

**UNDERSTANDING PREGNANCY INTENTION IN THE SOUTHERN
AFRICAN SETTING: VALIDATION OF THE LONDON MEASURE
OF UNPLANNED PREGNANCY IN THE CAPE TOWN AREA,
SOUTH AFRICA**

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ABSTRACT

Developed in the United Kingdom in 2002, the London Measure of Unplanned Pregnancy (LMUP) is a psychometrically valid measure of pregnancy intention. The LMUP has since been validated in numerous settings around the world, including a range of high-, middle-, and low-income countries. The aim of the LMUP is to accurately measure women's pregnancy planning and desires using a contemporary interpretation of pregnancy intention. The LMUP is a retrospective measure of pregnancy intention, designed to be administered to already pregnant women or women who have recently given birth. The measure can be used for any pregnancy, irrespective of its outcome (i.e. birth, miscarriage, or termination of pregnancy). Unlike traditional measures, which dichotomise pregnancy intention into intended or unintended pregnancies, the LMUP evaluates pregnancy intention on a continuous scale; this novel method aims to capture the full range of women's desires and feelings with respect to their pregnancy intentions and thus, reduces misclassification. Additionally, the LMUP aims to capture cultural factors that influence pregnancy intentions as well as acknowledges the various cognitive processes and contextual, behavioral, and emotional factors that influence women's pregnancy desires and planning. This contemporary conceptualisation of pregnancy intention has the potential to accurately measure the wide range of women's pregnancy intentions.

Although South Africa has the highest rate of contraception use in sub-Saharan Africa, the majority of pregnancies are reported as unintended. This indicates an unmet need in family planning services as well as a need to better understand women's pregnancy intentions in the South African context. As current measures of pregnancy intention in South Africa dichotomise pregnancy intention into intended or unintended pregnancies and fail to consider the complex cognitive processes and cultural contexts which influence reproductive health behaviors, there is a need to reevaluate the use of the current measurement tool. This dissertation aims to validate the LMUP in two official South African languages, Xhosa and Afrikaans, for use in South Africa. The objective of the validation is to produce a

valid and reliable pregnancy intention tool that will more accurately measure prevalence of pregnancy intention at the population level in South Africa. In addition, this tool has the potential to be used in the monitoring and evaluation of family planning interventions, pre-conception and pregnancy planning care, and ante/post-natal care.

Part A of this dissertation is a research proposal submitted for the validation of the LMUP in Xhosa and Afrikaans. The protocol proposes the standard, recognised procedure used to translate the LMUP into other languages and validate the translation of the original English version of the LMUP. The objective of the translation process is to find the most accurate translation of the LMUP concepts in Xhosa and Afrikaans. In addition, the protocol proposes a field test of the LMUP, in which 150 women will be initially tested with at least a 50 per cent follow-up one to two weeks later, for each language. The protocol proposes to analysis of the reliability and validity of the measure using Classical Test Theory, including use of principal component analysis and hypothesis testing. Additionally, the possible benefits, harms and ethical issues caused by this research are considered.

Part B of this dissertation is an in-depth review of the literature around pregnancy intention and associated economic, social, and health repercussions of unintended pregnancies. This literature aims to explain the burden of unintended pregnancies globally and more specifically, in the context of South Africa. Literature on the consequences of unintended pregnancy are investigated. In addition, conventional measures of pregnancy intention are reviewed and the need for a contemporary measurement of pregnancy intention is justified. The literature review is 4,250 words and includes 85 important articles in the field of pregnancy intention, family planning, and women's health.

Part C of this dissertation is a research article written in the format of submitting to the Bio Medical

Central Reproductive Health journal. The research article is comprised of four sections: background, methods, analysis, and discussion. This research article uses principal component analysis to determine how each item performs on the LMUP, as well as analyses the reliability and validity of the LMUP using a weighted Kappa and Chronbach's alpha, respectively. Hypothesis testing was conducted using the Mann-Whitney U test for two categories or the Kruskal Wallis test for more than two categories. Lastly, the results of the validation were compiled to discuss the success of the validation as well as possible implications of the LMUP in South Africa.

Part D of this dissertation includes appendices for Section A, B, and C. It also includes the study approval letter from the University of Cape Town's Human Research Ethics Committee and site approval letters from the Western Cape Health Department. Additionally, copies of the Informed LMUP in Xhosa and Afrikaans are included as well as journal submission guidelines and the turnitin report. As University of Cape Town requires turnitin reports to be under 20 megabytes, tables, graphs, and pictures were removed from the report. Additionally, the following three reports were run separately:

1. Protocol and Literature review
2. Journal Article
3. Appendices

LIST OF ACRONYMS AND ABBREVIATIONS

CHC	Community Health Center
CTOP	Choice on Termination of Pregnancy Act
DHS	Demographic Health Survey
HIV	Human immunodeficiency virus
IPV	Intimate-partner violence
LARC	Long-acting reversible contraceptives
LMUP	London Measure of Unplanned Pregnancy
PCA	Principal component analysis
STD	Sexually transmitted disease
TOP	Termination of pregnancy
UK	United Kingdom

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PLAGIARISM DECLARATION

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PART A:

PROJECT PROPOSAL

Understanding pregnancy intention in the Southern African setting: validation of the London measure of unplanned pregnancy in the Cape Town area, South Africa

I. INTRODUCTION

Every year there are an estimated 74 million unintended pregnancies in the developing world from lack of contraception use or method failure [1]. Of these unintended pregnancies approximately 36 million result in termination of pregnancy, 28 million in live births, eight million in miscarriages and nearly one million in stillbirths [1]. An unintended pregnancy is traditionally defined as a pregnancy that is unplanned, mistimed, or unwanted. A large proportion of these unintended pregnancies are attributable to the fact that nearly 225 million women living in the developing world have an unmet need for modern contraceptive methods; these include male and female condoms, hormonal pills, and long-acting reversible contraceptives, such as intra-uterine devices (IUDs), hormonal implants and injectable methods [1].

Although all pregnancies expose women to health risks, unintended pregnancies are associated with an increased morbidity and mortality for both mother and child [2-6]. These risks are amplified in developing countries, where nearly 50 per cent of women do not have access to the quality of ante-natal care needed to carry out a healthy pregnancy [1]. In 2012, there were an estimated 290,000 pregnancy-related deaths amongst women living in developing countries, of which almost half were women with unintended pregnancies. However, 70,000 of these deaths could have been avoided if both modern contraceptive methods and adequate ante-natal care were provided [1]. Further, the majority of these preventable deaths would occur in sub-Saharan Africa, where there is both high maternal mortality and a large unmet need for modern contraception [1].

In 2003, the Demographic and Health Survey (DHS) in South Africa estimated that 65 per cent of sexually active women aged 18 to 49 used modern birth control methods [7]. However, despite South Africa having the highest rate of contraceptive use in sub-Saharan Africa, approximately 53 per cent of pregnancies in 2003 were unwanted or unplanned, indicating a serious need to better understand women's intentions around pregnancy and accurately update surveillance data on this topic [7]. A limitation of describing the burden of unintended pregnancy, however, is that the last DHS data collected in South Africa was in 2003. Lack of up-to-date surveillance information on unintended pregnancies makes it difficult to draw conclusions on how public health interventions and programmes have affected rates of unintended pregnancies throughout South Africa in more recent years.

The concept of pregnancy intention, however, is not as straightforward as previously conceptualised. Over the past 15 years, a growing body of research on the measurement and classification of pregnancy intention has found that accurately measuring pregnancy intention is both complicated and challenging [8-13]. This concept proves difficult to evaluate, as the variety of women's reproductive desires and intentions depends on the complex interactions between interpersonal, societal, and economic forces [8].

II. JUSTIFICATION

Currently, global measurements of pregnancy intention are modeled from the DHS, which asks "At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?" This question, however, does not sufficiently cover the complexity around capturing pregnancy intention, and thus, a more sophisticated method of estimating pregnancy intention is needed [9-13].

A new pregnancy intention measure, the London Measure of Unplanned Pregnancy (LMUP), was developed in 2002 to capture the multifaceted and complex construct of pregnancy intention and to reflect the growing evidence of pregnancy ambivalence, changing intentionality, and the influence of recall bias on pregnancy intention measures [10, 11]. The development of the LMUP was based on both qualitative and quantitative/psychometric studies which aimed to delineate concepts around pregnancy intention, planning, and wanting as well as to create a valid, reliable, and culturally appropriate tool to measure pregnancy intention [10, 11]. A retrospective measure, the LMUP is designed to measure pregnancy intention in already pregnant women or women who have recently given birth. The original LMUP, which was developed in English, has since been translated and validated in six other languages, including US-Spanish, US-English, Tamil, Kannada, Persian and Chichewa, in high-, middle-, and low-income countries (United States, India, Islamic Republic of Iran and Malawi respectively) [14-17]. The LMUP is currently being validated for use in both Brazil and Botswana. Validated translations of the LMUP are needed for the generalizability of the tool. The validation process of the LMUP aims to include cultural and linguistic differences in the conceptualisation of pregnancy intention in order to more accurately capture pregnancy. Invalidated translations of the LMUP are being used around the world, but this is not recommended.

The LMUP is comprised of six questions, and scored on a Likert scale ranging from 0 to 12 [10]. With every increase in the score, there is an increase in the degree of pregnancy intendedness. Rather than dichotomising pregnancy intention into “intended” or “unintended,” the LMUP allows women to express ambivalence around pregnancy intention. Furthermore, questions on the LMUP are not just designed to ask about pregnancy timing, which is only one dimension of pregnancy

intention, but also contraceptive use, pregnancy intention, desire for a baby, partner discussion, and pre-conception preparation (see appendix A for the original LMUP in English and socio-demographics survey). Thus far, the LMUP has shown to be a useful tool for understanding and describing pregnancy intention in a range of settings, including India, Malawi, and the United States; however, establishing its validity in the different settings and languages in which it may be used is essential.

In South Africa, the LMUP may enable a more accurate and complete understanding of women's pregnancy intentions. Other implications of this tool include the ability to understand more about reproductive health and reproductive health related behaviors as well as potentially being able to predict woman's pregnancy intention and thus provide her with the appropriate contraceptive method. Further, this tool will better measure pregnancy intention that will more accurately monitor the impact of interventions aimed at reducing unintended pregnancies. Additionally, the LMUP has potential to be useful in clinical settings by identifying women who truly have unintended pregnancies in order to provide them with appropriate ante-natal and post-natal care.

The benefits from this research on validation of the LMUP in two official South African languages include a measure that can be used in South Africa that, when implemented, provides a greater and more complete understanding of pregnancy intention and planning in South Africa. This may lead to more appropriate family planning interventions, health programmes, and policy development as well as yielding a locally validated measure of pregnancy intention, which can be used for future research and clinical care.

III. AIM OF THE STUDY

Specific Aim: To validate of the London Measure of Unplanned Pregnancy (LMUP) which measures intendedness and planning of a current/recent pregnancy in English, Xhosa, Afrikaans, and Zulu for use in South Africa.

3.1 Objectives:

1. Create an agreed-upon culturally appropriate translation of the LMUP in two official South African languages: Xhosa and Afrikaans.
2. Per translation (Xhosa and Afrikaans), field test the translated LMUP to a minimum of 125 pregnant women in the Cape Town area.
3. Retest a minimum of 75 women per each translation to determine the reliability of the tool.
4. Analyse the data using classical test theory and principal component analysis to assess the validity of the Xhosa and Afrikaans language versions of the LMUP.

IV. METHODOLOGY

4.1 Study design:

This is a quantitative study. In order to assess the LMUP, we will use a quantitative measurement validation approach, in which the LMUP will be validated for use in two official South African languages, Xhosa and Afrikaans. The validation process will take place in the following steps:

- a) translation and back translation,
- b) field-testing with retest of sub-sample of participants, and
- c) Statistical analysis to determine reliability and validity of measure.

1) Translation

Although the LMUP was originally designed to be a self-administered questionnaire, due to varying literacy levels, the LMUP will be administered by an interviewer within the same guidelines as the validations in India and Malawi [15, 16]. Prior to validation, three translators for

each language, Xhosa and Afrikaans, will translate the original English LMUP. The translators must be involved in health research and be bilingual in English with their first language being Xhosa or Afrikaans. Each translator will be briefed on the LMUP purpose and background and work independently to translate the LMUP (see appendix B for translation instructions).

The study investigators will review the three translations per language and discrepancies will be discussed at a consensus meeting in which the translators and the principal investigator will review the differences and jointly decide upon the most accurate translation. The chosen translation will then be back translated into English by a native English speaker who is fluent in either Xhosa or Afrikaans. Like the original validation study, the back-translator will be provided a short briefing on the broad purpose of the LMUP.

2) Cognitive interviews

After back-translation of the LMUP is completed in Xhosa and Afrikaans, the LMUP will be pre-tested using cognitive interview techniques per language (see appendix C for Cognitive Interview information sheet and informed consent form). The objective of using cognitive interviewing techniques is to evaluate the acceptability of the LMUP questions by identifying any misunderstandings in the translations and by measuring the ease with which women understand the questions (see appendix D for cognitive testing protocol and questions in English). Per LMUP translation, five to ten pregnant women will be recruited to participate in the cognitive interviews from the ante-natal clinics which we will be conducting our study in. Prior to participating in the cognitive interviews, women will be given a written informed consent.

3) *Field testing*

After translated versions of the LMUP are finalized, field-testing will commence at two ante-natal clinics: Mowbray Maternity Clinic and Khayelitsha Site B Community Health Center (CHC). Field workers who translated the LMUP will be used to administer the LMUP and a short demographic and obstetric history.

4.2 Population and sample:

All pregnant women aged 18 or older attending Mowbray Maternity clinic or Khayelitsha Site B CHC during the period of data collection will be invited to participate. Patients who present to the ante-natal clinic for registration will be given basic information about the study while waiting for their appointment.

Inclusion Criteria:

- Pregnant women ≥ 18 years of age at ante-natal visit willing to participate in study.
- Mentally competent to understand study procedures and give informed consent.
- Able and willing to return for or be contacted by phone for follow-up in 1 to 2 weeks' time.

Exclusion Criteria:

- Not mentally competent to understand study procedures or give informed consent.
- Males
- Non-pregnant females
- Unable or unwilling to be followed-up

Sample size

Based on the accepted guidelines for a sufficient sample size for the validation of a questionnaire, the target sample size is 150 women, and at least 75 women must complete the re-test [18].

4.3 Sampling and recruitment:

The field workers will screen interested women for eligibility. If eligible, the field worker will verbally explain the purpose of the study to the potential participant, who will also receive a paper containing information regarding the study (see appendix E for information sheet on LMUP and informed consent). After consent, participants will be administered the LMUP questionnaire in private. The study personnel will work with clinic staff to ensure that participants retain their place in the queue for their appointment. The informed consent and the LMUP should take between 7 to 10 minutes maximum to complete, which can easily be finished while women wait to be seen. To show our appreciation to the ante-natal clinic for allowing our presence, refreshments will be offered to both ante-natal clinic staff and all women participating in the study.

4.4 Data collection:

Women who consented to participate and met eligibility requirements will be given a unique identification number and asked the six questions on the LMUP by the field worker as well as a brief socio-demographic and obstetric history questionnaire, which includes questions regarding participant's occupation, education, relationship to father of pregnancy, and number of previous pregnancies (see appendix A). Phone numbers of participants will be obtained in order to complete the re-test of the LMUP in one to two weeks' time. The unique identification number will be used to link the test and retest data, as personal identifiable data will not be collected.

Follow-up will occur one to two weeks after the initial interview. Field workers will attempt to reach participants up to three times, in which participants will be considered lost-to follow-up if after the third attempt, contact was not made. Field workers will identify participants during follow-up interviews by the participants first name and date of birth. Once participants have been

contacted, or considered lost-to follow-up, all personal identifying information will be deleted.

4.5 Data management

Participants' answers will be captured on paper questionnaires. A database created with Epidata will be used to capture the data. This program will help minimize the risk of errors during data entry by only allowing certain responses to be entered. Data will be exported either to an Excel spreadsheet or directly to STATA statistical software. All data will be anonymous.

4.6 Data analysis

A Classical Test-Theory-based approach conducted in STATA version 12.0 will be used to compare the original UK study and previous validations of the LMUP to the validation of the LMUP in Xhosa and Afrikaans [14-16]. Missing data rates will be examined to assess the acceptability of the test, in which lower levels of missing data will indicate a higher acceptability [19]. Item-endorsement values will be checked to evaluate item discrimination and confirm that no item has an endorsement greater than 80% [20]. In order to evaluate the targeting of the scale (i.e. that the full range of LMUP scores is expressed in the sample), the distribution of total LMUP scores will be examined. Using the standard cut off point of 0.70, internal consistency will be assessed by calculating the Cronbach's α statistic to evaluate reliability of the scale [21]. Furthermore, all item-rest correlations will be considered, in which a minimum correlation of 0.20 will be deemed acceptable [20]. To assess the test-retest stability, the weighted κ will be calculated with a score above 0.60 considered adequate [21].

Due to the lack of a 'gold standard' for the measurement of pregnancy intention, the concurrent criterion validity of the LMUP is not assessable. Thus, in order to assess construct validity,

hypothesis testing and principal component analysis will be conducted. Derived from current literature on pregnancy intention and based on hypotheses used in previous LMUP validations, the following three hypotheses adapted to suit the South African context were generated: pregnancies will be reported as more unintended in women with two or more live children; women who are unmarried; and women aged under 20 or over 39 [16-19]. The three main hypotheses will be tested using the Wilcoxon Rank-Sum (Mann Whitney U) test due to the non-parametric distribution of pregnancy intention scores. The internal structure of the LMUP will be evaluated using principal component analysis (PCA). If all items load onto one component with an Eigenvalue larger than one, the scale will be considered valid and all items measure the same construct [23]. Sensitivity analyses may be undertaken to determine the effect of removing certain questions on the validity of the scale.

Any hard copy versions of informed consents and data collection forms will be kept in a locked research cabinet in a locked research office at the Women's Health Research Unit at the University of Cape Town, in which only authorized study personal will have access. Electronic data collection stored on computers will be password protected.

The data used in analysis and training will have no identifying information (e.g. name, ID, or birthdate).

4.7 Risk/Benefit Assessment

a. Potential Risks and Discomforts:

The potential risks encountered during the study are:

1. Questionnaire/interviews: Participants may experience concern or embarrassment

regarding some of the items on the questionnaire or in the interview guides. They will be informed that they have the option of not responding to questions that make them uncomfortable.

2. Data cleaning and analysis: The risk to participants is minimal as the data provided for analysis will be completely de-identified, making it unlikely for a breach of confidentiality to occur.

b. Risk Classification: Minimal.

c. Minimizing Risks:

Informed consent and strict confidentiality will be rigorously enforced to minimize risks to participants. All study personnel will receive training in good clinical practices, including confidentiality and the informed consent process. Participants will be provided with a number whereby the Principal Investigators, Dr. Chelsea Morroni and Deborah Constant, MSc, MPH, may be contacted in case of emergency or to answer questions regarding participants' informed consent.

d. Potential Benefits:

In taking part in this study, there are no direct benefits to the individual. However, participation may have societal benefits in which improvements are made in the pregnancy-related health of women and couples in South Africa.

e. Therapeutic Alternatives: Participation in the study is entirely voluntary and participants will be reminded that they may withdraw from the study at any point. Women who decline to participate will not be affected in any way.

f. Risk/Benefit Ratio: The benefits and risk of participation are well balanced, as there is minimal risk involved in this study.

g. Vulnerable Subjects: All interviews and exchange of information will be conducted in

English, Zulu, Xhosa or Afrikaans depending on the participant's preference. Women who are under 18 are not eligible to participate and will be excluded from the study.

4.8 Financial Considerations

a. Payment for Participation: To incentivize participation in the follow-up, 15 South African Rand (£.79/\$1.00/€.95) airtime will be provided to women who participate in the retest.

b. Financial Obligations of the Subjects: There are no costs to participate in the study.

4.9 Emergency Care and Compensation for Research-Related Injury:

There is minimal risk associated with participating in this study. If participants believe they have experienced a research-related injury, they will be able to reach the Principle Investigators, Dr. Chelsea Morroni and Deborah Constant, at the telephone numbers provided on the informed consent. Study personnel will help participants obtain appropriate care if they are experiencing a life-threatening emergency.

4.10 Informed Consent

a. Capacity to consent: All participants will have the capacity to give informed consent.

b. Personnel Inviting Participants:

Field workers will invite potential participants to learn about the study while explaining in detail the informed consent process. The informed consent will only be signed once the field workers have provided participants with all necessary information and answered all the participant's questions. Prior to collecting data, the informed consent form must be signed and all participants will be given a copy of the informed consent. Field workers will not allow women to participate in the study if they are unable to understand the informed consent, severely mentally disabled, or

do not meet the inclusion criteria. Consent forms will be secured in a locked office. Field workers involved in the recruiting and consenting of participants will have completed the South African equivalent of a Human Research Subjects certification program before the beginning of the study.

c. Process of Consent (*conducted by study personnel*): After eligibility of participants is verified, the informed consent process will continue as follows:

- The study interviewer says: “We would like to read through this information sheet and consent form with you because we want to make sure that you understand everything in it and that we answer any questions you may have.” The study interviewer reviews the information sheet/consent form, paragraph by paragraph, and stops as needed for any questions or clarifications.
- The interviewer asks the potential participant short questions about the consent to make sure that she fully understands the study. This process gives the interviewer time to assess the potential participant to make sure there are no “gross impairments” that would invalidate the informed consent (e.g. participant does not fully understand the study, is intoxicated, etc.) and make study participation unethical and prohibited.
- If the potential participant agrees to participate in the study, the study interviewer then signs and dates the consent form. The participant’s study code is then written on the consent form.
- The participant is given a copy of the information sheet/consent form if they would like one.

d. Comprehension of the Information Provided (*conducted by study personnel*):

The study personnel will ask participants to restate in their own words the study’s objectives and what participation involves to determine if they fully understand the informed consent. If the

participant does not understand the protocol, the study interviewer will explain again the content of the consent form. If the participant is still unable to understand the protocol after it is reviewed again, she will be excluded from participation in the study.

e. Information withheld from Subjects: Not applicable.

f. Consent/Assent forms: The consent forms used in the study are included.

4.11 Conflicts of Interest The investigators involved in this study have no conflicts of interest to report.

V. WRITE UP AND DISSEMINATION

Upon completion of the data collection and analysis by the main researcher, all results will be shared with the two ante-natal clinics in which the data was collected from. The results will also be presented to the Western Cape Provincial Department of Health. Electronic copies of the results will be provided to Mowbray Maternity Clinic and Khayelitsha Site B CHC.

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PART B:

STRUCTURED LITERATURE REVIEW

I. Introduction

Unintended pregnancies are a global concern that may lead to negative economic, social, and health repercussions for women and their families [1-5]. These adverse consequences are even more pronounced in developing countries, where a myriad of factors, such as poverty and lack of family planning access, amplify the consequences associated with unintended pregnancies and unplanned births [6].

An unintended pregnancy is conventionally defined as a pregnancy that is either unwanted, mistimed, or unplanned [1-5]. An unwanted pregnancy is a pregnancy that occurs when no children or no more children are desired, whereas a mistimed pregnancy is a pregnancy that occurs earlier than intended [1-5]. In addition, an unplanned pregnancy is a pregnancy that occurs when a woman does not desire to become pregnant, but is not using contraception or her method of contraception failed [1-5]. Assessing the burden of unintended pregnancy provides insight into the effectiveness of reproductive health interventions, such as access to family planning services or uptake of contraceptive methods, and also highlights gaps in reproductive health care.

Currently, standard measurements of pregnancy intention used at the national level for surveillance purposes are modelled from the Demographic and Healthy Survey (DHS), which asks “At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?” However, a growing body of research suggests that this conventional tool needs to be re-conceptualised to reflect the individual, partner, and societal influences which may impact women's pregnancy intentions [7-16]. Further, in 2008 a review of the literature on pregnancy intentions and infant, child, and parental health conducted by Gipson, Koenig, and Hindin found that outcome studies used either varying definitions of pregnancy

intention or used conventional DHS questions, but combined mistimed pregnancies and unwanted pregnancies or wanted pregnancies and mistimed pregnancies into one category [1]. For this reason, drawing conclusions on the consequences of unintended pregnancy is challenging.

In addition, research suggests that although a pregnancy may be reported as unplanned or unintended, it is not necessarily unwanted, further indicating a need to re-evaluate the cognitive, cultural, and contextual factors influencing women's pregnancy intentions [16]. Moreover, conventional measurements of pregnancy intention dichotomise pregnancies into either intended or unintended. However, research on pregnancy intention shows that women report ambivalence around contraceptive use and pregnancy avoidance, demonstrating that pregnancy intention spans a range of desires and feelings [16-17]. Thus, the conventional methods of measuring pregnancy intention in already pregnant women, or women who have recently given birth, need to be re-evaluated and re-conceptualised to reflect current knowledge about the factors that influence women's pregnancy intentions.

The primary motivations for measuring pregnancy intention are to better develop family planning programs and contraceptive services as well as to monitor and evaluate the effect of these programs on women's reproductive choices. Additionally, in countries such as South Africa, where the risk of HIV and other sexually transmitted diseases (STDs) is high, understanding women's pregnancy intentions are vital to preventing both unintended pregnancies and disease.

The aim of this literature review is to:

1. Describe the burden of unplanned pregnancy, both globally and within South Africa;
2. Examine the research on associated health risks of unintended pregnancies, specifically in the South African context; and to

3. Highlight gaps in conventional measures of pregnancy intention and review research indicating the need for a contemporary measure of pregnancy intention and planning.

This literature review serves to justify the primary purpose of this thesis: to validate a culturally appropriate pregnancy intention tool in two official South African languages, namely Xhosa and Afrikaans, to more accurately measure women's pregnancy intentions in South Africa. A limitation of this literature review is the fact that the last DHS data collected in South Africa was in 2003. Lack of up-to-date surveillance information on unintended pregnancies makes it difficult to draw conclusions on how public health interventions and programmes have affected rates of unintended pregnancies throughout South Africa in more recent years.

1.1 Literature Search Review Methodology

A review of the literature was conducted using the search engines Academic Search Premier and Google Scholar. Similar to traditional databases, Google Scholar results include peer-reviewed papers from online academic journals, as well as books, abstracts, dissertations, conference reports, and court documents. Search criteria relating to publications on adverse consequences of unintended pregnancy were considered up until 2016. The following terms were searched: “pregnancy planning”, “pregnancy intention”, “unplanned pregnancy”, “unintended pregnancy”, “unwanted pregnancy”, “South Africa”, “family planning”, “risks”, “consequences”, “burden”, “HIV”, “abortion”, “termination of pregnancy”, “gender inequality”, “reproductive health” and “empowerment”. Search engines yielded over 4,000 citations using different combinations of the terms listed above. Of these 4,000 citations, 85 were included in the final literature review.

Abstracts of articles with titles relevant to the literature review were reviewed and chosen to be included if applicable to the topic of pregnancy intention. Government reports and reports produced

by the United Nations and the World Health Organisation that related to women's health were searched and included in the literature review. Publications relating to the development and validation of the London Measure of Unplanned Pregnancy (LMUP) were accessed via the LMUP website (www.lmup.com). Additionally, the bibliographies from articles included in the literature were reviewed, and titles applicable to the topic of pregnancy intention were examined and included, if relevant.

II. Burden of Unintended Pregnancies

In underdeveloped countries an estimated 74 million unintended pregnancies occur each year as a result of method failure or lack of contraception use [18]. Of these unintended pregnancies, approximately 36 million result in termination of pregnancy (TOP), 28 million in live births, eight million in miscarriages and nearly one million in stillbirths [18]. A significant proportion of unintended pregnancies are attributable to the fact that nearly 225 million women living in the developing world have an unmet need for modern contraceptive methods. These methods include male and female condoms, hormonal pills, injectables, and long-acting reversible contraceptives, such as intra-uterine devices and hormonal implants. Women with an unmet need for family planning are sexually active women of reproductive age who report wanting to prevent or delay pregnancy, but are not using any modern contraceptive methods. This concept describes the disconnect between women's pregnancy intentions and their contraceptive behaviour [19].

Between 2003 and 2014, the number of women wanting to avoid pregnancy in the developing world increased by 157 million, 75 per cent of which was a result of population growth, while the remaining 25 per cent was due to an increased desire to avoid pregnancy [18]. Although nearly three quarters of women who want to avoid pregnancy reported using modern contraceptive methods, the number of women in need of family planning remains high, particularly in women

who live in rural areas, are less educated and who are poorer [18]. Globally, the highest proportion of women with an unmet need for modern contraceptive methods reside in sub-Saharan African. Although global rates of unintended pregnancies decreased by three per cent between 2008 and 2012, the rate of unintended pregnancies has remained relatively constant in sub-Saharan Africa during this time period, despite public health interventions to increase uptake of contraceptives [20].

In 2003, the South Africa Demographic and Health Survey (DHS) estimated that 65 per cent of all sexually active women aged 18 to 49 used modern birth control methods [21]. Although South Africa has the highest rate of contraceptive use in sub-Saharan Africa, approximately 53 per cent of pregnancies in 2003 were reported as unwanted or unplanned, which indicates an absence of continued or effective contraceptive use [21]. Higher rates of unwanted pregnancies were found in women under the age of 20 and between the ages of 40 to 44; additionally, in women aged 15 to 49, nearly 25 per cent and 30 per cent of first births occurring within the past five years were reported as unwanted or mistimed, respectively [21]. Due to the lack of up-to-date surveillance information on unintended pregnancies in South Africa, it is challenging to compare South African pregnancy intention trends with more recent global and regional data. However, regional estimates of unintended pregnancy rates show a small decline in unintended pregnancies in Africa between 2008 and 2012, whereas estimated global unintended pregnancy rates show little change during this time period [20].

III. Causes of Unintended Pregnancies in South Africa and sub-Saharan Africa

Women's pregnancy intentions are assumed to be autonomous decisions, when in reality women's pregnancy desires and planning are shaped by a multitude of contextual and cultural factors, including gender inequality and access to modern contraceptive methods.

In sub-Saharan Africa gender inequality and a lack of women's empowerment directly affects pregnancy intentions and contraceptive use [22-24]. Women's pregnancy related decisions may be influenced by exogenous factors, such as cultural norms on family size or fears about modern contraceptive use [22-24]. These studies show that women who live in areas with gender inequality are more likely to have unintended pregnancies and thus, be at risk for associated health consequences of unintended pregnancies [22-24]. For example, a study conducted in 2015 in Tanzania 5 on gender inequality and reproductive health found that women who were empowered, which was measured by her economic contribution to the household, were significantly more likely to have control over their reproductive health, measured by number of ante-natal clinics and at home births [22].

Furthermore, studies in other developing countries, such as Indonesia and India, found that women who lived in a gender unequal society, where there was male patriarchal control, were more likely to report unintended pregnancy and experience intimate partner violence (IPV), which reduced their autonomous decisions over sexual and reproductive health [25, 26-28]. Additionally, women who were not physically abused, but lived in areas with high levels of IPV, were significantly more likely to experience an unintended pregnancy, in comparison to women living in areas with low levels of IPV [28]. Thus, the lack of empowerment influences women's reproductive desires and pregnancy planning.

Another factor contributing to unintended pregnancy is a lack of access to or uptake of modern, reliable contraceptive methods. Uptake of contraception plays an integral role in maternal and child health by reducing health consequences caused by unwanted pregnancies, unplanned births, and unsafe termination of pregnancies. Use of long-acting reversible contraceptives helps prevent user error and method failure that are associated with short-acting contraceptives, such as condoms,

hormonal birth control pills and injectable methods.

In South Africa, nearly 64 per cent of sexually active women aged 15 to 49 use modern contraceptive methods; however, contraception use is much lower in South Africa in comparison to other high-middle-income countries [19, 21]. Additionally, studies investigating uptake of contraceptives in other developing countries have found that women who use contraceptives inconsistently may be misclassified as continued users [29, 30], which could be partially responsible for inflating the percentage of women counted as consistent contraceptive users in South Africa. Furthermore, regardless of the high prevalence of contraception use in South Africa, over 50 per cent of pregnancies were reported as unintended in the 2003 South African DHS [21]. This may in part be due the fact that the hormonal injectable has been the primary method of prophylaxis in sexually active women aged 15 to 49 [19]. Although this method of family planning is highly effective in reducing unwanted pregnancies, interrupted use of the hormonal injectable persists in South Africa for several reasons. Women who do not access the clinic within two weeks of their scheduled follow-up injection will not be eligible for re-injection until their next menses. This is to prevent administering the injectable to already pregnant women [31]. Further, Baumgartner et al. [32] found that providers in both the Eastern Cape and Western Cape refused some women re-injection, despite attending their follow-up appointment before the end of the two week grace period, indicating providers' lack of knowledge about standard re-injection guidelines set by the South African Department of Health. Consequently, discontinuation of hormonal injectables can lead to unintended pregnancies.

Knowledge of other long-acting reversible contraceptives remains low amongst both sexually active and non-sexually active women in South Africa [33]. Although national guidelines indicate that intra-uterine devices (IUDs) should be readily available in the public sector, uptake of the IUD is

low [19]. Research in a variety of settings, including South Africa, El Salvador, and the United States, have found that low-uptake of the IUD is partly due to misconceptions regarding the safety and use of the IUD as well as health system barriers, such as lack of skills, resources, and training of service providers [34-36]. Additionally, knowledge and uptake of emergency contraception is extremely low in South Africa, despite its high efficacy in reducing unwanted pregnancies when taken immediately after unprotected sex and widespread availability in the public sector [19]. In part, uptake is low due to service providers concern that women will terminate use of reliable family planning methods to use emergency contraceptives [37].

Low-uptake of long-acting reversible contraceptives and emergency contraceptives, in conjunction with high use of injectable hormones, which are unreliable due to discontinuation, may be partly responsible for high rates of unintended pregnancy in South Africa [29-37]. Additionally, other exogenous factors, such as gender inequality and IPV, may also contribute to the high number of unintended pregnancies in South Africa. Thus, it is vital to more accurately measure women's pregnancy intentions in order to help better design reproductive health interventions, such as family planning programmes, which may prevent unintended pregnancies.

IV. Consequences of Unintended Pregnancies

Many studies examining the effects of unintended pregnancies and adverse health consequences have found that unintended pregnancies are associated with increased health risks to both women and children and can cause economic and social repercussions for women and their families [1-5, 33, 38, 39]. Research on consequences of unintended pregnancies, mostly conducted in developed countries, has shown positive associations between unintended pregnancy and maternal and child mortality and morbidity, negative mental health repercussions for women, as well as social and economic repercussions for both women and their families [1-5, 33, 38, 39]. In contrast, however,

many other studies, especially those conducted in developing countries, have found little or no association between unintended pregnancies and adverse health consequences for both mother and child [40-43] Likely due to the inherent challenges in the field of studying pregnancy intention and health outcomes, the existing evidence on consequences of unintended pregnancies show mixed results on whether unintended pregnancies truly result in adverse health outcomes for women and their children.

Accurate measurement of association between pregnancy intention and adverse health outcomes is challenging for several reasons. Firstly, recall bias may influence associations between pregnancy intention and outcomes, as measuring pregnancy intention is retrospective in nature [1]. Secondly, unlike surveillance studies, which use DHS-type questions to measure pregnancy intention, outcome studies use varying questions and methods to measure pregnancy intentions [1]. Thirdly, more recent evidence shows that depending on whether a pregnancy is mistimed, unwanted, or unplanned has different health consequences for women and their children [44-46]. A review of the literature in 2008, found that many older outcomes studies conflated mistimed and unwanted pregnancies due to small sample sizes [1]. Lastly, most research on pregnancy intention occurs in high-income countries, with little research conducted on the consequences of unintended pregnancies in the developing world [38, 39]. Earlier research on consequences of unintended pregnancy may not reflect current consequences, as new health policies as well as access to legal termination of pregnancy services and ante- and post-natal care impact couples' reproductive choices [2].

4.1 Unintended Pregnancies and Access to Termination of Pregnancy Services in South Africa

Termination of Pregnancy (TOP) is a common consequence of unintended pregnancies. There is minimal risk of health complications to women who access legal, safe TOP services. However,

unsafe TOPs performed illegally account for 13 per cent of global maternal deaths each year [47]. The South African Choice on Termination of Pregnancy Act (CTOP), which was promulgated in 1996, has been described as one of the most progressive TOP laws in the world [48]. Upon request, women may terminate pregnancy up to 12 weeks of gestation and up to 20 weeks in cases of incest, rape, socio-economic hardship, or health risks associated with the pregnant woman or fetus. Since the enactment of CTOP, nearly 80,000 women a year access abortion services, 30 per cent of which are performed in the second trimester (over 12 weeks of gestational age) [49, 50].

Although two thirds of young pregnancies are unintended, a study in 2004 estimated that only three per cent of young women access legal and safe TOP services in South Africa [51]. Teenagers, poorer women, and women living in rural areas were found to have limited knowledge of legal abortion services [52, 53]. However, amongst women who were aware of the new legislation regarding legalisation of TOP, nearly half were unaware of the time limitations for terminating pregnancy [53]. Most women who are denied abortion services due to their gestational period being over the legal limit turn to TOP services outside of the legal system [54]. Although complications from incomplete TOPs still occur in South Africa, the mortality and morbidity from illegal terminations has been reduced since 1996 [55]. This reduction in mortality and morbidity from illegal terminations is likely due to the increased access to legal, safe TOP services and the use of the drug misoprostol, which although is not used for TOPs in registered settings in South Africa, provides a safer way to induce TOPs in unregistered settings [55].

Although national statistics on TOP trends are not publically available, the large number of women accessing TOP services in South Africa suggests an unmet need for effective and reliable family planning to women of child bearing age. Providing women with family planning needs with modern contraceptive methods will reduce the number of unintended pregnancies and consequently, reduce

the number of women who access TOP services in unsafe and unregistered settings.

4.2 Consequences in South Africa

In South Africa, the growing number of women reporting unintended pregnancies amongst vulnerable groups, such as adolescents and HIV positive women, are of particular concern [56]. Adolescent pregnancies, occurring between the ages of 10 to 19, can have greater health, economic, and social repercussions than unintended pregnancies at older ages [56-60]. Health consequences of early childbearing include increased risk of maternal mortality and morbidity [59, 60]. Although some studies have found that low socio-economic status and poor ante-natal care confound associated risks between teenage pregnancy and increased mortality and morbidity, many studies have documented an increased risk of maternal obstetric, foetal, and neonatal complications in adolescent pregnancies, irrespective of confounders [61- 66].

Early childbirth not only has health repercussions for mothers and their children, but also social and economic consequences. Teenage pregnancies limit educational achievement, which can limit both the mother and child's economic advancement throughout their lives [67, 68]. Further, early child bearing has serious intergenerational consequences, in which daughters of adolescent pregnancies are more likely to give birth below the age of 20 [69, 70]. As the majority of teenage pregnancies are unintended, there is an unmet need for reliable modern contraceptives amongst this high-risk group, which needs to be addressed [21].

In South Africa and elsewhere, unintended pregnancy is not the only major consequence of unprotected sex, especially amongst adolescents. Women who have unprotected sex are also at high risk of acquiring the human immunodeficiency virus (HIV). Non-pregnancy related infections remains the highest cause of maternal mortality in South Africa, with HIV is the underlying cause

in approximately 70 per cent of maternal deaths and nearly 50 per cent of all child deaths occurring under the age of five [71, 72]. Women aged 18 to 24 who were HIV-positive or had an STD in the past 12 months were less likely to use contraceptives, putting them at greater risk of having an unintended pregnancy [58]. In 2010, over 30 per cent of all women who attended public health facilities for ante-natal care were HIV-positive, indicating a high risk of mother-to-child transmission of HIV in South Africa [73]. Additionally, pregnancy planning is of greater concern for women who are HIV-positive, as ante-natal care for HIV-positive women requires additional measures to reduce health complications for mother and child [74].

Furthermore, there is minimal research regarding women's pregnancy intentions in HIV-positive women. As greater access to antiretroviral drugs improves quality and length of life, studies have found that HIV-positive women desire to have children [75-77]. However, because many HIV-positive women feel that health care providers disapprove of them wanting to give birth, intended pregnancies may be underreported amongst HIV-positive women [75, 78]. In addition to their HIV status, women who are HIV-positive may have different social and cultural factors that play a role in shaping their pregnancy intention, such as societal disapproval or health concerns [77]. Nevertheless, recent advances in pre-conception care as well as ante-natal and post-natal care allow for HIV-positive women to more safely conceive and give birth [75]. Thus, a greater and more complete understanding of pregnancy intentions among HIV-positive women is necessary in order to monitor and evaluate programmes related to pre-conception and ante-natal and post-natal care for HIV-positive women.

V. Measuring Pregnancy Intention

Measuring pregnancy intention is an essential component in assessing the burden of unintended pregnancies, monitoring and evaluating the effectiveness of family planning interventions and

advocating for women's rights regarding their reproductive health choices [8]. The DHS's fertility planning questions are the standard measurement used to assess pregnancy intention as either intended or unintended. Similar to many countries, South Africa uses the following questions to classify whether a current pregnancy is unwanted or mistimed respectively: "At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?" However, a growing body of research suggests a need for a new pregnancy intention tool, as the conventional method falls short of accurately measuring women's pregnancy intentions for the following reasons:

1. Mistimed or unplanned pregnancies are not necessarily reported as unwanted. Further the extent of pregnancy intention may be associated with different health consequences for the mother and child [7-12];
2. Women's reproductive health behaviours and their responses to pregnancy intention questions are contradictory, indicating that women's pregnancy desires are complex and cannot be captured as only unintended or intended [7-12]; and
3. Pregnancy intention studies are often retrospective and suffer from recall bias, in which the presence of a baby will likely influence women's memory with regards to her pregnancy intention prior to becoming pregnant or giving birth [8].

Pregnancy intention, as currently measured in South Africa by DHS questions, fails to capture the multidimensionality of pregnancy intention. The dichotomisation of pregnancy planning (either planned or unplanned) and pregnancy happiness (wanted or unwanted) presumes a link between pregnancy intention and behaviour, which recent research has showed is more complex than what is currently measured [14-16; 79]. These studies have found that reproductive health behaviours and pregnancy intention are paradoxical to the traditional understanding of pregnancy intentions, that an unplanned or mistimed pregnancy is also an unwanted pregnancy.

For example, Sable and Libbus [14] found that nearly half of women who reported having unintended pregnancies were somewhat or very happy to be pregnant. In addition, only 68 per cent of women who had a contraception failure classified their pregnancy as unintended, according to Trussell, Vaughan, and Stanford [16]. Further, women's interpretation of terms commonly used to measure pregnancy intention, such as “planned”, “unplanned”, “intended”, “unintended”, “wanted” and “unwanted” differed greatly between women and were not often used by participants to describe their own pregnancy intentions [10]. This indicates that accepted measurements of pregnancy intention may not be accurately capturing women's pregnancy intentions, and that in fact, “intending” a pregnancy and “wanting” a pregnancy may be two distinct concepts. Moreover, pregnancy intention feelings and reproductive behaviours may be at odds with one another, indicating a need to better understand women's reproductive health goals and desires to provide them with appropriate family planning.

An additional limitation of current retrospective measurements on pregnancy intention is their inability to describe pregnancy intentions on the individual level, despite being a useful measurement of pregnancy intention at the population level [23, 24]. Women's individual pregnancy intentions may change, especially when measured retrospectively, such that pregnancies once reported as intended might later be reported as unintended and vice versa [80]. Current measurements of pregnancy intention, however, are unable to reflect an individual's change in pregnancy desires or goals.

VI. The London Measure of Unplanned Pregnancy

To better capture the multifaceted and complex construct of pregnancy intention, a new measurement tool, the London Measure of Unplanned Pregnancy (LMUP), was developed in 2002 [7]. The tool,

developed and validated in the United Kingdom, measures the degree of pregnancy intention in women who are already pregnant or who have recently given birth [10]. The creation of the LMUP was based on both qualitative and quantitative/psychometric studies that aimed to understand women's interpretation of language commonly used around pregnancy intention, as well as to create a valid, reliable, and culturally appropriate tool to measure pregnancy intention [7,10]. The LMUP is a retrospective measure that can be used for any pregnancy, irrespective of its outcome (birth, TOP, or miscarriage) [7].

The LMUP is comprised of six questions, each scored on a Likert scale ranging from 0 to 12 [7]. With every increase in score, there is an increase in the degree of pregnancy intention. Rather than dichotomising pregnancies into “planned” or “unplanned,” the LMUP allows women to express ambivalence around pregnancy intention. Questions on the LMUP do not only ask about pregnancy timing, but also contraceptive use, intention, desire for a baby, partner discussion, and pre-conception preparation. The six questions which comprise the LMUP, fall in to three domains that make up the conceptual basis of the LMUP. These domains capture women's behaviour (i.e. pre-conceptual preparations and contraceptive use), women's stance on pregnancy (i.e. desire for pregnancy and expressed intentions) and context (i.e. personal circumstances/timing and partner influences) (figure 1) [7]. Congruence is not assumed between the three dimensions nor is it required [7].

The original LMUP was written in English and has since been translated and validated in five other languages including US-Spanish, US-English, Tamil, Kannada, and Chichewa in a range of high-, middle-, and low-income countries, (United States, India and Malawi respectively) [81-83] (see table 1). Additionally, the LMUP was recently validated in Persian in the Islamic Republic of Iran, an upper-middle income country [84]. The completed evaluations of the LMUP used nearly the same methodologies, in which there were three integral steps in the translation process:

1. The LMUP is first translated into the new language by a native speaker of that language.
2. The LMUP is then independently back-translated from the new language by a native speaker of that language into English.
3. Lastly, a comparison of the two translations with the original LMUP are examined, and an agreed upon translation is finalised.

Figure 1: Conceptual Model of Pregnancy Planning

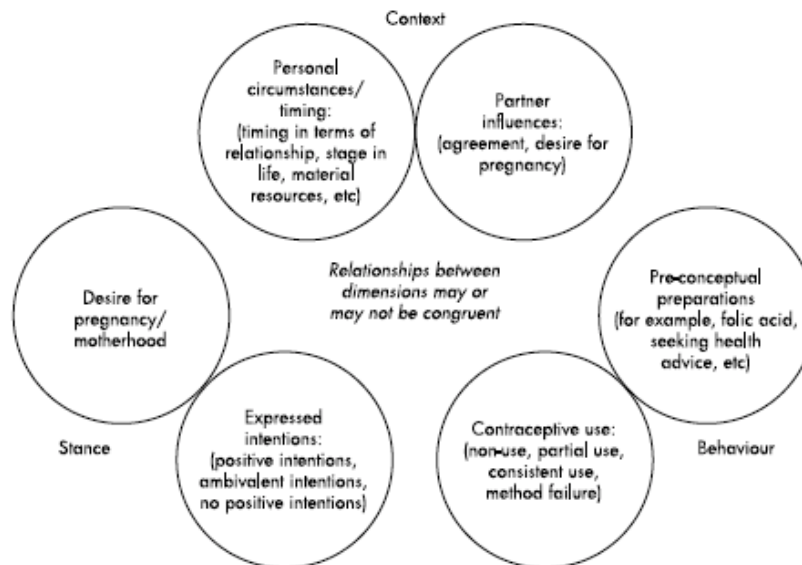


Figure from pg. 340 in: Barret G, Smith SC, Wellings K. Conceptualisation, development, and evaluation of a measure of unplanned pregnancy. *J Epidemiol Community Health*. 2004;58:426.

The most common alteration in the translated LMUPs was to item 6 with regards to preparation for pregnancy. Culturally relevant responses were added to item 6 if additional responses were common during pre-testing of the LMUP. In Malawi, the Islamic Republic of Iran, and India, item 6 had item-correlation scores below the apriori cut-off point. However, in all three studies, the item was included in the final version of the LMUP as the internal consistency and reliability of the scale was still relatively high with its inclusion.

Table 1: Original LMUP study and subsequent validations

	United Kingdom (original)	Bangalore, Karnataka, India	United States	Malawi	Islamic Republic of Iran
Administration:	Self-administered	Interviewer-administered	Self-administered	Interviewer-administered	Interviewer-administered
Languages	English	Kannada and Tamil	English (US) and Spanish (US)	Chichewa	Persian
Population:	Currently or ever-pregnant women of all ages recruited in 14 clinics (antenatal, abortion and general practitioner)	Currently or ever-pregnant women aged 16-25 recruited from low-income communities at government health centers	Currently or ever-pregnant women aged 15-45 recruited from a government hospital in San Francisco	Currently or ever-pregnant women aged 15-41 recruited from a Mchinji District Hospital antenatal clinic	Currently or ever-pregnant women aged 15-40 from an approved delivery facility in East Azerbaijan province
Design	Administered cross-sectionally	Administered at year 1 and at year 2	Administered cross-sectionally	Administered cross-sectionally	Administered cross-sectionally
Internal consistency, Chronbach's alpha	0.92	0.76 – Kannada 0.71 - Tamil	0.78 (US-English) 0.84 (US-Spanish)	0.78	0.87
Reliability, test retest weighted k	0.97 and 0.86	0.43	0.72(US-English) and 0.77 (US-Spanish)	0.80	0.70

To date, validated versions of the LMUP have been and continue to be used in a range of settings to better measure women’s pregnancy intentions [85-89]. Validated versions of the LMUP have, for example, contributed to research examining TOP and women’s emotional well-being, pregnancy intention and pre-conception health, as well as contraception use and pregnancy intention [85-87]. Although the LMUP has and continues to contribute to a greater and more complete understanding of pregnancy intention in a range of settings, its validity in different countries and settings requires further testing. Validated translations of the LMUP is crucial for the generalizability of the tool. The validation process of the LMUP aims to includes cultural and linguistic differences in the conceptualisation of pregnancy intention in order to more accurately capture pregnancy intention and planning.

VII. Conclusion

The LMUP may provide a more accurate and in-depth understanding of women's pregnancy intention in South Africa at the population level. This tool will better monitor and evaluate reproductive health interventions by providing a more accurate way of understanding pregnancy intention and thus allowing for better development of family planning care, pre-conception and pregnancy planning care, and ante- or post-natal care. Other implications of this tool include the ability to understand more about reproductive health and reproductive health behaviours as well as potentially predicting a woman's pregnancy intention and thus providing her with the appropriate contraceptive method.

The benefits from this research include a greater understanding of pregnancy intention and planning in South Africa, leading to more appropriate interventions, health programmes, and policy development as well as yielding a locally validated measure of pregnancy intention that can be used for future research and clinical care.

X. References

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PART C:

JOURNAL ARTICLE

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Understanding Pregnancy Intention in the Southern African Setting: Validation of the London Measure of Unplanned Pregnancy in the Cape Town Area, South Africa.

Running head: Validation of the LMUP in South Africa

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UCT MPH guidelines direct that advisors not be listed as authors on a dissertation's Part C: the journal ready manuscript, and instead have their contribution to the finished work mentioned in the Acknowledgements. Though this article was written according to the guidelines for BMC, it directs that all authors be listed on the covering page, along with their affiliations and degrees. As per UCT MPH guidelines, Mrs. Deborah Constant's (MPH) and Dr. Chelsea Morroni's contributions will be recognized in the acknowledgements. Detailed formatting instructions for BMC can be found in Part D of this dissertation, under section V.

Abstract

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Keywords: Pregnancy Intention, Pregnancy Planning, Unintended Pregnancy, Unwanted Pregnancy, London Measure of Unplanned Pregnancy

Background: Developed in the United Kingdom, the London Measure of Unplanned Pregnancy (LMUP) is a psychometrically valid retrospective measure of pregnancy intention developed to capture the multifaceted construct of pregnancy intention. An improved understanding of women's pregnancy intentions in South Africa is essential to the development of family planning, pre-conception and pregnancy planning, and ante/post-natal care interventions. This research aimed to validate the LMUP for use in two official South African languages, Afrikaans and Xhosa.

Methods: Three Xhosa and three Afrikaans speakers translated the LMUP, and one translation was agreed upon for each translation. This translation was then back-translated and pre-tested on at least five pregnant women using cognitive interviews. The measure was field tested with pregnant women who were recruited at two ante-natal clinics and re-tested between one and two weeks after the initial interview. The data were analyzed using Classical Test Theory, principal component analysis (PCA) and hypothesis testing for both Xhosa and Afrikaans separately.

Results: 150 pregnant women aged 18-42 (median 26.5) completed the Xhosa LMUP and 148 pregnant women aged 18-42 (median 28.0) completed the Afrikaans LMUP. Scores ranging from 1-12, nearly the entire LMUP range, were captured in both Afrikaans and Xhosa. One-hundred and twenty six of 150 (84.0%) of the Xhosa and 103 of 148 (69.6%) of the Afrikaans were followed up for re-test, well in excess of the 50% target.

For both translations, the scales were internally consistent (Chronbach's alpha: Xhosa= 0.83; Afrikaans=0.73) and the test-retest data showed good stability (weighted Kappa: Xhosa = 0.82; Afrikaans=0.77). Unmarried women and women who were <20 or 40+ were more likely to report unintended pregnancies for both translations. For the Xhosa LMUP, PCA revealed five of the six components loaded onto one factor whereas for the Afrikaans LMUP four of the six components loaded onto one factor. A sensitivity analysis showed that removing the weakest component improved performance of both translations only slightly; thus, including all components is recommended.

Conclusions: The Xhosa and Afrikaans-language versions of the LMUPs are valid and reliable and can now be used in South Africa in research, surveillance/monitoring and clinical care.

Key Words: Pregnancy Intention, Pregnancy Planning, Unintended Pregnancy, Unwanted Pregnancy, London Measure of Unplanned Pregnancy

This article meets the requirements for the BMC Reproductive Health manuscripts as described in the Online Submission and Review System Guidelines for the BMC Reproductive Health Journal.

In accordance with these guidelines, tables and figures referenced in the text are attached after the references.

Background

Every year there are an estimated 74 million unintended pregnancies in the developing world [1]. Of these unintended pregnancies approximately 36 million result in abortion, 28 million in live births, eight million in miscarriages and nearly one million in stillbirth [1]. An unintended pregnancy is conventionally defined as a pregnancy that is unplanned, mistimed, or unwanted. An unwanted pregnancy is a pregnancy that occurs when no children or no more children are desired, whereas a mistimed pregnancy is a pregnancy that occurs earlier than intended [1-5]. A large proportion of these unintended pregnancies are attributable to the fact that nearly 225 million women living in the developing world have an unmet need for modern contraceptive methods [1].

Although all pregnancies expose women to health risks, unintended pregnancies are associated with an increased morbidity and mortality for both woman and child [2-6]. These risks are amplified in developing countries, where nearly 50 per cent of women do not have access to the quality of ante-natal care needed to carry out a healthy pregnancy [1]. In 2012, there were an estimated 290,000 pregnancy-related deaths amongst women living in developing countries, of which almost half were women with unintended pregnancies [1]. However, 70,000 of these deaths could have been avoided if both modern contraceptive methods and adequate ante-natal care were provided [1]. Further, the majority of these preventable deaths would occur in sub-Saharan Africa, where there is both high maternal mortality and a large unmet need for modern contraception.

Measuring pregnancy intention is an essential component in assessing the burden of unintended pregnancies, evaluating reproductive health programmes, and advocating women's rights regarding their reproductive choices [7]. Globally, the Demographic Health Survey's (DHS) fertility planning questions are the standard measurement used to assess pregnancy intention retrospectively which ask "At the time you became pregnant, did you want to become pregnant

then, did you want to wait until later, or did you not want to have any (more) children at all?” Similar to many nations, South Africa uses the following questions to classify whether a pregnancy is unwanted or mistimed respectively: “At the time you became pregnant did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?” [8]. However, a growing body of research suggests that this conventional tool needs to be re-conceptualized to reflect the evolution of women's rights, advances in contraception, and the legalization of abortion in order to accurately capture women's pregnancy intentions retrospectively [9-18].

A new pregnancy intention measure, the London Measure of Unplanned Pregnancy (LMUP), was developed in 2002 to capture the multifaceted and complex construct of pregnancy intention and to reflect the growing evidence of pregnancy ambivalence, changing intentionality, and the influence of recall bias on pregnancy intention measures [9, 12]. Developed and validated in the United Kingdom (UK), the LMUP measures the degree of pregnancy intention in women who are already pregnant or who have recently given birth [9]. The development of the LMUP was based on both qualitative and quantitative/psychometric studies which aimed to delineate as well as to create a valid, reliable, and culturally appropriate tool to measure pregnancy intention [9, 12]. The original LMUP, which was developed in English, has since been translated and validated in US-Spanish, US-English, Tamil, Kannada, Persian, and Chichewa in a range of high-, middle-, and low-income countries, (United States, India and the Islamic Republic of Iran, and Malawi respectively) [19-22].

In 2003, the DHS in South Africa estimated that 65 per cent of women of child-bearing age used modern birth control methods [23]. However, despite South Africa having the highest rate of contraceptive use in sub-Saharan Africa, approximately 53 per cent of pregnancies in 2003 were

unwanted or unplanned, indicating an unmet need in family planning services as well as a need to better understand women's pregnancy intentions in the South African context [23]. As current measures of pregnancy intention in South Africa dichotomise pregnancy intention and fail to consider the complex cognitive processes and cultural contexts which influence reproductive health behaviors, there is a need to critically examine the current measure used to retrospectively measure women's pregnancy intentions. Additionally, due to the out-dated surveillance data last collected in 2003, it is difficult to draw conclusions on how public health interventions and programmes have affected rates of unintended pregnancies throughout South Africa in more recent years.

The benefits from this research on validation of the LMUP in two official South African languages include a measure that can be used in South Africa that, when implemented, provides a greater and more complete understanding of pregnancy intention and planning in South Africa. This may lead to more appropriate family planning interventions, health programmes, and policy development as well as yielding a locally validated measure of pregnancy intention, which can be used for future research and clinical care. The validation of different LMUP translations aims to measure pregnancy intention more accurately around the world, which may lead to culturally appropriate policy development for family planning interventions as well as health programmes.

Methods

Although the LMUP was originally designed to be self-administered, due to varying literacy levels in the Western Cape [24], the LMUP was adapted to be interviewer-administered as per the Indian and Malawian validations [20, 21].

For each language, three translators who speak Xhosa or Afrikaans as a first language were identified and sent a copy of the LMUP in English. Prior to translation, each translator was given a brief description on the objective and background of the LMUP. Translations were completed independently with the purpose of accurately translating the concepts of the English version of the LMUP. For each language, the lead investigator reviewed the three translations. Discrepancies between the translations were discussed during a consensus meeting where all translators for each language were present and a final agreed upon version was selected for back-translation. For each language, back-translation was completed by a translator whose first language was English and who spoke either Xhosa or Afrikaans fluently as a second language. Comparable with other validations of the LMUP, back-translators had a general awareness on the purpose of the LMUP, but were not provided detail on the objectives of the validation.

The objective of using cognitive interviewing techniques was to evaluate the acceptability of the LMUP questions by measuring whether women understand the questions easily and identifying any misunderstandings in the translations. Five women were recruited from an ante-natal clinic in the Cape Town area where the majority of patients presenting to the clinic were Afrikaans speaking, whereas 10 women were recruited from an ante-natal clinic in the Khayelitsha Health District, a predominately Xhosa speaking area. Women were explained the purpose of the cognitive interviews and were only invited to participate after informed consent was provided.

Experienced field workers received training on conducting the translated questionnaire. At both sites, all pregnant women 18 years or older attending the ante-natal clinic were invited to participate. Women who agreed to participate were verbally explained the purpose of the LMUP with the aid of a written information sheet translated into Xhosa or Afrikaans. Consenting women answered a short socio-demographic and obstetric history questionnaire prior to responding to all

six LMUP questions. The field workers verbally administered both questionnaires. Participants were told that they would receive a follow-up phone call in 7-14 days to complete the retest interview. To incentivize participation of the retest, participants were offered 15 South African Rand (£.79/\$1.00/€.95) airtime upon completion of their follow-up phone call. Registers containing personal identifiable information were stored separately from the questionnaires. Test and retest data were linked using a unique personal identification number assigned to each woman at the initial interview. Date of birth was also used to verify that test and retest data were linked correctly.

Xhosa and Afrikaans questionnaires were entered into separate databases created using EpiData version 2.0.0.0. Data were double entered and discrepancies were resolved where possible by confirming correct responses on the paper copy of the questionnaire. Data were exported directly to STATA version 12.0 for analysis.

Analysis of psychometric properties

The analysis was conducted in STATA version 12.0 and used a Classical Test Theory-based approach for each language version separately. To determine whether any significant differences existed between women who participated in follow-up and women who were lost-to-follow-up, Pearson's chi-squared and Fisher's exact tests were used to compare socio-demographic characteristics between women retested and women not retested.

To assess the acceptability of the LMUP questions, qualitative feedback from the cognitive interviews on the ease of comprehension of the LMUP and acceptability of translations was examined. Responses that occurred from more than one participant were considered and changes were made to the LMUP where applicable. Additionally, the percentage of missing data were also

calculated, in which a lower percentage of missing data indicated a higher level of acceptability of [25]. The distribution of total LMUP scores was examined to ensure that a full range of scores between 0-12 had been captured, indicating a heterogeneous sample of women. For both translations, item discrimination was assessed by determining that no item on the LMUP had an endorsement greater than 80 per cent, further indicating a heterogeneous sample of women [26].

For both translations, internal consistency was assessed by calculating Chronbach's alpha, in which a standard cut-off point of 0.70 was used to denote acceptable reliability [27]. All item-rest scores were examined to determine that item correlation values were greater than 0.20, which would indicate that each item was consistent with the overall scale [26]. Additionally, the inter-item correlation matrix was compared with item-rest scores to determine if individual items were consistent with the other items on the test. For each translation, a weighted Kappa score was calculated to assess inter-rater reliability in which a score greater than 0.60 was considered acceptable [28].

Hypothesis testing and principal component analysis (PCA) were used to determine construct validity. PCA was used to evaluate the internal structure of the LMUP; if all items loaded onto one component with an Eigenvalue greater than one, all items were assumed to measure the same construct and the scale was considered valid. For both translations, sensitivity analysis was performed to assess the effect of removing the first item (contraception use) on the internal structure of the LMUP. The three main hypotheses that pregnancies will be reported as more unintended (i.e. total LMUP scores will be lower) in women aged under 20 and greater than 39, in women who are unmarried, and women who have higher parity, were tested using the Wilcoxon Rank-Sum (Mann Whitney U) test due to the non-parametric distribution of pregnancy intention scores.

Ethical Approval

Ethics approval to conduct this study was granted by the University of Cape Town's Human Research Ethics Committee. The Western Cape Health Department approved for this study to be conducted in an ante-natal clinic in the Cape Town area as well as an ante-natal clinic in the Khayelitsha Health district.

Results

Pre-testing

Cognitive interviews were conducted in Afrikaans on five pregnant women recruited from an ante-natal clinic in the Cape Town area and on ten pregnant women in Xhosa recruited from an ante-natal clinic in the Khayelitsha Health district. The women were aged 21-41 (median 26.5) and 18-37 (median 22.0) for Xhosa and Afrikaans, respectively. Four of the five women interviewed in Afrikaans were married and participating women had between 0-2 previous pregnancies. Two of the ten women interviewed in Xhosa were married and participating women had between 0-4 previous pregnancies.

Women found the instructions on the LMUP understandable and straightforward for both the Afrikaans and Xhosa translations. For the Xhosa cognitive interviews it was felt that the word for pregnancy should be changed from 'endimthe' to 'endikhulelwe,' which is a colloquially used term for pregnancy. Another addition to the Xhosa LMUP was to question six regarding preparation, in which several women suggested "financial planning" as a pregnancy preparation action. For the Afrikaans translation, women understood and interpreted questions correctly. The main additions to the Afrikaans translation included adding the word "fiancé" in Afrikaans to the partner

description in question five regarding partner involvement in pregnancy planning as well as adding two additional preparation actions to question six on pregnancy preparation. Two or more women responded that pregnancy preparation actions should include “stopping use of contraceptives” and “taking vitamins” and thus, were included on the field-tested version of the Afrikaans LMUP. Based on evidence from the cognitive interviews, the translation process and finalization of the LMUP allows for slight differences between LMUP versions. This is to include instructions and responses that are culturally relevant to the area in which the LMUP is being validated, and thus more completely measure pregnancy intention.

Field-Test: women's characteristics

Data were collected from 150 and 148 pregnant women for Xhosa and Afrikaans, respectively. Based on the accepted guidelines for a sufficient sample size for the validation of a questionnaire, the target sample size was 150 women, and at least 75 women must complete the re-test [29]. Women interviewed in Xhosa were aged 18-42 (median 26.5) and had between 0-3 live children (median 1.0); 24 per cent of these women were married and 40 per cent cohabited with their partner (table 1). Women interviewed in Afrikaans were aged 16-42 (median 28.0) and had between 0-7 live children (median 1.0). Nearly 51 percent of these women were married; data on cohabitation was not collected for Afrikaans participants (table 1).

Field-Test: psychometric properties

There were no missing data for the Xhosa LMUP and less than one per cent missing data for the Afrikaans LMUP. No responses had more than an 80 per cent endorsement and nearly the full range of scores were captured for both translations (figure 1). LMUP scores ranged from 1.0 to 12.0 for both languages. Median LMUP scores were 5.0 and 8.0 for Xhosa and Afrikaans, respectively.

Chronbach's alpha for the whole Xhosa LMUP scale was 0.83 and was 0.72 for the whole Afrikaans LMUP scale. For the Xhosa translation, item-rest scores were all above 0.20 for items two through six; item one had a low item-rest score of 0.16 (table 2). The inter-item matrix, with correlations between 0.06 and 0.86, showed that item one had the lowest correlations with other test items. For the Afrikaans translation, item-rest scores were above 0.20 for items two through five; item one had an item-rest score of 0.20 and item 6 had an item-rest score of 0.16 (table 2). The inter-item correlation matrix, with correlations between 0.01 and 0.60, showed that both item one and item six had low correlations with other test items.

Eighty-four per cent of women who participated in the Xhosa LMUP were retested between 7-23 days after the initial interview with an average follow-up time of 12 days (median 12.0). Nearly 70 per cent of women who participate in the Afrikaans LMUP were retested between 7-8 days after the initial interview with an average follow-up time of 7 days (median 7.0). For both Xhosa and Afrikaans translations, women who were retested did not significantly differ by number of children, marriage status, education level, or partner's occupation from women who were not retested (table 1). A statistical significant difference by age between women retested and women not retested was found in both LMUP translations, in which women who were retested were slightly older than women who were not retested.

The median LMUP score difference between test and retest scores was 1.0 (mean difference 0.3) with a weighted Kappa statistic of 0.82 for the Xhosa translation whereas the median difference between test and retest scores was 0.0 (mean difference -0.1) with a weighted Kappa statistic of 0.76 for the Afrikaans translation.

Hypothesis testing for the Xhosa LMUP confirmed that women who were younger than 20 and older

than 39 ($p < 0.010$) and women who were unmarried ($p < 0.001$) were significantly more likely to have lower scores on the pregnancy intention scale than women between the ages of 20-39 and women who were married (figure 2). While median LMUP score was lower among women with higher parity in comparison to women with lower parity (4.5 for 2-3 vs 6 for 0-1), it was not statistically significant in this sample (figure 2).

Similar to the Xhosa translation of the LMUP, hypothesis testing for the Afrikaans LMUP confirmed that women who were younger than 20 and older than 39 ($p = 0.020$) and women who were unmarried ($p < 0.001$) were significantly more likely to have lower scores on the pregnancy intention scale than women between the ages of 20-39 and women who were married (figure 3). Additionally, women with two or more children ($p = 0.020$) were significantly more likely to have lower scores on the pregnancy intention scale than women with less than two children (figure 3).

Field Test: sensitivity analysis

Item one regarding contraceptive use had an item-rest correlation below 0.20 for both the Xhosa and Afrikaans LMUP and item six regarding preparation behaviors had an item-rest correlation below 0.20 for the Afrikaans LMUP only. Both the Xhosa and Afrikaans LMUP were reanalyzed excluding item one. For the Xhosa LMUP, the range of LMUP scores reduced to 0 to 10 (median 4), Chronbach's alpha increased from 0.83 to 0.87, and all five items loaded onto one component with an eigenvalue of 3.30. For the Afrikaans LMUP, the range of LMUP scores also reduced to 0 to 10 (median 6), Chronbach's alpha increased from 0.73 to 0.75, and all five items loaded onto one component with an eigenvalue of 2.66.

Finalisation of the Xhosa and Afrikaans LMUP

The percentages of responses to pre-conception pregnancy preparations for item six were examined for

both field-tested translations to determine whether any preparation actions should be removed for the final version of the LMUP. For the Xhosa LMUP, less than five per cent of women reported a reduction in smoking and using folic acid in preparation for their pregnancy. However, these items were included in the final version of the Xhosa LMUP. For the Afrikaans LMUP, there was a range of responses to pre-conception pregnancy preparation actions, indicating all actions should be included in the final version of the Afrikaans LMUP.

Discussion

Performance of the Xhosa and Afrikaans LMUP analysed using Classical Test Theory show that both tests meet the pre-determined criteria for acceptability, internal consistency, and reliability. In addition, hypothesis testing confirmed acceptable construct validity for both translations. The original LMUP, which was validated in the UK, performed strongly when analysed using Classical Test Theory, and although subsequent validations in Malawi, India, and the United States of America performed weaker, they still met the pre-set criteria at an acceptable level similar to the Xhosa and Afrikaans validation of the LMUP (see table 3) [12, 19-21]. Additionally, a more recent validation in the Islamic Republic of Iran, which used slightly different statistical methods, also met the pre-set construct validity criteria at an acceptable level [22].

All items on the Xhosa LMUP loaded onto one component with an Eigenvalue greater than one. Similar to patterns found in other validations of the LMUP, the low inter-item correlations for item one are consistent with its low item-rest correlation, suggesting that item one on contraception use is not very consistent with the rest of the scale. A sensitivity analysis confirmed that the internal consistency of the test increased when item one was removed. In contrast, the Afrikaans LMUP loaded onto two components with an Eigenvalue larger than one; however, the second component was roughly equal to one, the pre-set cut-off point. Item one on contraception use accounts for nearly three quarters of

component two (item loading = 0.75), but on component one, does not appear to be consistent with the rest of the scale. For this reason, item one was removed and a sensitivity analysis was performed, in which the internal consistency of the test increased.

However, the Xhosa and Afrikaans LMUP still perform well with the inclusion of item one. Further, item one represents one of two questions that comprise the behaviour domain of the conceptual model used to develop the LMUP, and thus may be beneficial to include in the final test. Although no contraception use was highly associated with pregnancy intention in the original validation of the LMUP, validations of the LMUP in similar settings to South Africa also found a smaller association between pregnancy intention and no contraception use [20, 21]. This low association between contraception use and pregnancy intention in the South African setting could be explained by an unmet need for family planning. Although 65 per cent of South African women in 2003 had access to modern contraceptive methods, over 50 per cent of pregnancies were unintended, indicating an unmet need for reliable, modern contraceptive methods [22]. Similarly, in the validations of the LMUP in India, Malawi, and in low-income women in the United States, an unmet need for contraception may also be a contributing factor to the low association between no contraception use and pregnancy intention [19-21]. Moreover, behaviours relating to contraception use are influenced by health service availability and knowledge [10, 12].

For two distinct reasons, the inclusion of item one on the Xhosa LMUP and inclusion of item one and six on the Afrikaans LMUP are recommended:

1. As both of item one and item six represent the behaviour domain of concept behind the LMUP and are influenced by contextual factors, these items may become more relevant over time.
2. Neither scale is comprised by including items with an item-rest score below 0.20.

Limitations

There are several limitations to this study. Firstly, the LMUP was only tested in pregnant women attending ante-natal clinics who were planning to carry their pregnancy to term. Although an estimated 95% of women in the Western Cape Province attend an ante-natal clinic at least once, it is likely that women who do not attend ante-natal clinics differ from women who do attend ante-natal clinics in socio-economic factors and subsequently, pregnancy intention [29]. This selection bias may not only distort the results found, but may also limit the generalizability of the use of the LMUP in terms of the wider population of Xhosa and Afrikaans speaking women. Additionally, the translated versions of the LMUP in South Africa were not tested on women who choose to terminate their pregnancy. However, the original LMUP study developed and validated in the UK, included termination of pregnancy as a pregnancy outcome, and thus could potentially be used in South Africa in women accessing termination of pregnancy services.

Secondly, the limited range in follow-up times for which the retest data was collected for the Afrikaans LMUP could be problematic. Women who were not reached between the first and second day of follow-up were considered lost to follow-up due to interviewer error. Although women retested far exceeded the number required for follow-up, women who were considered lost-to-follow-up may differ significantly from those who were retested, which could bias the results of the validation of the Afrikaans LMUP.

Thirdly, inherent in all retrospective measures, recall bias may influence the validity of the LMUP. Recall bias may be even more likely in the context of pregnancy intention, as women's attitudes and consequently, the way they respond to pregnancy intention questions may change over the course of their pregnancy [31]. Women may not have intended conception, but retrospectively consider the pregnancy to occur at the right time. Similarly, even if a pregnancy was unintended or mistimed, the

pregnancy may still be wanted. The LMUP aims to reduce recall bias by delineating the concepts around pregnancy intention, planning, and wanting.

Finally, although hypothesis testing and PCA demonstrated that the construct validity of both the Xhosa and Afrikaans LMUP validation were high, indicating that the Xhosa and Afrikaans LMUP may be used throughout South Africa, it is likely that the both tests will perform differently in different provinces around South Africa due to differing access of reproductive, ante-natal, and termination of pregnancy services.

Conclusion

The translated scales in this study provide a valid and reliable way to measure pregnancy intention in Xhosa or Afrikaans speaking women who are currently pregnant or recently gave birth and reside in the Western Cape. Both scales provide a more in depth and nuanced understanding of pregnancy intention than previously provided by the demographic health survey inspired questions regarding pregnancy intention. The two validated scales can be used for research in the monitoring and evaluation of family planning, pre-conception and pregnancy planning, and ante/post-natal care interventions. Additionally, the Xhosa and Afrikaans LMUP can be used as a tool in the exploration of pregnancy related behaviours and pregnancy intention as well as in the exploration of pregnancy intention and its influences on maternal and child health. The use of the LMUP in Xhosa and Afrikaans will aid in measuring factors influencing pregnancy intention and related pregnancy planning behaviours, in which South Africa can use to design programmes to help provide women with appropriate family planning and ante-natal care.

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Table 1: Characteristics of women completing the London Measure of Unplanned Pregnancy field test and retest in both Xhosa and Afrikaans in the Western Cape, South Africa

Socio-demographic Characteristics	<u>Xhosa</u>			<u>Afrikaans</u>			Comparison of retest and non-retest groups	
	LMUP field test N=150	LMUP retest N=126	LMUP non-retest N=24	LMUP field test N=148	LMUP retest N=103	LMUP non-retest N=45	Xhosa	Afrikaans
	Age							
mean (sd)	27.59 (5.70)	28.00 (5.69)	25.41 (5.40)	28.52 (5.80)	29.10 (5.53)	27.50 (6.00)		
median	26.5	27	25	28	28	27.5	P = 0.02	P=0.10
range	18-42	18-40	18-40	18-42	20-42	18-41		
Age group	N (%)	N (%)	N (%)	N=145 (%)	N=103 (%)	N=42 (%)		
<20	9 (6.00)	5 (3.97)	4 (16.66)	5(3.45)	0	5 (11.90)		
20-24	47 (31.33)	40 (31.75)	7 (29.17)	37 (25.52)	29 (28.16)	8 (19.05)		
25-29	45 (30.00)	35 (27.78)	10 (41.66)	45 (31.03)	29 (28.16)	16 (38.10)	P =0 .04	P=0.003
30-34	29 (19.33)	28 (22.22)	1 (4.17)	33 (22.76)	24 (23.30)	9 (21.43)		
35-39	15 (10.00)	14 (11.11)	1 (4.17)	20 (13.79)	18 (17.47)	2 (4.76)		
>= 40	5 (3.33)	4 (3.17)	1 (4.17)	5 (3.45)	3 (2.91)	2 (4.76)		
Children	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)		
0	66 (44.00)	53 (42.06)	13 (54.17)	35 (23.65)	21 (20.39)	14 (31.10)		
1	44 (29.33)	38 (30.16)	6 (25.00)	57 (38.51)	41 (39.81)	16 (35.56)		
2	28 (18.67)	27 (21.43)	1 (4.16)	37 (25.00)	28 (27.18)	9 (20.00)	P = 0.06	P=0.63
3	12 (8.00)	8 (6.35)	4 (16.67)	11 (7.43)	8 (7.77)	3 (6.67)		
4	0 (0.00)	0 (0.00)	0 (0.00)	8 (5.41)	5 (4.85)	3 (6.67)		

Marriage status to father	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)		
Married	36 (24)	33 (26.19)	3 (12.50)	76 (51.35)	51 (49.51)	25 (55.56)	P = 0.30	P=0.50
Unmarried	114 (76)	93 (73.81)	21 (87.50)	72 (48.65)	52 (50.49)	20 (44.44)		
Cohabiting/living with father	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)		
Yes	61 (40.67)	53 (42.06)	8 (33.33)	N/A	N/A	N/A	P = 0.43	
No	89 (59.33)	73 (57.94)	16 (66.67)	N/A	N/A	N/A		
Highest Level of Education completed	N (%)	N (%)	N (%)	N=146 (%)	N=101 (%)	N=42 (%)		
Primary School	3 (2.00)	2 (1.59)	1 (4.14)	3 (2.05)	1 (0.99)	2 (4.44)	P = 0.41	P=0.23
High School	147 (98.00)	124 (98.41)	23 (95.83)	132 (90.41)	93 (92.08)	39 (86.67)		
Tertiary	0 (0.00)	0 (0.00)	0 (0.00)	10 (6.85)	7 (6.93)	3 (6.67)		
Other	0 (0.00)	0 (0.00)	0 (0.00)	1 (0.68)	0 (0.00)	1 (2.22)		
Father Occupation	N= 146 (%)	N=123 (%)	N=23 (%)	N (%)	N (%)	N (%)		
Employed	124 (84.93)	104 (84.55)	20 (86.96)	125 (85.03)	86 (84.31)	39 (86.67)	P=0.51	P = 1.00
Unemployed	15(10.27)	12 (9.76)	3 (13.04)	20 (13.61)	14 (13.73)	6 (13.33)		
Student	7 (4.80)	7 (5.69)	0	2 (1.36)	2 (1.96)	0		

Table 2: Principal component analysis of Afrikaans and Xhosa London Measure of Unplanned Pregnancy

Items	<u>Xhosa LMUP</u>				<u>Afrikaans LMUP</u>			
	Chronbach's alpha	Item-rest correlations	Component 1 (Eigenvalue =3.3)		Chronbach's alpha	Item-rest correlations	Component 1 (Eigenvalue =2.72)	Component 2 (Eigenvalue =1.04)
			Item loadings				Item loadings	Item loadings
1- Contraception	0.83	0.16	0.11	0.72	0.20	0.20	0.74	
2- Timing		0.68	0.44		0.48	0.43	-0.13	
3- Intention		0.78	0.49		0.65	0.50	0.05	
4- Desire		0.80	0.50		0.65	0.50	0.17	
5- Partner		0.71	0.47		0.64	0.47	-0.22	
6- Preparation		0.38	0.27		0.16	0.16	-0.59	

Table 3: Comparison of results of classical test theory analysis for validation of original London Measure of Unplanned Pregnancy (LMUP) and subsequent validations

	Internal consistency Chronbach's alpha	Eigenvalues of principal component analysis components	Test retest weighted k
UK (original)	0.92	4.22	0.97 and 0.86
USA (English)	0.78	2.90	0.72
USA (Spanish)	0.84	3.40	0.77
India (Kannada)	0.76	2.66 and 1.05	0.43
India (Tamil)	0.71		
Malawi (Chichewa)	0.78	3.1 and 1.00	0.80
South Africa (Xhosa)	0.83	3.30	0.82
South Africa (Afrikaans)	0.72	2.72 and 1.04	0.76

Figure 1: Distribution of scores for the London Measure of Unplanned Pregnancy (LMUP) in South Africa

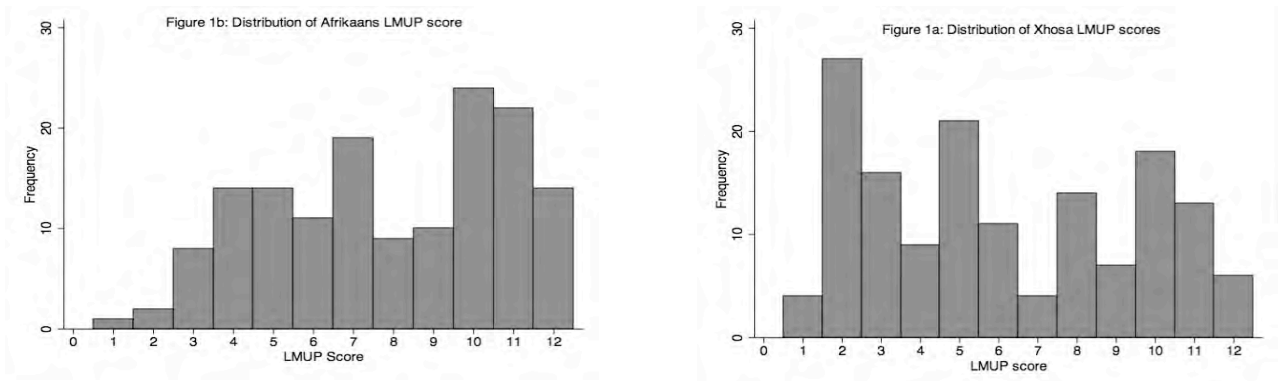


Figure 2: Total Xhosa LMUP scores by age, marriage, and parity

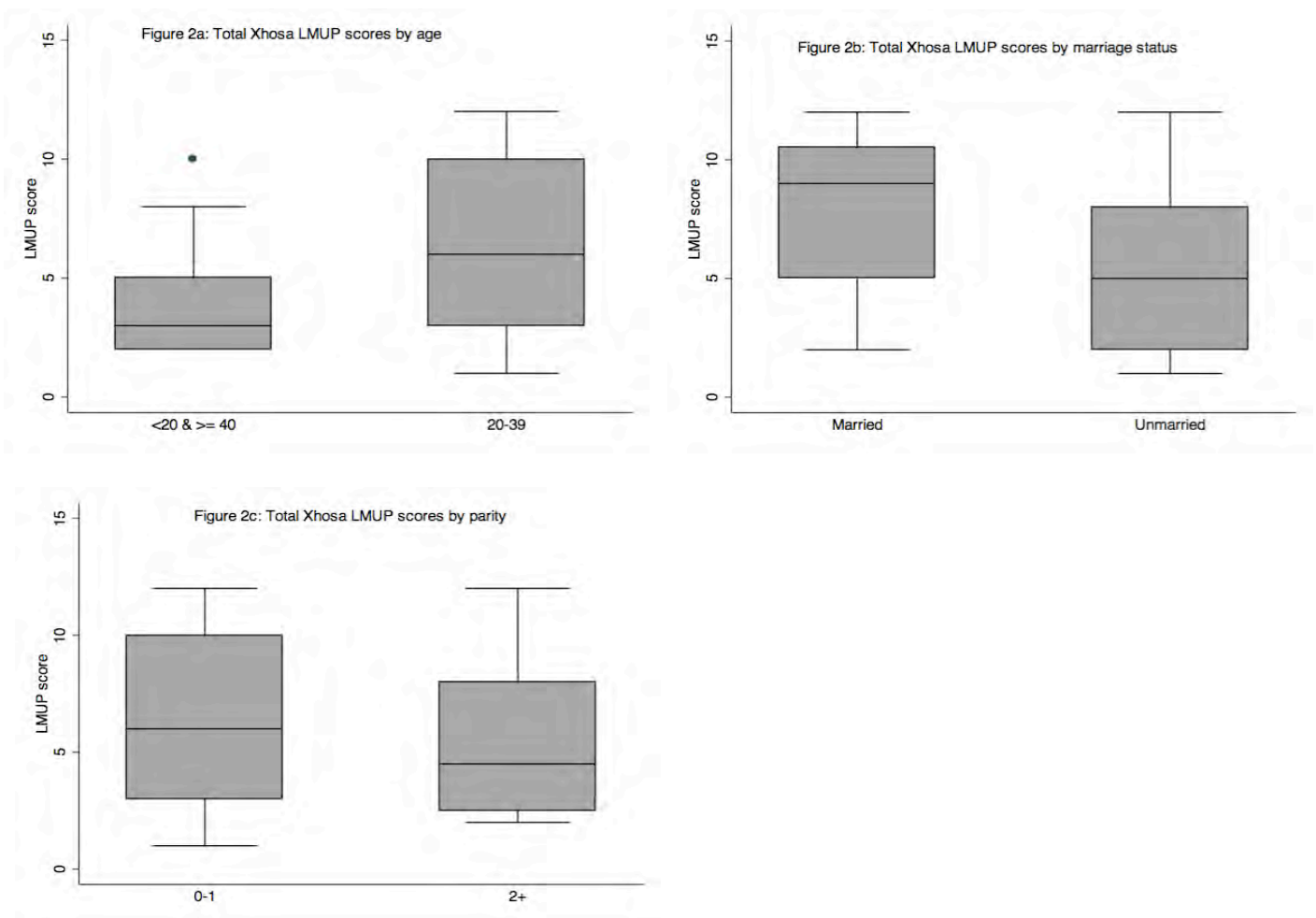
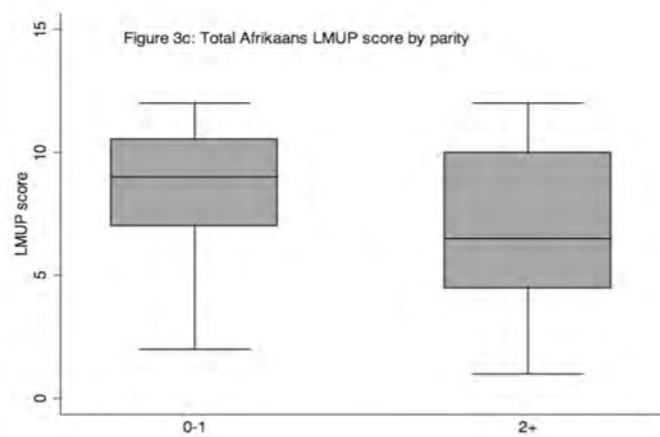
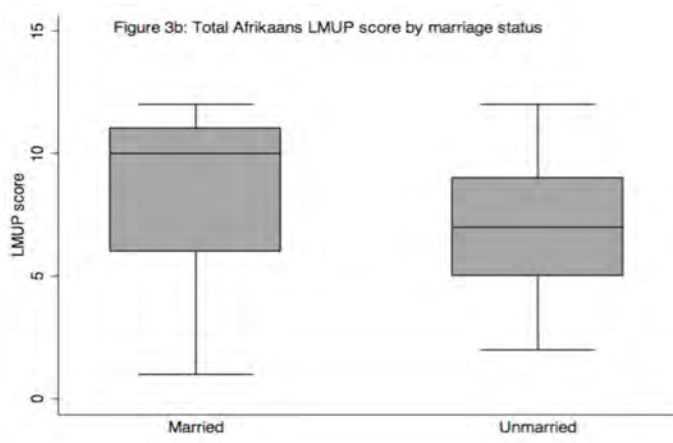
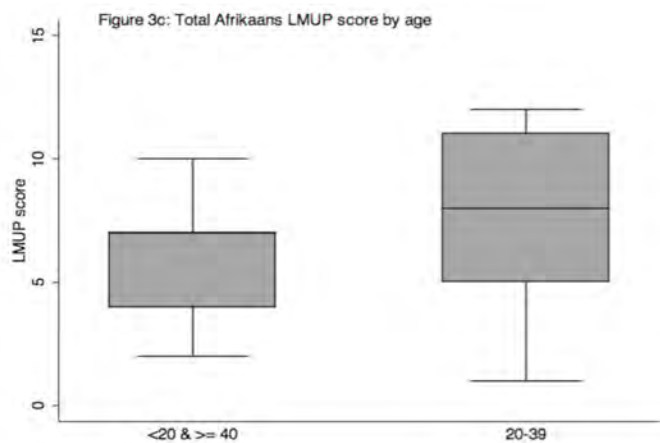


Figure 3: Total Afrikaans LMUP scores by age, marriage, and parity



LIST OF ABBREVIATIONS

LMUP	London Measure of Unplanned Pregnancy
PCA	Principal component analysis
UK	United Kingdom

DECLARATIONS

Ethics Approval and Consent to Participate

The University of Cape Town's Human Research Ethics Committee approved this study in June 2015.

The reference number is HREC: 280/2015.

Consent for Publication

Not Applicable

Availability of data and materials

The datasets generated during this study are available upon request from Ms. Deborah Constant at the University of Cape Town's Women's Health Research Unit. She can be reached at:

deborah.constant@uct.ac.za.

Competing Interests

The authors declare that they have no competing interests.

Funding

Funding for this project was sourced privately.

Authors' contributions

For the purpose of this dissertation, Elizabeth Ernstoff is the sole author of this journal article

Acknowledgements

Thank you to Ms. Deborah Constant of the University of Cape Town and Dr. Chelsea Morroni of the University of Botswana for your guidance and support throughout this research project as my advisors.

Thank you to both field-workers for your dedication and hard work throughout this study. Thank you to the nurses at the ante-natal clinics for providing space to conduct the study and willingness to help./

PART D:

APPENDICES

I. University of Cape Town Research Ethics Committee Study Approval Letter



UNIVERSITY OF CAPE TOWN
Faculty of Health Sciences
Human Research Ethics Committee



Room 603-34 Old Man Building
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 Observatory 7935
 Telephone (021) 406 6000 • Facsimile (021) 406 0411
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 Website: www.health.uct.ac.za/fhs/research/humanethics/forms

22 June 2015

HREC REF: 289/2015

Ms D Constant
 Women's health Research Unit
 Public Health & Family Medicine
 Palmouth Building

Dear Ms Constant,

PROJECT TITLE: UNDERSTANDING PREGNANCY INTENTION IN THE SOUTHERN AFRICAN SETTING: VALIDATION OF THE LONDON MEASURE OF UNPLANNED PREGNANCY IN CAPE TOWN, SOUTH AFRICA (MPH candidate - Ms E Ernetoff)

Thank you for your response to the Faculty of Health Sciences Human Research Ethics Committee received on 10 June 2015.

It is a pleasure to inform you that the HREC has formally approved the above-mentioned study.

Approval is granted for one year until the 30th June 2016.

Please submit a progress form, using the standardized Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

Please quote the HREC REF in all your correspondence.

We acknowledge that the student, Elizabeth Ernetoff will also be involved in this study.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Yours sincerely

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE

Federal Wide Assurance Number: FWA00001637

Institutional Review Board (IRB) number: IRB00001938

This serves to confirm that the University of Cape Town Human Research Ethics Committee complies to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Convention on Harmonisation Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (Doll

HREC 289/2015

II. Western Cape Department of Health Approval Letters

Appendix B: Mowbray Maternity Approval Letter



STRATEGY & HEALTH SUPPORT
Health.Research@westerncape.gov.za
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REFERENCE: WC_2015RP5_318
ENQUIRIES: Ms Charlene Roderick

University of Cape Town
Anzio Road
Observatory
Cape Town
7935

For attention: **Ms Deborah Constant, Ms Elizabeth Ernstoff and Dr Chelsea Morroni**

Re: UNDERSTANDING PREGNANCY INTENTION IN THE SOUTHERN AFRICAN SETTING: VALIDATION OF THE LONDON MEASURE OF UNPLANNED PREGNANCY IN CAPE TOWN, SOUTH AFRICA

Thank you for submitting your proposal to undertake the above-mentioned study. We are pleased to inform you that the department has granted you approval for your research.

Please contact the following people to assist you with any further enquiries in accessing the following sites:

Mowbray Maternity Hospital S Fawcus Contact No: 021 659 5579

Kindly ensure that the following are adhered to:

1. Arrangements can be made with managers, providing that normal activities at requested facilities are not interrupted.
2. Researchers, in accessing provincial health facilities, are expressing consent to provide the department with an electronic copy of the final feedback (annexure 9) within six months of completion of research. This can be submitted to the provincial Research Co-ordinator (Health.Research@westerncape.gov.za)
3. The reference number above should be quoted in all future correspondence.

Yours sincerely A

DR A HAWKRIDGE
DIRECTOR: HEALTH IMPACT ASSESSMENT
DATE: 31 / 7 / 2015.
CC

III. Project Proposal Appendices

Appendix A: Demographics and LMUP Questionnaire (English Version)

NOTE to Ethics Committee: The translation of this instrument is a key part of the research process for a measurement validation study, thus only the English version is provided here. A detailed translation and back translation process will occur as part of the research

BETTER MEASURING PREGNANCY INTENTION IN SOUTH AFRICA STUDY

Socio-demographic and reproductive history questions

How old are you?	Age (years) _ _
What is your date of birth?	Day/Month/Year _ _ / _ _ / _ _ _ _
What is the highest level of school you attended?	None <input type="checkbox"/> Primary <input type="checkbox"/> Secondary <input type="checkbox"/> Tertiary <input type="checkbox"/>
What is your relationship to the man who fathered this pregnancy?	Married <input type="checkbox"/> Boyfriend / fiancé <input type="checkbox"/> Casual acquaintance <input type="checkbox"/> Relative <input type="checkbox"/> Divorced / separated <input type="checkbox"/> Widowed <input type="checkbox"/> Other (specify) _____
What is his main occupation?	Farming <input type="checkbox"/> Casual worker/Yuga <input type="checkbox"/> Salaried worker <input type="checkbox"/> Small business/artisan <input type="checkbox"/> Student <input type="checkbox"/> No work <input type="checkbox"/> Other (specify) _____
Have you ever had a pregnancy before this child, even if it ended early or the baby was a stillbirth?	Yes <input type="checkbox"/> No <input type="checkbox"/> (if no this is the end of the questions)
How many pregnancies have you had?	Number _ _
How many babies have you given birth to?	Number _ _
How many children of your own do you have alive now?	Number _ _

London Measure of Unplanned Pregnancy

I would like to ask you some questions that are about your circumstances and feelings around the time you became pregnant. Please think of your current pregnancy when answering these questions. For every question there is a list of possible answers. Please wait and listen to all the responses and then choose the option that is most applicable to you and tell me which one it is.

The first question has four possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

- 1) In the month that I became pregnant.....
 - I/we were not using contraception
 - I/we were using contraception, but not on every occasion
 - I/we always used contraception, but knew that the method had failed (i.e. broke, moved, came off, came out, not worked etc) at least once
 - I/we always used contraception

Now I am going to ask a question and there are *three* possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

- 2) In terms of becoming a mother, I feel that my pregnancy happened at the.....
 - right time
 - ok, but not quite right time
 - wrong time

The next few questions ask about before you became pregnant. This question also has three possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

- 3) Just before I became pregnant.....
 - I intended to get pregnant
 - My intentions kept changing
 - I did not intend to get pregnant

The next question has three possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

- 4) Just before I became pregnant....
 - I wanted to have a baby
 - I had mixed feelings about having a baby
 - I did not want to have a baby

In the next question, we ask about your partner - this might be (or have been) your husband, a partner

you live with, a boyfriend, or someone you've had sex with once or twice.

There are three options for the next question. Again thinking about before you became pregnant would you say...

5) Before I became pregnant....

- My partner and I had agreed that we would like me to be pregnant
- My partner and I had discussed having children together, but hadn't agreed for me to get pregnant
- We never discussed having children together

The last question also asks you to think about before you became pregnant. There is a list of possible options and I would like you to tell me all of those that apply to you.

6) Before you became pregnant, did you do anything to improve your health in preparation for pregnancy?

- took folic acid
- stopped or cut down smoking
- stopped or cut down drinking alcohol
- ate more healthily
- sought medical/health advice
- took some other action, please describe _____

or

- I did not do any of the above before my pregnancy

Appendix B: Instructions for translators

Instructions for translators

Thank you very much for helping us to translate the London Measure of Unplanned Pregnancy (LMUP) into **INSERT XHOSA OR AFRIKAANS**.

The LMUP is a new tool that is designed to assess how planned or unplanned a woman's pregnancy is. It asks six questions that cover a range of attitudes and behaviours associated with pregnancy. The response to each question is scored with zero, one or two points. The scores on all six questions are added together to give a total score between zero and twelve. This score is what tells us how planned or unplanned a pregnancy is with a score of zero being completely unplanned and a score of twelve being completely planned. We believe that this way of measuring pregnancy intention is much better than the current method as it provides more information and allows for variety in planning status.

The LMUP was originally developed as a questionnaire to be completed by the women themselves. However, during testing and translation in India and Malawi it was adapted to be used as an interviewer-administered questionnaire. As this fits better with the context in South Africa, we will also be adopting this approach.

The aim of this translation is not necessarily to translate the LMUP word for word, but to translate the concept behind the question to ensure that we are asking the same question. This becomes most apparent on the final question which asks women about what actions they took prior to becoming pregnant in preparation for the pregnancy. In the English version this question includes options such as 'stopped smoking,' which may not be relevant in the South African context. For example, in the Indian and Malawian version translators changed the options to culturally equivalent actions that might be taken in preparation for pregnancy, such as 'stopped eating paan leaves' or 'saved money for medical expenses.' When translating this question, please think about whether the options started are relevant and, if not, what actions women in South Africa might take in preparation for becoming pregnant. Please list these alternative actions for this question.

Throughout the translation please bear in mind that we are trying to ask the same question, but not necessarily use the same words. Feel free to amend the sentence structure to make it more understandable, less offensive, or more like normal speech if you think that it needs it. Please note

these changes as we will discuss all adaptations made.

The LMUP is being translated separately by three people. We are asking everyone to have finished the translation by **INSERT DATE** and to send the translation to Deborah Constant (deborah.constant@uct.ac.za).

Ms. Constant will distribute the three translations to all of the translators. Please read each of these translations before you attend the meeting at **INSERT PLACE** on **INSERT DATE** at **INSERT TIME**. All the translators and investigators will be present at this meeting. We will use this time to examine the three translations of the LMUP and discuss the reasons for observed differences, agree what the question is trying to ask and come to a consensus on the most appropriate translated version. Please note that initial differences in translations is expected and does not indicate a problem or a failure in the translations.

Once a final version of the translated LMUP is agreed upon, we will continue the translation process by back translating the LMUP before it is tested on a small number of pregnant women. After any final changes are made, the LMUP will be field-tested and validated.

The text of the LMUP that you are being asked to translate is in the attached document. If you have any queries or require any further clarification please do not hesitate to contact Deborah Constant at deborah.constant@uct.ac.za **or INSERT NUMBER**

I look forward to meeting you on **INSERT DATE**.

Kind regards,

Deborah

INFORMATION SHEET FOR COGNITIVE INTERVIEWS: STUDY TO VALIDATE THE LONDON MEASURE OF UNPLANNED PREGNANCY IN SOUTH AFRICA

We would like to invite you to participate in this research project. You do not have to take part in this research if you don't want to.

This is a research study by **Deborah Constant and other researchers from the University of Cape Town and the University of Botswana.**

The London Measure of Unplanned Pregnancy (LMUP) is a six item questionnaire that **measures how planned or unplanned a woman's current, or most recent, pregnancy is.** The LMUP was first developed in the United Kingdom, but is now used in other countries including India, Malawi, the United States of America and Brazil. We are interested in **testing the LMUP in South Africa** to check that it works as well here as it does in other places.

The measurement and understanding of pregnancy intention is very important to understanding need for family planning in the Western Cape and how women decide when to have children. This information will also help us understand whether the pregnancy intention effects maternal and child health, and if so, how. In South Africa, there are still a high number of maternal and child deaths and **understanding how pregnancy intention influences this will suggest ways in which these deaths could be prevented.** If the LMUP is found to be suitable for use in South Africa, we plan to use it in other research and in the clinics.

In order to test the LMUP in the Western Cape we have translated it into Xhosa and Afrikaans. Now we need to check the translation and we would like to ask you to help us with this. We will be asking a small number of pregnant women to talk to us about the questions that we are asking in the LMUP. We need to be sure that women can understand the questions so that they are answering the questions that we think that we are asking. If our translation is not good enough it might mean that people misunderstand the questions and we aren't able to get the information that we are looking for. It is important to be aware that we are not testing you but the translated LMUP; we will not be judging your answers as right or wrong.

If you agree to participate in this research **we would like to ask you to participate in a one to one interview** where we will ask you a series of questions about you and your understanding of the questions in our Xhosa or Afrikaans version of the LMUP. The interview will be conducted by Deborah Constant or another study investigator with the aid of a translator, if necessary. If you agree to be interviewed it will take **about 45 minutes** of your time. We would like to **record the interview** so that we can make a careful analysis of the discussions. These recordings will be written up and kept securely. Your responses will be used to improve the translated LMUP.

Agreeing to take part in this research

Your participation is entirely voluntary. If you don't want to take part, you can refuse without any penalty or loss of benefits to you. It is important to be aware that **the ante-natal care that you receive here will not be affected in any way whether or not you decide to take part.** If you do agree to participate and then change your mind, please tell the researchers and they will end your participation immediately, without question and without any penalty or loss of benefits to you. You can do this at any point during this study.

Benefits of taking part in this research

Although there are no direct benefits to yourself of taking part in this research, your participation will be an important contribution to work that will help us to understand more about pregnancy intention in the Western

Cape. The hope is that this information can ultimately be used to reduce maternal and child deaths and improvement in pregnancy health in the Western Cape. As we will not have your contact information we will not be able to provide you with a copy of the results automatically. However if you would like to see these please contact Deborah Constant who will give you a copy of the results.

Potential harms involved in taking part in this research

We do not anticipate that any harm will come to you through your participation in this research. However it is possible that some of the questions we ask you will cause feelings of regret or distress about your pregnancy. If this occurs and you do not wish to continue, please inform the researcher who will stop the interview immediately. If you would like to talk to someone about the feelings generated by these questions please contact [insert name of social worker at particular clinic], Deborah Constant, or let the interviewer know who will refer you to counselling. All interviewers went through training to give the interview and are supervised by Deborah Constant from the University of Cape Town.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form.

Confidentiality

As a participant in the research you can expect that all the information you provide will be kept private. The responses that you provide to the LMUP and other questions will only be used by the researchers. No one outside the research team will know how you answered the questions. We will not have information that links your personal information to your responses.

Ethical approval

The ethics committee of the University of Cape Town have approved this study (**insert application number**).

More information

For further questions about this research, your rights as a subject, or any negative effects related to the research, please contact:

[Insert name of social worker at particular hospital or rape crisis counsellor in surrounding area]

Deborah Constant
Women's Health Research Unit
University of Cape Town
Email: deborah.constant@uct.ac.za
Telephone: [072 252 7415]

Dr Marc Blockman
Human Research Ethics Committee
University of Cape Town
Telephone: [021 406 6338]

Please discuss the information above with others if you wish or ask us if there is anything that is not clear or if you would like more information.

Remember, it is up to you to decide whether to take part or not; choosing not to take part will not disadvantage you in any way. If you do decide to take part you are still free to withdraw at any time and without giving a reason.

INFORMED CONSENT FORM FOR COGNITIVE INTERVIEWS: STUDY TO VALIDATE

THE LONDON MEASURE OF UNPLANNED PREGNANCY IN THE WESTERN CAPE, SOUTH AFRICA

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you. **Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.**

If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you to decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.

Participant's Statement

I _____ (NAME)

- have read the notes written above and the Information Sheet, and understand what the study involves.
- understand that this interview will be recorded. I understand that the tapes will be transcribed and kept for some time before being destroyed.
- agree that the researchers may transfer the information that I provide to the University of Cape Town use it in their analysis/training.
- understand that the information I give will be treated in the strictest confidence by the researchers.
- understand that at any time I may withdraw from this study without giving a reason and that I will not be affected negatively in any way if I do not want to participate or if I decide to withdraw.
- agree that the research project named above has been explained to me to my satisfaction and I voluntarily agree to take part in this study.

Please tick as appropriate:

- I agree that my comments in the interview may be quoted, but my name will be anonymised
- I do not agree that any of my comments in the interview may be quoted, even anonymously, but the researchers may use information from my interview to inform their analysis

Participant's signature: _____ **Date:** _____

Researcher's name (please print): _____ **Date:** _____

Researcher's signature: _____

This study has been approved by the University of Cape Town's Research Ethics Committee (Project ID Number):

LMUP Xhosa/Afrikaans Cognitive Testing Protocol

Instructions to the Subject

Thank you for agreeing to take part today. Let me tell you a little more detail about what we will be doing.

We have translated a questionnaire into Xhosa/Afrikaans and would like to test the translation and the questions by going through it with several pregnant women like yourself. I'll ask you questions and you answer them, just like a normal questionnaire. However, here we are less interested in the actual answer to the question and much more interested in getting a better idea of whether the questions are clear and easy to understand.

To help us do this I'd like you to try to think aloud as much as you can as you answer the questions – just tell me everything that you are thinking about as you go about answering them.

At times I might also ask you more questions about a particular word or phrase or what you think the question is asking about. I will be taking some notes and recording the interview.

Please keep in mind that I really want to hear all of your opinions and reactions whether good or bad. Please don't hesitate to tell me if something seems unclear, is hard to answer or doesn't seem to apply to you – this is really helpful information for me and I won't be upset or offended.

If we haven't already finished by then we will stop the interview after one hour.

Do you have any questions before we start?

This is the start of the questionnaire. First there are some instructions.

I would like to ask you some questions that are about your circumstances and feelings around the time you became pregnant. Please think of your current pregnancy when answering these questions. For every question there is a list of possible answers. Please wait and listen to all the responses and then choose the option that is most applicable to you and tell me which one it is.

PROBE: Are these instructions easy or difficult to understand?

The first question has *four* possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

In the month that I became pregnant.....

I/we were not using contraception

I/we were using contraception, but not on every occasion

I/we always used contraception, but knew that the method had failed (i.e. broke, moved, came off, came out, not worked etc) at least once

I/we always used contraception

PROBE: Is the instruction 'Please choose the one option that is most applicable to you and tell me which one it is' easy or difficult to understand?

What does 'the month that I became pregnant' mean to you?

What does the term 'contraception' mean to you?

What types of contraception do you think are included in this question?

What does 'every occasion' mean to you?

What does 'the method had failed' mean to you?

Now I am going to ask a question and there are *three* possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

In terms of becoming a mother, I feel that my pregnancy happened at the.....

- right time
- ok, but not quite right time
- wrong time

PROBE: How did you arrive at your answer?

If answers 'wrong time' – what are the factors that led you to feel that the pregnancy wasn't quite at the right time?

The next few questions ask about before you became pregnant. This question also has *three* possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

Just before I became pregnant.....

- I intended to get pregnant
- My intentions kept changing
- I did not intend to get pregnant

PROBE: In your own words, what is this question asking?

How did you arrive at your answer?

What does the term 'intention' mean to you as it is used in this question?

How much thought would you say you have given to this before today?

The next question has *three* possible responses to it. Please choose the one option that is most applicable to you and tell me which one it is.

Just before I became pregnant....

- I wanted to have a baby
- I had mixed feelings about having a baby
- I did not want to have a baby

PROBE: You said Exactly when does your answer refer to?

How did you arrive at your answer?

How easy or difficult was it to remember how you felt about having a baby before you became pregnant?

If you were asked how you feel about having the baby now that you are pregnant would you give the same answer or a different answer?

In general, how do you feel about this question?

How do you feel this question differs from the previous question? (repeat question if needed)

In the next question, we ask about your partner - this might be (or have been) your husband, a partner you live with, a boyfriend, or someone you've had sex with once or twice.

PROBE: What does the word 'partner' mean to you in this question?

Are the descriptions of the types of partner complete or is there something else that you would add?

There are three options for the next question. Again thinking about before you became pregnant would you say...

Before I became pregnant....

- My partner and I had agreed that we would like me to be pregnant
- My partner and I had discussed having children together, but hadn't agreed for me to get pregnant
- We never discussed having children together

PROBE: How did you arrive at your answer?

Was this question easy or difficult to answer?

The question uses the word 'partner'. Does that sound ok to you or would you choose something different?

The last question also asks you to think about before you became pregnant. There is a list of possible options and I would like you to tell me all of those that apply to you.

Before you became pregnant, did you do anything to improve your health in preparation for pregnancy?

- took folic acid
- stopped or cut down smoking
- stopped or cut down drinking alcohol
- ate more healthily
- sought medical/health advice
- took some other action, please describe _____
or
- I did not do any of the above before my pregnancy

PROBE: In your own words, what is this question asking?

What does 'folic acid' mean to you?

What other things are there that women might do to prepare for pregnancy that aren't on this list?

Thank you, this in the end of the questionnaire. Now that you have completed it, how well do you think these questions assess your thoughts and feelings about becoming pregnant?

- Good
- Ok
- Bad

Do you have any other thoughts or comments that you would like to share with us?

End time of interview_____

INFORMATION SHEET: VALIDATION OF THE LONDON MEASURE OF UNPLANNED PREGNANCY IN SOUTH AFRICA

We would like to invite you to participate in this research project. You do not have to take part in this research if you don't want to.

This is a research study conducted by **Deborah Constant and other researchers from the University of Cape Town and the University of Botswana.**

The London Measure of Unplanned Pregnancy (LMUP) is a six item questionnaire that aims to **assess how planned or unplanned a woman's current, or most recent, pregnancy is.** The LMUP was originally developed in the United Kingdom, but has since been used in other countries including India, Malawi, the United States of America and Brazil. We are interested in **testing the LMUP in South Africa** to check that it works as well here as it does elsewhere.

The measurement and understanding of pregnancy intention is essential to understanding need for family planning in the region and how decisions are made about when to have children. This information will also help us understand whether the degree of pregnancy intention has any impact on maternal and child health, and if so, how. There are still high numbers of maternal and child deaths in South Africa and **understanding how pregnancy intention influences this will suggest ways in which these deaths could be prevented.** If the LMUP is found to be suitable for use in South Africa we plan to use it in other research and clinical care.

In order to test the LMUP in South Africa we have translated it into Xhosa and Afrikaans. Now we would like to ask **one hundred and fifty pregnant women** to complete the LMUP, which is why we have approached you. In addition to the six questions on the LMUP, we would also like to ask you a **few questions today about yourself**, such as your age, marital status, partner's occupation, education level and how many previous pregnancies you have had. This information will allow us to analyse your responses to the LMUP to confirm whether or not it is successful. We anticipate that altogether these questions will take **less than ten minutes.**

To fully assess the LMUP we also need as many women as possible to complete the LMUP again in the next one to two weeks. We will be contacting you by telephone over the next few weeks. We will ask for your first name, telephone number and what times are convenient to reach you in about a weeks time. All of this information will remain completely confidential. We will phone you in about a week to ask the same questions again by phone. Once we have spoken to you or tried to contact you 3 times without success, we will permanently delete your name and telephone number from our records, and after that your participation in the study will be completely anonymous.

Agreeing to take part in this research.

Your participation is entirely voluntary. If you don't want to take part, you can refuse without any penalty or loss of benefits to you. It is important to be aware that **the ante-natal care that you receive from this clinic will not be affected in any way whether or not you decide to take part.** If you do agree to participate and then change your mind, please tell the researchers and they will end your

participation immediately, without question and without any penalty or loss of benefits to you. You can do this at any point during this study.

Benefits of taking part in this research

Although there are no direct benefits to yourself in taking part in this research, your participation will be an important contribution to work that will help us to understand more about pregnancy intention in South Africa. The hope is that this information can ultimately be used to reduce maternal and child deaths and better pregnancy health in South Africa. If you would like to see these results of the study please contact Deborah Constant who will ensure that you are provided with a copy.

Potential harms involved in taking part in this research

We do not anticipate that any harm will come to you through your participation in this research. However it is possible that feelings of regret or distress might be provoked by some of the questions about your pregnancy. If this occurs and you do not wish to continue, please inform the researcher who will stop the interview immediately. If you would like to talk to someone about the feelings generated by these questions please contact Deborah Constant.

If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form.

Compensation

You will not receive any reimbursement for partaking in this study. This does not affect your right to withdraw from the study at any point.

Confidentiality

As a participant in the research you can expect that all the information you provide will be treated in confidence. The responses that you provide to the LMUP and other questions will only be used by the researchers. No one outside the research team will know how you answered the questions. We will not have information that links you to your unique identifying number.

Ethical approval

The ethics committee of the University of Cape Town have approved this study (**insert application number**).

More information

For further questions about this research, your rights as a subject, or any adverse effects related to the research, please contact:

Deborah Constant
Women's Health Research Unit
University of Cape TOWN
Email: deborah.constant@uct.ac.za
Telephone: [072 252 7415]

Dr Marc Blockman
Human Research Ethics Committee
University of Cape Town
Telephone: [021 406 6338]

Please discuss the information above with others if you wish or ask us if there is anything that is not clear or if you would like more information.

Remember, it is up to you to decide whether to take part or not; choosing not to take part will not disadvantage you in any way. If you do decide to take part ,you are still free to withdraw at any time and without giving a reason.

**INFORMED CONSENT FORM FOR A STUDY TO VALIDATE THE LONDON MEASURE
OF UNPLANNED PREGNANCY IN SOUTH AFRICA**

Thank you for your interest in taking part in this research. Before you agree to take part, the person organising the research must explain the project to you. **Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.**

If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you to decide whether to join. You will be given a copy of this Consent Form to keep and refer to at any time.

Participant's Statement

I _____ (NAME)

- have read the notes written above and the Information Sheet, and understand what the study involves.
- understand that if I decide at any time that I no longer wish to take part in this project, I can notify the researchers involved and withdraw immediately and that neither I nor my ante-natal or subsequent care will be affected negatively in any way if I do not want to participate.
- understand that my responses will be used to assess the validity of the [insert Xhosa/Afrikaans] version of the London Measure of Unplanned Pregnancy and I agree that the researchers may transfer the information that I provide to the University of Cape Town and use it in their analysis.
- understand that such information will be treated as strictly confidential.
- understand that I am invited to return to the ante-natal clinic next week to repeat the questionnaire and that if I do so I will be compensated for my time and inconvenience. I may also choose telephone follow-up next week, in which case I will provide by first name, date of birth, and telephone number, but that information will be permanently deleted once I have been contacted or after 3 contact attempts have been made.
- agree that the research project named above has been explained to me to my satisfaction and I voluntarily agree to take part in this study.

Participant's signature: _____ **Date:** _____

Researcher's name (please print): _____ **Date:** _____

Researcher's signature: _____

This study has been approved by the University of Cape Town Research Ethics Committee (Project ID Number)

Appendix IV: Final Xhosa LMUP Translation

Umlinganiselo waseLondon wokhulelo olungacwangciswanga

Ndingathanda ukukubuza imibuzo ethile malunga neemeko neemvakalelo zakho ngelaxesha lokukhulelwa kwakho. Nceda ucinge ngolu khulelo lwakho ngoku xa uphendula le mibuzo. Kumbuzo ngamnye kukho uluhlu lwempendulo onokuzikhetha. Nceda ulinde kananjalo umamele zonke iimpendulo uze emva koko ukhethe leyo ichanekileyo kuwe uze undixelele ukuba yeyiphi na. Umbuzo wokuqala unempendulo ezine ezinokuthi zilunge kuwo. Nceda ukhethe ibenye eyeyona ichanekileyo kuwe uze undixelele ukuba yeyiphina.

1. Kulenyanga endikhulelwe ngayo...

- a) Bendi/besi ngasebenzisi lucwangciso ntsapho
- b) Bendi/ besi sebenzisa ucwangciso ntsapho kodwa hayi ngamaxesha onke
- c) Ndi/sisebenzise ucwangciso ntsapho rhoqo kodwa ndisazi ukuba oluhlobo alubanga nampumelelo (i.e. gqabhukile, isukile, iphumile, ayisebenzanga njalo njalo) ubuncinci kwakanye
- d) Ndi/sisebenzise ucwangciso ntsapho rhoqo

Ngoku ndiza kukubuza umbuzo kwaye kukho iimpendulo ezintathu onokukhetha kuzo. Nceda ukhethe ibenye eyeyona ichanekileyo kuwe uze undixelele ukuba yeyiphina.

2. Ngokubhekiselele ekubeni ngumama, ndinoluvo lokuba ukukhulelwa kwam kwenzeke ngexesha:

- a) ngexesha elifanelekileyo
- b) Lilungile, kodwa ixesha belingalunganga ncam.
- c) Ixesha belingalunganga.

Imibuzo embalwa elandelayo ibhekiselele ngaphambi kokuba kokuba ukhulelwe. Nalo mbuzo unempendulo ezintathu onokukhetha kuzo. Nceda ukhethe ibenye eyeyona ichanekileyo kuwe uze undixelele ukuba yeyiphina.

3. Nje, phambi kokuba ndikhulelwe

- a) Bendinenjongo zokukhulelwa
- b) Iinjongo zam bezitshintsha oko
- c) Bendingenanjongo zakukhulelwa

Umbuzo olandelayo unempendulo ezintathu onokukhetha kuzo. Nceda ukhethe ibenye eyeyona ichanekileyo kuwe uze undixelele ukuba yeyiphina.

4. Nje, phambi kokuba ndikhulelwe

- a) .Bendifuna ukuba nomntwana
- b) Bendinezimvo ezahlukeneyo malunga nokuba nomntwana
- c) Bendingafuni ukuba nomntwana

Kumbuzo olandelayo, sibuzo ngeqabane lakho – isenokuba iselilo (okanye ayiselilo) umyeni, iqabane ohlala nalo, okanye umntu oyindoda othandana naye, okanye umntu okhe wabelana naye ngesondo kanye okanye kabini.

Nalo mbuzo unempendulo ezintathu onokukhetha kuzo. Kwakhona xa ucinga malunga naphambi kokuba umithe unokuthi...

5. Phambi kokuba ndikhulelwe

- a) Mna neqabane lam savumelana ukuba singathanda ukuba ndikhulelwe
- b) Mna neqabane lam saxoxa malunga nokuba nabantwana kunye kodwa khangela sivumelane ukuba ndikhulelwe
- c) Zange sixoxe ngokuba nabantwana kunye

Umbuzo wokugqibela nawo ufuna okokuba ucinge ngexesha eliphambi kokuba ukhulelwe. Kukho uluhlu lweentlobo kwaye ndingathanda okokuba undixelele zonke ezithi zichaneke kuwe.

6. Phambi kokuba ukhulelwe, ingaba ikhona na into owathi wayenza ukuphucula impilo yakho ukulungiselela ukukhulelwa?

- a) Nda ipilisi izibizwa ifolic acid
- b)wayeka okanye wehlisa ukutshaya
- c) wayeka okanye wehlisa ukusela utywala
- d) Ndatya nangakumbi ngokusempilweni
- e) Zame Ukuzilungiselela ngezi mali ngendlela ezithile (umzekelo,zame ukugcina okanye ukuboleka imali okanye ukufumana umsebenzi okanye umsebenzi ongcono)
- f) Ndayakufuna iingcebiso zonyango/zempilo.
- g) Ndathabatha amanyathelo angamanye, nceda uwachaze _____

Okanye

- e) andenzanga nanye kwezi zingentla phambi kokukhulelwa kwam

Appendix V: Final Afrikaans LMUP Translation

Londense maaatstaf van onbeplande swanskape

Ek wil u/jou graag 'n paar vrae vra aangaande die omstandighede en gevoelens rondom die tyd toe jy swanger geraak het. Dink aan u huidige swangerskap wanneer u die vrae beantwoord. Vir elke vraag is daar 'n lys van moontlike antwoorde. Wag asseblief en luister na al die opsies voordat jy die opsie kies was jou situasie die beste beskryf.

Die eerste vraag het vier moontlike antwoorde. Kies asseblief die een wat jou situasie die beste beskryf en dui aan dan watter een dit is.

In die maand toe ek swanger geword het

- a) Het ek/ons nie voorbehoedmiddels gebruik nie.
- b) Het ek/ons wel voorbehoedmiddels gebruik, maar nie op elke geleentheid nie.
- c) Ek/ons het altyd voorbehoedmiddels gebruik, maar het geweet dat dit nie gewerk het nie (bv, dit het, ten minste een keer, gebreek, geskuif, afgekom of uitgekom).
- d) Ons het altyd voorbehoedmiddels gebruik.

Die tweede vraag het drie moontlike antwoorde. Kies asseblief die een wat jou situasie die beste beskryf en dui aan dan watter een dit is.

In terme van ma word, voel ek dat my swangerskap gebeur het op die.....

- a) Regte tyd
- b) Ok, maar Nie heeltemal op die regte tyd nie
- c) Verkeerde tyd

Die volgende vraag gaan oor die tydperk voordat jy swanger geword het. Hierdie vraag het ook drie moontlike antwoorde. Kies asseblief die een wat jou situasie die beste beskryf en dui aan dan watter een dit is.

Net voordat ek swanger geword het

- a) Ek beplan om swanger te word
- b) Ek dikwels van plan verander.
- c) Ek nie beplan om swanger te word nie.

Die volgende vraag het drie moontlike antwoorde. Kies asseblief die een wat jou situasie die beste beskryf en dui aan dan watter een dit is.

Net voordat ek swanger geword het

- a) Wou ek 'n baba hê
- b) Ek gemengde gevoelens gehad oor 'n baba
- c) Wou ek nie 'n baba hê nie

In die volgende stel ons vrae oor jou lewensmaat – dit mag wees (of is steeds) jou man, 'n lewensmaat saam met wie jy bly, 'n kêrel, verloofde, of iemand met wie jy een of twee keer seks / omgang gehad het

Daar is drie moontlike antwoorde vir hierdie vraag. Dinkweer aan die tyd voordat jy swanger geword het. Sou jy sê

Voordat ek swanger geword het

- a) My lewensmaat en het besluit dat ons wil hê dat ek moet swanger word
- b) My lewensmaat en ek het gepraat dat ons saam kinders wil hê, maar nie besluit dat ek swanger word nie
- c) Ons nooit gepraat dat ons saam kinders wil hê nie

Die laaste vraag vra jou om te dink aan die tydperk voor jou swangerskap. Daar is n lys van moontlike antwoorde, jy kan meer as een kies. Kies asseblief die opsies wat jou situasie die beste beskryf en dui aan dan watter een dit is

6) Voordat jy swanger geword het, het jy enigsinsiets gedoen om jou gesondheid te verbeter in voorbereiding vir swangerskap?

- a) Foliensuur/Folic Acid gebruik
- b) opgehou of minder gerook
- c) Ophou alkohol gebruik of minder alkohol gebruik
- d) Meer gesond geëet
- e) Gegaan vir mediese hulp/advies
- f) Iets anders gedoen, beskryf asseblief _____

OF

- g) Ek het geen van hierdie dinge voor my swangerskap gedoen nie
- h) Ek het ophou voorbehoedmiddels
- i) Ek gebruik vitamien

VI: BMC Journal Submission Guidelines

Research article

Criteria

Research articles should report on original primary research, but may report on systematic reviews of published research provided they adhere to the appropriate reporting guidelines which are detailed in our [editorial policies](#). Please note that non-commissioned pooled analyses of selected published research will not be considered.

BMC Public Health strongly encourages that all datasets on which the conclusions of the paper rely should be available to readers. We encourage authors to ensure that their datasets are either deposited or in publicly available repositories (where available and appropriate) or presented in the main manuscript or additional supporting files whenever possible. Please see [Springer Nature's information on recommended repositories](#).

Preparing your manuscript

The information below details the section headings that you should include in your manuscript and what information should be within each section.

Please note that your manuscript must include a 'Declarations' section including all of the subheadings (please see below for more information).

Title page

The title page should:

- present a title that includes, if appropriate, the study design e.g.:
- "A versus B in the treatment of C: a randomized controlled trial", "X is a risk factor for Y: a case control study", "What is the impact of factor X on subject Y: A systematic review"
- or for non-clinical or non-research studies a description of what the article reports
- list the full names, institutional addresses and email addresses for all authors

- if a collaboration group should be listed as an author, please list the Group name as an author. If you would like the names of the individual members of the Group to be searchable through their individual PubMed records, please include this information in the “Acknowledgements” section in accordance with the instructions below
- indicate the corresponding author

Abstract

The Abstract should not exceed 350 words. Please minimize the use of abbreviations and do not cite references in the abstract. Reports of randomized controlled trials should follow the CONSORT extension for abstracts. The abstract must include the following separate sections:

Background: the context and purpose of the study

Methods: how the study was performed and statistical tests used

Results: the main findings

Conclusions: brief summary and potential implications

Trial registration: If your article reports the results of a health care intervention on human participants, it must be registered in an appropriate registry and the registration number and date of registration should be in stated in this section. If it was not registered prospectively (before enrollment of the first participant), you should include the words 'retrospectively registered'. See our [editorial policies](#) for more information on trial registration

Keywords

Three to ten keywords representing the main content of the article.

Background

The Background section should explain the background to the study, its aims, a summary of the existing literature and why this study was necessary or its contribution to the field.

Methods

The methods section should include:

- the aim, design and setting of the study
- the characteristics of participants or description of materials
- a clear description of all processes, interventions and comparisons. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses
- the type of statistical analysis used, including a power calculation if appropriate

Results

This should include the findings of the study including, if appropriate, results of statistical analysis which must be included either in the text or as tables and figures.

Discussion

This section should discuss the implications of the findings in context of existing research and highlight limitations of the study.

Conclusions

This should state clearly the main conclusions and provide an explanation of the importance and relevance of the study reported.

List of abbreviations

If abbreviations are used in the text they should be defined in the text at first use, and a list of abbreviations should be provided.

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All manuscripts must contain the following sections under the heading 'Declarations':

- Ethics approval and consent to participate
- Consent for publication
- Availability of data and material
- Competing interests
- Funding
- Authors' contributions
- Acknowledgements
- Authors' information (optional)

Please see below for details on the information to be included in these sections.

If any of the sections are not relevant to your manuscript, please include the heading and write 'Not applicable' for that section.

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Manuscripts reporting studies involving human participants, human data or human tissue must:

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If your manuscript contains any individual person's data in any form (including individual details, images or videos), consent for publication must be obtained from that person, or in the case of children, their parent or legal guardian. All presentations of case reports must have consent for publication.

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- The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.
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The datasets generated during and/or analysed during the current study are available in the [NAME] repository, [PERSISTENT WEB LINK TO DATASETS].

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Acknowledgements

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doi:10.1007/128_2006_108.

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Accessed 20 Feb 2007.

Dataset with persistent identifier

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