



## Built spaces and features associated with user satisfaction in maternity waiting homes in Malawi

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### ABSTRACT

**Objective:** To assess satisfaction with maternity waiting home built spaces and features in women who are at risk for underutilizing maternity waiting homes (i.e. residential facilities that temporarily house near-term pregnant mothers close to healthcare facilities that provide obstetrical care). Specifically we wanted to answer the questions: (1) Are built spaces and features associated with maternity waiting home user satisfaction? (2) Can built spaces and features designed to improve hygiene, comfort, privacy and function improve maternity waiting home user satisfaction? And (3) Which built spaces and features are most important for maternity waiting home user satisfaction?

**Design:** A cross-sectional study comparing satisfaction with standard and non-standard maternity waiting home designs. Between December 2016 and February 2017 we surveyed expectant mothers at two maternity waiting homes that differed in their design of built spaces and features. We used bivariate analyses to assess if built spaces and features were associated with satisfaction. We compared ratings of built spaces and features between the two maternity waiting homes using chi-squares and *t*-tests to assess if design features to improve hygiene, comfort, privacy and function were associated with higher satisfaction. We used exploratory robust regression analysis to examine the relationship between built spaces and features and maternity waiting home satisfaction.

**Setting:** Two maternity waiting homes in Malawi, one that incorporated non-standardized design features to improve hygiene, comfort, privacy, and function (Kasungu maternity waiting home) and the other that had a standard maternity waiting home design (Dowa maternity waiting home).

**Participants:** 322 expectant mothers at risk for underutilizing maternity waiting homes (i.e. first-time mothers and those with no pregnancy risk factors) who had stayed at the Kasungu or Dowa maternity waiting homes.

**Findings:** There were significant differences in ratings of built spaces and features between the two differently designed maternity waiting homes, with the non-standard design having higher ratings for: adequacy of toilets, and ratings of heating/cooling, air and water quality, sanitation, toilets/showers and kitchen facilities, building maintenance, sleep area, private storage space, comfort level, outdoor spaces and overall satisfaction ( $p = <.0001$  for all). The final regression model showed that built spaces and features that are most important for maternity waiting home user satisfaction are toilets/showers, guardian spaces, safety, building maintenance, sleep area and private storage space ( $R^2 = 0.28$ ).

**Key conclusions and implications for practice:** The design of maternity waiting home built spaces and features is associated with user satisfaction in women at risk for underutilizing maternity waiting homes, especially related to toilets/showers, guardian spaces, safety, building maintenance, sleep area and private storage space. Improving maternity waiting home built spaces and features may offer a promising area for improving maternity waiting home satisfaction and reducing barriers to maternity waiting home use.

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## Introduction

More than 280,000 women die annually, nearly all in low- and middle-income countries, from pregnancy and childbirth-related complications that could be prevented with early identification and treatment (World Health Organization, 2014a, 2014b; United Nations Children's Fund, 2009). To reduce the number of these preventable deaths, the World Health Organization recommends access to facilities with the capacity for emergency obstetric care for expectant mothers (World Health Organization, 2012, 2004, 2015). These recommendations are supported by evidence that facility-based births with skilled attendants reduce the risk of maternity and neonatal mortality and morbidity (Van Lonkhuijzen et al., 2012; Graham et al., 2001; Bulatao and Ross, 2003).

However, distance to healthcare facilities that are equipped to handle obstetric complications represents a significant barrier for pregnant women in low- and middle-income countries (Henry et al., 2017; Save The Children, 2010; Sialubanje et al., 2015b; Kyei et al., 2012; Gabrysch et al., 2011; Pathak et al., 2010). Therefore, to improve access to obstetrical care, especially for women near term and residing in rural areas, maternity waiting homes (MWHs) – residential facilities that temporarily house near-term pregnant mothers close to healthcare facilities that provide obstetrical care – have been built in a number of countries (Stekelenburg et al., 2006; World Health Organization, 1996; Gaym et al., 2012; Lori et al., 2013; Millard et al., 1991). Many studies show that MWHs facilitate access to obstetrical care and skilled attendant births, and as a result play a role in reducing maternity mortality rates, and improving maternity and newborn health outcomes (Sialubanje et al., 2017; Henry et al., 2017; Kelly et al., 2010; Millard et al., 1991; Lori et al., 2013; Andemichael et al., 2009; Van Lonkhuijzen et al., 2003; Van Lonkhuijzen et al., 2012; Lee et al., 2009; Bhutta et al., 2009; Eckermann, 2006).

The literature, however, also suggests that women may underutilize MWHs (Mramba et al., 2010; Henry et al., 2017; Sialubanje et al., 2017; Lori et al., 2013; Van Lonkhuijzen et al., 2012). In addition to logistical and cost barriers (e.g. distance to MWH, conflicting childcare and other obligations, lack of money to pay for travel or food) (Sialubanje et al., 2014; Kyei et al., 2012; Sialubanje et al., 2015a), reasons women give for not using a MWH include perceptions that using MWHs is only for women who have complications in their pregnancies (Sialubanje et al., 2015b; Vellakkal et al., 2017), that previous births at home were “easy” so there was no impetus to seek out a facility birth in subsequent pregnancies, and/or an inability to judge when to go to a MWH (especially true for first time mothers) (Sidney et al., 2012; Kyokan et al., 2016; Mramba et al., 2010; Sialubanje et al., 2015b). These findings suggest that women who have, and have had, uncomplicated pregnancies and first time mothers are two populations of expectant mothers who are particularly at risk for underutilizing MWHs and giving birth at home. While these populations may not have known pregnancy risk factors, it is estimated that 20% will develop a complication requiring treatment by a skilled attendant at a facility that can provide emergency obstetric care (World Health Organization, 1994). Therefore, it is important to include them in efforts to maximize the use of MWHs.

While there are many factors that women consider when making decisions about using a MWH, the role of the MWH built spaces and features in this decision is not well understood. In past studies women have noted concerns about the lack of privacy, safety, hygiene and/or the quality of many MWHs, all features related to the design of the MWH, and these concerns may factor into decisions regarding their use (Henry et al., 2017; Mramba et al., 2010; Van Den Heuvel Et Al., 1999; Sialubanje et al., 2015b; Lori et al., 2013). In low- and middle-income countries, governments generally are responsible for building and maintaining MWHs. Therefore, MWH design is within the government's area of responsibility and amenable to change, and thus constitutes a promising area for reducing barriers to MWH use. Satisfaction with design features of the MWH may be of particular importance to women who are

more likely to give birth at home (i.e. women with no known pregnancy risk factors and first time mothers); there may be less impetus for them to seek out a facility birth and, as a result, satisfaction with the MWH may be of higher importance to them when making a decision about using a MWH. The purpose of this study was to assess satisfaction with MWH built spaces and features in women who had no known pregnancy risk factors and first time mothers. Specifically we wanted to answer the questions: (1) Are built spaces and features associated with MWH satisfaction? (2) Can built spaces and features designed to meet user needs improve maternity waiting home satisfaction? And (3) What built spaces and features are most important for MWH satisfaction? Understanding design features that are most associated with MWH satisfaction can inform MWH design to maximize their use, particularly in populations at risk for underutilizing MWHs. Building MWHs that women are satisfied with may contribute to decreasing barriers to MWH use and increasing facility births. Our findings contribute to the growing literature of evidence-based design and offer insight into the association between satisfaction and built spaces in a low-income country.

## Methods

### Study design

We conducted a cross-sectional study of expectant mothers, who had either no pregnancy risk factors or were first time mothers, at two MWHs, one that incorporated building design features to improve hygiene, comfort, privacy and function and the other that had a standard design.

### Study setting

As part of the Presidential Initiative on Safe Motherhood, the Malawi Ministry of Health committed to building 130 MWHs throughout the country to increase access to medical facilities for expectant mothers and reduce the number of women giving birth at home (Malawi Office of the President, 2013). In a collaboration between the Malawi Ministry of Health, the University of North Carolina Project-Malawi, and MASS Design Group, in 2014–2015 a MWH was built on the grounds of the Kasungu hospital. This MWH was built as part of a larger funded initiative lead by the University of North Carolina to increase facility births by establishing MWHs, promoting community mobilization and increasing the number of midwives in rural communities.

The design of the Kasungu MWH incorporated features to better meet user needs compared to the standard MWH design, particularly focusing on needs related to hygiene, comfort, privacy and function (Fig. 1(a) and (b)). The standard design MWH that we chose to compare the Kasungu MWH with was the MWH affiliated with the Dowa hospital (“the Dowa MWH”). We chose the Dowa MWH as our standard MWH comparison because it exemplifies the typical MWH design used in Malawi, was built about the same time as the Kasungu MWH (2014), is affiliated with a hospital that is comparable to the Kasungu hospital in terms of size and obstetrical capabilities, and offers programming similar to the Kasungu MWH.

An important feature of the Kasungu MWH design is that spaces were designed for a particular function (i.e. sleeping spaces, kitchen spaces) whereas the built space at the Dowa MWH is a large room that is multi-purpose (i.e. serves as a sleeping area, socializing area, eating area, etc.). Sleeping areas in the Kasungu MWH were housed in nine independent brick (compressed stabilized earth block) buildings, each designed to accommodate four women. These independent sleeping rooms were arranged around a central courtyard that offered community space where women could socialize. This design feature was to increase privacy for residents. In contrast, the sleeping area of the Dowa MWH consisted of a brick building that was designed to accommodate thirty-six women in a barracks like arrangement. The Kasungu sleeping rooms also incorporated secure space in each for safe storage of belongings. There was no dedicated secure space in the Dowa MWH; women store their belongings underneath their beds. Both the Kasungu and Dowa MWHs were

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