Trust, social networks, family planning and contraception in Africa *

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Abstract

Family planning programs in developing countries are often implemented either through media (i.e., radio, newspaper or television) or through personal contacts (i.e., health workers visiting the villages or health centers). In this paper, we develop and test a network-based computational model that shows that generalized and particularized trust moderate the effect of family planning programs on contraceptives' use in Africa. More specifically, while a basic level of generalized trust is required for any information to be credible and reliable, in areas where generalized trust is higher the efficacy of family planning programs through media exposure is higher as well. We empirically test this hypothesis by using multilevel data from the DHS and the Afrobarometer.

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1 Introduction

According to the latest available projections from the UN population division, more than half of global population growth between 2017 and 2050 is expected to occur in Africa.[1] In Africa, the fertility transition is only slowly under way (Bongaarts, 2017b). When talking about the fertility transition in Africa, one of the greatest challenges for the contemporary world, Bongaarts suggests to focus on the diffusion of information about methods of birth control, and on the pivotal role played by family planning programs. (Bongaarts, 2017a). The literature so far has been not unanimous on the effects of family planning programs (Miller and Babiarz, 2016), with either an emphasis on the substantial contribution of family planning programs to fertility decline (e.g., Bongaarts et al., 1990; Bongaarts and Sinding, 2009), or on the role of the demand for children (e.g., Pritchett, 1994).

Family planning programs in Africa have been so far implemented mainly through two different mechanisms: through mass media (radio, newspapers, and television) and through in-person, service and community-based provision. A sizable literature to date shows that campaigns based on mass media can help to speed up the fertility transition in developing contexts (see Della Vigna and La Ferrara (2015) for a review). Accordingly, the demographic literature today clearly recognizes that social learning and social influence play a crucial role in terms of the propagation of ideas, behaviors and preferences in terms of fertility among linguistically or culturally homogeneous populations, independently of social and economic changes (Coale and Watkins, 1986; Cleland and Wilson, 1987; Montgomery and Casterline, 1996; Bongaarts and Watkins, 1996; Behrman et al., 2002). Furthermore, results from Behrman et al. (2002) suggest that the main association of networks in terms of contraception is through social learning. Essentially, individuals collect information about the efficacy and possible risks associated with the use of contraceptives by those who already use them and make their choices based on this information. On the opposite, social influence has a reduced association. This result is only partially confirmed by Kohler et al. (2001) showing that some contextual factors make the associations of social learning prevailing in some areas, and those of social influence prevailing in some others depending on the density of the networks.

However, reducing fertility is an innovative behavior, and when an innovation is proposed uncertainty is high. Therefore one needs to trust those who spread the information in order to adopt it. Only recently population scholars have looked at trust as a candidate explanation for fertility dynamics in developed countries (Yamamura and Andres, 2011; Aassve et al., 2016). To the best of our knowledge, the literature is almost completely silent about the role of trust in terms of fertility in developing countries.

[1] https://esa.un.org/unpd/wpp/Publications/Files/WPP2017_KeyFindings.pdf

Through which channels could trust interact with demographic dynamics in Africa? Our claim is that trust is a crucial moderator of the role of family planning programs delivered either through mass media or through personal contacts in terms of adoption of modern contraceptive methods.

In this paper we first develop a computational model to investigate how levels of trust affect the effectiveness of family planning programs (Section 2). Key assumptions in this model relate to how trust affects the structure of networks in which women discuss family planning. Then, in Sections 3 and 4, we use data from the DHS and the Afrobarometer and multilevel modelling techniques to empirically investigate how generalized and particularized trust moderate the effect of family planning programs. We find, as hypothesized, that while a basic level of generalized trust is required for any information to be credible, in areas characterized by higher levels of generalized trust, the effectiveness of family planning programs through media is higher. This result is robust to the use of alternative empirical definition of trust, statistical models, and sample restrictions.

2 Theoretical Model

In this Section, we devise a theoretical agent-based simulation model to investigate theoretically how trust impacts the effectiveness of family planning campaigns. The model builds on network diffusion models (e.g., Valente, 2005), with individual women being connected through network ties for the discussion of family planning. This discussion network allows for the spread of information and social influence. At the start of the simulated process, some women receive family planning information through a campaign and some of these women begin using contraceptives. These women may tell others about their use of contraceptives and this may convince the latter to start using contraceptives, too, and they may again inform and influence others. ... The model is implemented using Netlogo v. 6.0.4 (Wilensky, 1999).

In the model, we assume that trust affects with whom women discuss family planning. That is, trust affects the structure of the discussion network. Family planning and the use of contraceptives are sensitive, personal topics that women discuss typically only with few trusted others (Gilliam et al., 2004). We assume that if there is more trust, general trust as well as particular trust, women discuss family planning issues with a larger number of other women. Thus, if there is more trust, the density of the discussion network is higher. Second, we assume that women in communities with high levels of particularized trust discuss family planning issues mainly with others from their close social surroundings, e.g., relatives. Therefore, compared to the situation in a community with low particularized trust, the discussion network will exhibit higher clustering in a community with high particularized. Put differently, if A and B both discuss with C, it is more likely that

also A and B discuss together if there is a lot of particularized trust then if there is little particularized trust. Finally, we assume that generalized trust has the opposite effect on clustering. By emancipating women to move out of their close social surroundings, generalized trust will reduce the amount of clustering and instead lead to more "long ties between women who are not connected through shared discussion partners.

Figure 1 illustrates these assumed effects of trust on family planning discussion networks in a community of 20 women. If there is little particularized trust as well as generalized trust (panel A), the network is very sparse while the level of clustering is intermediate. If the levels of particularized trust as well as generalized trust are high (panel D), the network density is high while clustering is again intermediate. (We assume that the effects of particularized and generalized trust on clustering are equal in size and thus chancel each other out.) If there is a lot of particularized trust but little generalized trust (panel B), density is intermediate while clustering is high. If, conversely, there is a lot of generalized trust but little particularized trust (panel C), there are many long ties (low clustering) while density is again intermediate.

The networks in Figure 1—as the larger networks used in our simulations—are generated starting from a regular ring network in which every node is linked to its four nearest neighbors and by randomly rewiring and removing some links. The rewiring probability is the same in panels A and D; it is twice as high for panel C and half the size for panel B. No ties are removed in panel D while the probability of removing a given tie is twice as high in panel A than in panels B and C. The sensitivity of simulation results to these specific ratios is not explored in the preliminary results presented in this draft.

Personal family planning initiatives and media family planning initiatives are assumed to differ in three respects. First, with the same financial budget, many more women can be provided with information about contraceptives through the media than through personal contact. We therefore assume that if there would be $budget = 10$, meaning that 10 women can be targeted in a local campaign, a media campaign would reach an $x \cdot budget$ women, where $x > 1$. Second, in light of the evidence that women are more responsive to information received through personal contact rather than anonymous sources (Kincaid, 2000), we assume that a woman's inclination to use contraceptives increases more if she receives information through personal family planning instead of media family planning. Third, we assume that personal family initiatives planning are more geographically localized than media family planning campaigns. In our model, a media family planning campaign targets any node with equal probability while a personal family planning initiative targets only nodes which, on the underlying circle, are not more than $budget \cdot r$ links away from a randomly picked seed node, where $budget$ is the number of women that get exposed to the campaign.

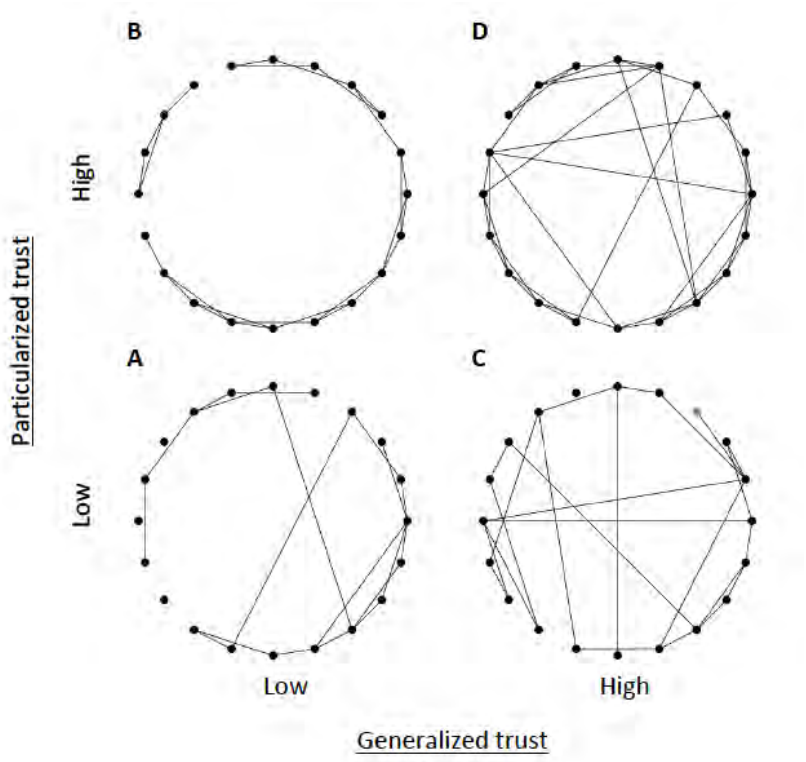


Figure 1: Illustration on the assumed effects of particularized and generalized trust on the structure of discussion networks

We further assume that no woman would use contraceptives unless she is exposed to a family planning campaign (at the start of the simulated process) or has network connections to contraceptives users. In particular, in our model woman i uses contraceptives if $\alpha \cdot exposed\_personal\_FP + \beta \cdot exposed\_media\_FP + proportion\_users\_network\_neighbors \geq threshold_i$, where $\alpha > \beta$ and $threshold_i$ is uniformly distributed in the interval $(0, 1]$. (We will explore also more sophisticated specifications of the decision rule, such as a logistic choice function, and alternatives specifications of the learning and influence from network neighbors).

Table 1 shows results from 4000 simulations of the model, 500 for each of the four combinations of low or high personalized and generalized trust, for each campaign type. For each run, a new network of 100 women was created. The rewiring probability for the high/high and low/low trust situations of 0.2 and a tie removal probability for the low/low trust situation was 0.5. In runs for the scenario with a personal campaign, ten women in a radius of $r = 10 \cdot 1.3$ of a seed node were targeted, and $x = 3$ times more women were targeted in runs with media campaigns. α was set to 0.6 and β to 0.3. (First sensitivity explorations yield similar results for somewhat different parameterizations.)

Table 1: Percentage of women who adopted the use of contraceptives by type of family planning campaign and level of personalized and generalized trust. (Averages from 500 simulation runs per cell.)

		Personal FP			Media FP	
Particularized trust	high	22.9	26.9	high	38.9	50.4
	low	19.3	26.0	low	29.5	44.5
		low	high		low	high
		Generalized trust			Generalized trust	

Table 1 shows that the average number of women who adopted the use of contraceptives was lowest in simulations for the low/low scenario with a personal family planning campaign as well as with a media family planning campaign. High personalized trust and high generalized trust both increase the effectiveness of personal as well as media campaigns, but these effects are clearly stronger for media campaigns. The effectiveness of media campaigns as well as personal campaigns depends furthermore more on generalized trust than particularized trust.

3 Data and Methods

We aim to test empirically the predictions of our theoretical model, using linked micro-level data. Our dataset is built using multiple sources of information. Individual-level data on contraception and related topics are provided by Demographic and Health Surveys, while trust information are retrieved from Afrobarometer. Both datasets are described in Section 3.1. Core analysis consists in multilevel modeling, supplemented by the estimation of heterogeneous effects by educational level. The methods used are described in Section 3.2.

3.1 Data

Demographic and Health Surveys

Demographic and Health Surveys (DHS) furnish information about individual contraceptive usage and family planning (FP) promotion. Our focus is on surveys that target female population of reproductive age (15-49 years old). Final sample includes 23 sub-Saharan countries: Benin, Burkina Faso, Burundi, Cameroon, Cote d'Ivoire, Ghana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Togo, Uganda, Zambia, and Zimbabwe. For each country, we use a varying number of surveys - in any case, no more than three surveys - that range from 2003 to 2014. Survey selection is based on the availability in

the Afrobarometer (see next subsection) of trust information within a 4-year range centred in the year when DHS was fielded. This criterion leads to a selection of 43 surveys in total.

Data include information about the contraceptive method currently adopted by respondents (i.e., traditional, folkloristic or modern method) or about their practice to have unprotected sexual intercourses (i.e. no contraception). In this analysis, we are particularly interested in modern methods of contraception, so we construct a binary variable that takes value equal to 1 if the respondent reports to currently use modern contraceptive tools, and 0 otherwise.

In addition, we know if the respondent has received information about family planning (FP henceforth) during the 12 months preceding the interview. The promotional channels that DHS take into consideration are: newspapers, radio, television, family planning workers and medical staff at health facilities. Figure 2 shows the sample proportion of respondents exposed to FP by channel. Almost half of individuals (48 percent) are reached through media - and in particular through radio. Promotional campaigns are still a tool mainly unexploited, since just 23 percent of the sample reports to have received details on the importance of contraception. As before, we do not use the raw variables provided in DHS datasets, but we aggregate them into two macro-variables. The first one is a binary variable that relates only to FP promotion through media and that takes value equal to 1 if the respondent has received information about FP from *at least one media*. We call it **general family planning**. The second variable is still a dummy, but it is about information obtained from *at least one personal contact* (i.e. FP worker or health facility). Conversely, this variable is called **personal family planning**.

Figure 3 provides the geographical distribution of FP promotion through both media and personal contacts. Media coverage of FP topics is more heterogeneous across regions, while on-field promotional campaigns are more clustered. FP workers and/or health facilities are more active in Central-Eastern Africa, while in West Africa generally less than 25 percent of population is instructed about contraception through personal contacts. Together with these variables, some individual characteristics are collected, namely age, education, religion, occupation, marital status, # living children, and fertility preferences. A summary of the main varibales used in the empirical analysis is depicted in table 3.

Afrobarometer

Afrobarometer is a project born in 1999 that aims at gathering data at the individual level related to several topics, such as social capital and participation to politics, in African countries. Six rounds have been carried out so far, the last one in 2016. Surveys are submitted to citizens with voting rights (>

Figure 2: Types of family planning, avg. 2003-2014

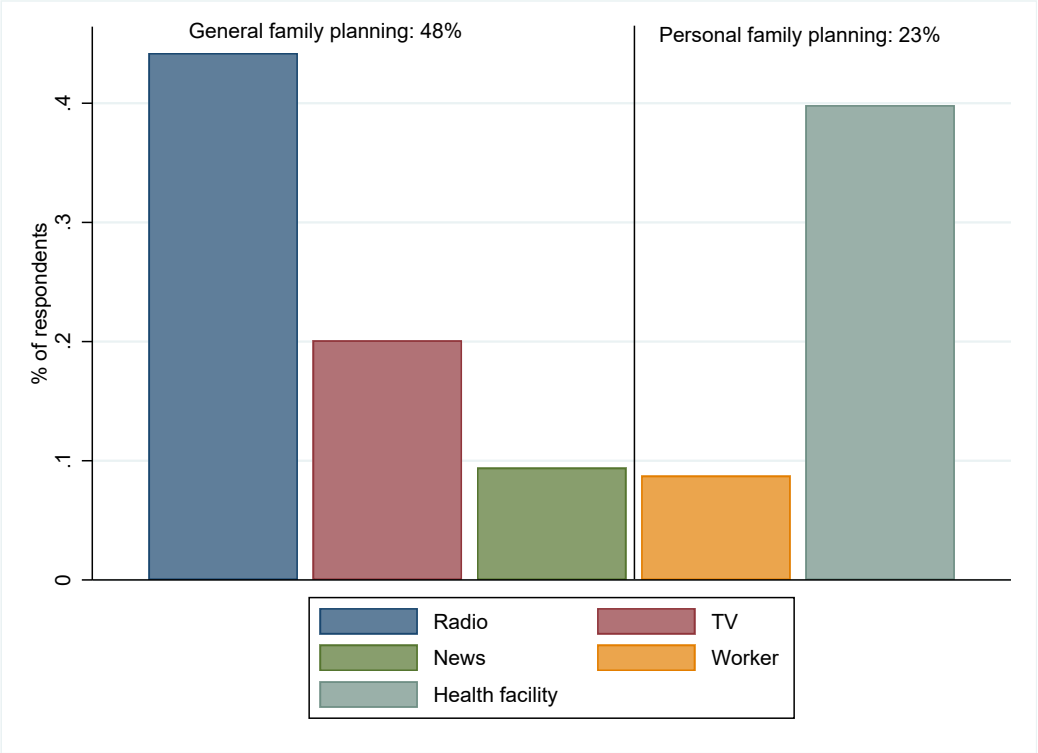
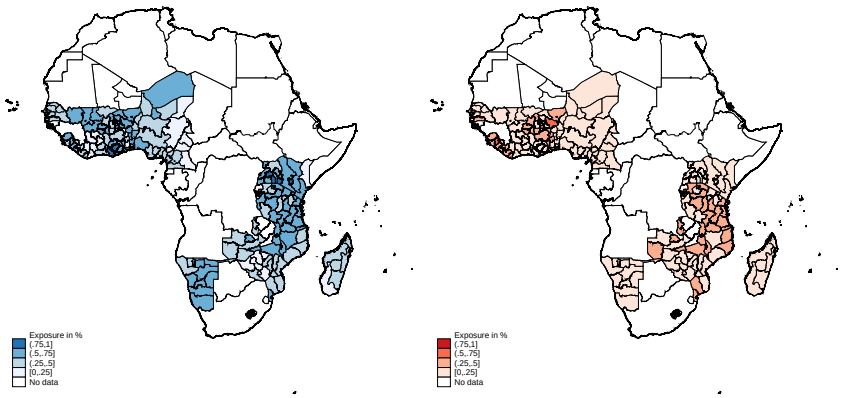


Figure 3: Exposure to family planning through media (left) and personal contacts (right)



18 years old). Samples are constructed in a way that each gender is equally represented (almost 50 percent from every country). For our analysis, we collect information on generalized trust and particularized trust. In particular, data come from three rounds: round 5 (2011-13), round 4 (2008-09), and round 3 (2005-06).

Generalized trust is a binary variable that originates from the respondents' answer to the following question: "Generally speaking, would you say

that most people [in your country] can be trusted or that you must be very careful in dealing with them?". It takes value equal to 1 if respondents claim that most of people are trustworthy.

On the other side, particularized trust measures are categorical variables, whose integer value ranges from 0 ("dont trust them") to 3 ("trust them a lot"). Afrobarometer provides multiple measures of particularized trust, such as trust towards relatives, towards acquaintances and towards neighbours. We choose to use only the trust in relatives, since it seems to be very high correlated with the other two measures (see Table 2) and consequently we expect to find similar results for all of them. This strategy solves also the problem of availability of data, since information about trustworthiness of acquaintances and neighbours are present just in 2 out of 3 selected rounds.

In order to link trust data to DHS, we take average values from each sub-region. The sub-region is the urban or rural side within a specific region. Sub-regions are split into four groups according to their level of both generalized and particularized trust (see Figure 4). The cut-off levels are represented by the sample mean of the two dimensions of trust: if the average trust of both generalized and particularized trust is below their respective sample mean, then the sub-region is labelled as *low-generalized and low-particularized* area (or L-L). The other three groups are defined in the same way, so we have H-L sub-regions, L-H sub-regions and H-H sub-regions. Note that the first element of the label will refer always to generalized trust, while the second one to particularized trust. This categorization will be useful in estimating our models. Figure 5 shows the geographical distribution of trust groups (at regional level). H-H groups are concentrated in West Africa, that is characterized by a sharp difference between inland sub-regions (high-trust) and coastal areas (low-trust). Regions that face the sea generally show very low level of generalized trust and sometimes this is paired with a low level of particularized trust too (see Nigeria). Central and Eastern Africa mostly has low level of generalized trust with the exception of a few continental areas and Madagascar.

Table 2: Correlation table for particular trust measures

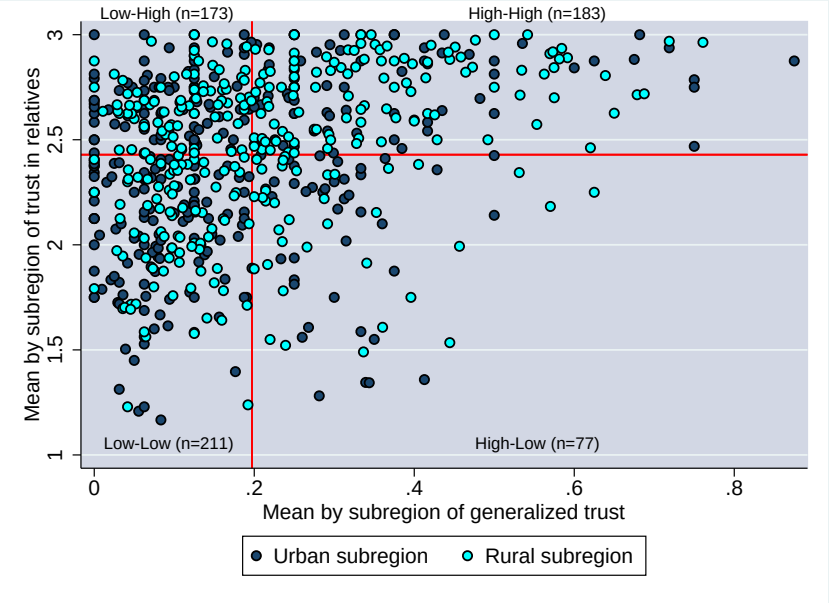
	Relatives	Neighbours	Acquaintances
Relatives	1		
Neighbours	0.703***	1	
Acquaintances	0.473***	0.631***	1

Note: * p<0.10, ** p<0.05, *** p<0.01

Table 3: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Family planning					
Respondent uses modern methods	0.21	0.41	0	1	444783
Family planning: general	0.48	0.5	0	1	437723
Family planning: personal	0.23	0.42	0	1	444072
Trust measures					
Generalized trust	0.21	0.15	0	0.88	356617
Trust in relatives	2.41	0.41	1.17	3	437906
Age, education and marital status					
Respondent's current age	30.21	8.99	15	49	444783
Education in single years	4.53	4.57	0	26	444522
Never married	0.14	0.34	0	1	444773
Have a partner	0.77	0.42	0	1	444773
Widowed	0.03	0.18	0	1	444773
Do not have a partner	0.06	0.24	0	1	444773
Fertility preferences					
Have another child	0.62	0.48	0	1	443496
Undecided	0.05	0.22	0	1	443496
No more	0.29	0.45	0	1	443496
Sterilized (respondent or partner)	0.01	0.12	0	1	443496
Declared infecund	0.03	0.16	0	1	443496
Religion					
Bahai	0	0.01	0	1	409512
Christian	0.6	0.49	0	1	409512
Hindu	0	0	0	1	409512
Muslim	0.33	0.47	0	1	409512
Traditional	0.03	0.16	0	1	409512
Other	0.01	0.1	0	1	409512
No religion	0.03	0.18	0	1	409512
Occupation					
Agricultural - employee	0.04	0.2	0	1	441066
Agricultural - self employed	0.23	0.42	0	1	441066
Agriculture, breeding, fishing, forest	0.01	0.09	0	1	441066
Clerical	0.01	0.1	0	1	441066
Household and domestic	0.01	0.1	0	1	441066
Military/security	0	0	0	1	441066
Professional/technical/managerial	0.03	0.18	0	1	441066
Sales and services	0.23	0.42	0	1	441066
Skilled manual	0.05	0.21	0	1	441066
Unskilled manual	0.03	0.16	0	1	441066
Other	0	0.04	0	1	441066
None	0.38	0.48	0	1	441066

Figure 4: Sub-regions by trust groups



3.2 Methods

The empirical analysis is structured into three steps. The first one consists in estimating two multilevel models built with different measures of trust.

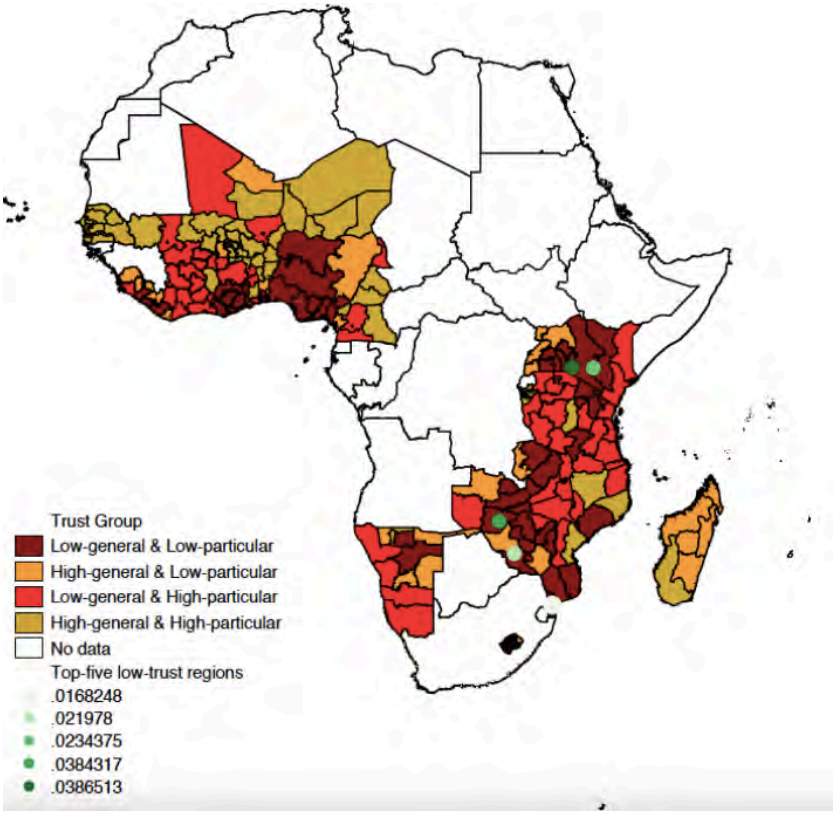
The first model uses trust taken in deviation from the mean, as follows:

$$Pr(CONTRACEPTION_i = 1) = \alpha + X_i\beta + \delta_1 * FAMILYPLAN_i + \delta_2 * TRUST_{sr}^{dev} + \delta_3 * [FAMILYPLAN_i * TRUST_{sr}^{dev}] \quad (1)$$

where X_i is the matrix containing individual controls, namely age, education, religion, occupation, marital status, # living children, and fertility preferences, and $TRUST_{sr}^{dev}$ is defined as the sub-regional level of trust taken in deviation from the sample mean (i.e., $TRUST_{sr}^{dev} = TRUST_{sr} - \overline{TRUST}$). The coefficient of interest (δ_3) measures the magnitude of the effect of trust on the probability of using modern contraceptive methods conditional to the respondent's exposure to family planning programs. We would have an idea of how the effectiveness of the family planning programs changes when the local trust level varies. In the model, error heteroskedasticity is allowed at the country level, since at sub-regional level trust is constant within sub-regions.

The second model uses dummy variables for trust groups as defined in

Figure 5: Geographical representation of trust groups



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3.1.

$$Pr(CONTRACEPTION_i = 1) = \alpha + X_i\beta + \delta_1 * FAMILYPLAN_i + \delta_2 * TRUST_{sr}^{H,L} + \delta_3 * [FAMILYPLAN_i * TRUST_{sr}^{H,L}] + \delta_4 * TRUST_{sr}^{L,H} + \delta_5 * [FAMILYPLAN_i * TRUST_{sr}^{L,H}] + \delta_6 * TRUST_{sr}^{H,H} + \delta_7 * [FAMILYPLAN_i * TRUST_{sr}^{H,H}] \quad (2)$$

The estimated coefficients of interaction terms tell us how the effectiveness of family planning programs differs in sub-regions with at least one high-trust dimension respect to L-L areas (the omitted group).

The second step consists in estimating the heterogeneous effects by educational level. In other words, we want to see how the FP program performs along the dimensions of both trust and education. As before, two models will be estimated, one with mean-centered trust and the other with trust groups. For the sake of easiness, we present just the model with mean-centered trust:

$$Pr(CONTRACEPTION_i = 1) = \alpha + X_i\beta + \delta_1 * FAMILYPLAN_i + \delta_2 * TRUST_{sr}^{dev} + \delta_3 * [FAMILYPLAN_i * TRUST_{sr}^{dev}] + \delta_4 * EDUCATION_i + \delta_5 * [EDUCATION_i * TRUST_{sr}^{dev}] + \delta_6 * [FAMILYPLAN_i * EDUCATION_i] + \delta_7 * [FAMILYPLAN_i * EDUCATION_i * TRUST_{sr}^{dev}] \quad (3)$$

The variable $EDUCATION_i$ is measured in total years. δ_7 is our new coefficient of interest.

Finally, we perform three robustness checks in order to give more relevance to our results.

First, we estimate the same coefficients as 1 and 2 using a logit model with clustered errors at sub-regional level and country fixed-effects. The multilevel analysis takes into account all the possible variability between and within levels. However, it requires 3 main assumptions: 1) that the random associations are normal, 2) that there are not omitted variables, so that you are safe assuming that errors and regressors are uncorrelated at all levels, 3) that there are enough observations at each level. Assumpions 2) holds also for Logit models. Furthermore while the model should have enough clusters so that the variance-covariance estimate is obtained as a sum over sufficiently many independent terms, it does not need asymptotics in terms of the number of observations per cluster, what is the case for multilevel models. Furthermore, multilevel models allows for interactions between levels, what is more controversial in logit models (Ai and Norton, 2003).

Second, we estimate again the multilevel model as in 1 by taking trust in deviation from the *median* sample (instead that in deviation from the *median*).

Third, we perform the analysis on a restricted sample including only respondents who have been exposed to one FP program (either through media or through personal contacts), in order to get rid of confounding effects.

4 Empirical results

In this section we present the results of the empirical analysis. We start by presenting the results of a multilevel model considering both general and particular trust, a measure of trust centered around the mean and a specific categorization of trust as presented in section 3. Then, we present heterogeneous effects by women educational level. Some robustness checks are presented in the Appendix. We conclude by qualitatively describing the sub-regions who depict the lowest levels of trust in our dataset.

4.1 The moderating role of trust

Table 4 and 5 in the Appendix depict the results of estimating equation (1) (columns 1-4) and (2) (columns 5-6) by multilevel modelling using as main explanatory variables general trust and particular trust, respectively. The relevant coefficient estimates for the interaction term (δ_3 in equation (1) and δ_4, δ_5, and δ_6 in equation (2)) are plotted in figures 6 and 7, respectively (leftern panels for general trust and rightern panels for particular trust).

These estimates show that family planning programs through personal contacts are, on average, more effective in terms of contraceptive use with respect to family planning programs through media. While general trust act as a moderator of the role of both family planning programs through personal contacts and media in terms of adoption of modern contraceptives, trust in relatives moderate only the role of family planning programs through personal contacts. To put it differently, at higher levels of generalized trust we see a better performance of both general and personal family planning programs, while trust in relatives has a positive effect on probability of contraception conditional to exposure to personal family planning only.

This path emerges more clearly from figure 7, where the low-low group is taken as baseline estimation (first panel of figure 7). Where general trust is low, the interaction term with family planning programs through media is never significant. A basic level of generalized trust is required for this interaction to be statistically different from zero (forth panel in figure 7). To put it differently, marginal effects show that a high level of generalized trust is crucial for boosting the effectiveness of the family planning programs through media. In the case of personal family planning programs, we found a higher impact of promotional campaigns in all three groups relatives to low-low subregions, and this impact is higher for high-high subregions.

Figure 6: Multilevel model: mean-centered trust

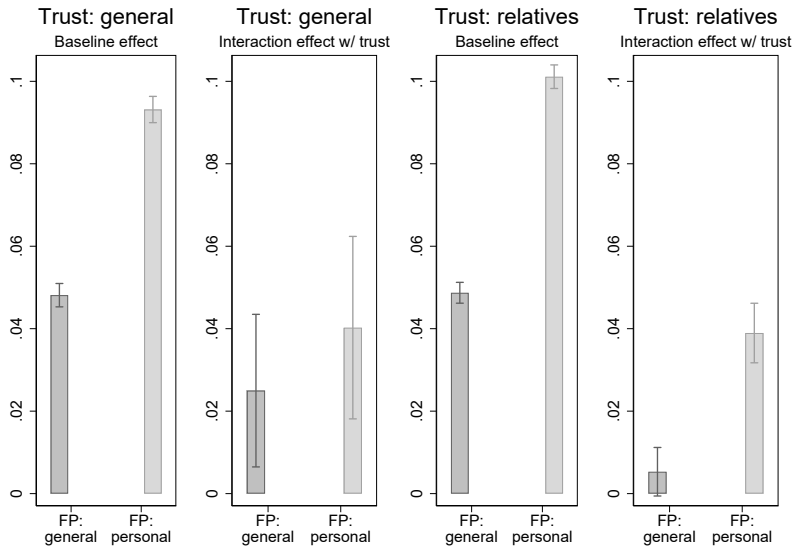
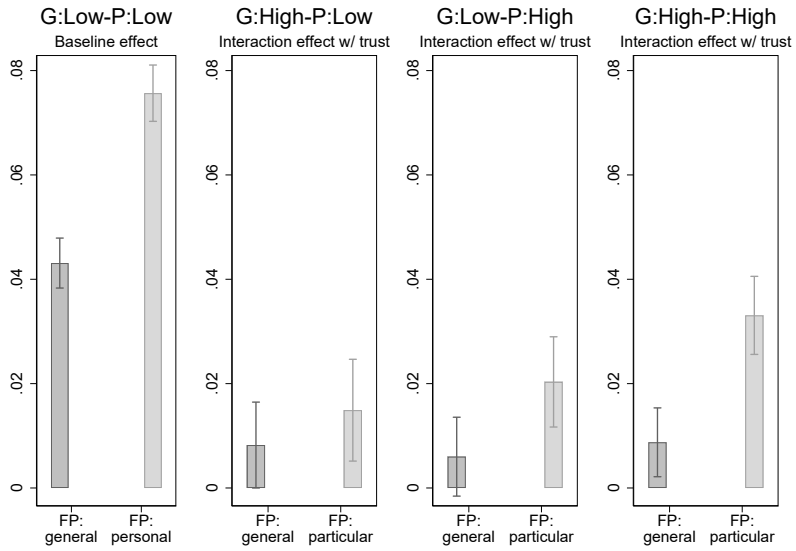


Figure 7: Multilevel model: trust groups



4.2 Heterogeneous effects by education

Figures 8, 9, 10 and 11 plot the estimated results of a triple interaction terms between family planning, trust and women educational levels (((δ_7 in equation (3)). Tables AAA AAA in the Appendix depict the same result.

Figure 8 shows no significant differences with general nor with particular trust. Figure 9 shows significant differences at the highest level of education.

The more education women have, the smaller is the change in trust needed to have a rise in the predicted probability of adoption of modern contraceptives. When education is high, gen trust has the opposite effect relative to the bottom of educational level: increase the effectiveness of the program.

Figure 8: Heterogeneous associations on personal family planning: mean-centered trust and education

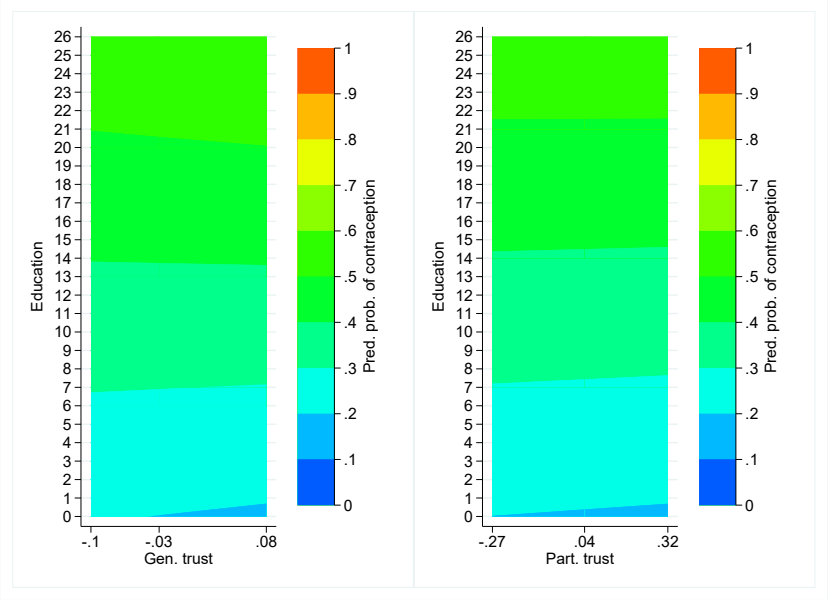


Figure 9: Heterogeneous effects on personal family planning: mean-centered trust and education

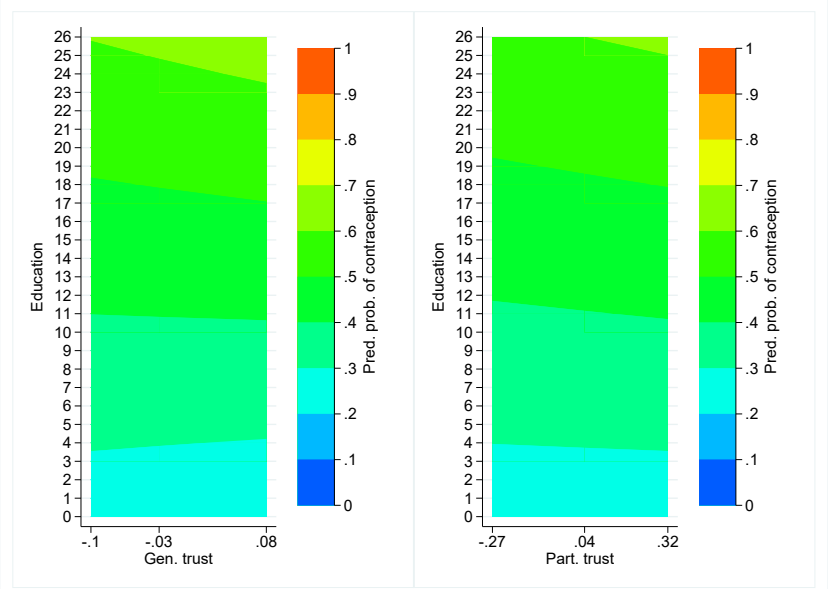


Figure 10 shows that in every trust group and for each level of education there is no difference between who received and who did not receive general family planning programs in terms of contraceptive use.

The results are different for personalized family planning (figure 11) where a significant difference emerge in high-high group between individuals not exposed to family planning and individuals exposed to family planning at every level of education. In low-high group and low-low group the difference is significant just for individuals with zero education or who have primary education, while in high-low it is always significant with the exception of zero education. As for before, low levels of generalized trust has an impact on the effectiveness of programs especially when educational level is low. When generalized trust is high, we see a bigger impact in the upper tail of the educational distribution only when particular trust is low.

Figure 10: Heterogeneous effects on general family planning: trust groups and education

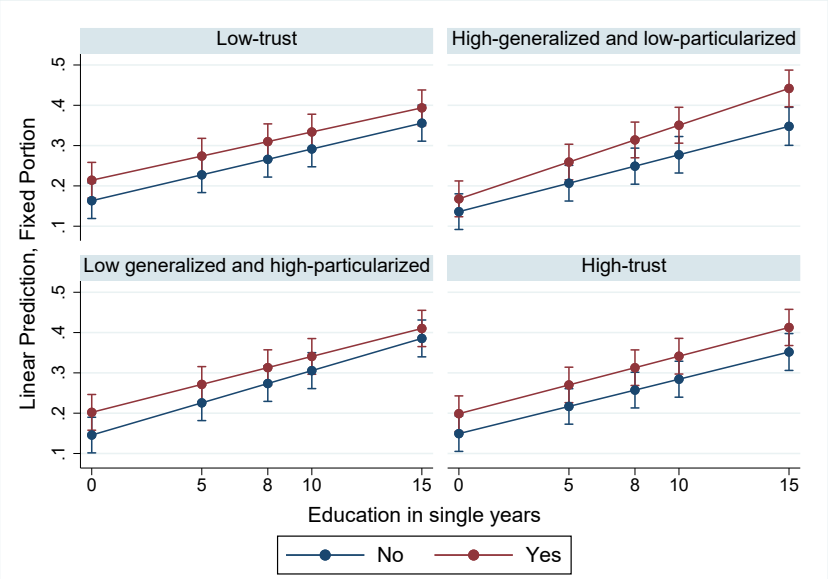
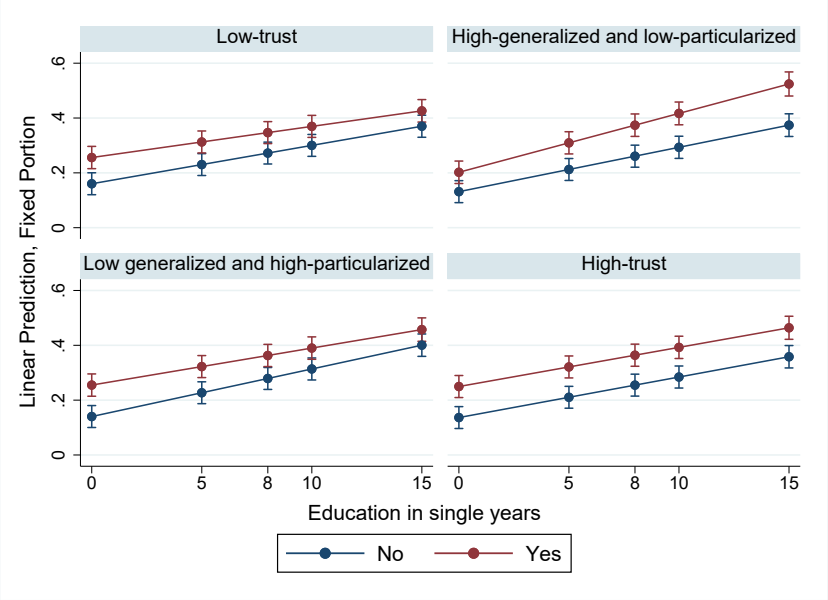


Figure 11: Heterogeneous effects on personal family planning: trust groups and education



5 Discussion and conclusions

[TO BE ADDED BEFORE PAA]

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Appendix

5.1 Main associations

Table 4: Multilevel models with general family planning

	Mean-centered gen. trust		Mean-centered trust in relatives		Trust groups	
Respondent uses modern methods	(1)	(2)	(3)	(4)	(5)	(6)
Family planning: general	0.048***	0.024***	0.049***	0.024***	0.043***	0.026***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
Mean-centered generalized trust	-0.080***	-0.084***				
	(0.008)	(0.007)				
FP: general × Mean-centered general trust	0.025***	0.023**				
	(0.009)	(0.010)				
Mean-centered trust in relatives			-0.017***	-0.014***		
			(0.003)	(0.003)		
FP: general × Mean-centered trust in relatives			0.005*	-0.008***		
			(0.003)	(0.003)		
High-general & Low-particular					-0.022***	-0.021***
					(0.003)	(0.003)
Low-general & High-particular					-0.006**	-0.006*
					(0.003)	(0.003)
High-general & High-particular					-0.012***	-0.011***
					(0.003)	(0.003)
FP: general × High-general & Low-particular					0.008*	0.002
					(0.004)	(0.004)
FP: general × Low-general & High-particular					0.006	-0.002
					(0.004)	(0.004)
FP: general × High-general & High-particular					0.009***	-0.004
					(0.003)	(0.004)
FP overlapping	Yes	No	Yes	No	Yes	No
N.	310.351	259.509	390.630	331.773	310.351	259.509

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

Table 5: Multilevel models with personal family planning

	Mean-centered gen. trust		Mean-centered trust in relatives		Trust groups	
Respondent uses modern methods	(1)	(2)	(3)	(4)	(5)	(6)
Family planning: personal	0.093***	0.082***	0.101***	0.093***	0.076***	0.067***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.004)
Mean-centered generalized trust	-0.082***	-0.080***				
	(0.006)	(0.006)				
FP: personal × Mean-centered general trust	0.040***	0.023				
	(0.011)	(0.017)				
Mean-centered trust in relatives			-0.022***	-0.018***		
			(0.002)	(0.002)		
FP: personal × Mean-centered trust in relatives			0.039***	0.040***		
			(0.004)	(0.005)		
High-general & Low-particular					-0.020***	-0.018***
					(0.003)	(0.003)
Low-general & High-particular					-0.005**	-0.004*
					(0.003)	(0.002)
High-general & High-particular					-0.020***	-0.018***
					(0.002)	(0.002)
FP: personal × High-general & Low-particular					0.015***	0.006
					(0.005)	(0.008)
FP: personal × Low-general & High-particular					0.020***	0.011*
					(0.004)	(0.006)
FP: personal × High-general & High-particular					0.033***	0.030***
					(0.004)	(0.006)
FP overlapping	Yes	No	Yes	No	Yes	No
N.	316.764	265.922	396.896	338.039	316.764	265.922

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

5.2 Heterogeneous effects

Table 6: Multilevel models with heterogeneous effect by years of education and general family planning

	Mean-centered gen. trust		Mean-centered trust in relatives		Trust groups	
Respondent uses modern methods	(1)	(2)	(3)	(4)	(5)	(6)
Family planning: general	0.049***	0.023***	0.047***	0.021***	0.050***	0.030***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Education in single years	0.014***	0.014***	0.014***	0.014***	0.014***	0.014***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mean-centered generalized trust	-0.060***	-0.063***				
	(0.009)	(0.009)				
FP: general × Mean-centered general trust × Education	0.015***	0.011***				
	(0.002)	(0.002)				
Mean-centered trust in relatives			-0.021***	-0.016***		
			(0.003)	(0.003)		
FP: general × Mean-centered trust in relatives × Education			0.000	-0.001		
			(0.001)	(0.001)		
High-general & Low-particular					-0.028***	-0.026***
					(0.004)	(0.004)
Low-general & High-particular					-0.018***	-0.017***
					(0.004)	(0.004)
High-general & High-particular					-0.015***	-0.014***
					(0.004)	(0.004)
FP: general × High-Low × Education					0.005***	0.003***
					(0.001)	(0.001)
FP: general × Low-High × Education					-0.001	-0.001
					(0.001)	(0.001)
FP: general × High-High × Education					0.002**	0.001
					(0.001)	(0.001)
FP overlapping	Yes	No	Yes	No	Yes	No
N.	310.351	259.509	390.630	331.773	310.351	259.509

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

Table 7: Multilevel models with heterogeneous effect by years of education and personal family planning

	Mean-centered gen. trust		Mean-centered trust in relatives		Trust groups	
Respondent uses modern methods	(1)	(2)	(3)	(4)	(5)	(6)
Family planning: personal	0.101***	0.086***	0.110***	0.102***	0.093***	0.077***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.005)	(0.007)
Education in single years	0.016***	0.016***	0.015***	0.015***	0.015***	0.015***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Mean-centered generalized trust	-0.072***	-0.069***				
	(0.008)	(0.008)				
FP: personal × Mean-centered general trust × Education	0.013***	-0.002				
	(0.003)	(0.004)				
Mean-centered trust in relatives			-0.025***	-0.020***		
			(0.003)	(0.003)		
FP: personal × Mean-centered trust in relatives × Education			0.001	-0.001		
			(0.001)	(0.001)		
High-general & Low-particular					-0.029***	-0.028***
					(0.003)	(0.003)
Low-general & High-particular					-0.020***	-0.019***
					(0.003)	(0.003)
High-general & High-particular					-0.024***	-0.022***
					(0.003)	(0.003)
FP: personal × High-Low × Education					0.008***	0.007***
					(0.001)	(0.002)
FP: personal × Low-High × Education					-0.001	-0.001
					(0.001)	(0.002)
FP: personal × High-High × Education					0.002**	0.001
					(0.001)	(0.001)
FP overlapping	Yes	No	Yes	No	Yes	No
N.	316.764	265.922	396.896	338.039	316.764	265.922

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

5.3 Robustness

5.3.1 Logit model

Table 8: Logit model with mean-centered general trust

Respondent uses modern methods	(1)	(2)
Family planning: general	0.385***	
	(0.028)	
FP: general × Mean-centered general trust	0.782***	
	(0.181)	
Family planning: personal		0.620***
		(0.031)
FP: personal × Mean-centered general trust		0.934***
		(0.222)
Mean-centered generalized trust	-1.139***	-1.001***
	(0.225)	(0.209)
N.	305.787	311.951

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

Table 9: Logit model with mean-centered particular trust

Respondent uses modern methods	(1)	(2)
Family planning: general	0.371***	
	(0.029)	
FP: general × Mean-centered trust in relatives	0.057	
	(0.069)	
Family planning: personal		0.661***
		(0.036)
FP: personal × Mean-centered trust in relatives		0.371***
		(0.075)
Mean-centered trust in relatives	-0.222***	-0.290***
	(0.085)	(0.072)
N.	385.333	391.350

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

5.3.2 Multilevel model: no overlapping family planning

Table 10: Multilevel model with general family planning

	(1)	(2)	(3)	(4)	(5)	(6)
Respondent uses modern methods		No overlap		No overlap		No overlap
Family planning: general	0.048***	0.024***	0.049***	0.024***	0.043***	0.026***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.003)
Mean-centered generalized trust	-0.080***	-0.084***				
	(0.008)	(0.007)				
FP: general × Mean-centered general trust	0.025***	0.023**				
	(0.009)	(0.010)				
Mean-centered trust in relatives			-0.017***	-0.014***		
			(0.003)	(0.003)		
FP: general × Mean-centered trust in relatives			0.005*	-0.008***		
			(0.003)	(0.003)		
High-general & Low-particular					-0.022***	-0.021***
					(0.003)	(0.003)
Low-general & High-particular					-0.006**	-0.006*
					(0.003)	(0.003)
High-general & High-particular					-0.012***	-0.011***
					(0.003)	(0.003)
FP: general × High-general & Low-particular					0.008*	0.002
					(0.004)	(0.004)
FP: general × Low-general & High-particular					0.006	-0.002
					(0.004)	(0.004)
FP: general × High-general & High-particular					0.009***	-0.004
					(0.003)	(0.004)
N.	310351	259.509	390.630	331.773	310.351	259509

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

Table 11: Multilevel model with personal family planning

	(1)	(2)	(3)	(4)	(5)	(6)
Respondent uses modern methods		No overlap		No overlap		No overlap
Family planning: personal	0.093***	0.082***	0.101***	0.093***	0.076***	0.067***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.004)
Mean-centered generalized trust	-0.082***	-0.080***				
	(0.006)	(0.006)				
FP: personal × Mean-centered general trust	0.040***	0.023				
	(0.011)	(0.017)				
Mean-centered trust in relatives			-0.022***	-0.018***		
			(0.002)	(0.002)		
FP: personal × Mean-centered trust in relatives			0.039***	0.040***		
			(0.004)	(0.005)		
High-general & Low-particular					-0.020***	-0.018***
					(0.003)	(0.003)
Low-general & High-particular					-0.005**	-0.004*
					(0.003)	(0.002)
High-general & High-particular					-0.020***	-0.018***
					(0.002)	(0.002)
FP: personal × High-general & Low-particular					0.015***	0.006
					(0.005)	(0.008)
FP: personal × Low-general & High-particular					0.020***	0.011*
					(0.004)	(0.006)
FP: personal × High-general & High-particular					0.033***	0.030***
					(0.004)	(0.006)
N.	316.764	265.922	396.896	338.039	316.764	265.922

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

5.3.3 Multilevel model: median-centered trust and no overlapping family planning

Table 12: Multilevel model with median-centered general trust

	(1)	(2)	(3)	(4)
Respondent uses modern methods		No overlap		No overlap
Family planning: general	0.047***	0.023***		
	(0.001)	(0.002)		
FP: general × Median-centered general trust	0.025***	0.023**		
	(0.009)	(0.010)		
Family planning: personal			0.092***	0.081***
			(0.002)	(0.002)
FP: personal × Median-centered general trust			0.040***	0.023
			(0.011)	(0.017)
Median-centered generalized trust	-0.080***	-0.084***	-0.082***	-0.080***
	(0.008)	(0.007)	(0.006)	(0.006)
N.	310.351	259.509	316.764	265.922

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01

Table 13: Multilevel model with median-centered particular trust

	(1)	(2)	(3)	(4)
Respondent uses modern methods		No overlap		No overlap
Family planning: general	0.049***	0.023***		
	(0.001)	(0.001)		
FP: general × Median-centered trust in relatives	0.005*	-0.008***		
	(0.003)	(0.003)		
Family planning: personal			0.103***	0.095***
			(0.001)	(0.002)
FP: personal × Median-centered trust in relatives			0.039***	0.040***
			(0.004)	(0.005)
Median-centered trust in relatives	-0.017***	-0.014***	-0.022***	-0.018***
	(0.003)	(0.003)	(0.002)	(0.002)
N.	390.630	331.773	396.896	338.039

Note: Standard errors clustered at the sub-regional level in parentheses. Covariates as described in Table 3. * p<0.10, ** p<0.05, *** p<0.01