RESEARCH ARTICLE

Exploring factors influencing pregnant women’s attitudes, perceived subjective norms and perceived behavior control towards male involvement in maternal services utilization: a baseline findings from a community based interventional study from Rukwa, rural Tanzania

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Abstract

Background: Although male involvement enhances obstetric care-seeking behavior, the practice of male involvement in developing countries remains unacceptably low. Male involvement in maternal services utilization can be influenced by the attitude, subjective norm, and perceived behavior control of their female partners. Little is known about factors influencing pregnant women’s attitudes, perceived subjective norms, and perceived behavior control towards male involvement in maternal services utilization.

Methods: A baseline community-based cross-sectional study whose target was pregnant women were performed from 1st June until 30th October 2017. A three-stage probability sampling technique was employed to obtain a sample of 546 pregnant women. A structured questionnaire that hinged the Theory of Planned Behavior was used. The questionnaire explored three main determinants of male involvement, which were: attitudes towards male involvement, perceived subjective norms towards male involvement, and perceived behavior control towards male involvement.

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Background
Maternal mortality is a public health challenge worldwide. In 2015, 303,000 maternal deaths were estimated to have occurred globally [1]. Nearly all of these deaths occurred in low resource countries [1]. In Tanzania, the reckoned maternal mortality ratio was 556/100,000 [2], meaning that for every 1000 live births, about 5 women died due to pregnancy-related causes which amounted to 8000 maternal deaths per year. Therefore, Tanzania was categorized to be among the countries in Africa with the highest maternal mortalities.

Low male involvement in maternal services utilization in low resource countries has been cited as one of the factors contributing to high maternal mortality in these countries [3]. Male involvement in maternal services utilization has been expressed as a practice of social and behavioral change that is needed for men to take more responsibility in maternal services utilization with the focus of ensuring women’s and children’s health [4].

There are complex behavioral and cultural factors influencing male partner’s involvement in the care of their expecting wives/partners in Tanzania [5]. The evidence indicates that efforts that embrace male partners and uphold gender-equitable relationships between men and women are more efficient in producing behavior change than narrowly focused interventions [6].

The practice of male involvement in developing countries including Tanzania remains unacceptably low [7–9]. The previous study was done by Sokoya Masunmola et al., [10] has reported that although both men and women are in support of male involvement during pregnancy and childbirth surprisingly very few men were involved in maternal services utilization. The low male involvement practice could be rooted in cultural gender roles where pregnancy care and childbirth are believed to be women’s responsibility [3] while men’s responsibility is to provide financial support [5].

The effect of gender roles and responsibilities does matter in actual male involvement in maternal services utilization in low resources settings including Tanzania [5]. It has been a norm in rural settings that pregnant care, childbirth, and post-delivery care are solemnly responsible for women [5]. The responsibility of the male partner is to provide financial support [5]. The trend in low resources settings is now struggling to change from the traditional maternal services delivery from addressing a pregnant woman to addressing couples. If pregnant women understand and accept positively on involving their male partners in maternal services utilization, the state of male involvement in maternal services utilization will improve dramatically.

As well, pregnant women’s negative attitude towards male involvement [8] is among the barriers towards male involvement. The negative attitude is due to three aspects, the perception that pregnancy and childbirth are the responsibility of women [5, 8], avoiding negative stereotyping [8], and fear male involvement may decrease their superior power and end up being insecure like women [8].

Studies have also reported unfair reproductive health programmes for women without partners as a contributing factor for low male involvement in maternal services utilization [9]. This means the struggle to bring male partners in maternal health services utilization must go hand in hand with creating male-centered services. It should go beyond physical presence. Although the center of care is a pregnant woman, a man should feel involved by either his vital signs taken or given health education specifically for him. Tanzania is among the countries with low male involvement in maternal health

Results: After adjusting for the confounders, factors influencing positive attitude towards male involvement were age at marriage [19 to 24 yrs., (AOR = 1.568 at 95% CI = 1.044–2.353), more than 24 yrs. (AOR = 2.15 at 95% CI = 1.150–1.159)]; education status [primary school (AOR = 1.713 at 95% CI = 1.137–2.58)]; and economic status [earning more than one dollar per day (AOR = 1.547 at 95% CI = 1.026–2.332)]. Factors influencing perceived subjective norms was only age at marriage [19 to 24 yrs., (AOR = 1.447 at 95% CI = 0.970–2.159), more than 24 years, (AOR = 2.331 at 95% CI = 1.261–4.308)]; factors influencing perceived behavior control were age at marriage [more than 24 years (AOR = 2.331 at 95% CI = 1.261–4.308)], and the intention to be accompanied by their male partners (AOR = 1.827 at 95% CI = 1.171–2.849).

Conclusion: The study revealed that women who were married at an older age were more likely to have a positive attitude, subjective norms, and perceived behavior control towards male involvement in maternal services utilization than those who were married at a young age. Pregnant women who had primary education and earn more than a dollar per day were more likely to have positive attitudes towards male involvement than poor and uneducated pregnant women. The study recommends an interventional study to evaluate the influence attitude, subjective norms, and perceived behavior control on male involvement in maternal services utilization.

Keywords: Attitude, Subjective norms, Perceived behavior control, Male involvement, Pregnant women.
services especially the rural communities [10]. There is a direct relationship between male involvement and cultural beliefs which means that the societal perception and beliefs about male involvement do affect male involvement [11]. When there is a cultural belief that disapproves of the involvement of male partners in maternal services utilization, there is low male involvement despite educational interventions and mobilizations to improve male involvement.

Male partners may be willing to learn their roles in maternal services utilization but the existing perception that pregnant care issues are solemnly responsibility of women may act as a barrier towards their involvement in maternal services utilization [12, 13]. This study invested in studying the attitudes perceived subjective norms and perceived behavior control towards male involvement in maternal services utilization among pregnant women.

According to the Theory of Planned Behavior, behavior intention is influenced by three predictors which are attitude, subjective norms, and perceived behavior control [14]. Attitude is influenced by individual beliefs and the evaluation of behavioral outcomes. The perceived subjective norms are the way a pregnant woman perceives her society approves of disapproves male involvement in maternal services utilization. If she perceived her society approves for her to be accompanied by her male partner, she will act in favor of male involvement but if she perceives her society disapproves of the act then she will act accordingly. The perceived behavior control is influenced by control beliefs and perceived power.

Therefore, there was a need to determine pregnant women’s attitudes, perceived subjective norms, and perceived behavior control towards male involvement in maternal services utilization. The study also went further to explore factors that are associated with attitudes, subjective norms, and perceived behavior control towards male involvement in maternal services utilization.

Methods
Study design and setting
It was a community-based cross-sectional study done in Rukwa Region from 1st June to 30th October 2017, among pregnant women from forty-five villages. According to the national census of 2012, Rukwa had a population of 1,004,539 people; 487,311 males, and 517,228 females. The region has the lowest mean age at a marriage where male marry at the age of 23.3 years and female marry at age of 19.9 years and has a fertility rate of 7.3 [15].

Sampling method and sample size
Sampling technique
Rukwa region has four administrative districts. Two districts (Sumbawanga and Kalambo Districts) were purposively selected from the four districts due to the high proportion of home birth assisted by unskilled birth attendants [16]. Three stages of sampling technique were used to obtain study participants. In the first random samplings, a simple random sampling technique was used to obtain five wards from 12 wards of Sumbawanga district and ten wards from 17 wards of Kalambo district. In the second stage random samplings, all villages in the selected wards were listed separately from each district and a simple random sampling technique using the lottery method was used to select 15 villages from Sumbawanga rural district and thirty villages from Kalambo district. A systematic sampling technique was used in the third stage sampling. Households with pregnant women of 24 weeks gestation age or less and living with a male partner were systematically selected. The first household was randomly selected; a female partner was assessed for signs and symptoms of pregnancy. For a female partner who had missed her period for 2 months was requested to test for pregnancy. For those with positive tests and consented to participate were enrolled in the study. If a selected household had no eligible participants, the household was skipped and researchers entered into the next household in the predetermined direction.

Sample size calculation
The sample size was calculated using the following formula [17].

\[
 n = \left\lfloor \frac{Z_\alpha \sqrt{\pi \rho (1 - \pi \rho)} + 2B \sqrt{\pi \rho(1 - \pi \rho)} }{(\pi \rho - \pi_1)^2} \right\rfloor^2
\]

Where:
- \( n \) = maximum sample size.
- \( Z_\alpha \) = Standard normal deviation (1.96) at 95% confidence level for this study.
- \( 2B \) = standard normal deviate (0.84) with a power of demonstrating a statistically significant difference before and after the intervention between the two groups at 90%.
- \( \pi_0 \) = Proportion at pre-intervention (Use of skilled delivery in Rukwa region 30.1%) [16].
- \( \pi_1 \) = proportion after intervention (Proportion of families which would access skilled birth attendant 51%) [16].

\[
 n = \left\lfloor \frac{1.96 \sqrt{0.301(1 - 0.301)} + 0.84 \sqrt{0.51(1 - 0.51)} }{(0.6 - 0.51)^2} \right\rfloor^2
\]

\[
 n = 162 \text{ couples } + 10\% = 180
\]

The required sample size in the intervention group = 180 pregnant women.
Intervention: control ratio = 1:2. Sample size in the control group = 360 pregnant women. Therefore the total sample size was 546 pregnant women.

Data collection procedure
Data was collected using interviewer-administered questionnaires. The theory of planned behavior questionnaire guide was used to guide the development of the questionnaire [8]. The questionnaire was translated into Swahili and was pretested before actual administration. Four trained research assistants were recruited, trained, and participated in data collection. The tool had two parts; the social demographic characteristics and a Likert scale where respondents were supposed to strongly agree, agree, neutral, disagree, and strongly disagree. The Likert scale was subdivided into three subparts of the statements in the Likert scale which were; i) attitudes towards male involvement questions ii) perceived subjective norms towards male involvement iii) perceived behavior control towards male involvement in maternal services utilization.

Attitudes towards male involvement had five Likert scale statements which were if my husband participates in setting apart of the skilled birth attendant, he is doing a good and beneficial thing, if my husband accompanies me during antenatal clinics, he is doing a good and beneficial thing, if my husband tests for HIV with me during pregnancy, he is doing a good and beneficial thing, if my husband accompanies me during childbirth, he is doing a good thing which is beneficial and if my husband accompanies me for postnatal checkups, he is doing a good and beneficial thing. Likert scale statements involved in measuring perceived subjective norms towards male involvement were; the eminent person to me believe my husband should participate in earmarking of the skilled birth attendant, eminent person to me believe my husband to escort me during antenatal clinics, eminent person to me believe my husband has to test for HIV/AIDs with me during antenatal visits, eminent person to me believe my husband has to accompany me during childbirth and eminent person to me believe my husband to escort me during postnatal checkups. Perceived behavior control was measured using the following Likert scale statements: my husband to participate in earmarking of the skilled birth attendant is trouble-free, for me, my husband to escort me during antenatal clinics is trouble-free, for me, my husband to test for HIV/AIDS with me during antenatal visits is trouble-free, for me, my husband to accompany me during labor and childbirth is trouble-free and for me, my husband to escort me during a postnatal checkup is trouble-free.

Data processing and analysis
The collected data were verified for integrity then coded and entered into computer using statistical package IBM SPSS version 23. Descriptive statistics were used to generate frequency distribution and cross-tabulation used to describe the characteristic of the study participants. Factor analysis was done to measure attitude, subjective norms, and perceived behavior control. The normality test was tested and the mean score was established. The regression score above the mean was termed as positive and below mean negative (Table 1). Logistic regression was done to determine the factors which influence the attitude, perceived subjective norms, and perceived behavior control towards male involvement in maternal services utilization.

There were 25 different responses from five questions formulated based on the theory of planned behavior change for each predictor of intention. The responses were subjected to factor analysis and 15 statements of attitude and perceived subjective norms and 16 perceived behavior control had sample adequacy to test the three predictors of intention.

Validity and reliability
To ensure the validity of the tool, a pilot study was conducted to assess the accuracy of the data collection tools. A Cronbach’s Alpha was conducted to establish the reliability of the tool. The Cronbach’s Alpha for attitude towards male involvement was 0.947, Cronbach’s Alpha

| Table 1 | Factor analysis       | Attitude | Subjective norms | Perceived behavior control |
|---------|-----------------------|----------|------------------|---------------------------|
| Initial questions analyzed | 25        | 25      | 25               |
| Initial Eigen values (before extraction) | Comp.1 = 36.072%, Comp. 2 = 14.290% | Comp.1 = 34.452%, Comp.2 = 18.777% | Comp. 1 = 37.207%, Comp. 2 = 15.216% |
| Final questions Question with component matrix > 0.3 | 15        | 15      | 16               |
| Initial Eigen values (after extraction) | 59.98%    | 57.26%  | 58.06           |
| KMO measure | 0.726    | 0.782   | 0.623           |
| Mean      | 0         | 0       | 0               |

Positive = above mean; Negative = below mean
for perceived subjective norms was 0.948 and a Cronbach’s Alpha for perceived behavior control was 0.938.

Results

Socio-demographic characteristics

The study enrolled 546 pregnant women at a turnover rate of 100%. The sample consisted of 546 pregnant women. The mean age was 25.57 years (sd = 6.810). The majority of the pregnant women were married (390, 71.4%), monogamous (469, 85.9%), live on less than 1 dollar per day (382, 70.0%), and receive their basic obstetric care services from dispensaries (452, 82.8). Ninety-five percent of the respondents had attained primary level education or less (Table 2).

Predictors of attitudes, subjective norms, and perceived behavior control towards male involvement in maternal services utilization.

Predictor of attitude towards male involvement

The variables which portrayed a significant relationship with attitudes towards male engagement in maternal services utilization were age at marriage \( (p < 0.001) \), education status \( (p < 0.001) \), ethnic group \( (p < 0.001) \), economic status \( (p < 0.05) \), and owning a mobile phone \( (p < 0.001) \) (Table 3).

After adjusting for the confounders the factors which influence attitude towards male involvement in maternal services utilization among pregnant women were age at marriage [19 to 24 years, \( \text{AOR} = 1.568 \text{ at } 95\% \text{ CI} = 1.044–2.353, p < 0.05 \)], more than 24 years \( \text{AOR} = 2.15 \text{ at } 95\% \text{ CI} = 1.150–1.159, p < 0.05 \)], education status [primary school \( \text{AOR} = 1.713 \text{ at } 95\% \text{ CI} = 1.137–2.58, p = 0.01 \)], ethnic group [Mambwe \( \text{AOR} = 2.743 \text{ at } 95\% \text{ CI} = 1.726–4.359, p < 0.001 \)], and economic status [earning at least one dollar per day \( \text{AOR} = 1.547 \text{ at } 95\% \text{ CI} = 1.026–2.332, p < 0.05 \)] (Table 4).

Predictor of subjective norms towards male involvement in maternal services utilization

The variables which showed a significant relationship with subjective norms towards male involvement in maternal services utilization among pregnant women were age at marriage \( (p < 0.001) \), education status \( (p < 0.01) \), ethnic group \( (p < 0.001) \), owning a mobile phone \( (p = 0.001) \) and having the intention to be accompanied by a male partner \( (p < 0.001) \) (Table 5).

After adjusting for the confounder, the predictors of subjective norms towards male involvement among pregnant women were age at marriage [19 to 24 years, \( \text{AOR} = 1.447 \text{ at } 95\% \text{ CI} = 0.970–2.159, p < 0.05 \)], more than 24 years \( \text{AOR} = 2.331 \text{ at } 95\% \text{ CI} = 1.261–4.308, p < 0.01 \), ethnic group [Mambwe \( \text{AOR} = 2.287 \text{ at } 95\% \text{ CI} = 1.444–3.596, p < 0.001 \)] (Table 6).

| Table 2: Socio-Demographic Characteristics of Respondents \( (n = 546) \) |
|-----------------|-----------------|-----------------|
| Character       | Female          | Percents (%)    |
| Age (years)     | Less than 20    | 167             | 30.6 |
|                 | 20 to 25        | 156             | 28.6 |
|                 | 26 to 30        | 105             | 19.2 |
|                 | 31 to 35        | 55              | 10.1 |
|                 | 36 and above    | 63              | 11.5 |
| Age at Marriage (years) | Less than 18 | 395             | 72.3 |
|                 | 19 to 24        | 147             | 26.9 |
|                 | 25 and above    | 4               | 0.7  |
| Ethnic group    | Fipa            | 322             | 59.0 |
|                 | Mambwe          | 120             | 22.0 |
|                 | Others          | 104             | 19.0 |
| Marital status  | Cohabit         | 156             | 28.6 |
|                 | Married         | 390             | 71.4 |
| Education level | Non-formal      | 230             | 42.1 |
|                 | Primary School  | 299             | 54.8 |
|                 | Secondary school or Higher | 17 | 3.1 |
| Income per day  | Less than 1 dollar | 399       | 73.1 |
|                 | More than 1 dollar | 147       | 26.9 |
| Own radio       | Yes             | 253             | 46.3 |
|                 | No              | 293             | 53.7 |
| Own mobile phone| Yes             | 69              | 12.6 |
|                 | No              | 477             | 87.4 |
| Covered by Health Insurance | Yes | 177     | 32.4 |
|                 | No              | 369             | 67.6 |
| Health facility | Dispensary      | 452             | 82.8 |
|                 | Health centre   | 94              | 17.2 |
| Distance to health facility (Km) | Less than 1 | 258 | 47.3 |
|                 | 1 to 5          | 233             | 42.7 |
|                 | More than 5     | 55              | 10.1 |
Table 3: The relationship between pregnant women’s characteristic and attitudes towards male involvement in maternal services utilization

| Variables                  | Negative attitude | Positive attitude |   |   |
|----------------------------|-------------------|-------------------|---|---|
|                            | Frequency         | Percent (%)       | Frequency | Percent (%) | X²   | p-value |
| Group                      |                   |                   |   |   |
| Intervention               | 116               | 21.2              | 66 | 12.1 | 3.846 | 0.05   |
| Control                    | 200               | 36.6              | 164| 30   |       |        |
| Age group                  |                   |                   |   |   |
| Less than 20               | 63                | 11.50             | 38 | 7.00 |       |        |
| 21 to 25                   | 94                | 17.20             | 60 | 11.00|       |        |
| 26 to 30                   | 65                | 11.90             | 48 | 8.80 | 5.357 | 0.253  |
| 31 to 35                   | 35                | 6.40              | 40 | 7.30 |       |        |
| 36+                        | 59                | 10.80             | 44 | 8.10 |       |        |
| Age at marriage            |                   |                   |   |   |
| Less than 18               | 158               | 28.90             | 76 | 13.90|       |        |
| 19 to 24                   | 129               | 23.60             | 119| 21.80| 16.566| <0.001 |
| 25 +                       | 29                | 5.30              | 35 | 6.40 |       |        |
| Education status           |                   |                   |   |   |
| No formal                  | 136               | 24.9              | 58 | 10.60|       |        |
| Primary school             | 166               | 30.40             | 158| 28.90| 18.471| <0.001 |
| Secondary school or higher | 14                | 2.60              | 14 | 2.60 |       |        |
| Ethnic group               |                   |                   |   |   |
| Fipa                       | 198               | 36.30             | 141| 25.80|       |        |
| Mambwe                     | 41                | 7.50              | 71 | 13.00| 41.752| <0.001 |
| Others                     | 77                | 14.10             | 18 | 3.30 |       |        |
| Economic status            |                   |                   |   |   |
| Less than one dollar per day| 234               | 42.90             | 151| 27.70|       |        |
| At least one dollar per day| 82                | 15.00             | 79 | 14.50| 4.516 | 0.034  |
| Own mobile phone           |                   |                   |   |   |
| Yes                        | 76                | 13.90             | 92 | 16.80|       |        |
| No                         | 240               | 44.00             | 138| 25.30| 15.896| <0.001 |
| Walking distance           |                   |                   |   |   |
| Less than 1 km             | 151               | 27.70             | 109| 20.00|       |        |
| 1 to 5 km                  | 133               | 24.40             | 97 | 17.80| 0.017 | 0.992  |
| More than 5 km             | 32                | 5.90              | 24 | 4.40 |       |        |
| Ever heard about birth preparedness |           |                   |   |   |
| Yes                        | 252               | 46.20             | 196| 35.90| 2.705 | 0.100  |
| No                         | 64                | 11.70             | 34 | 6.20 |       |        |

**Predictor of perceived behavior control towards male involvement in maternal services utilization**

Variables which showed a significant relationship with perceived behavior control among pregnant women were age at marriage ($p < 0.001$), education status ($0.01$), ethnic group ($0.001$), own mobile phone ($p = 0.001$) and having the intention to be accompanied during childbirth ($p < 0.001$) Table 7.

After adjusting for confounders, the factors associated with confidence to involve their male partners in maternal services utilization were age at marriage [more than 24 years AOR = 2.331 at 95%CI = 1.261–4.308,$p < 0.01$], ethnic groups [Mambwe AOR = 2.278 at 95%CI = 1.444–3.596, $p < 0.001$] and having the intention to be accompanied by their male partners AOR = 1.827 at 95%CI = 1.171–2.849,$p < 0.01$ (Table 8).
Male involvement in maternal services utilization has been recognized as an effective strategy for the improvement of birth outcomes [18]. Many studies have reported male involvement and factors which influence male involvement focusing on males themselves [8, 9, 19]. Pregnant women’s attitudes, subjective norms, and perceived behavior control towards male involvement in maternal health services is an important behavioral aspect which if well addressed has the potential to improve male involvement. A female partner may act as a barrier towards bringing men to pregnancy care and childbirth. Their attitude, perceived subjective norms, and perceived behavior control matters a lot in their intention to have their male partners with them in maternal services utilization [5].

The study found that majority of pregnant women had negative attitudes towards the involvement of male partners in maternal health services utilization could be rooted in cultural beliefs and traditions and customs [5, 19]. Traditions and customs in most African cultures have assigned the role of pregnancy care and childbirth to women (Antenatal women and their mother and mother in law). In with accordance to Theory of Planned Behavior, the attitude towards a certain behavior can be influenced by the belief an individual has on the behavior and the way an individual evaluates the outcome of the behavior [13]. When pregnant women evaluate the outcome of male partner’s involvement in maternal health services utilization to have no contribution to the desired outcome, their attitude disregards male involvement in maternal health services utilization. Innovative interventions are highly recommended in this low resource setting to sensitize pregnant women on the benefits of male involvement in maternal health services utilization.

Likewise, the majority of pregnant women had negative perceived subjective norms towards male involvement in maternal health services utilization. This means that majority perceived that their community disregarded the accompaniment of their male partners in maternal health services. This perception is also stemmed from community beliefs and traditional gender roles [5, 19]. It sends a signal that insisting pregnant women come with their male partners during maternal services utilization alone without addressing their norms may delay male involvement in maternal services in our context. The effect of societal pressure on male involvement in maternal services utilization may act as a barrier towards male involvement in maternal services utilization. Innovative interventions are recommended to sensitize the community on the benefits of male involvement in maternal services utilization.

Similarly, the majority of pregnant women had negative perceived behavior control towards male involvement in the utilization of maternal health services. They perceive that they cannot bring their male partners in maternal health services utilization. Based on the Theory of Planned Behavior, perceived behavior control is influenced by control beliefs and perceived power [13]. Perceived behavior control could be affected by the low socio-economic status of the study community where a male partner has to engage in work to earn money for family sustainability.

The study found that factors which influence pregnant women’s attitude towards male involvement were age at marriage, education status, ethnicity, economic status, and having a mobile phone. Age at marriage, education status, ethnicity, and economic status significantly predicted all three domains of intention, attitude, subjective norms, and perceived behavior control. The attitude towards male involvement in maternal services utilization was also influenced by pregnant women’s level of education and her economic status. In addition to age at marriage, the perceived behavior control was also influenced by pregnant women’s intention to be accompanied by her male partner. These findings are discussed hereunder.

The high proportion of pregnant women with negative attitudes towards the involvement of male partners in maternal health services utilization could be rooted in cultural beliefs and traditions and customs [5, 19]. Traditions and customs in most African cultures have assigned the role of pregnancy care and childbirth to women (Antenatal women and their mother and mother in law). In with accordance to Theory of Planned Behavior, the attitude towards a certain behavior can be influenced by the belief an individual has on the behavior and the way an individual evaluates the outcome of the behavior [13]. When pregnant women evaluate the outcome of male partner’s involvement in maternal health services utilization to have no contribution to the desired outcome, their attitude disregards male involvement in maternal health services utilization. Innovative interventions are highly recommended in this low resource setting to sensitize pregnant women on the benefits of male involvement in maternal health services utilization.

### Table 4 Predictors of attitude towards male involvement among pregnant women and their male partners

| Variables                  | AOR  | 95% CI       | p-value |
|----------------------------|------|--------------|---------|
| Age at marriage            |      |              |         |
| Less than 18               | 1    |              |         |
| 19 to 24                   | 1.568| 1.044 2.353  | 0.03    |
| 25 =+                      | 2.15 | 1.159 3.989  | 0.015   |
| Education status           |      |              |         |
| No formal                  | 1    |              |         |
| Primary school             | 1.713| 1.137 2.58   | 0.01    |
| Secondary school or higher| 1.78 | 0.731 4.336  | 0.204   |
| Ethnic group               |      |              |         |
| Fipa                       | 1    |              |         |
| Mambwe                     | 2.743| 1.726 4.359  | <0.001  |
| Others                     | 0.425| 0.235 0.768  | 0.005   |
| Economic status            |      |              |         |
| Less than one dollar per day| 1   |              |         |
| At least one dollar per day| 1.547| 1.026 2.332  | 0.037   |
| Own mobile phone           |      |              |         |
| No                         | 1    |              |         |
| Yes                        | 1.283| 0.837 1.965  | 0.253   |

### Discussion

Male involvement in maternal services utilization has been recognized as an effective strategy for the improvement of birth outcomes [18]. Many studies have reported male involvement and factors which influence male involvement focusing on males themselves [8, 9, 19]. Pregnant women’s attitudes, subjective norms, and perceived behavior control towards male involvement in maternal health services is an important behavioral aspect which if well addressed has the potential to improve male involvement. A female partner may act as a barrier towards bringing men to pregnancy care and childbirth. Their attitude, perceived subjective norms, and perceived behavior control matters a lot in their intention to have their male partners with them in maternal services utilization [5].

The study found that majority of pregnant women had a negative attitude, perceived subjective norms, and perceived behavior control towards male involvement in maternal services utilization. Age at marriage predicted all three domains of intention, attitude, perceived subjective norms, and perceived behavior control. The attitude towards male involvement in maternal services utilization was also influenced by pregnant women’s level of education and her economic status. In addition to age at marriage, the perceived behavior control was also influenced by pregnant women’s intention to be accompanied by her male partner. These findings are discussed hereunder.
marriage, education status, and economic status. Pregnant women who were married at the elder age were more likely to have a positive attitude towards male involvement in maternal health services than those who were married at a younger age. The possible reason for this finding could be that women who were married at a younger age did not have the opportunity to be exposed to formal education as compared to those who were married at an older age. Exposure to formal education can dilute the cultural beliefs of a woman which may influence power relations between men and women [20].

Pregnant women who had primary education were 1.7 times more likely to have a positive attitude towards male involvement than pregnant women who had no formal education. The finding is in line with a previous study which has reported a direct relationship between education and male involvement in maternal services utilization [20].

The study further noted that pregnant women who earned at least one dollar per day were 1.5 times more likely to have a positive attitude towards male involvement than pregnant women who earned less than one dollar per day. This could be poor women are concerned about their husbands engaging in earning work to sustain their living rather than participating in pregnancy care. A similar finding is reported by a previous

| Variables                          | Negative subjective norms | Positive subjective norms | X²  | p-value |
|------------------------------------|---------------------------|---------------------------|-----|---------|
|                                    | Frequency | Percent (%) | Frequency | Percent (%) |       |         |
| Group                              |           |             |           |             |       |         |
| Intervention                       | 107       | 19.6        | 75        | 13.7        | 0.537 | 0.464  |
| Control                            | 202       | 37          | 162       | 29.7        |       |         |
| Age group                          |           |             |           |             |       |         |
| Less than 20                       | 57        | 10.40       | 44        | 8.10        |       |         |
| 21 to 25                           | 93        | 17.00       | 61        | 11.20       |       |         |
| 26 to 30                           | 60        | 11.00       | 53        | 9.70        | 4.598 | 0.331  |
| 31 to 35                           | 36        | 6.60        | 39        | 7.10        |       |         |
| 36+                                | 63        | 11.50       | 40        | 7.30        |       |         |
| Age at marriage                    |           |             |           |             |       |         |
| Less than 18                       | 154       | 28.20       | 80        | 14.70       |       |         |
| 19 to 24                           | 128       | 23.40       | 120       | 22.00       | 16.006| < 0.001|
| 25+                                | 27        | 4.90        | 37        | 6.80        |       |         |
| Education status                   |           |             |           |             |       |         |
| No formal                          | 128       | 23.40       | 66        | 12.10       |       |         |
| Primary school                     | 169       | 31.00       | 155       | 28.40       | 11.7  | 0.003  |
| Secondary school or higher         | 12        | 2.20        | 16        | 2.90        |       |         |
| Ethnic group                       |           |             |           |             |       |         |
| Fipa                               | 195       | 35.70       | 144       | 26.40       |       |         |
| Mambwe                            | 44        | 8.10        | 68        | 12.50       | 25.073| < 0.001|
| Others                             | 70        | 12.80       | 25        | 237         |       |         |
| Economic status                    |           |             |           |             |       |         |
| Less than one dollar per day       | 227       | 41.60       | 158       | 28.90       |       |         |
| At least one                       | 82        | 15.00       | 79        | 14.50       | 2.979 | 0.084  |
| Own mobile phone                   |           |             |           |             |       |         |
| Yes                                | 77        | 14.10       | 91        | 16.70       |       |         |
| No                                 | 232       | 42.50       | 146       | 26.70       | 11.437| 0.001  |
| Would you like to accompany your partner to childbirth? |         |             |           |             |       |         |
| No                                 | 103       | 18.90       | 40        | 7.30        |       |         |
| Yes                                | 206       | 37.70       | 197       | 36.10       | 18.788| < 0.001|
study which reported that family earning do influence male involvement [23].

Age at marriage predicted the perceived subjective norms towards male involvement in maternal services utilization. Women who were married at the elder age were more likely to have a positive perception of societal approval for male involvement than women who were married at a young age. This finding could be women who are married at a younger age are less likely to have exposure to other societal cultural practices as they grow in the same culture. Those married at the elder age could have exposure to both education and travels to different places.

The age at marriage also influenced the perceived behavior control towards male involvement in maternal services utilization. Similarly, pregnant women who were married at the elder age, perceived to be able to be accompanied by their male partners for maternal services utilization. This could be because pregnant women who were married at a younger age could have stronger cultural attachment than those married at an elder age.

It was also found that pregnant women with the intention to be accompanied by their male partners were more likely to have positive perceived behavior control than those without the intention to be accompanied by their male partners.

This study used baseline data from an intervention study where control and intervention were compared. The two samples were treated as one sample after comparing the outcome variables (attitudes, subjective norms and perceived behavior control) and found no significant difference existed between the two groups. Intervention group participants were matched with control in a ratio of one to two. Even though in both cases random sampling was employed, our analysis may have suffered bias from differences in sampling probabilities in the two groups. There is a chance that some group is over represented than the other so may limit the generalizability of findings. To minimize the effect of this limitation, the participants were matched (5 years age groups and parity). The study also included robust of background information (ethnicity, economic status, exposure to media, education level, covered with health insurance, religion) in the data collection tool and were included in the analysis to adjust for the confounders.

Both groups came from rural districts of Rukwa region. Because rural Rukwa districts share similar cultural and social economic status, our findings can be generalized within rural Rukwa and other rural settings within Tanzania with similar characteristics.

### Table 6: Predictors of subjective norms towards male involvement among pregnant women and their male partners

| Variables                                      | AOR  | 95% CI     | p-value |
|------------------------------------------------|------|------------|---------|
| **Age at marriage**                            |      |            |         |
| Less than 18                                   | 1    |            |         |
| 19 to 24                                       | 1.447| 0.97-2.159 | 0.07    |
| 25 = +                                         | 2.331| 1.261-4.308| 0.007   |
| **Education status**                           |      |            |         |
| No formal                                      | 1    |            |         |
| Primary school                                 | 1.344| 0.902-2.003| 0.147   |
| Secondary school or higher                     | 1.761| 0.736-4.211| 0.203   |
| **Ethnic group**                               |      |            |         |
| Fipa                                           | 1    |            |         |
| Mambwe                                         | 2.278| 1.444-3.596| < 0.001 |
| Others                                         | 0.742| 0.428-1.284| 0.286   |
| **Would you like to accompany your partner to childbirth?**|      |            |         |
| No                                             | 1    |            |         |
| Yes                                            | 1.827| 1.171-2.849| 0.008   |
| **Own mobile phone**                           |      |            |         |
| No                                             | 1    |            |         |
| Yes                                            | 1.254| 0.831-1.891| 0.28    |

### Conclusion

The study indicated that aged women are more likely to have a positive attitude, subjective norms, and perceived behavior control towards male involvement in maternal services than young pregnant women. Pregnant women with primary education, who earned more than a dollar per day were more likely to have positive attitudes towards male involvement than their counterparts. The intention to attend maternal services with their male partners significantly influenced positively the perceived behavior control. The study recommends a community based interventional study to address the community beliefs and traditional gender roles in maternal services utilization to improve pregnant women’s attitudes, subjective norms, and perceived behavior control towards male involvement in maternal services utilization. Behavior theory integrated interventions to address deep-seated predictors of male involvement and health-seeking behaviors have not been well explored in the existing literature. To understand and address such factors there is a need for innovative high-impact interventions that utilize theories, to address modifiable predictors of intention to engage in a behavior (Attitude, subjective norms, and perceived behavior control. The findings from such studies can be useful in shaping antenatal care interventions such as male involvement in maternal services utilization.
Table 7 The relationship between pregnant women’s characteristic and perceived behavior control towards male involvement

| Variables                          | Negative perceived | Positive perceived | X²   | p-value |
|-----------------------------------|--------------------|--------------------|------|---------|
|                                   | Frequency          | Percent (%)        | Frequency | Percent (%) |     |        |
| Group                             |                    |                    |      |          |      |        |
| Intervention                      | 107                | 19.6               | 75   | 13.7     | 0.537 | 0.464 |
| Control                           | 202                | 37                 | 162  | 29.7     |       |        |
| Age group                         |                    |                    |      |          |      |        |
| Less than 20                      | 57                 | 10.40              | 44   | 8.10     |       |        |
| 21 to 25                          | 93                 | 17.00              | 61   | 11.20    |       |        |
| 26 to 30                          | 60                 | 11.00              | 53   | 9.70     | 4.598 | 0.331 |
| 31 to 35                          | 36                 | 6.60               | 39   | 7.10     |       |        |
| 36+                               | 63                 | 11.50              | 40   | 7.30     |       |        |
| Age at marriage                   |                    |                    |      |          |      |        |
| Less than 18                      | 154                | 28.20              | 80   | 14.70    |       |        |
| 19 to 24                          | 128                | 23.40              | 120  | 22.00    | 16.006 | < 0.001|
| 25 = +                            | 27                 | 4.90               | 37   | 6.80     |       |        |
| Education status                  |                    |                    |      |          |      |        |
| No formal                         | 128                | 23.40              | 66   | 12.10    |       |        |
| Primary school                    | 169                | 31.00              | 155  | 28.40    | 11.7  | 0.003 |
| Secondary school or higher        | 12                 | 2.20               | 16   | 2.90     |       |        |
| Ethnic group                      |                    |                    |      |          |      |        |
| Fipa                              | 195                | 35.70              | 144  | 26.40    |       |        |
| Mambwe                            | 44                 | 8.10               | 68   | 12.50    | 25.073 | < 0.001|
| Others                            | 70                 | 12.80              | 25   | 4.60     |       |        |
| Economic status                   |                    |                    |      |          |      |        |
| Less than one dollar per day      | 227                | 41.60              | 158  | 28.90    | 2.979 | 0.084 |
| At least one dollar per day       | 82                 | 15.00              | 79   | 14.50    |       |        |
| Own mobile phone                  |                    |                    |      |          |      |        |
| Yes                               | 77                 | 14.10              | 91   | 16.70    |       |        |
| No                                | 232                | 42.50              | 146  | 26.70    | 11.437 | 0.001 |
| Would you like to accompany your partner to childbirth? | | | | | | |
| No                                | 103                | 18.90              | 40   | 7.30     | 18.788 | < 0.001|
| Yes                               | 206                | 37.70              | 197  | 36.10    |       |        |
### Table 8 Predictors of perceived behavior control among pregnant women and their male partners

| Variables                        | AOR   | 95% CI   | p-value |
|----------------------------------|-------|----------|---------|
| **Pregnant women**               |       |          |         |
| **Age at marriage**              |       |          |         |
| Less than 18                     | 1     |          |        |
| 19 to 24                         | 1.447 | 0.97     | 2.159   | 0.07   |
| 25+                              | 2.331 | 1.261    | 4.308   | 0.007  |
| **Education status**             |       |          |         |
| No formal                        | 1     |          |        |
| Primary school                   | 1.344 | 0.902    | 2.003   | 0.147  |
| Secondary school or higher       | 1.761 | 0.736    | 4.211   | 0.203  |
| **Ethnic group**                 |       |          |         |
| Fipa                             | 1     |          |        |
| Mambwe                           | 2.278 | 1.444    | 3.596   | <0.001 |
| Others                           | 0.742 | 0.428    | 1.284   | 0.286  |
| **Would you like to accompany your partner to childbirth?** |       |          |         |
| No                               | 1     |          |        |
| Yes                              | 1.827 | 1.171    | 2.849   | 0.008  |
| **Own mobile phone**             |       |          |         |
| No                               | 1     |          |        |
| Yes                              | 1.254 | 0.831    | 1.891   | 0.28   |

### Availability of data and materials
Data set (supplementary file 1) and the questionnaire (supplementary file 2) are uploaded as supplementary material.

### Ethics approval and consent to participate
The ethical clearance to conduct this study was given by the Ethical Review Committee of the University of Dodoma, Dodoma, Tanzania. Also, a letter of permission was obtained from the Rukwa Regional Administration. Both written and verbal consents were obtained from study participants after they were given an explanation on the study objectives and procedures and their right to refuse to participate in the study at any time they were assured.

### Consent for publication
Not applicable.

### Competing interests
Authors declare there is no competing interest.

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Received: 20 March 2019 Accepted: 8 October 2020

Published online: 19 October 2020

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### Additional file

- Additional file 1.
- Additional file 2.

### Abbreviations
- AIDS: Acquired Immunodeficiency Syndrome
- ANC: Antenatal Clinic
- HIV: Human Immunodeficiency Virus
- MoHCDGEC: Ministry of Health, Community Development, Gender, Elderly and Children
- NBS: National Bureau of Statistics
- STIs: Sexually Transmitted Infections
- TDHS-MIS: Tanzania Demographic and Health Survey and Malaria Indicator Survey

### Acknowledgments
We gratefully acknowledge the University of Dodoma for financial support. We are thankful to the administration of the Rukwa Region for allowing us to conduct the study and the acknowledgments are extended to all study participants for their participation in this study.

### Authors’ contributions
FM led the conception, design, acquisition of data, and drafting of the manuscript. SK and FF guided the conception, design, and acquisition of data, analysis, interpretation, and critically revising the manuscript for intellectual content and have given final approval for the version to be published. All authors read and approved the final manuscript.

### Funding
The study was not funded.
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