Maternity wear fit influences pregnant women's maternity wear purchasing.

Sample Characteristics

In this study, the sample characteristics of the participants were determined because they play a decisive role in defining the physical changes and issues associated with the fit of maternity garments during pregnancy. Participants were recruited through social media platforms such as Facebook and Instagram in September and October. In total, 63 participants took part in the study, but only 56 responses were suitable for analysis. The ages of participants ranged from 18 to 42 years old, with the majority (29%) between 23 and 27 years of age. It was revealed that 63% of the participants were married, 27% single, 5% separated, 4% never married, and 2% divorced. According to trimester distributions, the majority of participants (39%) were in the third trimester, while 23% and 36% were in the first and second trimesters, respectively.

A variety of pregnancies were experienced by the participants: 48% had their first pregnancy, 21% their second, and 30% had their third. In addition, participants represented a diverse range of ethnic backgrounds, with the majority (32%) being White Americans, followed by those of African descent (20%), Caucasians (16%), and Hispanics (9%). Furthermore, pregnant women's educational backgrounds varied, with the majority holding an undergraduate degree (43%), followed by graduates (41%), high school graduates (13%), and others (4%). Table 1 below summarizes the results.

Table 1: Sample Characteristics of Participants (N=56)

	Measurement	**Frequency**	**Frequency percentage**	**Cumulative percentage**
Age	18-22	7	12.5	62.5
	23-27	16	28.6	89.3
	28-32	14	25.0	91.1
	33-37	13	23.2	96.4
	38 +	6	10.7	100.0
Marital status	Married	35	62.5	62.5
	Single	15	26.8	89.3
	Divorced	1	1.8	91.1
	Separated	3	5.4	96.4
	Never married	2	3.6	100.0
Trimester of pregnancy	First (0-13 weeks)	13	23.2	23.2
	Second (14-26 weeks)	21	35.5	55.7
	Third (27-40 weeks)	22	39.3	100.0
Number of pregnancies	First	27	48.2	48.2
	Second	12	21.4	69.6
	Third +	17	30.4	100.0
Ethnicity	Caucasian	9	16.1	16.1
	Black American	6	10.7	26.8
	African	11	19.6	46.4
	White American	18	32.1	78.6
	Hispanic	5	8.9	87.5
	Others	7	12.5	100.0
Level of education	Graduate	23	41.1	41.1
	Undergraduate	24	42.9	83.9
	Highschool	7	12.5	96.4
	Others	2	3.6	100.0

Hypothesis Testing

In this study, four research questions were addressed.

Research question one: Do physical changes at the bust, waist, and hip at trimesters one, two, and three influence the need for clothes to accommodate them?

Hypothesis 1: Pregnant women's physical changes at the bust, waist, and hip in trimesters one, two, and three influence the need for clothing that accommodates them.

This research question examines the effect of physical changes at the bust, waist, and hip during trimesters one, two, and three on the need for clothing that accommodates them. The independent variables were trimester (trimesters one, two, and three), physical changes at the bust, waist, and hip area, while the dependent variable was maternity wear requirement. In the survey, three questions were designed to determine whether physical changes at the bust, waist, and hip in trimesters one, two, and three influenced the need for maternity clothing. An online survey was conducted to determine whether physical changes at the bust, waist, and hip contributed to the need for maternity clothing based on trimester one, trimester two, and trimester three. First, participants were required to indicate on a dichotomous scale (Yes/No) the physical changes they had experienced to date. The respondents were then asked to state if the changes mentioned in the previous question had caused them to look for maternity clothing that could accommodate their changing needs. Lastly, the respondents were asked to identify the types of clothing they were interested in.

Results revealed that most respondents (43%) reported having enlarged busts, waists, and hips when the survey was completed. In addition, 88% of participants sought clothing that could accommodate their physical changes. Unexpectedly, many participants (39%) preferred non-maternity clothing that stretches. The results are presented in Tables 2, 3, and 4 below.

Table 2: Physical Changes experienced so Far (N=56)

	Frequency	Percentage frequency	Cumulative percentage
Enlarged breasts	6	10.7	10.7
Enlarged hips	3	5.4	16.1
All	24	42.9	58.9
None	4	7.1	66.1
Enlarged breasts and hips	4	7.1	73.2
Enlarged breasts and waist	14	25.0	98.2
Enlarged waists and hip	1	1.8	100.0
Total	**56**	**100.0**	

Table 3: Need for Clothing that would Accommodate the Physical Changes (N=56)

	Frequency	Percentage frequency	Cumulative percentage
Yes	49	87.5	87.5
No	7	12.5	100.0
Total	**56**	**100.0**	

Table 4: Types of Clothes Sought for (N=56)

	Frequency	Percentage frequency	Cumulative percentage
Maternity wear	16	28.6	28.6
Non-maternity wear in larger sizes	13	23.2	51.8
Non-maternity wear that stretches	22	39.3	91.1
Others	5	8.9	100.0
Total	**56**	**100.0**	

To test hypothesis one (H1), one-way analysis of variance (ANOVA) was performed to determine whether physical changes in key body areas (bust, waist, hip) affect the need for maternity wear at various trimesters of pregnancy. To test this hypothesis, a question was asked

regarding whether the participants sought out clothes that were suitable for their physical changes. As a categorical variable, the dependent variable, "Need for clothing that accommodates the changes," was coded as "Yes" or "No." The results revealed a statistically significant difference in the need for clothes that accommodates the physical changes between groups (trimesters) as determined by one-way ANOVA, F (2, 53) = F-value (8.281), p = p-value= .001) (Table 5).

To examine specific differences between trimesters, a Turkey post-hoc test was utilized. The results of the post-hoc test revealed that the need for clothes that would accommodate the physical changes was statistically significantly higher in the second (Mean=1.0, p=.004) and third (Mean=1.0. p=.002) trimesters compared to trimester one (Mean=1.3) (Table 6). The results indicate that these physical changes have a significant impact on the need for maternity clothing across the trimesters. However, there was no statistically significant difference in the need for clothes to accommodate the physical changes between the second and third trimesters (p=.100)

Table 5: ANOVA Test results showing the effect of Trimester on the need for Clothing that could Accommodate the Physical Changes (N=56)

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig**
Between Groups	1.458	2	.729	8.281	>.001
Within Groups	4.667	53	.088		
Total	6.125	55			

Table 6: Mean Comparisons between Trimesters using Tukey HSD (p=0.05)

(I) Trimester of pregnancy	(J)Trimester of pregnancy	Mean Difference (I-J)	Std. Error	Sig	Confidence Interval	
					Lower B	Upper B
First	Second	.33	.098	.004	.0959	.5708
	Third	.33	.094	.002	.1068	.5599
Second	First	-.33	.098	.004	-.5708	-.0959
	Third	.00	.100	1.0068	-.2428	.2428
Third	First	-.33	.094	.002	-.5599	-.1068
	Second	.00	.100	1.0068	-.2428	.2428

Research question two: Do the physical changes at the bust, waist, and hips in trimesters one, two, or three influence maternity wear fit?

Hypothesis 2 (H2): Pregnant women's physical changes in trimesters one, two, or three influence maternity wear fit.

This research question and hypothesis investigates whether maternity wear fits differently during the first, second, and third trimesters due to physical changes in the bust, waist, and hips. It was aimed at understanding how changes in the body affect maternity clothing fit and appropriateness. A total of 56 pregnant women in different trimesters of pregnancy contributed information about their body changes and trimester of pregnancy, along with how well their maternity clothes fit. To answer the research question, participants were asked if the physical changes they have experienced so far relate to maternity wear fit. A five-point Likert scale where 1 indicated extremely related and 5 extremely not related was utilized. The results showed that majority of the respondents (50%) perceived that the physical changes at the waist were related to maternity fit, followed by bust (46%), and hips (42%). The results are illustrated in Table 7 below.

Table 7: Perception of the Physical Changes in Relation to Maternity Wear Fit (N=56)

Physical Changes	Measurement	Frequency	Frequency percentage	Cumulative percentage
Enlarged Bust	Extremely related	11	19.6	19.6
	Somewhat related	15	26.8	46.4
	Related	26	46.4	96.4
	Not related	1	1.8	98.2
	Not extremely related	1	1.8	100.0
Enlarged Waist	Extremely related	12	21.4	21.4
	Somewhat related	13	23.2	44.6
	Related	28	50.0	91.1
	Not related	3	5.4	96.4
	Not extremely related	2	3.6	100.0
Enlarged Hips	Extremely related	8	14.3	14.3
	Somewhat related	13	23.2	37.5
	Related	24	42.9	80.4
	Not related	2	3.6	83.9
	Not extremely related	9	16.1	100.0

An analysis of variance (ANOVA) was conducted using hypothesis two (H2) to determine whether physical changes in key areas of the body influence the fit of maternity clothing throughout pregnancy. The one-way ANOVA results showed a statistically significant difference in the perception of physical changes in relation to maternity wear fit between groups (trimesters), bust area F (2, 53) = F-value=4.468, p = p-value=.016 and waist area F (2, 53) = F-value=5.017, p-value=.010. However, there was no statistically significant difference of trimester to the way participants perceived the hips in relation to maternity wear fit (p-value=.086). These findings, therefore, indicate that the perceived fit of maternity wear varies significantly according to pregnancy trimester. To further understand the differences in perceived fit among trimesters, Tukey post hoc analyses were conducted. The post hoc tests revealed that enlarged bust and waist were statistically significantly highly related to maternity wear fit in second (2.19, p=.022), (Mean=2.33, p= .044) and third (2.23, p= .029), (Mean=2.14, p= .009) trimesters respectively

compared to trimester one (Mean=3.0), (Mean=3.2). However, there was no statistically significant difference in the way pregnant women perceived the physical changes in the bust (p= .989), waist (p= .773), and hips (p= .432) between the second and third trimesters. The results are presented in Tables 8 and 9 below.

Table 8: ANOVA Test results showing the influence of Trimester on the Maternity Wear Fit according to Physical Changes (N=56)

		Sum of Squares	**df**	**Mean Squares**	**F**	**Sig**
Bust	Between Groups	6.255	2	3.128	4.468	.016
	Within Groups	37.102	53	.700		
	Total	43.357	55			
Waist	Between Groups	8.889	2	4.445	5.017	.010
	Within Groups	46.950	53	.886		
	Total	55.839	55			
Hips	Between Groups	7.213	2	3.606	2.571	.086
	Within Groups	74.341	53	1.404		
	Total	81.554	55			

Table 9: Mean Comparisons between Trimesters using Tukey HSD (p=0.05)

Physical change	(I) Trimester of pregnancy	(J)Trimester of pregnancy	Mean Difference (I-J)	Std. Error	Sig	Confidence Interval	
						Lower B	Upper B
Bust	First	Second	.81	.30	.022	.0976	1.5215
		Third	.77	.29	.029	.0670	1.4785
	Second	First	-.81	.30	.022	-1.5215	-.0976
		Third	-.04	.26	.989	-.6523	.5787
	Third	First	-.77	.29	.029	-1.485	-.0670
		Second	.04	.26	.989	-.5787	-.6523
Waist	First	Second	.82	.332	.044	.0196	1.6214
		Third	1.02	.329	.009	.2236	1.8114
	Second	First	-.82	.332	.044	-1.6214	-.0196
		Third	.20	.287	.773	-.4954	.8893
	Third	First	-1.01	.329	.009	-1.8114	-.2236
		Second	-.20	.287	.773	-.8893	.4954
Hips	First	Second	.48	.417	.489	-.5280	1.4877
		Third	.93	.414	.073	-.0689	1.9291
	Second	First	-.48	.417	.489	-1.4877	.5280
		Third	.45	.361	.432	-.4210	1.3214
	Third	First	-.93	.414	.073	-1.9291	.0689
		Second	-.45	.361	.432	-1.3214	.4210

Research question three: Do pregnant women perceive maternity wear fit according to the physical changes?

Hypothesis three (H3): Pregnant women perceive maternity wear fit according to the physical changes.

To answer research question three, a question on participants maternity wear fit preference at the bust, waist, and hip was designed. Participants were asked to evaluate each proposed body change on a five-point Likert scale from 1 (extremely fitted) to 5 (not extremely fitted) to determine their maternity wear fit preference. It was found that most respondents preferred maternity wear to be fitted at the waist (41%), bust (39%), and hips (32%) respectively. This was followed by semi-fitted with the bust at 29%, hips 25%, and waist 23%. Unexpectedly,

few participants revealed that they preferred maternity wear to be extremely fitted at the bust (14%), waist (11%), and hips (7%). This suggests that overall, pregnant women perceived maternity wear fit in relation to the physical changes at the bust, waist, and hips differently. The results are illustrated in Table 10 below.

Table 10: Pregnant Women's Maternity Wear Fit Preference at the Bust, Waist, and Hips (N=56)

Physical Changes	Measurement	Frequency	Frequency percentage	Cumulative percentage
Enlarged Bust	Extremely fitted	8	14.3	14.3
	Fitted	22	39.3	53.6
	Semi-fitted	16	28.6	82.1
	Loose	9	16.1	98.2
	Extremely loose	1	1.8	100.0
Enlarged Waist	Extremely fitted	6	10.7	10.7
	Fitted	23	41.1	51.8
	Semi-fitted	13	23.2	75.0
	Loose	10	17.9	92.9
	Extremely loose	4	7.1	100.0
Enlarged Hips	Extremely fitted	4	7.1	7.1
	Fitted	21	37.5	44.6
	Semi-fitted	14	25.0	69.6
	Loose	13	23.2	92.9
	Extremely loose	4	7.1	100.0

Hypothesis H3 was tested using a one-way analysis of variance to determine if pregnant women's preferences for maternity wear fit at the bust, waist, and hip differed during trimesters one, two, or three. Results of the one-way ANOVA showed that there was a statistically significant effect of trimester on pregnant women's preferences for maternity wear fit at the bust and waist, F (2, 53) = F-value=5.008, p = p-value=.020 and waist area F (2, 53) = F-value=5.067, p-value=.015. However, there was no statistically significant difference of trimester to the way participants preferred fit of maternity wear at the hips (p-value=.096). These findings, therefore,

indicate that maternity wear fit preferences in relation to the physical changes varies significantly according to pregnancy trimester.

To further understand the differences in maternity wear fit preferences between trimesters, Tukey post hoc analyses were conducted. The post hoc tests revealed that participants maternity wear fit preference at the bust and waist areas were statistically significantly higher in second (Mean=1.19, p=.032), (Mean=2.33, p= .044) and third (Mean=1.05, p= .039), (Mean=2.14, p= .009) trimesters respectively compared to trimester one (Mean=3.2), (Mean=3.4). However, there was no statistically significant difference in the way pregnant women perceived maternity wear fit in relation to the physical changes in the bust (p= .989), waist (p= .773), and hips (p= .432) between the second and third trimesters. In light of the results, it is evident that the trimester of pregnancy influences how pregnant women perceive the fit of maternity clothing at the bust, waist, and hips. The results are illustrated in Tables 11 and 12 below.

Table 11: ANOVA Test results showing the effect of Trimester on the Maternity Wear Fit Preferences in Relation to Physical Changes (N=56)

		Sum of Squares	**df**	**Mean Squares**	**F**	**Sig**
Bust	Between Groups	7.255	2	4.128	5.008	.020
	Within Groups	38.102	53	.800		
	Total	45.357	55			
Waist	Between Groups	9.889	2	4.505	5.067	.015
	Within Groups	49.950	53	.986		
	Total	55.839	55			
Hips	Between Groups	8.213	2	3.706	2.671	.096
	Within Groups	75.341	53	1.504		
	Total	83.554	55			

Table 12: Mean Comparisons between Trimesters using Tukey HSD (p=0.05)

Physical change	(I) Trimester of pregnancy	(J)Trimester of pregnancy	Mean Difference (I-J)	Std. Error	Sig	Confidence Interval	
						Lower B	Upper B
Bust	First	Second	.81	.30	.032	.0976	1.5215
		Third	.87	.29	.039	.0670	1.4785
	Second	First	-.71	.30	.032	-1.5215	-.0976
		Third	-.04	.26	.989	-.6523	.5787
	Third	First	-.77	.29	.029	-1.485	-.0670
		Second	.04	.26	.989	-.5787	-.6523
Waist	First	Second	.82	.33	.034	.0196	1.6214
		Third	1.02	.33	.010	.2236	1.8114
	Second	First	-.82	.33	.054	-1.6214	-.0196
		Third	.20	.29	.773	-.4954	.8893
	Third	First	-1.01	.33	.009	-1.8114	-.2236
		Second	-.20	.29	.773	-.8893	.4954
Hips	First	Second	.48	.42	.489	-.5280	1.4877
		Third	.93	.41	.073	-.0689	1.9291
	Second	First	-.58	.42	.489	-1.4877	.5280
		Third	.55	.36	.432	-.4210	1.3214
	Third	First	-.93	.41	.073	-1.9291	.0689
		Second	-.55	.36	.432	-1.3214	.4210

Research question four: Does maternity wear fit influence maternity wear purchase?

Hypothesis four (H4): Maternity wear fit influences pregnant women's maternity wear purchasing.

To answer research question four, a question that outlined different factors that influence maternity wear purchase was designed. Participants were asked to use a dichotomous scale code as "Yes" = 1 and "No" = 2 to indicate whether maternity wear fit influenced their maternity clothing purchasing. Among the 56 participants, a significant majority (70%) answered "yes," indicating that maternity wear fit influences their purchasing decisions. Only a minority (30%) responded "no.". The results are shown in table 13 below.

Table 13: The influence of Maternity Wear Fit on Maternity Clothing Purchasing (N=56)

	Frequency	**Percentage frequency**	**Cumulative percentage**
Yes	39	69.6	69.6
No	17	30.4	100
Total	**56**	**100.0**	

To test hypothesis four (H4), one-way ANOVA was conducted. The purpose of this analysis was to determine whether a statistically significant difference exists between trimesters of pregnancy and the influence of maternity wear fit on purchasing decision. The one-way ANOVA results indicated that the influence of maternity wear fit on purchase decisions differed statistically across trimesters, F (2, 53) = F-value (11.131), p= p-value = .001 (Table 14). To identify which trimesters displayed significant differences in maternity wear fit influence on purchasing, post-hoc multiple comparison tests, specifically Tukey's Honestly Significant Difference (HSD) tests, were conducted. The results of the post-hoc test revealed that the influence of maternity wear fit on purchasing was statistically significantly higher in the second (Mean=1.89, p=.005) and third (Mean=1.05. p=.001) trimesters compared to trimester one (Mean=1.61) (Table 15). However, there was no statistically significant difference in the maternity wear fit influence on purchasing between the second and third trimesters (p=.136). There is evidence that the trimester of pregnancy influences how women prioritize fit when making purchase decisions.

Table 14: ANOVA Test results showing the effect of Trimester on the influence of Maternity Wear Fit on Purchase(N=56)

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig**
Between Groups	10.410	2	5.205	3.381	.041
Within Groups	81.590	53	1.539		
Total	92.00	55			

Table 15: Mean Comparisons between Trimesters using Tukey HSD (p=0.05)

(I) Trimester of pregnancy	(J)Trimester of pregnancy	Mean Difference (I-J)	Std. Error	Sig	Confidence Interval	
					Lower B	Upper B
First	Second	.43	.132	.005	.1142	.7489
	Third	.57	.126	>.001	.2636	.8692
Second	First	-.43	.132	.005	-.7489	-.1142
	Third	.13	.135	.579	-.1896	4594
Third	First	-.57	126	>.001	.8692	-.2636
	Second	-.13	.135	.579	-.4594	.1896

CHAPTER FIVE

Conclusions

Discussions and Implication

Pregnancy experience is one of the most life-changing and dynamic phases of a person's life (Abdukhashimovna, 2022). Medically, the body of a pregnant woman undergoes significant changes during pregnancy, particularly during the first, second, and third trimesters. This time of transition calls for a reevaluation of clothing needs, particularly maternity wear. To meet the unique needs of pregnant women, it is essential to understand how garment fit, and related perceptions and preferences change during pregnancy. This study examined pregnant women's garment fit perceptions during trimesters one, two, or three with a specific focus on the need for clothes that accommodate physical changes, perceptions of maternity wear fit in relation to these changes, preferences for fit based on physical changes, and influence of maternity wear fit on purchasing decisions. By using a one-way analysis of variance, this study examined whether there were statistically significant differences between these groups during pregnancy to gain insight into pregnant women's changing expectations**.** The findings of this study confirmed the expected outcomes, thus increasing the foundational information needed in this limited research area.

The study findings on the sample characteristics of the participants revealed that most participants were aged between 23 and 27 years, married, in the third trimester, and in their first pregnancy. Additionally, participants represented a diverse range of ethnic backgrounds with majority being white Americans. Regarding the education levels, most of the respondents were holders of an undergraduate degree. According to the study's findings, the focus of these age groups is on finding the perfect fit and latest styles when choosing maternity wear. In accordance

with the existing literature, younger pregnant women have different expectations and preferences when it comes to style and fashion than older pregnant women (Weigle & McAndrews, 2021). Similarly, marital status can also affect the need for and perception of maternity clothing. The results suggests that women who are married have different social expectations regarding clothing than women who are single or divorced. In line with the existing literature, Lapolla and Chen (2022) found that married pregnant women's preferences in maternity wear reflect their status as married women and their social responsibilities. Also, the results regarding trimester of pregnancy suggest that women's clothing needs in the later trimesters may differ from those in the earlier stages.

Additionally, the fact that most women were in their first pregnancy implies that their needs and perceptions of clothing will differ because of experiencing physical changes for the first time. The results are consistent with the literature that demonstrate that body changes and previous maternity wear experiences influence preferences (Abdukhashimovna, 2022). Furthermore, the ethnicity of the participants can contribute to understanding potential cultural differences in preferences for clothing fit during pregnancy. Also, education may influence participants' clothing choices, such as highly educated individuals who might be more concerned with style and comfort.

Regarding the need to adapt clothes to accommodate physical changes, the results indicated that most women had experienced changes at the waist, hips, and bust, and sought clothing that would accommodate these changes. As well, statistically significant differences were observed among pregnant women in trimesters one, two, and three about the need for clothing that can accommodate physical changes. More specifically, in trimesters two and three, there was a greater need for clothing to accommodate changes than in trimester one. Based on

the results of this study, it appears that the need for such clothing increases as pregnancy progresses, since waistlines expand, bust sizes change, and hips are repositioned. Consistent with the existing literature, the need for maternity clothing among pregnant women increases from trimesters two and three (Noopur, 2012; Ogle et al., 2013; Sohn & Bye (2015). This implies that the necessity for clothing that adapts to physical changes increases as pregnancy progresses, revealing the influence of these changes on the fit of the clothes in use at that moment. Thus, understanding the relationship between trimester-specific physical changes and the need for maternity wear is valuable for the maternity clothing industry and healthcare providers. As a result of this information, clothing lines and support can be developed that are tailored to the needs of pregnant women at different stages of pregnancy. Thus, this analysis indicates that the size of the breasts, waist, and hips during pregnancy significantly influences the need for maternity clothing. It is important to consider pregnancy-specific clothing needs during each trimester.

According to the study, pregnant women perceive physical changes in their bust, waist, and hips because of the fit of their maternity wear. In this study, it was confirmed that physical changes at the bust, waist, and hips significantly influence the perception of maternity wear fit. In addition, the study identified significant disparities in maternity wear fit perception across trimesters in relation to physical changes. In particular, enlarged busts and waists were strongly associated with maternity wear fit during the second and third trimesters in comparison to the first trimester. The increase in perceived maternity wear fit in relation to physical changes occurs as pregnancy progresses due to expectant mothers' increased interest in how maternity wear complements their changing bodies. Shamsaei et al (2022) demonstrates that pregnant women experience different views regarding their body shape and how clothes should fit as the

pregnancy progresses through the different stages. This illustrates the subjective nature of garment fit during pregnancy as well as the importance of adaptable clothing options. In conclusion, this study shows that physical changes during pregnancy have a significant impact on the perceived fit of maternity wear. It is important to consider trimester-specific clothing needs and adaptability when designing and selecting maternity clothing.

The results also revealed that pregnant women perceived maternity wear fit according to their physical changes. Fit perception for maternity wear differed at the bust, waist, and hip. Additionally, these perceptions differed from trimester to trimester. For example, pregnant women's maternity wear fit perceptions in the bust and waist areas were higher during the second and third trimester compared with the first trimester. Pregnant women preferred to have their clothes fitted at the bust and waist during the second and third trimesters. Based on these findings, maternity wear fit perceptions differ significantly by trimester in according to physical changes. Pregnant women's preferences for the fit of maternity wear are influenced significantly by changes in their bodies during pregnancy. The findings of this study indicate that pregnant women differ in their preferences for maternity wear fitting based on the area of their body that is most affected by pregnancy. This study, therefore, emphasizes the importance of considering trimester-specific clothing needs as well as adaptability when designing and selecting maternity clothing.

Furthermore, the results revealed that the fit of maternity wear influenced maternity wear purchase. Those who responded positively explained that they prioritize fitness to feel comfortable, have a smaller body image, and appear fashionable. This study also indicates that maternity wear fit has a statistically significant influence on purchases in different trimesters. The influence of maternity wear fit on maternity wear purchase varies according to the trimester.

In particular, it was found that maternity wear fit influences purchasing more in the second and third trimesters than trimester one. Based on the results of our study, it is evident that the fit of maternity clothing influences the purchase of maternity clothing in a significant manner. There is no doubt that fit impacts purchasing behaviors in different ways throughout pregnancy. For this reason, it is crucial to understand these shifts in order to design effective marketing strategies and products. Purchasing a well-fitting garment plays an important role in enhancing expectant mothers' overall satisfaction. The findings of this study have significant implications for the development and marketing of maternity wear, emphasizing the importance of valuing fit during the product development process and marketing.

Limitations and Recommendations

Time was one of the limitations of this study. Considering that the study was conducted over a limited period, it is possible that long-term changes in garment fit perception were not captured. Also, by using an online survey, the sample and population were limited to members of a social media group.

For recommendations, further research may focus on additional factors affecting maternity wear fit, such as garment designs, materials, and individual preferences, in order to obtain a more comprehensive understanding of maternity clothing requirements. In addition, fashion retailers and designers should consider creating maternity clothing that caters specifically to the fit and comfort needs of pregnant women at different stages of their pregnancy. As a result, trimester-specific lines could be produced or features that can be adjusted to accommodate changes in the shape of the body could be offered. The development of educational resources and materials for pregnant women would also be beneficial to help them understand how their bodies change during

pregnancy and how to choose clothing that is comfortable and fits. The distribution of these materials can take place through healthcare providers, websites, or social media channels.

References

Abdukhashimovna, V. U. (2022). Analysis of constructively decorative clothing solutions for pregnant women. *In Conference Zone* (pp. 255-258).

Ary, D., Jacobs, L. C., & Walker, D. A. (2019). *Introduction to Research in Education* (10th ed.). Boston: Cengage.

Ashdown, S. P. (2007). Sizing in clothing: Developing effective sizing systems for ready-to-wear clothing. England: Woodhead Publishing Limited.

Balasubramanian, M., Petrova, A., & Robinette, K. (2013). Anthropometric dynamics of pregnancy and their implications on apparel sizing. *4th International Conference and Exhibition on 3D Body Scanning Technologies,* Long Beach LA, USA. https://doi.org/10.15221/13.439.

Balasubramanian, M., & Robinette, K. (2018). A Predictive model estimating anthropometric measurement changes in pregnant women. *International Textile and Apparel Association Conference* (ITAA), Cleveland, Ohio, USA

Balasubramanian, M., & Robinette, K. (2020). Longitudinal anthropometric changes of pregnant women: Dynamics and prediction. *International Journal of Fashion Design, Technology and Education, 13*(3), pp 231–237. DOI: 10.1080/17543266.2020.1775898

Barasa, N. (2016). Views on physiological and psychological changes and their influence on maternity wear selection among women attending ante-natal clinic at Kenyatta National Hospital. Kenyatta University, Nairobi, Kenya. https://ir-library.ku.ac.ke/

Barasa, N. (2020). Dress features suitable for provision of smart maternity wear. *International Journal of Innovative Research and Development*.

Bernard, K. (2018), Millennial moms-to-be don't hide the bump, New York Times, available at: https://www.nytimes.com/2018/01/31/fashion/maternity-fashion-millennial-pregnancyhatch.html.

Cha, S. J. (2019). A Study on maternity design preference using Q methodology. *Journal of the Korean Society of Clothing and Textiles,* 742~752.

Cieśla, K., Frydrych, I., Krzywinski, S., & Kyosev, Y. (2020). Development workflow for virtual design of clothing for pregnant women. *Journal of Communications in Development and Assembling of Textile Products, 1*(2), pp148-1591(2). https://doi.org/10.25367/cdatp.2020

Coury, N. L. (2015). Consumer perceptions of apparel fit satisfaction and sizing based upon 3D body scanning and block garment assessment. *Scholarlyworks@UARK*.

Daanen, H. A., & Psikuta, A. (2018). 3D body scanning. In V. U. Amsterdam, & E. Swiss , Automation in Garment Manufacturing (pp. 237-252). St. Gallen, Switzerland: Elsevier Ltd.

Enes, E. (2013). Research on pregnant women's clothing shopping behaviors and suggestion of a sample model. *Journal of Textiles and Engineer*, pp 16-26.

Faust, M.-E. (2013). Designing for Pregnant Women. *Proceedings of the 4th International Conference on 3D Body Scanning Technologies,* Long Beach CA, USA, 19-20 November 2013. https://doi.org/10.15221/13.401.

HeeKyoung, O., & Oh, H. (2018). A Survey into maternity purchase and satisfaction according to Trimester of Pregnancy. *Journal of the Korean Society of Clothing and Textiles*, .pp 237-250.

Hurst, N. (2013, February 27th). Retailers should re-size maternity wear for women throughout their pregnancies, study finds. Retrieved from ttps://munewsarchives.missouri.edu/news-releases/2013/0227.

Jang, H.-C., & Park, S.-K. (2015). A Study on the one-piece dress design wearable during pregnancy and postnatal period. *The Research Journal of the Costume Culture*, pp 337-352.

Jaiswal, A. (2022). Smart motherhood wear: A solution to the problem of maternity wear. *International Journal of Home Science*, pp 278–281. www.homesciencejournal.com.

Kendra, L., & Chanjuan, C. (2022). Navigating maternity fashion: Reflections of US consumer attitudes during pregnancy. *Fashion, Style and Popular Culture*, pp 103-114.

Kılıç, A., Tama, D., & Öndoğan, Z. (2014). Clothing Problems with Maternity Garments. *13th International Izmir Textile and Apparel Symposium*, Turkey.

Kim, D.-E. (2015). Analysis of body shape and anthropometric measurements of US middle-aged women using 3D body scan data. *The Research Journal of the Costume Culture*, pp.726-736.

Komarkova, P., & Glombikova, V. (2013). Approach to pattern designing of maternity wear. Liberec: Technical University.

Krause, A. (2019). 20 photos that show how maternity fashion has changed over the years. Retrieved from https://www.insider.com/how-maternity-fashion-has-changed-2019-3.

Krisjanous, J., Allayarova, N., & Kadirov, D. (2020). Clothing of righteousness: exploring tensions of halal maternity wear on online apparel websites. *Journal of Islamic Marketing*, pp 1759-0833.

Lapolla, K., & Chen, C. (2022). Navigating maternity fashion: Reflections of US consumer attitudes during pregnancy. *Fashion, Style & Popular Culture*, *9*(1-2), 103-114.

Lu, Y., Song, G., & Li, J. (2014). A novel approach for fit analysis of thermal protective clothing using three-dimensional body scanning. *Applied Ergonomics*, pp 1439-1446.

Maternity Wear Market Size (2019), Maternity wear market size, share and trends analysis report by product (outerwear, innerwear, nightwear), by distribution channel (store-based, online), by region, and segment forecasts, 2019 – 2025, Grand View Research, available at: https://www. grandviewresearch.com/industry-analysis/maternity-wear-market.

Mayoh, J. (2019). Perfect pregnancy? Pregnant bodies, digital leisure, and the. *Leisure Studies Journal*, pp 204-217.

Miller-Spillman, K. A., & Reilly, A. (2019). The Meanings of dress. London: Bloomsbury Publishing Plc

Noopur, A. (2012). Smart maternity wear-an answer tolongevity problem of maternity. *Journal of Textile and Apparel, Technology and Management*, pp 1-3. from www.ojs.cnr.ncsu.edu.

Ogle, J. P., Tyner, K. E., & Tomschin, S. S. (2013). The role of maternity dress consumption in shaping the self and identity during the liminal transition of pregnancy. *Journal of Consumer Culture*, pp 119–139.

Oh, H., & Heesun , O. (2018). A Survey into maternity purchase and satisfaction according to Trimester of Pregnancy. *Journal of the Korean Society of Clothing and Textiles*, pp 237~250.

Oluwaleyimu,, O. O. (2022). Determining the functional apparel design requirements of pregnant women. Lagos: University of Lagos.

Phasha, M. (2017). Evaluating garment sizing and fit for petite women using 3D body scanned anthropometric data. University Of South Africa, Florida Campus. https://core.ac.uk/download/pdf/158576961.pdf

Priporas, C., Stylos, N. and Fotiadis, A. (2017), "Generation Z consumers' expectations of interactions in smart retailing: a future agenda", *Computers in Human Behavior, Vol. 77*, pp. 374-381

Rodriguez, C. Q., Anisimova, A., Ryan, D., & Troynikov, A. (2017). Critical design aspects of maternity support garments and their contemporary perspective. I*nternational Conference on Design and Technology* (pp. 91-97). KEG: Knowledge E.

Rodriguez, C. Q. (2019). Maternity support garments for improved comfort during pregnancy (Doctoral dissertation, RMIT University).

Saniya, A., & Maheshwari, V. (2021). A Study on durable maternity wear fashion. *Journal of Emerging Technologies and Innovative Research*, pp 961-965.

Sarkar, J., & Rasel, S. (2017, March 25). *Researchgate*. Retrieved from Textile focus.com: http://textilefocus.com/Maternity-Clothing-Comprehensive-Review.

Shamsaei, A., Kazemi, A., Enteshary-Najafabadi, H., & Borujeni, N. K. (2022). Essential criteria for designing healthy maternity wear: A narrative review. *Iranian Journal of Nursing and Midwifery Research*, *27*(6), 492.

Sohn, M., & Bye, E. (2015). Pregnancy and body image*:* Analysis of clothing functions of maternity wear. *Clothing and Textile Research Journal*, *33*(1), pp 64–78. https://doi.org/10.1177/0887302X14557809.

Sohn, M., & Bye, E. (2012). Visual analysis of body shape changes during pregnancy. *International Journal of Fashion Design, Technology and Education*, *5*(2), 117-128.

Sultana, S., & Tabraz, M. (2017, November). 'A critical analysis of the satisfaction level of maternity wear for Bangladesh women. *Journal of Research and Method in Education*, pp 47-60.

Takehara, K., Kato, S., Sasaki, A., Chik Jwa, S., Kakee, N., Sago, H., . . . Ishii, Y. (2015). Efficacy of advice from healthcare professionals to pregnant women on avoiding constrictive clothing around the trunk: a study protocol for a randomized controlled trial. *Bio-medical Journal* (BMJ).

Tiggemann, M. and Anderberg, I. (2020), "Social media is not real: the effect of 'Instagram vs reality' images on women's social comparison and body image", *New Media and Society*, *Vol. 22* No. 12, pp. 2183-2199.

Watson, B., Broadbent, J., Skouteris, H., & Fuller-Tyszkiewicz, M. (2016). A qualitative exploration of body image experiences of women progressing through pregnancy. Women and Birth, pp 72-79.

Weigle, E. A., & McAndrews, L. (2021). The future of maternity wear: Generation Z's expectations of dressing for pregnancy. *Journal of Fashion Marketing and Management*, pp 1361-2026.

Yadav, A., & Chanana, B. (2021). Maternity Wear Practices of Rural and Peri-Urban Women: An Assessment of Knowledge and Attitudes. *International Journal of Management*, *12*(1), pp 358–366. https://doi.org/10.34218/IJM.12.1.2021.030.

Appendices

Appendix A: Informed Consent

Title: Evaluating Garment Fit for Pregnant Women using 3D Body Scanning

Investigator(s):

Laurie M. Apple, Ph.D.
Associate Professor
University of Arkansas
School of Human Environmental Sciences
HOEC 118
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Purpose and Evaluation: The purpose of the study is whether physical body changes during pregnancy affect maternity wear fit, whether pregnant women perceive maternity wear fit according to the physical changes, and whether maternity wear fit influences maternity wear purchasing.

Instruments: Participants are asked to complete the survey regarding changes in their body and perceptions of maternity wear fit based on the changes. They are also asked to participate in a body scan using the Vitus 3D full-body scanner. The estimated time for completing 10-20 minutes.

Expectations: Each participant will be invited to participate in the research study. Included in the study is a body scan using the Vitus 3D full body scanner. The scanner is an enclosed booth using 4 laser sensors. Participants will be asked to wear tight-fitting clothing i.e. swimsuit, yoga pants, leggings, bike shorts, tank tops or sports bras. The participant will enter the scanning booth, standing in a specific pose and completely still for 3 seconds. Once the scan is completed, the participant will be asked to exit the booth and complete the questionnaire.

Benefits and Risks: The benefits include contribution to knowledge of how a pregnant woman's shape changes and how the perception of apparel fit changes during pregnancy. There is minimal risk associated with this project. The body scanner uses 4 laser sensors to capture the body measurements. This scanner is less invasive than an airport body scan.

Location: The study will take place at the Home Economics Building, Room 023, on the University of Arkansas Fayetteville campus. Parking instructions will be emailed to participants prior to their scheduled date.

Date: The desired dates for scanning will be September – October 2023.

Voluntary Participation/Right to Withdraw: Your participation is completely voluntary and refusing to volunteer will not adversely affect any relationship with the university or research. You may discontinue participation at any time without penalty. To participate in this research study, you must be at least 18 years old, and are currently pregnant.

Confidentiality: All information will be kept confidential to the extent allowed by law and University policy. Your survey and body scan will be coded so no personal information will be attached. Results from the study will be reported as group measures.

If you have any questions or concerns about the research please contact, Zipporah Barasa, principal researcher at nbarasa@uark.edu . Or contact, Laurie Apple, faculty supervisor 479-575-4576 or lapple@uark.edu If you have questions or concerns as your rights as a research participant please contact, Ro Windwalker, the University's IRB coordinator 479-575-2208 or irb@uark.edu

I have read the consent information and was able to ask questions and share any concerns with the investigator, who answered everything to my satisfaction. I understand why the study is being done, and the possible benefits and risks that are involved. I understand that participation is voluntary. I know that any important new findings developed during this research will be shared with the participant. I understand that no rights are being waived by signing the consent form. I have been given a copy of the consent form.

_____ _____

Print Name *Date*

_____

Signature

Appendix B: Participants Recruitment Flier

PREGNANT WOMEN NEEDED FOR AN APPAREL FIT RESEARCH PROJECT!

Apparel Size, Comfort, Style, and Fit Satisfaction Research Study

We would like to invite you to participate in a study conducted by researchers from the University of Arkansas.

- This study will **help us determine how satisfied pregnant women are with the fit, size, comfort, and style of maternity wear during their 1st, 2nd, or 3rd trimester,** and how the industry can improve the size and fit based on participants' responses.
- A survey will be administered for perceptions of fit and then the participant will be body scanned using the Vitus 3D Body Scanner **(a quick and non-invasive digital measurement device (shown below).**
- **Results from the study will be reported as group measures.** Data will be coded for confidentiality and kept in a secure location for a minimum of 3 years per state and federal regulations.
- The study will take place at the Home Economics Building, Room 023 on the **University of Arkansas Fayetteville** campus during the months of **September and October 2023.**

Project participation is in two Parts: Digital Survey & Body Scanning

For Accurate measurements, participants must wear fitted clothing: swimsuit, yoga pants, leggings, shorts, tank top or athletic top, etc.

ALL information will be coded for CONFIDENTIALITY

UNIVERSITY OF ARKANSAS
Dale Bumpers College of Agricultural, Food & Life Sciences
School of Human Environmental Sciences

TO PARTICIPATE,
Please Contact
Dr. Laurie Apple
(479) 575-4576
lapple@uark.edu OR

Zipporah Barasa
nbarasa@uark.edu

NEWSWIRE SUBMISSION

Pregnant women Needed for an apparel fit research project!

We would like to invite you to participate in a study conducted by researchers from the University of Arkansas.

- This study will help us **determine how satisfied pregnant women are with the fit, size, comfort, and style of maternity wear during their 1st, 2nd, or 3rd trimester**, and how the industry can improve the size and fit based on participants' responses.
- A survey will be administered for perceptions of fit and then the participant will be body scanned using the Vitus 3D Body Scanner (**a quick and non-invasive digital measurement device (shown below**).
- **Results from the study will be reported as group measures**. Data will be coded for confidentiality and kept in a secure location for a minimum of 3 years per state and federal regulations.
- The study will take place at the Home Economics Building, Room 023 on the **University of Arkansas Fayetteville** campus during the months of **September and October 2023**.
- **Please contact Dr. Laurie Apple**, **lapple@uark.edu or Zipporah Barasa, nbarasa@uark.edu to be considered for the projec**t.

INITIAL EMAIL TO PARTICIPANTS IN RESPONSE TO THE RECRUITMENT FLYERS

Dear Participant,

Thank you for agreeing to participate in the Apparel Size, Comfort, Style, and Fit Satisfaction Research Study for Pregnant Women. The researchers will be body scanning and collecting questionnaire data on Fridays in September and October of 2023. Please indicate below the desired date and time for participation. Once your date is confirmed, we will send the appropriate parking instructions and maps to the Home Economics Building and room location on the University of Arkansas campus.

For accurate measurements, please wear fitted clothing such as a swimsuit, yoga pants, leggings, tank top or athletic top or a sports bra. If you have any questions or concerns, please do not hesitate to contact either Zipporah Barasa (nbarasa@uark.edu) or Dr. Laurie Apple (lapple@uark.edu).

Dates: September 8; September 15; September 22 and September 29; October 6, October 13, October 20 and October 27.

Times for each date: 10:00 – 10:30 am

10:30 – 11:00 am

11:00 – 11:30 am

1:00 – 1:30 pm

1:30 – 2:00 pm

2:00 – 2:30 pm

Thank you,

Zipporah Barasa and Dr. Laurie Apple

Appendix C: Survey Instrument to Evaluate the Garment Fit Perceptions of Pregnant Women in Trimesters One, Two, or Three.

1. Please indicate your age

2. Please indicate your marital status.
    - Married.
    - Single.
    - Divorced.
    - Separated.
    - Never married.
3. Please indicate your period of pregnancy.
    - Trimester one (between 1 - 12 weeks).
    - Trimester two (between 13 - 20 weeks).
    - Trimester three (between 21 - 40 weeks).
4. Please indicate your ethnicity.
    - Caucasian
    - Black American
    - African
    - Asian
    - Hispanic
    - Other, please specify.
5. Please indicate your level of education.

- Graduate
- Undergraduate
- High School
- Other, please specify. ☐

6. Have you started wearing maternity wear?

YES	1	NO	2

7. If **YES**, at what stage did you begin wearing maternity wear?
    - 6-8 Weeks
    - 9-11 Weeks
    - 12-14 Weeks
    - 15-17 Weeks
    - 18-20 Weeks
    - 21-23 Weeks
    - 24-26 Weeks
    - 27-29 Weeks
    - 30-32 Weeks
    - 33-35 Weeks
    - 36-38 Weeks
    - 38-40 Weeks
8. If **YES,** please indicate what area (s) determined you needed maternity wear?
    - Bust Area
    - Waist Area
    - Hip Area
    - Other, please specify……
9. If no, do you anticipate wearing maternity wear?
    - Yes
    - No
10. Please indicate the physical changes you have experienced so far in your pregnancy.

	Yes	**No**
Enlarged breasts.	○	○
Enlarged waist.	○	○
Enlarged hips.	○	○

11. By referencing to the changes mentioned in question 4 above, did the changes cause you to look for other clothing that could accommodate the changes?
    - Yes
    - No

12. If yes, please indicate the type of clothing you sought for, giving a reason why you chose the type of clothing.
    - o Maternity wear ☐
    - o Non-maternity wear in larger sizes. ☐
    - o Non-maternity wear that stretched. ☐
    - o Other, please specify. ☐
13. If not, indicate which reason could have made you not seek other clothing.
    - o I can still fit in my non-maternity clothing.
    - o I will use my non-maternity clothing in larger size.
    - o I can still use my non-maternity clothing that stretches to accommodate the changes.
    - o Maternity clothing makes me look larger.
    - o Other, ☐

A. Perception of maternity wear fit according to the body measurement changes.

The following question relates to your perception of maternity wear fit according to the body measurement changes.

14. On a scale of 1 to 5, where 1 is extremely related and 5 is extremely not related, please indicate whether the following body changes are related to the fit of maternity wear.

Physical Body Changes	1 Extremely Related	2 Somewhat Related	3 Related	4 Not Related	5 Extremely Not Related
Enlarged breasts					
Enlarged waist					
Enlarged hips					

15. Do you have concerns with maternity clothing that is currently available on the market? Please tick the relevant number.

YES	1	NO	2

16. If YES, please specify your concerns by ticking the relevant number. Give a brief explanation if you have indicated a problem.

	1 No problem	2 Too loose	3 Too loose
○ Dresses bust	☐	☐	☐
○ Dresses waist	☐	☐	☐
○ Dresses hip	☐	☐	☐
○ Skirts waist	☐	☐	☐
○ Skirts hip	☐	☐	☐
○ Shirts bust	☐	☐	☐
○ Shirts waist	☐	☐	☐
○ Pants waist	☐	☐	☐
○ Pants hip	☐	☐	☐

17. The following are related to your preference of fit for each body area. On a scale of 1 to 5, where 1 is extremely fitting and 5 is extremely loose, please indicate how you would like the fit of maternity wear to be at each body part.

Physical Body Changes	1 Extremely fitting	2 fitting	3 Semi-fitting	4 loose	5 Extremely loose
Bust area					
Waist area					
Hip area					

18. Which factors do you consider to be a priority when purchasing maternity wear? Please rank order from 1 to 5 from the most important (1) to the least critical (5).

Options	**Your ratings (in order of preferences from 1-5)**
Fit	
Style/Design	
Price	
Size	
Appearance	

19. Explain why you rated your options in (12) above in this order.

Appendix D: IRB Approval

UNIVERSITY OF ARKANSAS

To:	Laurie M Apple
From:	Douglas J Adams, Chair IRB Expedited Review
Date:	08/16/2023
Action:	**Expedited Approval**
Action Date:	08/16/2023
Protocol #:	2302453687
Study Title:	Evaluating Garment Fit for Pregnant Women using 3D Body Scanning
Expiration Date:	07/05/2024
Last Approval Date:	

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

Adverse Events: Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Nelima Zipporah Barasa, Investigator

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