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Client and provider factors associated with companionship during labor and birth in Kigoma Region, Tanzania

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Abstract

Background: Labor and birth companionship is a key aspect of respectful maternity care. Lack of companionship deters women from accessing facility-based delivery care, though formal and informal policies against companionship are common in sub-Saharan African countries.

Aim: To identify client and provider factors associated with labor and birth companionship

Design: Cross-sectional evaluation among delivery clients and providers in 61 health facilities in Kigoma Region, Tanzania, April–July 2016.

Methods: Multilevel, mixed effects logistic regression analyses were conducted on linked data from providers (n = 249) and delivery clients (n = 935). Outcome variables were *Companion in labor* and *Companion at the time of birth*.

Findings: Less than half of women reported having a labor companion (44.7%) and 12% reported having a birth companion. Among providers, 26.1% and 10.0% reported allowing a labor and birth companion, respectively. Clients had significantly greater odds of having a *labor* companion if their provider reported the following traits: working more than 55 hours/week (aOR 2.46, 95% CI 1.23–4.97), feeling very satisfied with their job (aOR 3.66, 95% CI 1.36–9.85),

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Ethics approval

This project was approved by the National Institute for Medical Research (NIMR) in Tanzania as one activity among a larger set of activities for the *Project to Reduce Maternal Deaths in Tanzania*. It was also reviewed in accordance with CDC human subjects protection policy and was determined to be non-research.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC.

Conflict of interest

None declared.

and allowing women to have a labor companion (aOR 3.73, 95% CI 1.58–8.81). Clients had significantly lower odds of having a *labor* companion if their provider reported having an on-site supervisor (aOR 0.48, 95% CI 0.24–0.95). Clients had significantly greater odds of having a *birth* companion if they self-reported labor complications (aOR 2.82, 95% CI 1.02–7.81) and had a labor companion (aOR 44.74, 95% CI 11.99–166.91). Clients had significantly greater odds of having a *birth* companion if their provider attended more than 10 deliveries in the last month (aOR 3.43, 95% CI 1.08–10.96) compared to fewer deliveries.

Conclusions and implications for practice: These results suggest that health providers are the gatekeepers of companionship, and the work environment influences providers' allowance of companionship. Facilities where providers experience staff shortages and high workload may be particularly responsive to programmatic interventions that aim to increase staff acceptance of birth companionship.

Keywords

Birth companion; Health care providers; Health policy; Quality of care; Respectful maternity care; Tanzania

Introduction

Maternal deaths remain high in sub-Saharan Africa at an estimated 546 deaths per 100,000 live births (Alkema et al., 2016). In Tanzania, the maternal mortality ratio (MMR) is estimated at 556 maternal deaths per 100,000 live births (compared to the MMR in developing regions of 239 maternal deaths per 100,000 live births; WHO et al., 2015), and facility births are far from universal (63% facility delivery rate in 2015; MoHCDGEC et al., 2016). In Tanzania's northwestern region of Kigoma, the rate of facility birth is even lower at 60% (CDC, 2017). Recent evidence suggests that 32% of the estimated births in Kigoma Region may take place two or more hours from emergency obstetric care, a prohibitive distance if complications should arise (Chen et al., 2017).

Companionship, facility-based delivery, and health outcomes

While skilled birth attendance has been identified as a critical strategy for reducing maternal and neonatal mortality (Campbell et al., 2006; Lee et al., 2011), some women choose not to deliver in a health facility due to lack of privacy and the potential for disrespectful and abusive treatment by health staff (Bohren et al., 2015; Bowser et al., 2010; Warren et al., 2017). The White Ribbon Alliance and the World Health Organization (WHO) have recognized the need for companionship (including women's choice of companion) as an important component of quality and respectful maternity care (White Ribbon Alliance, 2011; WHO, 2017). The presence of a companion provides laboring women with a greater feeling of control and reassurance (Banda et al., 2010; Isbir & Serçeku, 2017), increases satisfaction (WHO, 2018; Yuenyong et al., 2012), decreases anxiety (Akbarzadeh et al., 2014) and perceived pain (Isbir & Serçeku, 2017; Safarzadeh et al., 2012), and may have a positive influence on how staff treat and interact with women (Dynes et al., 2018; Kabakian-Khasholian & Portela, 2017). A recent Cochrane systematic review (Bohren et al., 2017) indicates that women with the support of a companion have labors that are

shorter (Akbarzadeh et al., 2014; Kashanian et al., 2010; Safarzadeh et al., 2012; Yuenyong et al., 2012), require less need for analgesia (McGrath & Kennell, 2008), and result in fewer cesarean sections (Kashanian et al., 2010; McGrath & Kennell, 2008). By contrast, women's fear of the inability to have a companion during labor is a demonstrated deterrent to facility-based delivery in multiple countries and contexts (Bohren et al., 2015, 2014; Ishola et al., 2017; Kujawski et al., 2015; Mselle et al., 2013; Okafor et al., 2015; Shiferaw et al., 2013; Silal et al., 2012).

In addition to benefiting women in labor, companions may also help reduce staff workload and improve processes. Companions may give health staff the opportunity to attend to urgent issues, remind staff when it is time to re-examine women or when there is a sudden change, arrange transportation if complications arise, and reinforce messages and instructions to women (Banda et al., 2010; Kabakian-Khasholian & Portela, 2017). In situations where a provider is alone on duty, a companion may provide both social and practical support (Alexander et al., 2014), though most companions are not allowed to assist directly with the delivery (DONA International, 2017; MoHCDGEC & Thamini Uhai, 2017).

Desire for and allowance of companionship among women and health staff is not universal. Some women feel they should receive care only from health professionals, fear a companion would interfere, or feel worried about having to conform to social expectations of childbirth (Banda et al., 2010; Kabakian-Khasholian & Portela, 2017; Alexander et al., 2014). Providers have also expressed concerns that companions will introduce germs into a labor or delivery room, add to the crowding in shared maternity wards and delivery rooms, interfere in medical decisions, make women less cooperative, or provide women with traditional herbs and medicines (Banda et al., 2010; Kabakian-Khasholian & Portela et al., 2017). Moreover, there are individual studies which have failed to detect a significant benefit of labor companionship on labor duration and interventions (Hodnett et al., 2002; Thomas et al., 2017; Monguihott et al., 2018), and on maternal satisfaction (Dickinson et al., 2002).

There is a paucity of research on client predictors of having companionship in labor and at birth. Some evidence suggests that women who desire a companion are more likely to be younger, to be experiencing their first birth, to have more formal education, and to have had more antenatal care visits (Alexander et al., 2014). One study of clinicians found that better knowledge of evidence-based advantages of companionship and being responsible for fewer deliveries per month were associated with providers' statements of allowing a labor companion (Senanayake et al., 2017). No published evidence exists regarding provider-level predictors of companionship that investigate actual provider practice of companionship on the maternity ward. This project helps fill these persistent gaps in knowledge of provider-level predictors using linked client and provider data from Kigoma Region, Tanzania. Our results provide foundational evidence on companionship in low-resource, sub-Saharan African settings, and will inform programmatic and policy decisions in Kigoma Region.

Methods

Design and setting

We conducted a cross-sectional facility-based evaluation using client-exit and provider interviews in 6 hospitals, 25 health centers, and 30 dispensaries, in Kigoma Region, Tanzania from April to July 2016. All hospitals and non-refugee camp health centers in the region were included in the study. A sample of 30 dispensaries were chosen based on the following criteria: (1) had at least 180 or more births per year; (2) had two or more providers onsite; (3) was the site for our project partner or for the government initiative, *Big Results Now*; (4) referred clients to one of the health centers; and (5) to maximize geographic distribution.

Kigoma Region is located in the northwest part of Tanzania and covers 45,066 square kilometers. In 2012, the region had a population of 2127,930. More than eight of 10 people in Kigoma live in rural areas (83%) where farming is the key economic activity. (National Bureau of Statistics & Chief Government Statistician, 2016).

Since 2006, the *Project to Reduce Maternal Deaths in Tanzania* has worked in the region with the aim of decreasing maternal mortality through strengthening emergency obstetric and neonatal care and increasing use of family planning. As part of monitoring and evaluation activities conducted for the Bloomberg Philanthropies- and H&B Agerup Fondation-funded *Project to Reduce Maternal Deaths in Tanzania*, AFFILIATION has been providing technical assistance to document the quality of facility-based maternity care services in Kigoma. Project activities were conducted in collaboration with the Ministry of Health, Community Development, Gender, the Elderly and Children (MoHCDGEC), Thamini Uhai, and EngenderHealth.

Sampling and data collection

Facility, provider, and client sampling and interview procedures and tools are described in detail in previously published work (AUTHOR et al., 2018). Convenience sampling was used to enroll postbirth clients with the following criteria: (1) aged 15 to 49 years; and (2) had a vaginal, live birth at a facility without a neonatal death. All clients who met inclusion criteria during the data collection period and their providers were approached for participation. Medical doctors were not interviewed due to their limited number in the region.

Interviewers trained in quantitative data collection methods conducted face-to-face interviews in Swahili at the facility. Informed consent was obtained from each respondent prior to data collection and confirmed with the respondent’s thumbprint. Clients were interviewed upon discharge following delivery care; providers were interviewed at a time convenient to them. Clients and providers were linked by asking clients who provided the majority of their care during labor and birth; information was verified with facility staff.

Data was collected using questionnaires that were developed in English, translated into Swahili, back translated, and pilot tested in January 2016. The *Client Post-Birth Exit Interview Questionnaire* was designed to capture information about client demographic

characteristics, experiences of companionship, perceptions of and satisfaction with services, and pregnancy history and intention. The *Provider Interview Questionnaire* and *Provider Self-administered Knowledge Test* were designed to collect information about provider demographic characteristics, education, training, supervision, mentorship, perceptions of the work environment, current labor and birth practices, and clinical knowledge.

Outcome variables—The two outcome variables of interest were the dichotomous variables *Companion in labor* and *Companion at the time of birth*. For the purpose of our analysis, we defined companion as an individual who accompanied the client to the facility for support or someone from the community specially trained to be a companion; we did not consider healthcare providers to be labor or birth companions.

Independent variables—The *client-level variables* included: Age; Highest education attended; Literacy; Wealth; Number of live births; Marital status; Attendance at religious services; Self-reported delivery complications; and Labor companion (used only for Birth companion model). The provider-level variables included: Age; Sex; Highest education completed; Cadre; Work hours per week; Number of deliveries attended in last month; Treated complications recently; Access to Electronic mentoring opportunities; Perception in-service training has helped job performance; Job satisfaction; Perception paid fairly for job duties; Perception of adequacy of training for job duties; Has on-site supervisor; Years in cadre; Years at the facility; Clinical knowledge test score[2]; Delivery ever-training summative index[3]; Delivery pre-service summative index[2]; Delivery in-service summative index[2]; Recent delivery practice summative index[2]; Provider allows companion in labor (self-reported by the provider); and Provider allows companion at delivery (self-reported by the provider).

Analytic approach

Client and provider data were linked. Bivariate analyses were conducted to identify variables associated with the two outcomes of interest; variables with a significant unadjusted relationship ($p < 0.10$) with *Companion during labor* and *Companion at the time of birth* were included in multivariate modeling. A multilevel mixed-effects logistic regression was used to examine the effects of client and provider characteristics on companionship during labor and companionship at the time of birth, with random intercepts for each provider. A p-value of less than 0.05 was considered statistically significant for multilevel models. A facility identification cluster variable was included to account for clustering of data by facility. Data analyses were conducted using Stata 14.1.

[2]Percent correct on 64 antenatal, delivery, postpartum, and newborn care knowledge questions.

[3]Staff were asked, "Have you received pre-service training in […]?" "Have you received in-service training in […]?; and "Have you conducted […] in the last 3 months?" for the following 25 items: (1) Focused antenatal care; (2) Routine labor and delivery care; (3) Use the partograph; (4) Active management of the third stage of labor; (5) Manual removal of the placenta; (6) Beginning intravenous fluids; (7) Checking for anemia; (8) Administering intramuscular or intravenous magnesium sulfate for the treatment of severe pre-eclampsia or eclampsia; (9) Administering intravenous antibiotics; (10) Administering misoprostol or other uterotonic; (11) Bimanual uterine compression (external); (12) Bimanual uterine compression (internal); (13) Suturing an episiotomy; (14) Suturing vaginal lacerations; (15) Suturing cervical lacerations; (16) Vacuum extractor; (17) Forceps; (18) C-section; (19) A blood transfusion; (20) Adult resuscitation; (21) Resuscitating a newborn with bag and mask; (22) Basic Emergency Obstetric and Neonatal Care (BEmONC); (23) Advanced Emergency Obstetric and Neonatal Care; (24) Administering antiretrovirals (ART) for Prevention of Mother-to-Child Transmission (PMTCT); and (25) Rapid diagnostic testing for HIV. Responses were summed to create four indices.

Results

A total of 960 delivery clients and 361 providers (Clinicians *n* = 72, Nurses/midwives *n* = 188, Other staff *n* = 98) were interviewed. Following exclusion of data from non-linked clients and providers, data from 935 delivery clients and 249 providers (Clinicians *n* = 69, Nurses/midwives *n* = 176, Other staff *n* = 85) were used in the analysis.

Descriptive characteristics

About half of the clients were between 20 and 29 years of age (50.3%). The majority of clients reported primary school as their highest education attended (67.3%; data not shown), and the ability to read and write (70.9%). Most clients were in a union (91.0%; data not shown) and reported attending religious services at least weekly (86.4%). About half of clients delivered in a health center (50.6%; data not shown) and 12.9% reported experiencing a complication during labor and delivery. (Table 1)

Less than half of women reported having a *Companion in labor* (44.7%). The mother (34.5%), mother-in-law (30.4%), and a neighbor (22.5%) were the most common companions. About one in 10 women reported having a *Companion at the time of birth* (12.0%). The mother-in-law (28.6%), mother (22.3%), and a traditional birth attendant (TBA) (17.0%) were the most common companions at birth. Among women who did not have a companion, 36.2% reported they would have wanted a companion in labor, and 23.2% of women reported they would have wanted a companion at birth. (Table 2)

Four out of every 10 providers were aged 20 to 29 years (41.0%). About two-thirds of providers were female (64.7%; data not shown), had completed a college education (66.7%; data not shown), and were nurses/midwives (61.0%). Over two-thirds (69.1%) reported conducting 10 or fewer deliveries in the last month. On average, providers reported working 54.8 h per week. One-quarter of providers reported allowing women to have a companion during labor (26.1%), while 10.0% reported allowing a companion at the time of birth. (Table 3)

Companionship in labor

Bivariate analyses—No client variables had a significant positive, unadjusted association with having a Companion in labor. Client variables with a significant negative, unadjusted association with having a companion in labor included *Literacy* and *Attendance at religious services*. Provider variables with a significant positive, unadjusted association with having a companion in labor included *Provider work hours, Perception paid fairly for job duties, Job satisfaction*, and *Provider allows companion in labor*. The provider variables with a significant negative, unadjusted association with having a companion in labor were *Treated complications recently* and *On-site supervision*. (Appendix A)

Multilevel analyses—Clients had two and a half times greater odds of having a labor companion if their provider reported working more than 55 h per week compared to fewer hours (aOR 2.46, 95% CI 1.23–4.97). Clients had more than three and a half times greater odds of having a labor companion if their providers reported feeling very satisfied with their job compared to less satisfied (aOR 3.66, 95% CI 1.36–9.85). Similarly, clients had

three and three-quarters greater odds of having a labor companion if their provider reported allowing women to have a labor companion compared to not allowing a companion (aOR 3.73, 95% CI 1.58–8.81). In contrast, clients had significantly lower odds of having a labor companion if their provider reported having an on-site supervisor compared to not having this (aOR 0.48, 95% CI 0.24–0.95). Considering all the independent variables included in the model, 53% of the total variance in labor companionship occurred between providers (Intraclass Correlation [ICC] = 0.53). (Table 4)

Companionship at the time of birth

Bivariate analyses—The client variables with a significant positive, unadjusted association with having a companion at birth included client *Self-reported complications* and *Labor companion*. No client or provider variables had a significant negative, unadjusted association with having a companion at birth. Provider variables with a significant positive, unadjusted association with having a companion at birth included *Number of deliveries in the last month* and *Provider allows companion at birth*. (Appendix A)

Multilevel analyses—Clients who self-reported complications during labor and delivery had nearly three times greater odds of having a birth companion compared to clients who did not report complications (aOR 2.82, 95% CI 1.02–7.81). Clients had 44 times greater odds of having a companion at birth if they reported having a companion in labor compared to those without a labor companion (aOR 44.74, 95% CI 11.99–166.91). Clients had more than three times greater odds of having a birth companion if their provider reported attending more than 10 deliveries in the last month compared to fewer deliveries (aOR 3.43, 95% CI 1.08–10.96). Considering all the independent variables in the model, 62% of the total variance in birth companionship occurred between providers (ICC 0.62). (Table 4)

Discussion

Allowing labor and birth companionship in health facilities is one factor posited to influence women's decision to seek skilled birth attendance (Bohren et al., 2014). It is important to understand influential factors for companionship in settings where either written or unwritten policy at the regional, district, or local level may prohibit or limit companionship. We sought to explore client and provider characteristics that may take precedence over such policy in health facilities across Kigoma Region, Tanzania. Our results provide insight into how health providers act as gatekeepers of companionship, and the factors that may influence whether or not they allow women to have a companion in labor and at birth.

Several provider factors were identified as influential in the labor companion model. Providers who reported either working more than the average number of hours per week, feeling very satisfied with their job, or allowing women to have a companion in labor were significantly more likely to have clients with a labor companion. This is consistent with the suggestion that overburdened staff have their workload reduced by a client companion who is able to provide supportive care to a laboring woman (Banda et al., 2010), but contrasts with one study that found fewer deliveries per month was associated with reported allowance of labor companions (Senanayake et al., 2017). Regarding provider job satisfaction, it is possible that allowing companionship contributes to reduced provider workload or visible

benefits to clients during labor and delivery (Bruggemann et al., 2007). As expected, providers who report allowing labor companionship have clients with greater odds of having a companion in labor. Clients whose providers reported having an on-site supervisor were 52% less likely to have companion in labor. These providers may work in facilities with no-companion policies that are either better known or better enforced due to the presence of on-site supervisors.

A combination of client and provider factors were identified as influential for companionship at the time of birth. Clients who perceived to have labor and delivery complications were more likely to have a companion with them at the moment of birth. It may be that providers are more inclined to overlook a no-companionship policy when complications arise. Women who perceive that they may be at risk of obstetric complications may also be more likely to request or arrive at a facility with a companion. As with companionship during labor, a heavier delivery workload was associated with greater odds of companionship during birth. The busy provider may appreciate the assistance and surveillance that a birth companion can provide, allowing the provider to step away when needed (Kabakian-Khasholian & Portela, 2017). Further research is needed to demonstrate both the positive and negative sequelae related to having a companion when complications arise. As expected, having a companion in labor was an extremely strong predictor of birth companionship, suggesting that a companion who is allowed to be alongside a laboring woman is simply more likely to be allowed to stay through the birth. As such, encouraging labor companionship may be an important strategy for increasing companionship at birth.

Strengths and limitations

A major strength of our project is that we used linked data between clients and providers, allowing analyses to identify two levels of factors for companionship. This approach was imperative given the significant contribution of provider-level differences to the variance in the dependent variables. Moreover, to our knowledge, our study is the first to quantitatively identify factors that promote or discourage companionship.

The cross-sectional design and convenience sampling method prevent the generalization of our findings. Social desirability bias and fear of negative consequences may have influenced provider self-report of whether or not they allow companionship. Furthermore, potentially important differences may exist between women with a companion of their choice versus women with a companion not of their choice; due to lack of specificity in our questions, we were not able to differentiate between these sub-groups of companionship. Finally, we did not collect information on site- and supervisor-specific policies on companionship, therefore we are unable to determine if variations exist at the facility level.

Research, evaluation, programmatic, and policy implications

The findings emphasize the important influence of health providers and facility policies on allowing companions during labor and delivery. Providers in Kigoma who have a greater number of work hours and deliveries seem to show an inclination towards allowing companionship. This behavior of supporting companionship (only 26.1% of providers reported allowing it in labor and 10.0% allowed it at birth) may represent busy providers

who have found a way to reduce workload by allowing or even encouraging companions. When considering companionship programs in the future, individuals with high workload may be particularly responsive to interventions that aim to increase staff acceptance of birth companionship.

Future opportunities exist to better understand birth companionship in Kigoma. In 2017, the MoHCDGEC, AFFILIATION and AFFILIATION, with funding from the Blue Lantern Foundation, launched a pilot birth companionship project in nine health facilities in Kigoma. A participatory process, involving the input of government officials, providers, and community members, was used to define the roles of companions, results of which are being used to guide implementation (MoHCDGEC & Thamini Uhai, 2017). Training for health providers, routine supervision by project staff, extensive outreach to communities and close monitoring are expected to contribute to the success of the project, which will end in early 2019.

Quantitative studies are needed and are being planned in Kigoma to examine the influence of companionship on client satisfaction, intention to return to the facility and recommend it to others, and on perinatal and maternal health outcomes. Additional studies are needed to identify client and provider factors for companionship in other parts of Tanzania and sub-Saharan Africa where patterns of companionship may be different. Qualitative evaluation work is needed and is also being planned in Kigoma to better understand: (1) provider concerns and how best to address them; (2) women's agency in choosing a companion of choice; (3) community acceptability; (4) the process of implementing a birth companionship project; and (5) barriers to enacting policy change. Collectively, these data are critical for building the evidence in support of companionship as a key strategy to improve women's experiences of facility-based childbirth, improve facility delivery rates, and ultimately reduce mortality and morbidity.

Conclusion

Despite companionship being increasingly recognized as an integral component of respectful maternity care and a potentially important factor in facility delivery rates, a paucity of evidence exists on the factors that predict it. Our findings demonstrate that health providers are the gatekeepers of companionship, and that aspects of the work environment (e.g., number of deliveries per month, work hours per week, job satisfaction) are influential in provider's allowance of companionship. Future research is needed to better understand the role of companionship in facility delivery rates, client satisfaction, and likeliness to return in the future, and maternal and perinatal health outcomes. As evidence of the positive outcomes of companionship builds, community-level programs can be implemented to increase client demand for companionship. The information from this evaluation will help to build a foundation of evidence to encourage policy change. Providers who work in facilities with staff shortages and high workload may be particularly open to implementation of companionship programs. Identifying providers who allow companionship in a widely no-companion environment may be an additional strategy to increase acceptability among providers and help spread positive messages about companionship into the community.

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Appendix A.: Association between client and provider characteristics and companionship in labor and at the time of birth—Kigoma Region, Tanzania, 2016 (Clients *n* = 935, Providers *n* = 249)

	Companion in labor		Companion at birth	
	Unadjusted OR (95% CI)	**p-value**	**Unadjusted OR (95% CI)**	**p-value**
Client level variables				
Age in years				
15 to 19 (reference)				
20 to 29	1.45 (0.84–2.52)	0.19	1.31 (0.61–2.81)	0.50
30 to 39	1.47 (0.80–2.69)	0.22	1.18 (0.50–2.77)	0.70
40 to 49	1.63 (0.58–4.53)	0.35	0.35 (0.07–1.81)	0.21
Don’t know	0.46 (0.08–2.77)	0.40	–	–
Highest education attended				
No education (reference)				
Primary	0.68 (0.41–1.12)	0.13	0.81 (0.42–1.57)	0.54
Secondary	0.76 (0.36–1.59)	0.47	0.88 (0.30–2.55)	0.82
College or University	1.23 (0.30–5.00)	0.77	3.26 (0.56–18.91)	0.19
Literacy				
Cannot read and write (reference)				
Can read and write	0.65 (0.42–1.00)	0.05	0.93 (0.52–1.66)	0.80
Wealth quintile				
Lowest (reference)				
Low middle	1.06 (0.56–2.03)	0.86	1.01 (0.44–2.34)	0.98
Middle	0.79 (0.42–1.50)	0.48	1.18 (0.50–2.77)	0.70
High middle	1.06 (0.56–2.01)	0.86	0.74 (0.31–1.78)	0.50
Highest	1.70 (0.85–3.38)	0.13	2.02 (0.80–5.12)	0.14
Number of livebirths				
0 to 2 (reference)				
3 or more	1.34 (0.91–1.98)	0.14	0.71 (0.41–1.22)	0.21
Marital status				
Not in a union (reference)				
In a union	0.73 (0.37–1.43)	0.36	0.66 (0.27–1.60)	0.35
Attendance at religious services				
Attends less often than weekly (reference)				

	Companion in labor		Companion at birth	
	Unadjusted OR (95% CI)	**p-value**	**Unadjusted OR (95% CI)**	**p-value**
Attends at least weekly	0.54 (0.30–0.95)	0.03	0.73 (0.35–1.52)	0.40
Client self-reported delivery complications				
No (reference)				
Yes	1.24 (0.68–2.27)	0.485	2.99 (1.34–6.66)	0.007
Companion in labor				
No (reference)				
Yes	NA	NA	45.23 (11.96–171.07)	<0.001
Provider-level variables				
Age in years				
20 to 29 (reference)				
30 to 39	0.68 (0.24–1.94)	0.47	1.02 (0.31–3.38)	0.97
40 to 49	1.46 (0.58–3.64)	0.42	0.67 (0.22–2.02)	0.48
50+	1.11 (0.43–2.87)	0.83	0.77 (0.25–2.38)	0.65
Sex				
Male (reference)				
Female	0.54 (0.26–1.15)	0.11	0.79 (0.33–1.88)	0.60
Highest education completed				
Primary (reference)				
Secondary	0.50 (0.08–2.96)	0.44	0.37 (0.05–2.62)	0.32
College/university	0.35 (0.06–1.97)	0.23	0.50 (0.08–3.17)	0.46
Cadre				
Clinician (reference)				
Nurse/midwife	0.42 (0.14–1.27)	0.13	1.53 (0.39–5.94)	0.54
Other staff	0.41 (0.12–1.40)	0.16	0.95 (0.20–4.43)	0.95
Work hours per week				
Less than 55 hours per week (reference)				
55 or more hours per week	3.42 (1.70–6.88)	0.001	1.96 (0.85–4.51)	0.11
Number of Deliveries Attended in Last Month				
0 to 10 (reference)				
More than 10	1.02 (0.48–2.16)	0.96	2.86 (1.22–6.73)	0.02
Treated Complications Recently Summative Index *				
0 types of complications (reference)				
1 to 4 types of complications	0.36 (0.15–0.89)	0.03	0.57 (0.21–1.53)	0.27
Access to electronic mentoring opportunities **				
Access to 0 of 3 types (reference)				
Access to 1 to 3 types	1.53 (0.50–4.66)	0.46	1.01 (0.36–2.81)	0.99
Perception in-service training has helped job performance				
No (reference)				
Yes	0.48 (0.15–1.53)	0.22	0.55 (0.16–1.96)	0.36

	Companion in labor		Companion at birth	
	Unadjusted OR (95% CI)	**p-value**	**Unadjusted OR (95% CI)**	**p-value**
Job satisfaction				
A little satisfied/Neither satisfied nor dissatisfied/ Very dissatisfied (reference)				
Very satisfied	2.93 (0.93–9.23)	0.07	1.38 (0.31–6.19)	0.68
Perception paid fairly for job duties				
No (reference)				
Yes	3.08 (1.23–7.74)	0.02	1.52 (0.54–4.28)	0.43
Perception of adequacy of training for job duties				
No (reference)				
Yes	1.49 (0.70–3.20)	0.30	1.89 (0.74–4.85)	0.18
Has an on-site supervisor				
No (reference)				
Yes	0.31 (0.15–0.67)	0.003	0.54 (0.23–1.29)	0.17
Years in cadre	1.01 (0.97–1.05)	0.63	0 0.99 (0.95–1.04)	0.72
Years at the facility	0.99 (0.95–1.03)	0.53	0.99 (0.94–1.03)	0.59
Clinical knowledge test score, % correct	2.30 (0.16–32.3)	0.54	5.07 (0.23–110.12)	0.30
Delivery ever-training summative index score (possible range 0 to 25)	0.98 (0.92–1.05)	0.65	1.01 (0.93–1.10)	0.76
Delivery pre-service summative index (possible range 0 to 25)	0.99 (0.94–1.04)	0.69	1.02 (0.96–1.08)	0.51
Delivery in-service summative index (possible range 0 to 25)	1.01 (0.96–1.07)	0.57	0.97 (0.92–1.03)	0.40
Recent delivery practice summative index score (in last 3 months, possible range 0 to 25)	1.03 (0.95–1.11)	0.49	1.07 (0.97–1.17)	0.18
Allows a companion in labor	3.62 (1.15–11.4)	0.03	NA	–
Allows a companion at birth	NA	–	4.56 (1.38–15.09)	0.01

Note: CI = Confidence Intervals.

* Treated complications recently summative index = Number of types of complications dealt with in the last month related to postpartum hemorrhage, eclampsia, obstructed labor, puerperal sepsis.

** Access to electronic mentoring including emergency call system, e-learning, and teleconference.

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Table 1

Characteristics of women included in the companionship sample by self-reported type of companionship—Kigoma Region, Tanzania, 2016 ($n = 935$).

	Companion in labor				Companion at time of birth				Total	
	Yes ($n = 418$)		No ($n = 517$)		Yes ($n = 112$)		No ($n = 823$)		$N = 935$	
	Women, *n* (%)	95% CI	Women, *n* (%)	95% CI	Women, *n* (%)	95% CI	Women, *n* (%)	95% CI	Women, *n* (%)	95% CI
Age in years										
15–19	65 (15.6)	12.4–19.4	98 (19.0)	15.9–22.6	15 (13.4)	8.2–21.2	148 (18.0)	15.5–20.8	163 (17.4)	15.1–20.0
20–29	215 (51.4)	46.6–56.2	255 (49.3)	45.0–53.6	61 (54.5)	45.1–63.6	409 (49.7)	46.3–53.1	470 (50.3)	47.1–53.5
30–39	113 (27.0)	23.0–31.5	138 (26.7)	23.0–30.7	33 (29.5)	21.7–38.7	218 (26.5)	23.6–29.6	251 (26.8)	24.1–29.8
40–49	21 (5.0)	3.3–7.6	17 (3.3)	2.1–5.2	3 (2.7)	0.9–8.1	35 (4.3)	3.1–5.9	38 (4.1)	3.0–5.5
Don’t know	4 (1.0)	0.4–2.5	9 (1.7)	0.9–3.3	0 (0.0)	–	13 (1.6)	0.9–2.7	13 (1.4)	0.8–2.4
Literacy										
Cannot read and write	139 (33.3)	28.9–37.9	125 (24.3)	20.7–28.1	34 (30.4)	22.5–39.6	230 (28.0)	25.0–31.1	264 (28.2)	25.4–31.2
Can read and write	276 (66.0)	61.3–70.4	387 (74.9)	70.9–78.4	77 (68.8)	59.5–76.7	586 (71.2)	68.0–74.2	663 (70.9)	67.9–73.7
Missing or refused	3 (0.7)	0.2–2.2	5 (1.0)	0.4–2.3	1 (0.9)	0.1–6.2	7 (0.9)	0.4–1.8	8 (0.9)	0.43–1.7
Frequency of attendance at religious services										
Attends less often than weelkly	75 (17.9)	14.5–21.9	52 (10.1)	7.7–13.0	17 (15.2)	9.6–23.2	110 (13.4)	11.2–15.9	127 (13.6)	11.5–15.9
Attends at least weekly	343 (82.1)	78.1–85.5	465 (89.9)	87.0–92.3	95 (84.8)	76.8–90.4	713 (86.6)	84.1–88.8	808 (86.4)	84.1–88.5
Self-reported birth complications										
No	369 (88.3)	84.8–91.0	445 (86.1)	82.8–88.8	93 (83.0)	74.8–89.0	721 (87.6)	85.2–89.7	814 (87.1)	84.7–89.1
Yes	49 (11.7)	9.0–15.2	72 (13.9)	11.2–17.2	19 (17.0)	11.0–25.2	102 (12.4)	10.3–14.8	121 (12.9)	10.9–15.3

NOTE: CI = Confidence Intervals, SD = Standard deviation.

Table 2

Labor and birth companionship among women included in the companionship sample—Kigoma Region, Tanzania, 2016 ($n = 935$).

	Women, *n* (%)	95% CI
Had a companion in labor - Yes	418 (44.7)	41.5–47.9
Who was your companion? *		
Mother	144 (34.5)	30.0–39.2
Mother-in-law	127 (30.4)	26.1–35.0
Neighbor	94 (22.5)	18.7–26.8
Sister	92 (21.8)	18.1–26.0
Husband	88 (21.1)	17.4–25.2
Other (Traditional Birth Attendant (TBA), Aunt, Grandmother, Cousin)	50 (12.0)	9.2–15.5
Friend	43 (10.3)	7.7–13.6
Had a companion in labor - No	517 (55.3)	52.1–58.5
Would you have wanted a companion? - No	324 (62.7)	58.4–66.7
Would you have wanted a companion? - Missing	6 (1.2)	0.5–2.6
Would you have wanted a companion? - Yes	187 (36.2)	32.1–40.4
Who would you have wanted as a companion? *		
Mother	118 (63.4)	56.2–70.1
Sister	66 (35.5)	28.9–42.7
Mother-in-law	43 (23.1)	17.6–29.8
Other (TBA, Neighbor, Grandmother, Cousin, Friend, Nurse)	31 (16.6)	11.9–22.7
Husband	28 (15.1)	10.6–21.0
Had a companion at the time of birth - Yes	112 (12.0)	10.0–14.2
Who was your companion? *		
Mother-in-law	32 (28.6)	20.9–37.8
Mother	25 (22.3)	15.5–31.1
TBA	19 (17.0)	11.0–25.2
Other (Friend, Grandmother, Aunt)	19 (17.0)	11.0–25.2
Husband	13 (11.6)	6.8–19.1
Neighbor	13 (11.6)	6.8–19.2
Sister	12 (10.7)	6.1–18.1

	Women, *n* (%)	95% CI
Had a companion at the time of birth - No	823 (88.0)	85.8–90.0
Would you have wanted a companion? - No	623 (75.7)	72.6–78.5
Would you have wanted a companion? - Yes	191 (23.2)	20.4–26.2
Who would you have wanted as a companion?*		
Mother	122 (63.9)	56.8–70.4
Sister	49 (25.7)	19.9–32.4
Mother-in-law	37 (19.4)	14.3–25.7
Other (TBA, Neighbor, Friend, Nurse)	25 (13.1)	9.0–18.7
Husband	24 (12.6)	8.5–18.1

NOTE: TBA = Traditional Birth Attendant; CI = Confidence Intervals.

* Multiple responses possible, thus percentages do not sum to 100.

Table 3

Characteristics of providers included in the companionship sample by self-reported allowance of companionship—Kigoma Region, Tanzania, 2016 (n = 249).

	Allows a companion in labor and/or at birth (n = 69)		**Does not allow a companion in labor or at birth (n = 180)**		**Total N = 249**	
	Providers, n (%)	**95% CI**	**Providers, n (%)**	**95% CI**	**Providers, n (%)**	**95% CI**
Age in years						
20–29	32 (46.4)	34.3–58.8	70 (38.9)	31.7–46.4	102 (41.0)	34.8–47.4
30–39	11 (15.9)	8.2–26.7	26 (14.4)	9.7–20.4	37 (14.9)	10.7–19.9
40–49	13 (18.8)	10.4–30.1	43 (23.9)	17.9–30.8	56 (22.5)	17.5–28.2
50+	13 (18.8)	10.4–30.1	41 (22.8)	16.9–29.6	54 (21.7)	16.7–27.3
Cadre						
Clinician	11 (15.9)	8.2–26.7	23 (12.8)	8.3–18.6	34 (13.7)	9.7–18.6
Nurse/midwife	45 (65.2)	52.8–76.3	107 (59.4)	51.9–66.7	152 (61.0)	54.7–67.1
Other staff	13 (18.8)	10.4–30.1	50 (27.8)	21.4–34.9	63 (25.3)	20.0–31.2
Number of deliveries attended in last month						
0 to 10, or Don’t know	45 (65.2)	53.0–75.7	127 (70.6)	63.4–76.8	172 (69.1)	63.0–74.5
More than 10	24 (34.8)	24.3–47.0	53 (29.4)	23.2–36.6	77 (30.9)	25.5–37.0
Treated complications recently summative index *						
0 of 4	24 (34.8)	24.3–47.0	60 (33.3)	26.8–40.6	84 (33.7)	28.1–39.9
1 of 4	20 (29.0)	19.3–41.0	50 (27.8)	21.7–34.8	70 (28.1)	22.8–34.1
2 of 4	12 (17.4)	10.0–28.5	29 (16.1)	11.4–22.3	41 (16.5)	12.3–21.6
3 of 4	9 (13.0)	6.8–23.5	25 (13.9)	9.5–19.8	34 (13.7)	9.9–18.5
4 of 4	4 (5.8)	2.1–14.8	16 (8.9)	5.5–14.1	20 (8.0)	5.2–12.2
Job satisfaction						
Very dissatisfied	16 (23.2)	14.5–34.9	21 (11.7)	7.7–17.3	37 (14.9)	10.9–19.9
A little dissatisfied	22 (31.9)	21.8–44.0	48 (26.7)	20.7–33.7	70 (28.1)	22.8–34.1
Neither satisfied nor dissatisfied	10 (14.5)	7.9–25.2	21 (11.7)	7.7–17.3	31 (12.4)	8.9–17.2
A little satisfied	16 (23.2)	14.5–34.9	64 (35.6)	28.8–42.9	80 (32.1)	26.6–38.2
Very satisfied	5 (7.2)	3.0–16.6	26 (14.4)	10.0–20.4	31 (12.4)	8.9–17.2
Perception paid fairly for job duties						
No	54 (78.3)	66.7–86.6	149 (82.8)	76.5–87.7	203 (81.5)	76.2–85.9

	Allows a companion in labor and/or at birth (*n* = 69)		Does not allow a companion in labor or at birth (*n* = 180)		Total *N* = 249	
	Providers, *n* (%)	**95% CI**	**Providers, *n* (%)**	**95% CI**	**Providers, *n* (%)**	**95% CI**
Yes	15 (21.7)	13.4–33.3	31 (17.2)	12.3–23.5	46 (18.5)	14.1–23.8
Has an on-site supervisor						
No	30 (43.5)	32.1–55.6	47 (26.1)	20.2–33.1	77 (30.9)	25.5–37.0
Yes	39 (56.5)	44.4–67.9	133 (73.9)	66.9–79.8	172 (69.1)	63.0–74.5
Work hours per week						
Mean (SD)	60.4 (16.7)	56.4–64.5	52.6 (13.1)	50.7–54.6	54.8 (14.6)	53.0–56.6

NOTE: CI = Confidence Intervals, SD = Standard deviation.

*Treated complications recently summative index = Number of types of complications dealt with in the last month related to postpartum hemorrhage, eclampsia, obstructed labor, puerperal sepsis.

Table 4

Multilevel mixed-effects logistic regression analysis for companionship in labor and at the time of birth—Kigoma Region, Tanzania, 2016 (Clients n = 935, Providers n = 249).

	Companion in labor		Companion at birth	
	Adjusted OR (95% CI)	**p-value**	**Adjusted OR (95% CI)**	**p-value**
Fixed effects - client level variables Literacy				
Cannot read and write (reference)				
Can read and write	0.75 (0.48–1.17)	0.21	NA	NA
Frequency of attendance at religious services				
Attends less often than weekly (reference)				
Attends at least weekly	0.63 (0.32–1.24)	0.18	NA	NA
Client self-reported complications				
No (reference)				
Yes	NA	NA	2.82 (1.02–7.81)	0.046
Companion in Labor				
No (reference)				
Yes	NA	NA	44.74 (11.99–166.91)	<0.001
Fixed effects - provider-level variables				
Number of deliveries attended in the last month				
0 to 10, or Don’t know (reference)				
More than 10	NA	NA	3.43 (1.08–10.96)	0.037
Treated complications recently *				
0 types of complications (reference)				
1 to 4 types of complications	0.53 (0.25–1.13)	0.10	NA	NA
Job satisfaction				
A little satisfied/Neither satisfied nor dissatisfied/Very dissatisfied (reference)				
Very satisfied	3.66 (1.36–9.85)	0.01	NA	NA
Perception paid fairly for job duties				
No (reference)				
Yes	2.20 (0.96–5.07)	0.06	NA	NA
Work hours per week				

	Companion in labor		Companion at birth	
	Adjusted OR (95% CI)	**p-value**	**Adjusted OR (95% CI)**	**p-value**
Below average (less than 55 hours per week; reference)				
Average or above (55 or more hours per week)	2.46 (1.22–4.97)	0.01	NA	NA
Has an on-site supervisor				
No (reference)				
Yes	0.48 (0.24–0.95)	0.04	NA	NA
Provider allows a companion (self-reported)				
No (reference)				
Yes	3.73 (1.58–8.81)	0.003	2.73 (0.79–9.42)	0.11
Random effects				
Provider-level variance (SE)	3.64 (0.96)		5.39 (2.08)	
Provider-level variance partition coefficient	0.53		0.62	
Level 1 units	935		935	
Level 2 units	249		249	
Log likelihood	−510.92184		−245.54324	

NOTE: CI = Confidence Intervals, SE = Standard Error.

* Treated complications recently summative index = Number of types of complications dealt with in the last month related to postpartum hemorrhage, eclampsia, obstructed labor, puerperal sepsis.

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