TITLE
Ethnolinguistic Concordance and the Provision of Postpartum IUD (PPIUD) Counseling Services in Sri Lanka

SHORT RUNNING HEAD
Ethnolinguistic Concordance and PPIUD Counseling

AUTHOR NAMES
Mahesh Karra[1]
Erin Pearson[2]
David Canning[3]
Iqbal Shah[3]
Ranjith de Silva[4]
Arnjali Samarasekera[4]

AUTHOR AFFILIATIONS
1: Frederick S. Pardee School of Global Studies, Boston University, Boston, MA 02215 USA
2: Ipas, Chapel Hill, NC 27515 USA
3: Harvard T.H. Chan School of Public Health, Boston, MA 02115 USA
4: Sri Lanka College of Obstetricians and Gynaecologists, Colombo 08, Sri Lanka

CORRESPONDING AUTHOR
Mahesh Karra
Frederick S. Pardee School of Global Studies
Boston University
152 Bay State Road, Room G04C
Boston, MA 02215
Tel: +1-617-358-6674
E-mail: mvkarra@bu.edu

COMPETING INTERESTS
All authors declare that no competing interests exist.

FUNDING STATEMENT
Funding for the study was provided by the Susan Thompson Buffett Foundation. The funding body played no role in the design of the study, the collection, analysis, and interpretation of data, or in the writing and submission of the manuscript.

AUTHOR CONTRIBUTIONS
MK conceived the idea for the study. MK, EP, DC, and IS contributed to the study design, data collection, and analysis. All authors participated in the writing and review of the manuscript. All authors have read and approved the final manuscript.

Ethnolinguistic Concordance and the Provision of Postpartum IUD (PPIUD) Counseling Services in Sri Lanka

Abstract

Background

Ethnic and linguistic concordance are important dimensions of the patient-physician relationship and are linked to health care disparities. This study examines how concordance between women and their Primary Health Midwives (PHMs) in Sri Lanka is associated with women's receipt of immediate postpartum IUD (PPIUD) counseling services.

Methods and Findings

We use observational data from a cluster-randomized trial, in which women who delivered one of six hospitals were offered counseling and health services. Hospitals received an intervention that aimed to increase access to counseling on postpartum contraception, with an emphasis on the PPIUD. We merge data on women with data on PHMs, and we generate indicators of linguistic concordance (whether the woman's spoken language(s) match with the spoken language(s) of her PHM), ethnic concordance (whether the woman's ethnicity matches with the ethnicity of her PHM) and their joint interaction. We focus on receipt of PPIUD counseling, which was service that was newly introduced through this intervention. We use multivariate logistic regression analyses to assess how concordance is related to women's receipt of PPIUD counseling. We find that women from ethnolinguistic minority groups face larger disparities in their receipt of PPIUD counseling. We identify ethnic discordance to be the primary driver of this disparity rather than linguistic discordance.

Conclusions

Matching women and their health care providers based on ethnolinguistic background may reduce disparities in health service provision. Additional training of PHMs would serve to overcome key ethnically-driven cultural and linguistic barriers that are driving these disparities.

Keywords

Ethnicity; Language; Ethnolinguistic concordance; Postpartum family planning; PPIUD; Counseling; Sri Lanka

Introduction

Poor communication and a lack of mutual trust have long been cited as key determinants of a weak patient-physician relationship, which is fundamental to the lack of provision of effective medical care (1). In particular, interpersonal barriers that result from linguistic, racial, ethnic, or cultural differences between patients and providers may, in fact, exacerbate disparities in utilization, care seeking behavior, and health among minority groups (2–4). Studies have also shown that differential provider treatment towards minorities may explain differences in quality of care and outcomes such as patient satisfaction, adherence to treatment, and disease persistence, among others (5–7).

Ethnolinguistic concordance between patients and their providers has become an important dimension of the patient-physician relationship and has been thought to be linked to health care disparities. Most studies that have assessed the role of ethnolinguistic or cultural discordance between patients and providers have emerged from the debate over whether increasing the numbers of minority health professionals would ameliorate health care disparities for minority individuals. Over the last two decades, this debate has largely been informed by a large body of literature that examined the role of minority providers in caring for underserved minority populations (8–10). Several studies

have found that patients' trust, satisfaction, utilization of services, and involvement in decision-making about their health are higher when they share the same race, ethnicity, or language as their provider (2,6,11–13). On the other hand, other studies have found no significant associations between health care quality and physician-patient ethnic concordance (14,15), and the evidence on the benefits of other types of patient-physician concordance, such as gender is even more mixed (16,17).

In this study, we examine the relationships between ethnolinguistic concordance and the provision of postpartum contraception counseling services in Sri Lanka. We use data from a cluster-randomized stepped-wedge trial in which women who delivered in any one of six hospitals in the trial were offered antenatal counseling and postnatal health services with the newly added option to receive an immediate postpartum intrauterine device (PPIUD) following their delivery. We merge baseline data on postpartum women from the trial with background data collected on local Primary Health Midwives (PHMs), who are usually the entry point into antenatal care for pregnant women in remote and rural areas. We then generate indicators of linguistic concordance (whether or not the woman's spoken language(s) match with the spoken language(s) of her local PHM), ethnic concordance (whether or not the woman's ethnicity matches with the ethnicity of her local PHM) and their joint interaction (woman-PHM concordance across both ethnic and linguistic dimensions). We assess how these measures of concordance are related to women's receipt of PPIUD counseling services.

Our findings address the existing research gaps in two key ways. First, we provide insight into how language and ethnicity play a role in shaping interpersonal care-related outcomes in a low- and middle-income setting where evidence on patient-provider relationships is scarce. Second, we examine how patient-provider relationships across ethnicity and language are independently but also jointly related

to differences in the receipt of interpersonal health care, and we are able to disentangle the associations by which both of these sociocultural determinants affect processes of care.

Contextual Background

Since the end of its 26-year old civil conflict in 2009, Sri Lanka has made great economic progress and has transitioned towards achieving middle-income status (18). Sri Lanka has a highly developed health system, particularly in the areas of obstetric and maternal health care and family planning. Antenatal care in Sri Lanka is free and comprehensive, and 99 percent of Sri Lankan women receive antenatal care at least once during pregnancy (19). Antenatal counselling may be provided at field clinics, at hospitals and hospital clinics, and most often through home visits by PHMs, especially in rural and remote regions. The PHM is referred to as the "front line" health worker for providing domiciliary maternal and child health and family planning services in the community. Each PHM is assigned to oversee a catchment area of 2000 to 4000 people (20). Through systematic home visits, PHMs provide routine care to pregnant women and children as well as family planning services, including counselling and the distribution of contraceptive pills and condoms, to women and couples. PHMs also support local maternal and child health clinics and serve as a link between the community and the institutional health system. Low risk women who begin antenatal counselling at 6 to 8 weeks are typically visited by their local PHM over the course of their pregnancy, and topics related to postpartum health and family planning are routinely discussed as part of these visits (21). Family planning services in Sri Lanka are overseen by the Family Health Bureau (FHB) of the Government of Sri Lanka and by the Sri Lanka Family Planning Association (FPA), and PHMs are trained on the provision of family planning counseling and services by the FHB in collaboration with the FPA.

In recognizing the ethnic and linguistic roots of the conflict between the majority Sinhalese, who make up roughly 75 percent of the country's 21 million people, and the minority Tamil-speaking groups, who make up 24 percent of the population, the Government of Sri Lanka bestowed national language status to both Sinhala and Tamil, with English as a link language, in the country's Constitution (22,23). While this provision allows citizens to interact with institutions in any of the three languages, there has been increasing concern by service providers to meet public demand across multiple languages, particularly for Tamil populations. A key reason for this concern in the health sector is the shortage of qualified and multilingual health personnel in both public and private sectors in Tamil-majority areas. In a recent study of health services in Sri Lanka's Northern Province, a predominantly Tamil region, a majority of interviewed providers and inhabitants identified the shortage of health personnel to be the most pressing obstacle to improving health outcomes (24). Moreover, Sinhalese healthcare providers in the region reported the existence of a linguistic discordance between providers and patients and mentioned the difficulty of working in Tamil communities due to language barriers.

In the provision of family planning counseling services in Sri Lanka, counseling materials (brochures, etc.) are typically available and are distributed in all three languages. However, a shortage of multilingual health care providers may act as a barrier to effective counseling and communication of essential reproductive health information, regardless of the availability of counseling materials and family planning supplies. This barrier to effective service provision may be exacerbated if there also exists a mismatch in the distribution of providers relative to the distribution of the population being served by language, particularly for Tamil minorities. If there are too few counselors who speak Tamil and who work in Tamil-majority regions to serve Tamil clients, then we may find Tamil populations are less likely to receive counseling for family planning.

The Postpartum IUD Study

The International Federation of Gynaecology and Obstetrics (FIGO), in collaboration with its nationally affiliated Associations of Obstetricians and Gynaecologists, launched an initiative in 2014 to institutionalize postpartum contraceptive services, with a focus on PPIUD service provision, as a routine part of antenatal counselling and delivery room services in Sri Lanka. The FIGO initiative was developed and launched in collaboration with the Sri Lanka College of Obstetricians and Gynaecologists (SLCOG) to address the postpartum contraceptive needs of women. The key components of the FIGO-SLCOG initiative consisted of: 1) training PHMs, nurses, midwives, and hospital staff (doctors and delivery unit staff) in the provision of counselling and postpartum contraceptive services; 2) institutionalizing the provision of counselling and postpartum contraceptive services, especially the PPIUD, as part of routine delivery services; and 3) ensuring continuity of PPIUD service provision, in which health providers who are trained in provision of PPIUD services are followed to determine whether they continue to provide these services even if they move to other facilities and ensuring the regular supply of IUDs.

To assess the impact and performance of the FIGO-SLCOG initiative in Sri Lanka, an independent evaluation was undertaken in six hospitals, four in Sinhala-majority regions and two in Tamil-majority regions, by means of a cluster-randomized stepped-wedge trial (25). As part of the evaluation, detailed baseline data on family planning and PPIUD counseling services received during antenatal care were collected from approximately 42,000 women who delivered in these six study hospitals between September 2015 and March 2017. In particular, women were asked about their receipt of postpartum family planning and PPIUD counseling during pregnancy as well as about their experiences and satisfaction with the counseling that they received. For our analysis, we restrict our sample to women for whom more detailed sociodemographic data were collected. To assess women's language

proficiency, field interviewers recorded the languages in which the interview with the respondent was conducted and also probed the respondent on all languages that she could speak at a native or bilingual level. Independently of this data collection with women, we gather data on the spoken language(s) and ethnicities of PHMs within each hospital's catchment area. We merge baseline data collected on postpartum women from the trial with the language and ethnicity data collected on local PHMs from a sample of Medical Office of Health (MOH) catchment areas, and we generate indicators of ethnolinguistic concordance by identifying whether or not the woman's primary language(s) and ethnicity matched with the language(s) and ethnicity of her local PHM. We use these measures to determine how ethnolinguistic similarity is related to receipt of PPIUD counseling.

Methods

Analytic Sample

Data were collected for women who delivered in six hospitals in Sri Lanka between September 2015 and March 2017: Nuwara Eliya District General Hospital, Nawalapitiya District General Hospital, Polonnaruwa District General Hospital, Chilaw District General Hospital, Moneragala District General Hospital, and Kalutara District General Hospital. Four of the six hospitals (Polonnaruwa, Moneragala, Kalutara, and Chilaw) are located in Sinhala-majority regions of the country, while the other two hospitals (Nuwara Eliya and Nawalapitiya) are located in Tamil-majority regions of the country. Figure 1 presents a map of the ethnic distribution of Sri Lanka as well as the locations of the hospitals. Five data collection officers were assigned to each hospital to administer a questionnaire that collected information on each consenting woman's sociodemographic background characteristics, the location and quality of antenatal counselling, and whether the respondent received postpartum family planning and PPIUD counselling. The goal was to interview all women who delivered in these six hospitals and who consented to be interviewed.

A total of 7,191 women for whom more detailed sociodemographic information on ethnicity and language was available were matched to 258 PHMs from 13 MOH areas. In a few PHM catchment areas, more than one PHM was assigned. In the case where all PHMs assigned to the same catchment area had the same ethnolinguistic composition (e.g. all PHMs were ethnic Sinhalese who spoke Sinhala), then they were collapsed into one observation for the entire PHM area. In the case where all PHMs assigned to the same catchment area had the same ethnic composition (either ethnic Sinhalese or non-Sinhalese) but differing linguistic composition, the observation recoded to include the most flexible language capacity possible for the area. For example, if a PHM area had an ethnic non-Sinhalese PHM who spoke only Sinhala as well as an ethnic non-Sinhalese PHM who spoke only Tamil, then the PHM would be assigned as having a PHM who was ethnic non-Sinhalese who spoke both Sinhala and Tamil. Observations (both women and PHMs) for whom there was more than one PHM assigned to the PHM area and for whom a clear PHM ethnolinguistic composition could not be ascertained were dropped from the analysis to ensure cleaner identification of concordance between PHMs and women. After dropping observations where information on language and ethnicity for PHMs and women were not clearly coded or missing and observations where women were enrolled prior to the rollout of the FIGO intervention (and were therefore not potentially exposed to PPIUD counseling), we are left with an analytic sample of 4,497 women who delivered in six district general hospitals between September 2015 and March 2017 and who are matched to 245 PHMs from 13 MOH areas.

Outcome – PPIUD Counseling

Our key outcome variable is whether or not a woman i living in PHM area j (and who is therefore matched to PHM j) received PPIUD counseling prior to being admitted to one of our six study

hospitals for her delivery. Our selection of this outcome relies on the fact that a pregnant woman's first interactions with the health system would typically involve her local PHM, especially before she is admitted for delivery, during which time she is likely to interact with a wider range of health personnel. Given that PHMs are often a pregnant woman's first and most frequent point of contact, as well as her entry point into the cascade of care, we would need to identify an outcome, such as family planning counseling, that reflects a health service that a PHM is likely to provide to a woman before she is escalated through the health system over the course of her pregnancy.

Empirical Analysis

Our first set of analyses focuses on the role of ethnicity and consists of several specifications that estimate the associations between women's ethnicity, ethnic concordance between women and their PHMs, and women's receipt of PPIUD counseling. We first estimate the association between women's ethnicity and counseling as follows:

$$y_{ij} = \alpha + \beta E_i + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, y_{ij} is the PPIUD counseling outcome of interest for woman i living in PHM area j, E_i is a categorical variable that indicates woman i's ethnicity: Sinhala, Sri Lankan Tamil, Indian Tamil, Sri Lankan Moor, or Other, with ethnic Sinhala women assigned as the reference group. Given that the outcome, receipt of PPIUD counseling, is a binary variable, we conduct multivariate logistic regression analyses and include a range of confounding variables to control for potential bias. Specifically, the vector X_i includes woman-level controls such as educational attainment, age, the number of live births, and whether the woman has ever used a family planning method. In addition, we include a term δ_m that denotes MOH fixed effects, and standard errors are clustered at the PHM level.

We then examine the relationship between PHM ethnicity and receipt of counseling as follows:

$$y_{ij} = \alpha + \beta E_j + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, E_j is a categorical variable that indicates PHM j's ethnicity: Sinhala, Sri Lankan Tamil, Indian Tamil, Sri Lankan Moor, or Other, with ethnic Sinhala PHMs assigned as the reference group..

We then examine the binary relationship between ethnic concordance between women and their PHMs as follows:

$$y_{ij} = \alpha + \beta_1 WE_i + \beta_2 PE_j + \beta_3\left(WE_i \cdot PE_j\right) + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, WE_i is a binary indicator that signals whether woman i is of Sinhala ethnicity or not, and PE_j is a binary variable that indicates whether PHM j is of Sinhala ethnicity or not.

In following from the previous two specifications, we present a more decomposed interactive specification of the associations between PHM ethnicity, women's ethnicity, and counseling as follows:

$$y_{ij} = \alpha + \sum_{l\in\{S,NS\}}\sum_{k\in\{S,NS\}}\left[\beta_{kl}\mathbb{I}\{WE_i = k\}\cdot\mathbb{I}\{PE_j = l\}\right] + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, $\mathbb{I}\{WE_i = k\}$ is an indicator that identifies whether woman i is of Sinhalese or non-Sinhalese ethnicity (with women of Sinhalese ethnicity as the reference group), and $\mathbb{I}\{PE_j = l\}$ is an indicator that identifies whether PHM j is of Sinhalese or non-Sinhalese ethnicity (with PHMs of Sinhalese ethnicity as the reference group). We can then test the following restrictions: 1) whether concordance in ethnicity matters for outcomes, and if so, if concordance matters more for one ethnic group than the other; and 2) whether discordance in ethnicity matters for outcomes, and if so, if discordance matters more for one group than the other.

Our second set of analyses focuses on the role of language and linguistic concordance with their PHM on counseling. We first run a specification to examine the association of being a Tamil-speaking woman on counseling:

$$y_{ij} = \alpha + \beta L_i + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, L_i is a binary indicator of whether woman i speaks Tamil or not.

We then run a specification to examine the association of being a Tamil-speaking PHM on counseling:

$$y_{ij} = \alpha + \beta L_j + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, L_j is a binary indicator of whether PHM j speaks Tamil or not.

In following from the previous two specifications, we present a more decomposed interactive specification of the associations between PHM language, women's language, and counseling as follows:

$$y_{ij} = \alpha + \sum_{l\in\{S,T,B\}} \sum_{k\in\{S,T,B\}} \left[\beta_{kl}\mathbb{I}\{WL_i = k\} \cdot \mathbb{I}\{PL_j = l\}\right] + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Here, $\mathbb{I}\{WL_i = k\}$ is an indicator that identifies whether woman i speaks only Sinhala, only Tamil, or both languages (with women speaking only Sinhala as the reference group), and $\mathbb{I}\{PL_j = l\}$ is an indicator that identifies whether PHM j speaks only Sinhala, only Tamil, or both languages (with PHMs speaking only Sinhala as the reference group).

Our final set of analyses deconstructs the role of ethnolinguistic concordance by identifying each combination of ethnicity and language(s) spoken by women and their PHMs as follows:

$$y_{ij} = \alpha + \sum_{k\in\{S,NS\}} \sum_{l\in\{S,NS\}} \sum_{n\in\{S,T,B\}} \sum_{p\in\{S,T,B\}} \left[\beta_{klnp} \mathbb{I}\{WE_i = k\} \cdot \mathbb{I}\{PE_j = l\} \mathbb{I}\{WL_i = n\} \right.$$

$$\left. \cdot \mathbb{I}\{PL_j = p\}\right] + \boldsymbol{X}_i\gamma + \delta_m + \varepsilon_{ij}$$

Given that we have two ethnicities (Sinhalese and non-Sinhalese) and three languages (only Sinhala, only Tamil, or both) across two agents (women and PHMs), we have a total of $2 \times 2 \times 3 \times 3 = 36$ possible ethnolinguistic combinations. In our dataset, we observe that several of these combinations do not exist in our sample, while several combinations pertain to only 10 or fewer observations – these combinations and observations are dropped from the analysis. For this analysis, we assign the ethnolinguistically concordant majority group – women who are of Sinhalese ethnicity, who speak only Sinhala, and who are matched to PHMs who are of Sinhalese ethnicity and who speak only Sinhala – to be the reference group.

Results

Descriptive Results

Table 1 presents descriptive statistics of the sample. Of the 4,497 women in the analytic sample, 55.4 percent of women reported being counselled on PPIUD before admission. We find that 35.1 percent of women in our sample reported that their primary language was Tamil, while 25.6 percent of women in the sample were interviewed in Tamil. By comparison, 32 PHMs (13.1 percent) in our sample reported their primary language to be Tamil. Moreover, 307 women (6.8 percent) and 70 PHMs (28.6 percent) respectively reported that they are bilingual in Sinhala and Tamil. As shown in Table 2, 63.2 percent of women in our sample reported to be ethnic Sinhalese, while 29 percent of women reported to be ethnic Tamil (either Sri Lankan Tamil or Indian Tamil) and 7.6 percent of women reported to be Sri Lankan Moors. When comparing our analytic sample to the Sri Lankan population at large, we find that a larger proportion of women in our sample are from minority ethnic groups (Sri Lankan

Tamil, Indian Tamil, and Sri Lankan Moor) compared to census estimates of the ethnic distribution for these groups (23). Table 2 also presents the distribution of ethnicity across PHMs and shows that a total of 213 (86.9 percent) PHMs in our sample reported to be ethnic Sinhalese.

For 86.1 percent of women in our sample, we find there to be linguistic concordance between at least one of their reported spoken languages and at least one of their PHM's reported spoken languages; we coded cases in which a woman reported that she is bilingual in Tamil and Sinhala and her PHM reported speaking only one of those languages (or vice versa) as a linguistic match. Appendix Table 1 shows that while every Sinhala speaking woman was matched to a PHM that spoke Sinhala, only 60.5 percent of Tamil speaking women matched to a PHM that spoke Tamil. As Appendix Table 2 indicates, we find there to be ethnic concordance (either ethnic Sinhalese or non-Sinhalese) for 71.4 percent of women and PHMs in our sample; however, a further decomposition of this concordance shows that while 98 percent of ethnic Sinhalese women are matched to PHMs who are also ethnic Sinhalese, only 25.4 percent of non-Sinhalese women are matched to non-Sinhalese PHMs.

Table 3 presents the complete ethnolinguistic decomposition by woman and PHM. When using the most flexible definition of ethnolinguistic concordance, which interacts the definitions of linguistic concordance and ethnic concordance above, we find that 71.4 percent of women match with their PHMs on both ethnicity (Sinhalese or non-Sinhalese) and language (Sinhala, Tamil, or both). On the other hand, Table 4 shows that 13.9 percent of women match neither on ethnicity nor on language with their PHM, while 14.8 percent of women match with their PHM on ethnicity but not on language; no woman in our sample is matched on language without also being matched on ethnicity. When decomposing the sample on all ethnolinguistic combinations (Table 3), we find that the largest

ethnolinguistic category (52.7 percent of our sample) consists of ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala.

Counseling Tabulations and Logistic Regression Results

A tabulation of PPIUD counselling status by women's language, shown in Appendix Table 3, shows that 43.9 percent of Sinhala speaking women were not counselled before admission, while 46.1 percent of Tamil speaking women were not counselled before admission. When we run a tabulation of PPIUD counseling status by women's ethnicity, as shown in Appendix Table 4, we find that women of Indian Tamil ethnicity are much less likely to be counselled on PPIUD than any other ethnic group, either before admission or at any time – 57.5 percent of Indian Tamil women in our sample were not counselled before admission, compared to 43.8 percent of ethnic Sinhalese women who did not receive counselling.

The top panel of Appendix Table 5 presents results for the direct associations between language on women's receipt of PPIUD counseling, controlling for a range of woman-level covariates and MOH-level fixed effects. Compared to Sinhala speaking women (the reference group), women who speak Tamil have a 41.1 percent lower odds of receiving PPIUD counseling prior to admission; in contrast, women who have a Tamil speaking PHM are no less likely to receive counseling compared to women who have a Sinhala speaking PHM. When examining the direct associations between ethnicity on women's receipt of PPIUD counseling (bottom panel of Appendix Table 5), we observe that women of Sri Lankan Tamil, Indian Tamil, and Sri Lankan Moor ethnicities are all significantly less likely to receive PPIUD counseling compared to ethnic Sinhalese women, with Indian Tamil women having at much as a 63.4 percent lower odds of receiving counseling. Similarly to our language results, however,

we find that women who have a non-Sinhalese PHM are no less likely to receive counseling compared to women who are matched to an ethnic Sinhalese PHM.

The top panel in Table 5 assesses the relationship between women's language and PHM language on counseling using an interaction term approach. While these results confirm Tamil speaking women's lower likelihood to receive counseling when they are matched with a Sinhala speaking PHM, we also find that Tamil speaking women who are matched to Tamil speaking PHMs have a significant and higher odds of receiving counseling on PPIUD relative to Sinhala speaking women who are matched to Sinhala speaking PHMs. These findings are reinforced when we conduct a more complete decomposition analysis of linguistic concordance as shown in the top panel of Table 6. We find that women who only speak Tamil are less likely to receive counseling when paired with PHMs who only speak Sinhala ($OR = 0.548, 95\%CI: 0.406 - 0.738$); however, we also observe that women who speak both Tamil and Sinhala are equally less likely to receive counseling when matched with PHMs who speak only Sinhala ($OR = 0.663, 95\%CI: 0.483 - 0.911$). This significantly lower likelihood of counseling is not observed when we examine associations of linguistic discordance in which the PHM speaks Tamil. We also observe differential likelihoods of receiving counseling in cases where the PHM speaks both Tamil and Sinhala – women who speak only Tamil and who are matched to bilingual PHMs are no less likely to receive counseling, while women who speak Sinhala and who are matched to bilingual PHMs are significantly more likely to receive counseling.

By a similar token, the bottom panel of Table 5 shows that relative to ethnic Sinhalese women who are matched with Sinhalese PHMs, non-ethnic Sinhalese women are significantly less likely to receive PPIUD counseling when matched with ethnic Sinhalese PHMs ($OR = 0.561, 95\%CI: 0.446 - 0.707$). In contrast, Sinhalese women who are matched with non-Sinhalese PHMs are no less likely

to receive counseling, while non-Sinhalese women who are matched with non-Sinhalese PHMs have a higher and significant odds of receiving counseling when compared to ethnically concordant Sinhalese women and Sinhalese PHMs. These findings are again confirmed by the results presented in the bottom panel of Table 6.

The key strength of this study lies in its ability to disentangle the joint associations between ethnic and linguistic concordance and women's receipt of counseling through a complete deconstructive analysis across these two dimensions, as shown in Table 7. In this result, the ethnolinguistically concordant majority group are ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who also speak only Sinhala. Relative to this group, we find that ethnic non-Sinhalese women who are matched to Sinhalese PHMs who speak only Sinhala are less likely to receive PPIUD counseling, irrespective of these women's language capacities. More specifically, we find that non-Sinhalese women who speak both Tamil and Sinhala have an equally and significantly lower likelihood of receiving PPIUD counseling ($OR = 0.628, 95\%CI: 0.446 - 0.884$) relative to the ethnolinguistic majority as non-Sinhalese women who speak only Tamil ($OR = 0.539, 95\%CI: 0.398 - 0.730$). This finding suggests that ethnic discordance between women and their PHMs is likely to be driving differences in the likelihood of receipt of counseling, even in cases where women and their PHMs are linguistically concordant.

As part of this same analysis, we can also observe that women who are matched to non-Sinhalese PHMs do not face a significantly lower odds (and, in some cases, may even face marginally higher but insignificant odds) of being counselled on PPIUD before admission, irrespective of their ethnic or linguistic background. By the same token, women who are ethnically Sinhalese do not face a

significantly lower odds of being counselled on PPIUD before admission, regardless of the ethnolinguistic composition of their PHMs.

Several robustness checks (e.g. adding women's work status as a covariate, altering the definitions of ethnolinguistic concordance, using alternative measures of language proficiency, etc.) and alternative specifications were run to confirm the observed results that we have presented. We also present the association between ethnolinguistic concordance and other outcomes related to family planning service provision, including whether or not a woman received postpartum family planning (PPFP) counseling more generally, whether a woman received at least four antenatal care visits over the course of her pregnancy, and the total number of antenatal care visits that a woman received. While there is some variation in the significance of these results, the findings generally confirm our previous results in that women who belong to ethnolinguistic minority groups (non-Sinhalese and non-Sinhala speaking) and who are matched to ethnolinguistically discordant PHMs are generally found to have lower likelihoods of receiving counseling relative to women who belong to the ethnolinguistic majority group (Sinhalese and Sinhala-speaking) and also to women who are ethnolinguistically concordant with their PHMs. Results from these additional analyses are presented in the appendix (Appendix Tables 6 to 9).

Discussion

There is a large and growing body of literature that emphasizes the impact of cultural proximity and group diversity on social and economic welfare (26). In the context of transactions, there is evidence to suggest that the level of cultural homophily between transacting parties is likely to affect the outcome of the transaction, both on the extensive margin (i.e. whether the outcome takes place) and on the intensive margin (i.e. the welfare benefits for each party). However, the predicted effect of

cultural proximity on efficiency is ambiguous. On the one hand, cultural homophily may contribute to favoritism or ethnic sorting, which in turn may lead to misallocation of resources and lowers efficiency. On the other hand, cultural homophily also may contribute to reductions in the transaction costs or contract enforcement costs, which improves efficiency.

In the context of service provision, however, the role of cultural homophily is often less clear, and the question of interest from a social planner's perspective is more oriented towards optimal provision and distribution of resources. There is evidence to suggest that ethnic heterogeneity is inversely related with efficient distribution of services and usually leads to under-provision and free-riding from the minority population (27,28). In contrast, the targeted provision of services by cultural determinants such as ethnicity, geography, or language may create more efficient, but potentially less equitable, outcomes across groups.

In this study, we examine the relationship between correlates of cultural homophily, namely shared language and ethnicity between women and their PHMs, and the receipt of PPIUD counseling in Sri Lanka. We use data from a cluster-randomized stepped-wedge trial in which women who delivered in one of six hospitals in the trial were offered antenatal counseling and postnatal health services to be offered a PPIUD immediately following their delivery. We find that women from minority groups, including Tamil-speaking women and women from a non-Sinhalese ethnicity are less likely to receive PPIUD counseling. However, linguistic and ethnic concordance between women and PHMs were associated with higher likelihoods of receipt of counseling, regardless of whether the concordance is between minority or majority groups. By decomposing the ethnic and linguistic concordance channels, we find that ethnic discordance between women and PHMs, specifically in the case when women of an ethnic non-Sinhalese minority are matched with a PHM of the ethnic Sinhalese majority, are less

likely to receive counseling even when they are linguistically concordant with their PHMs. In contrast, we do not observe differential likelihoods in the receipt of counseling for women who are ethnically concordant but linguistically discordant with their matched PHMs, nor do we observe differential receipt of counseling for ethnic majority women who are matched to ethnic minority PHMs.

Our findings suggest that the disparity in PPIUD counseling for women from minority groups is driven by an ethnic discordance between women and their service providers rather than by linguistic discordance – we find that ethnic Sinhalese PHMs are less likely to counsel ethnic non-Sinhalese women independently of whether or not these women speak Sinhala. There are several possible reasons that could explain why we observe this difference in receipt of care. It is possible that the differential provision of PPIUD counseling services by ethnic Sinhalese providers is being driven by unobservable biases against ethnic minorities. In addition, Sinhalese providers may be more hesitant to offer family planning counseling and services to non-Sinhalese patients, especially for long-acting methods like the PPIUD, for fear of reprisal from the non-Sinhalese population. To this end, reluctance by providers to offer services may be the result of: 1) ongoing, and often polarized, coverage around contraception and other sensitive population issues in the Sri Lankan media; and 2) underlying ethnic tensions that continue to be fueled by reports of contraceptive coercion and the forced sterilization of ethnic minorities in the wake of the Sri Lankan Civil War (29). By the same token, it may also be that non-Sinhalese women are more reluctant to receive services from Sinhalese PHMs, which would reflect a mutual sense of mistrust between patients and providers. Regardless of the reasons, our findings imply that this differential gap in service provision cannot be eliminated simply by matching providers and patients based on language alone. Though matching on language is an important start to improving access to care, matching on ethnicity may also be required to further reduce disparities in service provision until such underlying ethnic tensions are addressed.

444

445 This study examines the role of cultural homophily in health service provision by assessing the role of
446 linguistic and ethnic concordance between women and their PHMs on provision of PPIUD
447 counseling. We find that women from minority, non-Sinhalese groups in Sri Lanka face disparities in
448 the receipt of PPIUD counseling. Furthermore, we identify ethnic discordance between women and
449 their providers to be the primary driver of these disparities rather than linguistic discordance. Our
450 findings suggest that until underlying ethnic tensions are resolved, matching women and PHMs on
451 ethnicity is likely to improve postpartum family planning service provision in Sri Lanka.

452

453 **Ethical Considerations**

454 Approval to conduct the full PPIUD study in Sri Lanka was granted to SLCOG by the Ethics Review
455 Committee at the Faculty of Medicine, University of Colombo (protocol number EC-15-059). An
456 informed consent to participate in the study was obtained and only women who consented (98.5
457 percent of the full sample) were interviewed.

References

1. Nelson A. Unequal treatment: confronting racial and ethnic disparities in health care. J Natl Med Assoc. 2002 Aug;94(8):666–8.
2. Cooper-Patrick L, Gallo JJ, Gonzales JJ, Vu HT, Powe NR, Nelson C, et al. Race, Gender, and Partnership in the Patient-Physician Relationship. JAMA. 1999 Aug 11;282(6):583–9.
3. Traylor AH, Subramanian U, Uratsu CS, Mangione CM, Selby JV, Schmittdiel JA. Patient Race/Ethnicity and Patient-Physician Race/Ethnicity Concordance in the Management of Cardiovascular Disease Risk Factors for Patients With Diabetes. Diabetes Care. 2010 Mar 1;33(3):520–5.
4. Stevens GD, Shi L, Cooper LA. Patient-Provider Racial and Ethnic Concordance and Parent Reports of the Primary Care Experiences of Children. Ann Fam Med. 2003 Jul 1;1(2):105–12.
5. David RA, Rhee M. The impact of language as a barrier to effective health care in an underserved urban Hispanic community. Mt Sinai J Med. 1998;65:393–397.
6. Ferguson WJ, Candib LM. Culture, language, and the doctor-patient relationship. FMCH Publ Present. 2002;61.
7. Cooper LA, Beach MC, Johnson RL, Inui TS. Delving Below the Surface: Understanding How Race and Ethnicity Influence Relationships in Health Care. J Gen Intern Med. 2006 Jan 1;21(S1):S21–7.
8. Komaromy M, Grumbach K, Drake M, Vranizan K, Lurie N, Keane D, et al. The Role of Black and Hispanic Physicians in Providing Health Care for Underserved Populations. N Engl J Med. 1996 May 16;334(20):1305–10.
9. Xu G, Fields SK, Laine C, Veloski JJ, Barzansky B, Martini CJ. The relationship between the race/ethnicity of generalist physicians and their care for underserved populations. Am J Public Health. 1997 May 1;87(5):817–22.

10. Moy E, Bartman BA. Physician Race and Care of Minority and Medically Indigent Patients. JAMA. 1995 May 17;273(19):1515–20.

11. Saha S, Komaromy M, Koepsell TD, Bindman AB. Patient-Physician Racial Concordance and the Perceived Quality and Use of Health Care. Arch Intern Med. 1999 May 10;159(9):997–1004.

12. LaVeist TA, Nuru-Jeter A. Is doctor-patient race concordance associated with greater satisfaction with care? J Health Soc Behav. 2002;43(3):296–306.

13. Enguidanos ER, Rosen P. Language as a factor affecting follow-up compliance from the emergency department. J Emerg Med. 1997 Jan 1;15(1):9–12.

14. Stevens GD, Mistry R, Zuckerman B, Halfon N. The parent-provider relationship: Does race/ethnicity concordance or discordance influence parent reports of the receipt of high quality basic pediatric preventive services? J Urban Health Bull N Y Acad Med. 2005 Dec;82(4):560–74.

15. Weisse CS, Foster KK, Fisher EA. The Influence of Experimenter Gender and Race on Pain Reporting: Does Racial or Gender Concordance Matter? Pain Med. 2005 Jan 1;6(1):80–7.

16. Flocke SA, Gilchrist V. Physician and patient gender concordance and the delivery of comprehensive clinical preventive services. Med Care. 2005;43(5):486–492.

17. Schmittdiel J, Grumbach K, Selby JV, Quesenberry CP. Effect of Physician and Patient Gender Concordance on Patient Satisfaction and Preventive Care Practices. J Gen Intern Med. 2000 Nov 1;15(11):761–9.

18. World Bank. Sri Lanka - Country Partnership Strategy for the Period FY2013-16. Washington, D.C.: The World Bank; 2012 Apr, p. 1–132. Report No.: 66286.

19. Department of Census and Statistics (DCS), Ministry of Healthcare and Nutrition (MOH). Sri Lanka Demographic and Health Survey 2016. Colombo, Sri Lanka: DCS and MOH; 2016.

20. Malini de Silva JK, Wickramasuriya K. Maternal and Child and Family Planning Services in Sri Lanka. Columbo, Sri Lanka: Sri Lanka Health Education Bureau; 2017.

21. Family Health Bureau (FHB), Sri Lanka Ministry of Health (MOH). Maternal Care Package: A Guide to Field Healthcare Workers. Colombo, Sri Lanka: FHB and MOH; 2011.

22. Government of Sri Lanka. The Constitution of the Democratic Socialist Republic of Sri Lanka. 1978.

23. Department of Census and Statistics (DCS). Census of Population and Housing, 2012. Colombo, Sri Lanka: Ministry of Finance and Planning; 2012.

24. Nagai M, Abraham S, Okamoto M, Kita E, Aoyama A. Reconstruction of health service systems in the post-conflict Northern Province in Sri Lanka. Health Policy. 2007 Sep 1;83(1):84–93.

25. Canning D, Shah IH, Pearson E, Pradhan E, Karra M, Senderowicz L, et al. Institutionalizing postpartum intrauterine device (IUD) services in Sri Lanka, Tanzania, and Nepal: study protocol for a cluster-randomized stepped-wedge trial. BMC Pregnancy Childbirth. 2016;16:362–73.

26. Fisman R, Paravisini D, Vig V. Cultural proximity and loan outcomes. Am Econ Rev. 2017;107(2):457–92.

27. Alesina A, Baqir R, Easterly W. Public Goods and Ethnic Divisions. Q J Econ. 1999 Nov 1;114(4):1243–84.

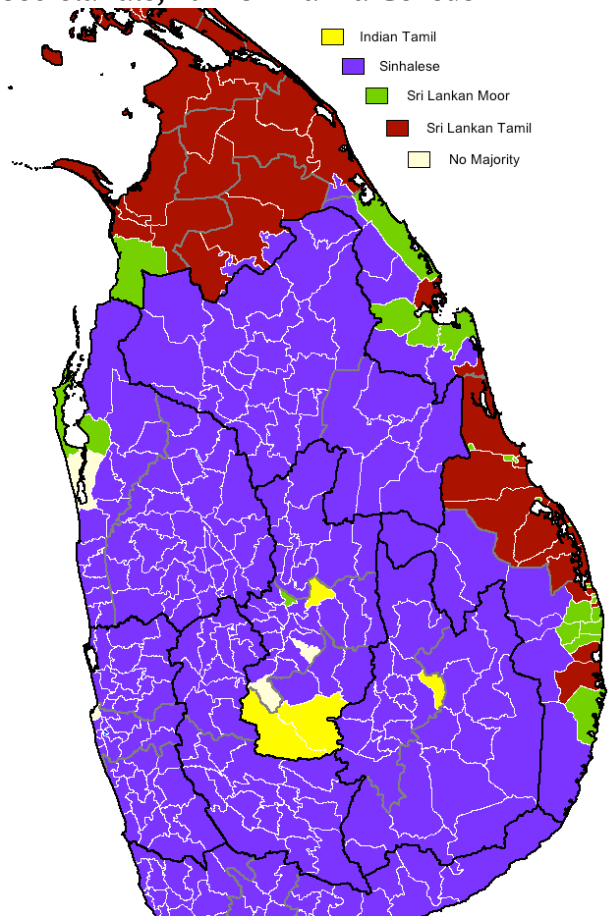
28. Kimenyi MS. Ethnicity, Governance and the Provision of Public Goods. J Afr Econ. 2006 Jan 1;15(suppl 1):62–99.

29. Sexual and Reproductive Rights violations of Tamil Women in the Island of Sri Lanka. New York, NY: United Nations; 2015. Report No.: A/HRC/28/NGO/94.

Figures and Tables

Figure 1:

Left: Ethnic Distribution in Sri Lanka by Divisional Secretariats, 2012 Sri Lanka Census



Right: Locations of Six PPIUD Study Hospitals

Table 1: Descriptive Statistics of Women and Primary Health Midwives (PHMs)

	Mean	SD	No. Cases
Outcomes			
Counselled on PPIUD before admission (1 = Yes)	0.554		2487
Woman and PHM Language Indicators			
Woman's primary language (1 = Tamil)	0.351		1577
Woman's interviewed language (1 = Tamil)	0.256		1150
Woman is bilingual (1 = Yes)	0.068		307
PHM's primary language (1 = Tamil)	0.131		32
PHM is bilingual (1 = Yes)	0.286		70
Woman and PHM Ethnicity Indicators			
Woman's ethnicity (1 = Non-Sinhalese)	0.367		1651
PHM's ethnicity (1 = Non-Sinhalese)	0.131		32
Linguistic Concordance Indicators			
Woman's and PHM's language matches? (1 = Yes)	**0.861**		**3874**
Woman speaks T and PHM speaks T (1 = Yes)*	0.032		144
Woman speaks T and PHM speaks S (1 = Yes)	0.139		623
Woman speaks S and PHM speaks S (1 = Yes)*	0.542		2436
Woman speaks T and S and PHM speaks S (1 = Yes)*	0.049		222
Woman speaks T and PHM speaks T and S (1 = Yes)*	0.112		503
Woman speaks S and PHM speaks T and S (1 = Yes)*	0.108		484
Woman speaks T and S and PHM speaks T and S (1 = Yes)*	0.019		85
Ethnic Concordance Indicators			
Woman's and PHM's ethnicity matches? (1 = Yes)	**0.714**		**3209**
Woman is S and PHM is S (1 = Yes)*	0.620		2788
Woman is not S and PHM is S (1 = Yes)	0.274		1230
Woman is S and PHM is not S (1 = Yes)	0.013		58
Woman is not S and PHM is not S (1 = Yes)*	0.094		421
Covariates			
Number of live births	1.908	0.907	
Ever used family planning (1 = Yes)	0.595		2677
Woman's age (years)	28.247	5.421	
Woman worked in last 7 days or 12 months? (1 = Yes)	0.057		257
Woman's education			
None	0.009		38
Some primary	0.023		104
Completed primary	0.018		81
Some secondary	0.142		637
Completed secondary	0.293		1315
More than secondary	0.516		2318
N			**4497**

Notes: T indicates Tamil (language), S indicates Sinhala (for language) and Sinhalese (for ethnicity). * indicates a concordant match between women and their PHMs on that characteristic (either ethnicity, language, or both).

Table 2: Distribution of Woman's and PHM's Ethnicity

	Freq.	Pct.
Woman's Ethnicity		
Sinhalese	2846	63.29
Sri Lankan Tamil	744	16.54
Indian Tamil	560	12.45
Sri Lanka Moor	347	7.72
Total	**4497**	**100.00**
PHM's Ethnicity		
Indian Tamil	28	11.43
Sri Lanka Moor	4	1.63
Sinhalese	213	86.94
Total	**245**	**100.00**

Table 3: Complete Ethnolinguistic Concordance Distribution

	Mean	No. Cases
Woman's and PHM's ethnicity and language(s) match? (1 = Yes)	**0.714**	**3209**
Woman is E-NS, L-T, PHM is E-NS, L-T	0.032	144
Woman is E-NS, L-T, PHM is E-NS, L-B	0.053	237
Woman is E-NS, L-B, PHM is E-NS, L-B	0.009	40
Woman is E-NS, L-T, PHM is E-S, L-S	0.139	623
Woman is E-NS, L-S, PHM is E-S, L-S	0.015	67
Woman is E-NS, L-B, PHM is E-S, L-S	0.047	210
Woman is E-NS, L-T, PHM is E-S, L-B	0.059	266
Woman is E-NS, L-S, PHM is E-S, L-B	0.004	19
Woman is E-NS, L-B, PHM is E-S, L-B	0.010	45
Woman is E-S, L-S, PHM is E-NS, L-B	0.013	58
Woman is E-S, L-S, PHM is E-S, L-S	0.527	2369
Woman is E-S, L-B, PHM is E-S, L-S	0.003	12
Woman is E-S, L-S, PHM is E-S, L-B	0.091	407
N		**4497**

Notes: The interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinations of ethnicity and language by woman and PHM did not contain any observations and are therefore dropped from the table.

Table 4: Tabulation of Ethnic Concordance by Linguistic Concordance

		Linguistic Concordance					
		No Match		Match		Total	
		Freq.	Cell Pct.	Freq.	Cell Pct.	Freq.	Col. Pct.
Ethnic	No Match	623	13.85	665	14.79	1288	28.64
Concordance	Match	0	0.00	3209	71.36	3209	71.36
	Total	**623**		**3874**		**4497**	**100.00**

Table 5: The Association between Woman's and PHM's Language, Ethnicity, and Counseling

VARIABLES	Counselled Before Admission
Top Panel: Language	
Woman's Language (1 = Tamil)	0.558***
	0.449 - 0.694
PHM's Language (1 = Tamil)	0.721*
	0.490 - 1.061
Woman x PHM Language (1 = Tamil)	1.959***
	1.177 - 3.261
Bottom Panel: Ethnicity	
Woman's Ethnicity (1 = Non-Sinhalese)	0.561***
	0.446 - 0.707
PHM's Ethnicity (1 = Non-Sinhalese)	0.717*
	0.484 - 1.062
Woman's x PHM's Ethnicity (1 = Non-Sinhalese)	1.945**
	1.166 - 3.245
Observations	**4,486**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For the regression in the top panel, the reference group is Sinhala speaking women who are matched to Sinhala speaking PHMs. For the regression in the bottom panel, the reference group is ethnic Sinhalese women who are matched to ethnic Sinhalese PHMs. The regression presents results for whether the woman was counselled before admission. Results are from logistic regressions that include woman- level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.

Table 6: The Association between Linguistic Concordance, Ethnic Concordance, and Counseling

VARIABLES	Counselled Before Admission?
Top Panel: Language	
Woman speaks T, PHM speaks T	0.909
	0.472 - 1.750
Woman speaks T, PHM speaks S	0.548***
	0.406 - 0.738
Woman speaks T and S, PHM speaks S	0.663**
	0.483 - 0.911
Woman speaks T, PHM speaks T and S	0.753
	0.529 - 1.070
Woman speaks S, PHM speaks T and S	1.487**
	1.040 - 2.126
Woman speaks T and S, PHM speaks T and S	0.858
	0.432 - 1.705
Bottom Panel: Ethnicity	
Woman is ethnic non-S, PHM is ethnic S	0.561***
	0.446 - 0.707
Woman is ethnic S, PHM is ethnic non-S	0.717*
	0.484 - 1.062
Woman is ethnic non-S, PHM is ethnic non-S	0.783
	0.496 - 1.235
Observations	**4,486**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For the regression in the top panel, the reference group is Sinhala speaking women who are matched to Sinhala speaking PHMs. For the regression in the bottom panel, the reference group is ethnic Sinhalese women who are matched to ethnic Sinhalese PHMs. The regression presents results for whether the woman was counselled before admission. Results are from logistic regressions that include woman- level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.

Table 7: The Association between Ethnolinguistic Concordance and Counseling

VARIABLES	(1) Counselled Before Admission?
Woman is E-NS, L-T, PHM is E-NS, L-T	0.851
	0.433 - 1.676
Woman is E-NS, L-T, PHM is E-NS, L-B	0.780
	0.506 - 1.202
Woman is E-NS, L-B, PHM is E-NS, L-B	1.210
	0.371 - 3.947
Woman is E-NS, L-T, PHM is E-S, L-S	0.539***
	0.398 - 0.730
Woman is E-NS, L-S, PHM is E-S, L-S	0.757
	0.401 - 1.429
Woman is E-NS, L-B, PHM is E-S, L-S	0.628***
	0.446 - 0.884
Woman is E-NS, L-T, PHM is E-S, L-B	0.693
	0.441 - 1.090
Woman is E-NS, L-S, PHM is E-S, L-B	0.926
	0.385 - 2.227
Woman is E-NS, L-B, PHM is E-S, L-B	0.584
	0.275 - 1.240
Woman is E-S, L-S, PHM is E-NS, L-B	0.753
	0.506 - 1.122
Woman is E-S, L-B, PHM is E-S, L-S	1.085
	0.288 - 4.087
Woman is E-S, L-S, PHM is E-S, L-B	1.680**
	1.120 - 2.520
Observations	**4,486**
R-squared	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. The interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinatorial categories did not contain enough observations for the analysis and are therefore dropped. The reference group is ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala. The regression presents results for whether the woman was counselled before admission. Results are from logistic regressions that include woman- level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.

Appendix Figures and Tables

Appendix Table 1: Tabulation of Linguistic Concordance by Woman's Language

	Sinhala		Tamil		Total	
	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.
No Match	0	0.00	623	39.51	623	13.85
Match	2920	100.00	954	60.49	3874	86.15
Total	**2940**	**100.00**	**1602**	**100.00**	**4497**	**100.00**

Appendix Table 2: Tabulation of Ethnic Concordance by Woman's Ethnicity

	Sinhalese		Sri Lankan Tamil		Indian Tamil		Sri Lankan Moor		Total	
	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.
No Match	58	2.04	531	71.37	362	64.64	337	97.12	1288	28.64
Match	2788	97.96	213	28.63	198	35.36	10	2.88	3209	71.36
Total	**2846**	**100.00**	**744**	**100.00**	**560**	**100.00**	**347**	**100.00**	**4497**	**100.00**

Appendix Table 3: Tabulation of Counselling Status before Admission and Woman's Language

	Sinhala		Tamil		Total	
	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.
Not Counselled	1279	43.85	726	46.10	2005	44.63
Counselled	1638	56.15	849	53.90	2487	55.37
Total	**2917**		**1575**		**4492**	**100.00**

Appendix Table 4: Tabulation of Counselling Status before Admission and Woman's Ethnicity

	Sinhalese		Sri Lankan Tamil		Indian Tamil		Sri Lankan Moor		Total	
	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.	Freq.	Col. Pct.
Not Counselled	1245	43.79	314	42.26	322	57.50	124	35.84	2005	44.63
Counselled	1598	56.21	429	57.74	238	42.50	222	64.16	2487	55.37
Total	**2843**		**743**		**560**		**346**		**4492**	**100.00**

Appendix Table 5: The Association between Language, Ethnicity, and Counseling

VARIABLES	Counselled Before Admission
Woman's Language	
Woman's Language (1 = Tamil)	0.589***
	0.479 - 0.724
PHM's Language	
PHM Language (1 = Tamil)	1.154
	0.752 - 1.771
Woman's Ethnicity	
Sri Lanka Tamil	0.687***
	0.531 - 0.887
Indian Tamil	0.366***
	0.269 - 0.500
Sri Lanka Moor	0.709**
	0.524 - 0.958
PHM's Ethnicity	
Indian Tamil	0.946
	0.526 - 1.704
Sri Lanka Moor	0.863
	0.557 - 1.337
Observations	**4,486**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: For all regressions, the unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For the language regressions, the reference group in the top regression is Sinhala speaking women, while the reference group in the bottom regression are women who are matched to Sinhala speaking PHMs. For the ethnicity regressions, the reference group in the top regression is ethnic Sinhala women, while the reference group in the bottom regression are women who are matched to ethnic Sinhala PHMs. All regressions present results for whether the woman was counselled before admission. Results are from logistic regressions that include woman- level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.

Appendix Table 6: The Association between Ethnolinguistic Concordance and Counseling, Controlling for Women's Work

VARIABLES	(1) Counselled Before Admission?	(2) Counselled Before Admission?	(3) Counselled Before Admission?
Respondent and PHM Language Match? (1 = Yes)	1.679***		
	1.286 - 2.193		
Respondent and PHM Ethnicity Match? (1 = Yes)		1.654***	
		1.337 - 2.046	
Woman is E-NS, L-T, PHM is E-NS, L-T			0.854
			0.434 - 1.681
Woman is E-NS, L-T, PHM is E-NS, L-B			0.780
			0.507 - 1.201
Woman is E-NS, L-B, PHM is E-NS, L-B			1.205
			0.369 - 3.942
Woman is E-NS, L-T, PHM is E-S, L-S			0.541***
			0.399 - 0.732
Woman is E-NS, L-S, PHM is E-S, L-S			0.757
			0.399 - 1.435
Woman is E-NS, L-B, PHM is E-S, L-S			0.628***
			0.446 - 0.885
Woman is E-NS, L-T, PHM is E-S, L-B			0.694
			0.441 - 1.093
Woman is E-NS, L-S, PHM is E-S, L-B			0.933
			0.387 - 2.250
Woman is E-NS, L-B, PHM is E-S, L-B			0.583
			0.274 - 1.240
Woman is E-S, L-S, PHM is E-NS, L-B			0.753
			0.505 - 1.123
Woman is E-S, L-B, PHM is E-S, L-S			1.092
			0.291 - 4.098
Woman is E-S, L-S, PHM is E-S, L-B			1.682**
			1.119 - 2.529
Observations	**4,486**	**4,486**	**4,486**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For Column 3, the interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinatorial categories in Column 3 did not contain enough observations for analysis and are therefore dropped. The reference group in Column 3 is ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala. The regressions present results for whether the woman was counselled before admission. Results are from logistic regressions that include woman-level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.

Appendix Table 7: The Association between Ethnolinguistic Concordance and Counseling, Using Hospital Fixed Effects

VARIABLES	(1) Counselled Before Admission?	(2) Counselled Before Admission?	(3) Counselled Before Admission?
Respondent and PHM Language Match? (1 = Yes)	1.213		
	0.918 - 1.602		
Respondent and PHM Ethnicity Match? (1 = Yes)		1.310**	
		1.054 - 1.628	
Woman is E-NS, L-T, PHM is E-NS, L-T			0.320***
			0.235 - 0.435
Woman is E-NS, L-T, PHM is E-NS, L-B			0.516***
			0.321 - 0.827
Woman is E-NS, L-B, PHM is E-NS, L-B			0.537
			0.230 - 1.254
Woman is E-NS, L-T, PHM is E-S, L-S			0.602***
			0.449 - 0.808
Woman is E-NS, L-S, PHM is E-S, L-S			0.721
			0.401 - 1.296
Woman is E-NS, L-B, PHM is E-S, L-S			0.620***
			0.440 - 0.874
Woman is E-NS, L-T, PHM is E-S, L-B			0.648*
			0.397 - 1.058
Woman is E-NS, L-S, PHM is E-S, L-B			0.637
			0.214 - 1.892
Woman is E-NS, L-B, PHM is E-S, L-B			0.449**
			0.206 - 0.976
Woman is E-S, L-S, PHM is E-NS, L-B			0.707
			0.421 - 1.187
Woman is E-S, L-B, PHM is E-S, L-S			1.114
			0.314 - 3.946
Woman is E-S, L-S, PHM is E-S, L-B			1.683**
			1.121 - 2.527
Observations	**4,485**	**4,485**	**4,485**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For Column 3, the interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinatorial categories in Column 3 did not contain enough observations for analysis and are therefore dropped. The reference group in Column 3 is ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala. The regressions present results for whether the woman was counselled before admission. Results are from logistic regressions that include woman-level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. hospital fixed effects are included, and standard errors are clustered at the PHM level.

Appendix Table 8: The Association between Ethnolinguistic Concordance and Counseling, Nawalapitiya and Nuwara Eliya Hospitals Only

VARIABLES	(1) Counselled Before Admission?	(2) Counselled Before Admission?	(3) Counselled Before Admission?
Respondent and PHM Language Match? (1 = Yes)	1.655***		
	1.237 - 2.215		
Respondent and PHM Ethnicity Match? (1 = Yes)		1.710***	
		1.323 - 2.210	
Woman is E-NS, L-T, PHM is E-NS, L-T			0.954
			0.468 - 1.945
Woman is E-NS, L-T, PHM is E-NS, L-B			0.867
			0.545 - 1.379
Woman is E-NS, L-B, PHM is E-NS, L-B			3.100
			0.662 - 14.518
Woman is E-NS, L-T, PHM is E-S, L-S			0.557***
			0.393 - 0.792
Woman is E-NS, L-S, PHM is E-S, L-S			0.714
			0.211 - 2.414
Woman is E-NS, L-B, PHM is E-S, L-S			0.568**
			0.348 - 0.929
Woman is E-NS, L-T, PHM is E-S, L-B			0.730
			0.444 - 1.200
Woman is E-NS, L-S, PHM is E-S, L-B			1.698
			0.296 - 9.744
Woman is E-NS, L-B, PHM is E-S, L-B			0.482*
			0.207 - 1.124
Woman is E-S, L-S, PHM is E-NS, L-B			0.760
			0.400 - 1.444
Woman is E-S, L-B, PHM is E-S, L-S			0.160*
			0.021 - 1.242
Woman is E-S, L-S, PHM is E-S, L-B			1.628**
			1.098 - 2.416
Observations	**2,436**	**2,436**	**2,436**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. Odds ratios are presented with 95% confidence intervals in the parentheses below. For Column 3, the interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinatorial categories in Column 3 did not contain enough observations for analysis and are therefore dropped. The reference group in Column 3 is ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala. The regressions present results for whether the woman was counselled before admission. Results are from logistic regressions that include woman-level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. hospital fixed effects are included, and standard errors are clustered at the PHM level.

Appendix Table 9: The Association between Ethnolinguistic Concordance and Other Family Planning Service Provision Outcomes

VARIABLES	(1) Received PPFP Counseling?	(2) Received at least 4 ANC Visits?	(3) Number of ANC Visits
Woman is E-NS, L-T, PHM is E-NS, L-T	0.873	0.347	0.762*
	0.353 - 2.156	0.091 - 1.322	-0.113 - 1.637
Woman is E-NS, L-T, PHM is E-NS, L-B	1.292	0.289**	0.091
	0.544 - 3.068	0.104 - 0.803	-0.412 - 0.595
Woman is E-NS, L-B, PHM is E-NS, L-B	1.477	3.439***	0.188
	0.329 - 6.643	2.251 - 5.255	-0.458 - 0.833
Woman is E-NS, L-T, PHM is E-S, L-S	0.459***	0.271***	-0.204
	0.310 - 0.679	0.132 - 0.556	-0.579 - 0.170
Woman is E-NS, L-S, PHM is E-S, L-S	2.093	1.565	-0.533*
	0.456 - 9.607	0.504 - 4.856	-1.096 - 0.030
Woman is E-NS, L-B, PHM is E-S, L-S	0.633*	1.317	-0.382
	0.381 - 1.052	0.713 - 2.431	-1.011 - 0.248
Woman is E-NS, L-T, PHM is E-S, L-B	0.477***	0.165***	0.091
	0.278 - 0.820	0.054 - 0.504	-0.544 - 0.726
Woman is E-NS, L-S, PHM is E-S, L-B			-0.222
			-1.515 - 1.071
Woman is E-NS, L-B, PHM is E-S, L-B	0.598	4.306***	0.359
	0.148 - 2.418	2.315 - 8.009	-0.151 - 0.870
Woman is E-S, L-S, PHM is E-NS, L-B	0.663	0.311***	-0.217
	0.351 - 1.251	0.179 - 0.541	-1.350 - 0.916
Woman is E-S, L-B, PHM is E-S, L-S	1.017		1.856***
	0.115 - 9.016		0.507 - 3.206
Woman is E-S, L-S, PHM is E-S, L-B	1.648	0.688	0.127
	0.862 - 3.153	0.226 - 2.096	-0.388 - 0.642
Observations	**4,472**	**4,291**	**4,491**
R-squared			**0.406**

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Notes: The unit of observation is a woman who gave birth at one of the six study hospitals. For columns 1-2, odds ratios are presented with 95% confidence intervals in the parentheses below. For column 3, point estimates are presented with 95% confidence intervals in the parentheses below The interpretation for each variable "Woman is E-W, L-X, PHM is E-Y, L-Z" is read as "Woman of ethnicity W (either Sinhalese S or non-Sinhalese NS) who speaks language X (either Tamil T or Sinhala S or both Tamil and Sinhala B) is matched to PHM of ethnicity Y (either Sinhalese S or non-Sinhalese NS) who speaks language Z (either Tamil T or Sinhala S or both Tamil and Sinhala B). Some combinatorial categories did not contain enough observations for the analysis and are therefore dropped. The reference group is ethnic Sinhalese women who speak only Sinhala and who are matched to ethnic Sinhalese PHMs who speak only Sinhala. The regression presents results for whether the woman was counselled before admission. Results are from logistic regressions (columns 1-2) and ordinary least squares regressions (column 3) that include woman- level controls such as educational attainment of the woman (no education, primary, secondary, higher), age of the woman (in 5-year age groups), number of births, and whether the woman has ever used family planning. MOH fixed effects are included, and standard errors are clustered at the PHM level.