Edutainment Radio, Women's Status and Primary School Participation:

Evidence from Cambodia*

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Abstract

This paper explores the effect of being exposed to education-entertainment ("edutaiment") gender-related radio information on women's status and primary school participation. Specifically, I examine one of the most popular radio stations in Cambodia using two identification strategies. The first exploits plausible exogenous variation in over-the-air signal strength between radio transmitters and villages within a district. The second exploits the variation across time and space in exposure. Using individual data, both approaches show that access to both entertaining and educating information about gender issues had a significant impact on behavior by raising the women's decision-making power within the household and increasing children's primary school attendance. The impact was found in both poor and rural households confirming that en radio broadcast is an effective way to transmit information in the more marginalized areas. Suggestive evidence shows that the exposure also affected attitudes towards domestic violence and the prevalence of son preference which is a stepping stone towards changing socially constructed gender norms. The effect on investing in children's human capital is also reflected by higher primary school enrollment three years after exposure.

Keywords: Radio, women's radio station, FM 102, gender, women's status, schooling, enrollment, attitude, behavior, edutainment, Cambodia

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1 Introduction

Promoting gender equality and empowering women, which is one of the UN Millennium Development Goals, is not only an end in itself; it has also proven to have large development gains. For example, several authors such as Qian (2008), King and Mason (2001), Duflo (2005), Jensen and Oster (2007) have found that when women obtain a higher status within the household, investments in children's human capital and well-being are enhanced. Although efforts to fulfill these goals are gaining momentum in many developing countries where legal framework provides social, economic and political equality of women and men before the law, strong traditional norms assigning higher status to men and marginalize women can undermine the implementation and enforcement of legislation and policy provisions.[1] Under such circumstances, media can play a crucial role in either reinforcing these traditional values or changing them depending on how the media format is designed and implemented.

Several studies have shown that media can be an extremely powerful and influential tool in changing attitudes and behavior. For example, Gentzkow and Shapiro (2004) show that television viewership in the Muslim world affects attitudes towards the West, and Della Vigna and Kaplan (2007) show large effects of the Fox News channel on voting patterns in the United States. Stromberg (2004) finds large and highly significant impact on US policies during their expansion of radio in 1920-1940. In the developing world, Olken (2009) finds that television decreases participation in social organizations in Indonesia and Svensson and Yanagizawa (2009) show that exposure to local FM radio made farmers better informed about the farm-gate prices affecting their surplus production.

The World Bank has acknowledged the role of effective communication strategies which encompasses a wide range of media applications to be utilized in the development processes.[2] Education-Entertainment or edutainment strategy is one such communication strategy using entertainment media for disseminating educational information by changing attitudes, behaviors and social norms. This strategy has been consciously applied to HIV prevention and control in the form of popular radio and television soap operas. For instance, Soul City in South Africa and Tinka Tinka Sukh (Happiness Lies in Small Things) in India are just a few examples. Research evaluations of such interventions are mostly found within the sociology field showing in general that they have measurable effects on changing HIV prevention be-

[1]UNIFEM and ADB (2004)
[2]Khalil et al. (2009)

havior.[3] There are however very few robust empirical studies evaluating the causal effects and, in particular, on other outcomes than HIV prevention.

This paper is an attempt to study whether access to edutainment information can affect and change attitudes, leading to behavioral changes involving higher status for women as well as increased primary school participation. Specifically, I examine a popular radio station in Cambodia, focusing on women's issues, whose mission is to educate and inform the Cambodians on various social and women's issues by designing and implementing entertainment radio aiming at changing both attitudes and behavior. To identify the effect, I use two complementing identification strategies. The first one exploits the within district variation in over-the-air signal strength. The second one uses variation across time and space, exploiting the fact that the radio coverage was gradually expanded over time and across regions. Recognizing the multifaceted nature of women's status, I use several indicators including the degree of son preference, women's attitude towards wife beating and their degree of participating in household decision-making, including having the sole final say in decisions regarding the children's schooling. To estimate the effect on children's school participation, I use school attendance for children aged 6-12, self-reported by the household, as well as enrollment records for grade one to six reported by the school. Independent of the identification strategies, I find that the radio exposure of the edutainment programs had a significant impact on types of behavior associated with women's status such as participating in household decision-making as well as investments in children's human capital. I find more suggestive evidence that the edutainment intervention had an impact on the attitude towards domestic violence and the degree of son preference.

When studying the impact on school enrollment for primary school using within school fixed effects, I find that the effect is increasing over time and that there are no trends prior to the exposure that could have driven the results in the exposed areas. I also conduct placebo tests for both strategies and do not find that there were any confounding trends in the outcome variables in the absence of radio coverage. Given the limitation of pre-exposure data, a technique adopted by La Ferrara et al. (2008), Jensen and Oster (2007) and Oster and Millett (2010), is employed to test the impact of future radio coverage. I do not find that future coverage had a significant impact on the outcome variables confirming that these variables were not progressing faster in coverage areas than in non-coverage areas.

The paper by Jensen and Oster (2007), which is most similar to this one, find that the introduction of cable television in rural India had only some

[3]For example, Singhal and Rogers 1999, Vaughan et al 2000, Valente 1997

suggestive increasing effect on school enrollment for younger children. In contrast to their paper, I find significant and large impact on school enrollment. One plausible explanation may be that radio has some crucial advantages when delivering pro-social contents to a rural population. Although not as popular, persuasive and prestigious as televised content, portable, easy-to-use and affordable technologies due to lower production costs make radio a stronger option when reaching citizens in the developing countries, particular women in the rural areas. Moreover, when the radio programs are designed and implemented with an edutainment strategy the effects may be even stronger.

The more suggestive evidence of edutainment radio on the attitudes towards domestic violence and the degree of son preference is interesting but not surprising. In a patriarchal system where gender discrimination is embedded and enforced by social norms, incentives aimed at changing more structural inequalities may be a more difficult task than persuading individuals adopting a new behavior which may be perceived as having immediate personal benefits. Another aspect is whether the findings actually reflect personal or perceived attitude since the latter could be strongly influenced by the survey context (answering what you believe is expected by the interviewer) and the media priming from the radio station.[4] But if behavior is determined by the perception about what is normal or desirable in a given community (the social norm) then, even if not internalized with the personal belief or attitude, changes in these attitudes are an important stepping stone towards changing behavior. In fact, according to the estimates the radio programs raised both women's decision-making power and children's school participation. In terms of impact, the average school enrollment raised by 7 percent yielding an approximate 26,979 and 33,381 more children enrolled in primary school some two and three years after exposure, respectively.

The main contribution of this paper is to provide a link between edutainment radio, gender related attitudes, behavior and development and add to the literature on media effects as already mentioned above. The findings may have important policy implications for developing countries. In contrast to resource-intensive interventions such as providing scholarship to girls in order to increase the proportion of girls in a village attending school, interventions using an edutainment communication strategy with radio as the driving force, attempt to change the community members' perception of a social norm which in turn, down the line, influence actual behavior. The major

[4] A person exposed to a radio program designed to alter individuals perceptions about which attitudes and behaviors are typical or desirable in their community is normally aware that many other members of the community are being exposed to the same program and will believe that this is endorsed by the community members.

difference here is that radio broadcasting programs are in general relatively cheaper to produce (higher impact-per-dollar spent) and have the potential of reaching an overwhelming number of people compared to education programs delivered in classrooms. If properly designed, edutainment radio can be an effective complement to these education programs for conveying important social contents and could thus be successfully employed in a broader set of development policies.

This paper is organized as follows. The next section provides the background. Section 3 presents the details of the Women's Radio Station FM 102 and section 4 describes the data and sample used. Section 5 describes the two empirical strategies. In section 6, the results of the estimations are presented including some robustness checks and the final section concludes the paper.

2 Background

2.1 Context

The media sector in Cambodia is considered to be one of Southeast Asia's liveliest and most unregulated. As of 2009, Cambodia had 341 newspapers, 119 magazines, 22 radio stations and seven television outfits.[5] Despite a process of media deregulation during the last decade, Cambodia is listed as number 141 of 196 in the in the 2011 annual press freedom index, where a high number indicates a low press freedom. Most of the television and radio broadcast platforms are owned by or have a close affiliation with the ruling Cambodian People Party (CPP).[6] There are only two radio stations that are regarded as independent, one of which is the Women's Station FM 102.[7]

This situation is partly explained by the rapid changes of political regimes since the 1970s. During the four years when the Khmer Rouge was in power (1975-1979), more than a million people were killed, many of them were highly educated and journalists. Under the subsequent Vietnamese rule, the media was reborn but controlled by the state and acted basically as a government tool for disseminating information and party propaganda. In 1986, there were about 200,000 radio receivers in the country but no daily newspaper.[8] After the withdrawal of Vietnamese troops and the arrival of the United Nation Transitional Authority in Cambodia (UNTAC) prior to the

[5] CCIM (2009)

[6] Deutsch Karlekar (2011)

[7] See Edman (2000) and Rosette (2010)

[8] Mehta (1997)

general election in 1993, the media sector changed remarkably again. The UN established and operated its own radio station to educate voters about their right to vote. Thousands of small radios were distributed to villagers and ninety percent of Cambodians voted in the first national election.[9] In 1997, there were an estimated one million radio receivers and only 100,000 televisions in Cambodia, more urban dwellers than rural had access to television media and most media was centered in the Khmer language.[10]

Despite tentative process of recovery, Cambodia remains the poorest and least developed country in Asia. The society is largely characterized by a patriarchal and hierarchical social structure with strong traditional norms.[11] For example, there are moral codes for a woman which were not long ago stated as part of the primary school curriculum (called Chba'p): "The woman is to be silent and walk so softly that one cannot hear the sound of her silk skirt rustling. She is shy and naive and must be protected. Before her marriage, she has ideally never left the company of family members".[12] Not only do the traditional values assign women a lower status, women also have a heavier work burden, work longer hours, have lower decision-making power, less control over resources, lower education and literacy rates and lower access to public services compared to men.[13] These gender disparities stand as some significant constraints to sustainable socio-economic development.

2.2 Edutainment

Edutainment as an effective communication strategy has been enthusiastically embraced by many development communication practitioners.[14] The purpose of edutainment media is to increase audience knowledge about an educational issue using drama, music or other communication formats that engage the emotions to inform audience and change attitudes, behaviors and social norms. This can be achieved by either influencing the audience awareness, attitudes and behaviors towards a socially desirable end or influencing the audiences' external environment to help creating the necessary condition for social change at the group or system level.[15]

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[9] CCIM (2009)

[10] Mehta (1997)

[11] UNIFEM and ADB (2004)

[12] Ledgerwood (1996)

[13] See Dahlerup (2010) and UNIFEM and ADB (2004).

[14] See, for example, Singhal and Rogers (2001) and Piotrow et al. (1990).

[15] For example, Singhal et al. (2006) describes how the radio soap opera "Tinka Tinka Sukh" led to an entire village in India rejecting traditional dowry practices following the broadcast of this program.

The field of development communication is dominated by two conceptual models: diffusion and participation. The edutainment approach draws upon the former model[16] that uses a top-down or vertical approach to persuade individuals to change their behavior by providing them with information. In contrast to the participation model[17] that uses a horizontal approach of communication where dialogues are exchanged at the community level, the diffusion model is more outcome oriented. The standard formulation of the diffusion model is Knowledge - Attitudes - Practice: information provides Knowledge, which leads to a change in Attitudes, which in turn leads to Practice - the desired behavior change.

Historically, many international development agencies have tended to rely on vertical, diffusion-oriented models of message dissemination. These initiatives are typically found in the health sector where individuals are encouraged to adopt a new behavior that they may perceive as having immediate personal and health benefits. In general, expected outcomes such as increased child vaccination rates, use of prenatal care or family planning, and knowledge about nutrition, hygiene, and HIV/Aids prevention are relatively easier to achieve than initiatives aimed at changing more structural inequalities.[18] Efforts to make more structural changes would perhaps be better employed with a participatory oriented intervention, or a combination of both approaches. The participatory model stresses the role of an empowerment process, where individuals obtain greater control over decisions that affect them, rather than on direct outcomes.

There are several examples of successful edutainment interventions including televised serials, soap operas, radio dramas, children's cartoons, video games etc. An effective edutainment intervention is generally designed to actively engage the audience in the process of delivering a pro-social message using entertainment media. Pure didactic interventions or communication programs are usually incapable to retain the audiences' interest, even if well produced, and could thus successfully be accompanied by the former strategy as part of an overall development communication approach.[19] By producing edutainment in a mass media delivery format, an extremely large audience can be reached with the potential for wide-reaching and rapid change in behaviors. The most famous example of a successful edutainment intervention in recent years is the "Soul City" television show broadcast by the Soul City Institute for Health and Development Communication, an NGO in Johannesburg, South Africa, addressing a wide range of key issues in-

[16] Rogers (1995)
[17] Morris (2001)
[18] Izett and Toubia (1999)
[19] Barker et al. (2005)

cluding HIV/Aids prevention, land reform, child health, domestic violence etc.[20] The series reached 16 million people in South Africa, achieving top audience ratings and winning six awards, including prize for South Africa's Best Television Drama, and is therefore regarded to have a very high level of impact-per-dollar spent in changing attitudes and behavior.

3 Women's Radio FM 102

The most popular radio station "Women's Radio FM 102" in Cambodia is using an edutainment approach in their communication strategy to promote social change in the society. It is owned by a local non-profit and non-governmental organization, the Women's Media Center (WMC)", that broadcasts programs which aim to educate and inform Cambodians on women's rights and health, domestic violence, HIV/AIDS awareness, trafficking, but also on elections, decentralization and poverty alleviation. Their primary mission is to raise awareness about social issues, to improve women's status by promoting socially conscious television, video and radio programs, and to increase women's participation in mainstream media through workshops, research and public lobbying.

Their radio programs map into four areas i) women's issues such as law, domestic violence and health; ii) news programs; iii) teenagers' programs and iv) children's programs. A good example of an edutainment program is for example a popular call-in show for young people called "Os Tos Mhong!" (Cool), broadcast in 2004 live every Sunday morning.[21] The program was presented by two youth who shared their own experiences as being young with whom the listeners could identify with. These two interactive characters encouraged young people to actively share their views with other listeners live on air as well as through e-mails and letters. The idea was to get young people a chance to discuss issues which might be of interest to them such as personal, health and education issues. The program format included talk shows, information, advice, music and competition and the communication strategy was to create a safe but lively and entertaining space for young people to questions, share ideas, and voice opinions. In addition to entertainment, the show provided information about sexual and reproductive health and HIV/AIDS and encouraged debate around these topics. Each week had a focus on a particular topic such as youth culture, music, gender equality, education etc.

[20] Singhal and Rogers (2004)
[21] WMC (2009b)

The "Women's Radio FM 102" has always been very popular and well-known radio station in Cambodia which have been confirmed by several reports and surveys.[22] Other reports have also showed that the station is perceived as being a vital source of unbiased information[23] where the reporting is considered to follow good journalistic practices in terms of balance and neutrality[24] and having a positive influence on the audience's attitude and behavior.[25] Themselves claims to be at "the cutting edge of producing high quality innovative programs to gain further attention and respect in order to become an example for other media organizations around the world". In 2009, the WMC was nominated by the One World Broadcasting Trust for a Special Award for Development Media.[26]

The WMC is a donor driven organization[27] that consists of five departments that conduct various media-related activities with a gender approach in all their programs.[28] The radio station FM 102 is their largest activity and is daily broadcasting programs that consist of live and own produced shows, daily news bulletins, as well as international news taken from the Australian Broadcasting Corporation service.

The organization was founded prior to the UN-supported national election in 1993 in order to increase the participation of women in the democratic process. It became registered as a Cambodian NGO in 1995 and in 1999 they launched their own radio station, FM 102, aired by a 200 W radio transmitter placed in Phnom Penh. Two years later, after receiving more funding, WMC upgraded their transmitter to a more powerful 10 kW and placed the old transmitter in another province (Kampong Thom) as a relay station. They expanded further with an additional relay station in Svay Rieng province to reach 11 (of 24) provinces covering about 60 percent of the population in Cambodia. At the end of 2006, the Kampong Thom transmitter was upgraded to a power of 1 kW and WMC started hiring broadcasting time from three transmitters in other provinces.[29] The variation across space and time in coverage will be used in this paper to analyze the impact of this radio

[22]See for Human Rights (2003), Alison Mee and Savage (2003), Rosette (2010) and WMC (2006).

[23]Edman (2000)

[24]Marseille (2008)

[25]WMC (2006)

[26]http://oneworldmedia.org.uk/.

[27]Some of the donors include UNESCO, UNICEF, foreign aid agencies from Sweden, Denmark, United Kingdom, Australia, Japan etc.

[28]The WMC also has a TV unit that produces programs (dramas, comedies, documentaries etc) with an edutainment approach but this is broadcast through other television broadcast platforms (such as TV3).

[29]See WMC (2004), WMC (2008), WMC (2009a) and WMC (2009b).

station on women's status and children's education.

3.1 Coverage Expansion across Time and Space

To map out the radio coverage for each transmitter, I use data provided from the WMC about each transmitter's location and technical parameters such as longitude and latitude, transmitter height above ground (m), transmission power (W), frequency (MHz), antenna gain (dBi) and polarization. The coverage maps are then created in COVWEB, which is a free web based application created by the Communications Research Centre Canada (CRC).[30] COVWEB calculates the coverage for a single transmitter using the ITM (Irregular Terrain Model) propagation prediction model, developed by the US Institute for Telecommunications Science, which is a modified version of the Longley-Rice standard model that predicts long-term median transmission loss over irregular terrain relative to free-space transmission loss.[31] The ITM model assumes that the strength of electromagnetic signals declines proportionally with the inverse square of the distance between the transmitting and receiving location in the absence of mountains. However, if a mountain blocks the signal's path the signal pattern becomes more complex as it can diffract around and between mountains depending on its frequency (the diffraction is higher the lower the frequency). Areas with direct line-of-sight to the transmitter have the strongest signal. This model has nowadays been adopted as a standard to predict radio coverage for commercial use as it is accurate over a wide range of frequencies and over various distances. Information about the surface refractivity (N-units), dielectric constant of ground, conductivity of ground (Siemens/m) and climatic zone are also necessary parameters to take into account when using the model. By integrating the model with a software, such as the ArcGIS, a detailed profile of path with predicted signal strength can be created using additional topographic information.

Figure 1 illustrates the expansion in coverage prediction of the transmitter in Phnom Penh from 1999 to 2001, Figure 2 illustrates the expansion in coverage prediction of Kampong Thom station from 2000 to 2006 and Figure 3 shows the prediction from Svay Rieng in 2001 (hereafter called PP1999, PP2001, KT2000, KT2006 and SR2001). The transmitter location is marked with a red triangle and the radio coverage is predicted from its location. The red color closest to the transmitter location (the triangles) indicate a strong radio signal (75-100 dBV/m), signal 1. The next signal level is marked with pink color on the map which indicates a medium strong signal (60-75

[30] CRC is the governments primary research lab for communications technologies in Canada.

[31] See Hufford (1995), Chamberlin and Luebbers (1982) and Longley (1968).

dBV/m), signal 2. In these signal levels or area covered, the radio receiver (at the ground level) is able to easily tune in to the specific frequency with clarity and with no interference from any other radio broadcasts. The simplest radio set can be tuned in at these signal levels. The third signal level is the outer area, marked with blue color, indicating a medium/weak signal (45-60 dBV/m), signal 3. In this area, one can still comfortably listen to the specific frequency but with some static noise and a little interference from other radio broadcasts. At the lowest signal levels around 45 dBV/m, only the radios with high sensitivity are able to pick up the signals (typically higher quality radio receivers). Any signal level below 45 dBV/m (not marked on the map), is highly affected by the atmospheric and terrain conditions and is hence unreliable and very weak.

The coverage prediction maps are then imported into a software called ArcGIS which is a system of software products for working with maps and geographical information (GIS).[32] Integrating the coverage prediction with ArcGIS, I can conduct an analysis with other geographic information, creating new maps and analyze mapped information. The right hand side of Figure 4 shows an administrative map over Cambodia with district boundaries combined with GIS information from the DHS for each cluster village (the white dots on the map) and the left hand side of Figure 4 is a topology map combined with DHS clusters.

To continue analyzing the impact of Women's Station FM 102 on women's status, it is important to understand the determinants of the transmitters' placements. Based on an interview conducted by the author in January 2011 in Phnom Penh with the communications specialist at the WMC, the placement of radio transmitters was not random. The availability of electricity was one of the fundamental determinants to place the transmitters at their current locations. For example, the transmitter in Phnom Penh has its own generators at daytime but at nighttime it uses the government electricity providers to supply the station with electricity. [33] The other fundamental part of the decision was the operational costs which include expenses for office rental, staffs, equipments, technicians, transportation etc. According to the communications specialist at the WMC, the placement of the radio transmitters was not demand-driven at all. Although ideal in principle for targeting the audience, placing the radio transmitters according to demand would be an impossible task given their budget constraints. Overall, based

[32]www.esri.com

[33]The reason for using the government providers during the night time is that they had major issues with their own generators as the electricity was often cut off. During the day time they are able to monitor their own generators which is more difficult and expensive during the night time.

on the qualitative analysis from the interview the placement of the radio antennas is largely driven by the operational cost for the WMC, rather than demand-driven.

4 Data and Samples

The data used in this paper are mainly from the Cambodian Demographic and Health Surveys 2000 and 2005 (hereafter DHS 2000 and 2005), conducted by the National Institute of Statistics (NIS), and include information on demography, family planning, maternal mortality, infant and child mortality, domestic violence, womens status and health related information such as breastfeeding, antenatal care, children immunization, childhood diseases, and HIV/AIDS. The DHS 2000 is the first standard DHS conducted in Cambodia and was carried out over a six-month period, from February to July 2000. It has a stratified sample based on the 1998 Cambodia General Population Census and consists of 600 villages selected with probability proportional to the number of households within the village. The stratification was achieved by separating every reporting domain into urban and rural areas and the sample was selected independently in every stratum. The DHS 2005 is the second DHS survey conducted in Cambodia and uses the same methodology as its predecessor.[34] The data collection of DHS 2005 was conducted from 9 September 2005 to 7 March 2006. Both surveys are based on a nationally representative sample across all 24 provinces in the country. The DHS 2000 interviewed 15,351 women aged 15-49 in 12,236 households and the DHS 2005 interviewed 16,823 women and 6,731 men aged 15-49 in 14,243 households. The womens status module was implemented in one-fourth of the households included in these samples, a subsample of all eligible women (aged 15-49) yielding a total of 3,771 and 4,174 completed interviews for the DHS 2000 and DHS 2005, respectively.

The outcome variables from the DHS surveys used in this paper are at the individual level. They include an indicator of son preference (Sonpref), the number of situations in which wife beating is justified (Wifebeat), the number of husband-wife and households decisions where the woman respondent has the final say (FinalSay), an indicator of having the sole final say in the decision about children's schooling (FS_Sch) and an indicator of attending school (SchAtt).

The whole survey is considered in the analysis with the exception of observations with missing values or answers such as "don't know" or "decision not made/not applicable" in either the dependent variables or in any of the

[34]See DHS (2001) and DHS (2006).

control variables (explained and defined in later section) as these are dropped in the regression analysis. I also exclude observations when I do not know whether they are exposed to the radio signals or not. Such observations include visitors or individuals that have given an incomplete answer to whether they are visitors or not (80 and 153 observations in DHS 2000 and DHS 2005, respectively) and are dropped from the analysis as they could potentially be visitor to the household for just one day, the survey day, and live in an unexposed area leading to an underestimation of the effect. Nine villages (310 observations) from DHS 2005 that lack geographical information about their location are also excluded since without this information I am unable to identify whether they are exposed or not.[35] Moreover, observations that are within coverage area from PP1999 station (see map on right-hand side in Figure 1, concerning 1,303 observations from DHS 2000 and 1,394 from DHS 2005) are also dropped as these individuals are exposed to radio signals in both surveys (i.e. both before and after) as well as 23 and 30 villages (or 755 and 853 observations) from DHS 2000 and DHS 2005, respectively, that are located just at the boarder of having coverage or not, i.e. they are located in communes with semi-coverage.

These semi-covered communes are further excluded in the school enrollment panel since the identification of being an exposed school is made at the commune level, which is the lowest possible administrative level. Since the school data is lacking the GIS (latitude and longitude) information, the identification of an exposed school is thus made by mapping each commune as either non-covered, semi-covered or fully-covered using provincial administrative commune boundaries maps in ArcGIS (digitalized by the author) together with the coverage prediction maps. Any school within a fully-covered commune is then defined as an exposed school and any school within a non-covered commune is defined as a non-exposed school. Hence, excluding schools in semi-covered communes is necessary to minimize potential biases where you have under- (or over) estimates of the true effect.

An additional sample restriction is to only include individuals that are aged 18 or above, i.e excluding children, when analyzing the impact on women's status; and to only include children aged 6-12 when analyzing the impact on primary school attendance. Furthermore, as the FinalSay variable is based on the FS_Sch variable and the survey question defining the latter variable is only addressed to women with children, these samples only include married women with children (1,787 and 1,748 observations from DHS 2000 and 2005, respectively). The inclusion of only married women, i.e. ex-

[35] This is however not a restriction in the DHS 2000 as the geographical information is complete in this survey.

cluding widows and single mothers, is important as I want to estimate the women's probability to have the sole final say in schooling decisions about their children in relation to that of their living husband.

The sample size is different depending on which dependent variable is analyzed due to these necessary restrictions. Table 2 shows that the number of observations used in the analysis with Sonpref as the dependent variable is 10,865 and 11,820 (or 71% and 70% of all women interviewed) from DHS 2000 and 2005, respectively. The other three variables Wifebeat, FinalSay and FS_Sch are part of the women's status module and only include a subsample of women aged 15-49 that are eligible for the women's status module. The number of observations used for Wifebeat analysis is 2,774 and 3,016 from DHS 2000 and 2005, respectively. The last DHS variable SchAtt is taken from the household recode containing information about schooling on all children in the household aged 6-12. The sample size for this variable is 8,367 and 9,774 observations for DHS 2000 and DHS 2005, respectively.

In addition to the outcome variables from the DHS survey, school (gross) enrollment data is used to verify the effect on children's schooling at the school level. This second dataset is provided by the Education Management Information System (EMIS) for school years 1999/00, 2001/02, 2002/03 and 2003/04, covering 8,443 public schools of which 5,250 are primary schools. It is collected by the Ministry of Education, Youth and Sports (MoEYS) who annually distributes school census forms to all schools in Cambodia. Since each census has information on previous school year's enrollment, I can construct a balanced panel from 1999/00 to 2003/04 where enrollment figures of 2000/01 are imputed from the 2001/02 census of previous enrollment figures. In sum, there are 5,180 primary schools across 5 school years leading to 25,900 observations in this sample, all summarized in Table 5, excluding schools in semi-covered communes as well as schools that are within coverage area from PP1999 station.[36] Moreover, in a falsification test I use a school census from year 1998/1999 that contains information about grade 1-6 for 5,086 schools of which 5,067 are used in the analysis, excluding the semi-coverage communes.

Tables 3 and 4 present the summary statistics for the control variables. The elevation is measured as the height above a fixed reference point of the Earth's sea level in kilometers provided from Shuttle Radar Topography Mission. The topographic slope, or percent gradient, describes the steepness of the topological location of a DHS cluster[37] - a higher slope value indicates a steeper incline.[38] It is computed in ArcGIS using the change in elevation

[36]Observations in the table refers to the number of schools, not pupils.

[37]One cluster in DHS is a village.

[38]Slope can also be represented in degrees. A 100 percent slope has a 45 degree slope

of the target raster cell, a DHS cluster, to its neighboring cells in the digital topographic map. Other geographic village-level control variables include the distance from each DHS cluster to the nearest WMC transmitter and the distance from each DHS cluster to the nearest Province Capital. Data information about the former is provided by the WMC and the latter is based on GIS information about each of the 24 province capitals. The individual or household control variables, including a dummy for living in urban areas, a dummy for whether the household have electricity, dummies for household's wealth quintiles, respondent's age and years of education, are provided by the DHS.

5 Empirical Strategy

5.1 Cross-Section Identification

To identify the impact of exposure to radio edutainment information on women's status and children's school attendance, two empirical strategies are applied. The first one uses a cross-section of individual data from the DHS 2005 to exploit plausible exogenous variation in over-the-air signal strength between radio transmitters and villages within a district. The idea is that the mountains in Cambodia and in particular the Cardamom Mountain range in the south west of Cambodia with the highest elevation at Phnom Aural, create variation in the radio coverage that is unrelated to other village characteristics that might affect women's status and school enrollment of children. The identification hinges on the assumption that the radio coverage is orthogonal to, i.e. uncorrelated with, the chosen dependent variables *before* the exposure to WMC radio signals. A similar approach is found in Olken (2009), who compares villages that, within the same district, are exposed or not exposed to the television and radio signal.[39]

Table 7 illustrates this empirically where the dependent variable in Panel A, using DHS 2000 data, is defined as the radio coverage from the KT2000, PP2001 and SR2001 transmitters and that in Panel B, using DHS 2005 data, is defined as the radio coverage from KT2006. Both panels in this table are estimated at the individual level with each of Sonpref, Wifebeat, FinalSay, FS_Sch and SchAtt as the independent variables. The estimates show that the indicators for women's status and children's schooling, observed before

and an increasingly vertical line (90 degrees) has a percentage slope approaching infinity while an decreasingly horizontal line (0 degrees) has a percentage slope close to zero.

[39]Figure 2, page 26 in Olken (2009) which is modified from Ellington et al. (1980) shows a nice illustration of the physics of broadcasting.

the exposure, did not imply a significant higher probability to receive radio coverage a few years later. As the KT2000 transmitter actually was on air during the second half of year 2000 and that the DHS 2000 is surveyed from January to July 2000, I do not have to worry that individuals exposed to the KT2000 actually were exposed during the collection of DHS 2000.

A potential problem is that the coverage of a specific village within the reach of the transmitter could be correlated with a number of factors that determines women's status and children's schooling. For example, Figure 5 shows that the share of individuals listening to the radio at least once a week or every day is highest in coverage areas with the highest signal 1 which is nearest to the transmitter. This does not necessarily suggest that the radio exposure to the FM 102 itself induced more radio listening. Rather that individuals within a closer distance to the radio station tend to listen to radio more often compared to individuals located further away from the larger cites, or the fact that the radio station is located in the suburbs of major big cities such as Phnom Penh and Kampong Thom. This would be a source of omitted variable bias. In order to avoid it, I control for the distance to the transmitting WMC radio location as well as the distance to the nearest major city such as the province capital.

Geographic factors such as the elevation and slope might also be problematic if they are correlated with the radio coverage and at the same time determine the outcome variables. For example, there might be systematically differences in the women's status for women in mountain areas than for the women in the surrounding lowland areas. In an attempt to empirically investigate which factors could have determined the radio coverage, Table 6 shows that the only relevant factor for a village, before the exposure, to receive coverage a few years later is its distance from the nearest WMC transmitter. The shorter the distance from the transmitter the higher probability to have radio coverage. However, the radio coverage also significantly correlates with the distance from the DHS cluster to the nearest province capital and the elevation of each DHS cluster. This indicates that the geographic control variables are relevant and should be added into the specification.

The empirical model for the first strategy is estimated at the individual level using OLS regression with adjusted standard errors clustered at the village level:

$$w_{ivd} = \beta C_{vd} + X_{ivd}\gamma + G_{vd}\delta + \zeta_d + \mu_m + \epsilon_{ivd} \tag{1}$$

where the dependent variable w_{ivd} is one of the outcome variables Sonpref, Wifebeat, FinalSay, FS_Sch or SchAtt, as defined in the previous section, for individual i in village v of district d. The radio coverage from the KT2000,

PP2001 and SR2001 transmitters is denoted C_{vd} and measured at the village level for each district, X_{ivd} is a vector of individual or household control variables including a dummy for living in urban areas, a dummy for whether the household has electricity, dummies for household's wealth quintiles, respondent's age and years of education, G_{vd} is a vector of geographical control variables measured at the village level and includes the elevation (per thousand meters), the slope (percent), distance to the nearest WMC transmitter, distance to nearest province capital. In all the specifications in this paper, there are district-level fixed effects ζ_d to account for district characteristics that might determine the radio exposure as well as month fixed effects μ_m to account for seasonality factors such as dry and wet seasons, school holidays, winter and summer terms etc that might affect children's schooling as well as labor market outcomes which in turn might affect the women's status. Throughout the analysis using the DHS data, the standard errors are clustered at the village level since the variation in radio exposure is mapped out at that level.

The data used to estimate this specification is taken from the DHS 2005, thus all individuals in coverage areas have been exposed to the radio signals since year 2000-2001, i.e. 4-5 years of exposure, compared to individuals in non-coverage areas who have never been exposed to the radio signals. I also conduct placebo regressions using the same specification (1) but with data from DHS 2000 where all individuals in coverage areas have not yet been exposed to the radio signals. From the placebo regressions, I expect to find no effect of the radio coverage on the outcomes.

Although the placement of the WMC's transmitters was not random, it seems unlikely that the radio coverage within a district given its distance to a WMC transmitter and to a major city, as well as given a number of control variables already stated in the specification would still be systematically correlated with some other unexplained factor that determine the outcome. Even if the endogeneity of the placement might not be a concern for this strategy another concern remains which is that there exist no information about the actual transmission pattern in order to compare how accurately the model of signal transmission predicts the actual radio reception. Showing the prediction map to the staff at the WMC during the field survey, they did indeed acknowledge that the coverage map seemed accurate but this can however not be quantitatively verified.

5.2 Across Time and Space Identification

The second strategy exploits the variation across time and geographical location in exposure to the radio channel by comparing individuals in villages

within a district that are and are not exposed, as well as before and after the exposure, to the radio signals. In a similar manner as with the first strategy, I estimate an OLS regression using district fixed effects with clustered standard errors at the village level and the same set of individual and geographical controls. The equation model for the second strategy is as follows:

$$w_{ivdt} = \alpha C_{vdt} P_{vdt} + \beta C_{vd} + X_{ivdt}\gamma + G_{vdt}\delta + \zeta_d + \eta_t + \mu_m + \epsilon_{ivdt} \qquad (2)$$

where t=2000,2005 denote the time of the DHS survey and the radio coverage C_{vdt} in village v of district d in time t is interacted with a post P indicator which is a dummy for post intervention, i.e. after exposure. The coefficient α can be thus interpreted as a difference-in-difference estimate where treatment is exposure to the radio signals. In addition to district fixed effects controlling for time-invariant regional characteristics that might influence the outcome, month fixed effects controlling for time-variant monthly factors that might affect the outcome, geographical and individual factors as described under specification (1), the vector X_{ivdt} in specification (2) and (3) also includes an interaction term between the post indicator P_{vdt} and a dummy for living in urban areas to account for any differential trends in the outcome by urban and rural individuals. For example, as the transmitters are placed in the suburbs of the major cities of Cambodia as shown by the coverage maps in Figure 1 - 3 one might suspect that it is some urban area characteristics driving the results. The interaction term thus allows each year to differ in the outcome by urban and rural areas.

The impact of the intervention on the outcome is estimated by computing the double difference, over time (before-after) and across subjects (between individuals in covered areas and individuals in non-coverage areas). The validity of this strategy depends on a crucial assumption: that in the absence of radio exposure, the trend in the outcomes of villagers (or schools when analyzing the school enrollment with school level data) in coverage areas would have been similar, or parallel, to that of the villagers (or schools) in non-coverage areas. One would need data on outcome for the pre-intervention time period to directly test the hypothesis that the growth paths were the same in the two groups in the absence of intervention. However, with this limited dataset consisting only of two pooled cross-section (one before and one after) it is not possible to verify that the outcome progressed in a similar manner between the two groups before the intervention.

Alternatively when lacking enough pre-intervention data on the outcome to directly test the parallel trend assumption is to estimate whether the future radio coverage has an impact on the outcome variables, a technique

which has been used before by, for example, La Ferrara et al. (2008), Jensen and Oster (2007) and Oster and Millett (2010). If we are concerned with the possibility that the results are driven by time-variant unobservable factors which influence both the placement of the transmitters and the outcome, and whether the outcome is progressing faster in coverage areas than in non-coverage areas, we could address these issues by introducing a dummy for future coverage F_{vdt} in village v of district d in year t in the following specification:

$$w_{ivdt} = \alpha C_{vdt} P_{vdt} + \theta F_{vdt} + \beta C_{vd} + X_{ivdt}\gamma + G_{vdt}\delta + \zeta_d + \eta_t + \mu_m + \epsilon_{ivdt} \quad (3)$$

Apart from adding this future coverage dummy defined as one for villages exposed to the signals of the KT2006 transmitter and zero else, specification (3) is identical to (2) with identical controls including the interaction term between post indicator and a dummy for living in urban areas. If the concern is true, a positive θ coefficient would indicate that individuals who will become exposed in 2006 have relative faster improvement in status and school attendance between 2000 and 2005. This would be an indication that the transmitters were placed in areas such that the outcome in coverage areas are progressing faster and thus the parallel trend assumption is invalid. Albeit not perfect, an insignificant θ would be an indication of the validity of this strategy.

The analysis of the children outcome is complemented using the school-level data, a balanced panel with school fixed effects dating from 1999/00 up to 2003/04 school year. The following equation is estimated:

$$ln(enrol)_{st} = \sum_{t=2001}^{2003} \beta_t C_{st} Y_{st} + \zeta_s + \eta_t + \epsilon_{st} \quad (4)$$

where $\ln(\text{enrol})_{st}$ is the log of enrollment in school s at time t=1999, 2000, 2001, 2002, 2003, representing the beginning of each school year, C_{st} is the radio coverage dummy for each school s in time t, Y_{st} is a year dummy for each school observation s in time t, ζ_s is a vector of school fixed effects and η_t is a vector of year fixed effects. The radio coverage C_{st} in school s in time t is interacted with a year dummy and the coefficient $\beta_t$is the FE within-school estimator for 2001 and each year after exposure, respectively. The reference is thus the average log enrollment in years t=1999 and t=2000, i.e. before exposure. As household's enrollment decision is in most cased made at the beginning of the school year, I expect any effect of radio exposure on school enrollment to happen with some lag and probably not in the same period as they become exposed to the radio. This implies that I expect β_t to be

insignificant in t=2001 and then increasing with t. Even if the specification includes school fixed effects controlling for school characteristics that are constant over time, such as the distance from school to the transmitter, the location of the school etc, and year fixed effects controlling for factors that are constant across schools but vary over time such as inflation etc, it is still a concern if schools in the coverage areas are progressing faster than schools in non-coverage areas. In such case, the coefficients would capture simply different time trends and not the effect of radio exposure per se.

This is the advantage of using the school data where I have several years of observations before radio exposure. Figure 6 illustrates the hypothesis that the growth path is the same in two sets of schools in the absence of intervention. It shows that the average log enrollment of a school in a coverage area, within a district, is slightly below that of a school in a non-coverage area during the 1998-2001 period but after the intervention in 2001 the log enrollment of schools in coverage areas increases at a faster rate than those in non-coverage areas. Each estimate is conducted from a district fixed effect regression for each year using log enrollment as the dependent variable and standard errors clustered at the district level. The trend is clearly parallel during the pre-intervention period and starts to diverge after the intervention illustrating the validity of this identification. To formally test this hypothesis in a regression, I re-estimate equation (4) but add an interaction between F_{st} which is a dummy for future coverage, i.e. equal to 1 for schools that will be exposed in year 2006 (KT2006), and a year dummy Y_{st} for school s in time t:

$$ln(enrol)_{st} = \sum_{t=2001}^{2003} [\beta_t C_{st} Y_{st} + \theta_t F_{st} Y_{st}] + \zeta_s + \eta_t + \epsilon_{st} \qquad (5)$$

The coefficient θ_t is expected to be insignificant for all t suggesting that the identification is valid. For the final placebo tests, I run specification (1) and (4) on pre-intervention data for the DHS and school data, respectively.

6 Results

6.1 Impact on Womens's Status and School Attendance

The results based on the DHS dataset using the cross section identification is presented in Table 8 where columns (1) to (4) represent the women's status results (Sonpref, Wifebeat, FinalSay, FS_Sch) and column (5) the school

attendance results (SchAtt). Panel A of the table shows a placebo regression on the five outcome variables using DSH 2000, i.e before the exposure of the radio signals from all the transmitters. The estimates of specification (1) on pre-exposure data are insignificant for all the outcomes, as expected. In panel B, the estimates of the same specification but on post-exposure data, i.e. DHS 2005, are significant and have the expected sign for three of the outcome variables, while are insignificant for Sonpref and Wifebeat as outcomes. The hypothesis that the radio exposure of Women's Station FM 102 will affect son preference and attitudes towards domestic violence is rejected here. Other results show that being exposed to the radio signals of the Women's Station FM 102 is associated with a 0.987 increase in the number of situations in which a married woman with children has the sole final say in a number of household decisions and a 26.6 percentage points higher probability to have the final say in decisions regarding the children's schooling compared to women in non-exposed areas. Reference figures for these effects are the average means from the non-exposed areas showed by Table 4, i.e. without exposure a married woman with children has a final say in on average 2.26 situation and the average share of married women with children having a final say in schooling decisions is 6.64 percent. The last column shows that a child aged 6-12 in exposed area has on average a 11.7 percentage points higher probability to attend school relative to a child of the same age in a non-exposed area.

These effects are quite large but using an additional variation (across time) would probably yield more precise estimates. Given the district fixed effects, the only variation left is within the districts at the frontier of the coverage and non-coverage areas (see Figure 1 - 3) when using the cross section approach. If there are insufficient variation within the district at a given point in time in these outcome variables, one can use this additional variation such that the variation becomes across time and space, to see whether the estimates are robust and produce similar results. In fact, we will see that the estimates become much lower when turning to the difference-in-difference results. Since this approach both take into account more data and more variation, yielding estimations with more precision, I will focusing on that approach in the remainder of the paper.

Table 9 presents the district fixed effect estimates from specification (2), without and with controls in Panel A.I and Panel A.II, respectively. Panel B runs the specification (3) with all control variables and district fixed effects but adding the future coverage as a test for pre-trends. In contrast to previous cross-section results, I find significant effect of radio exposure on all outcome variables and there are small changes in the difference-in-difference estimate. When adding the individual and geographical control variables, the estimates

do not change much. Even when adding the future coverage variable in Panel B, the estimates do not change much and the coefficient of the future coverage dummy is insignificant confirming the hypothesis of equal growth path in the outcomes. The direction of the effect is as expected when interpreting the estimates from Panel A.II: exposure to FM 102 radio leads to a 1.1 percentage points lower share of desired sons in the households (or a decrease of 2.35 percent from the control mean of 47.8 percent), a 0.296 decrease in the number of situations in which wife beating is justified (or a decrease of 29.0 percent from the control mean of 1.318), a 0.461 increase in the number of situations of having the sole final say (or an increase of 16.9 percent from the control mean of 2.263) and a 5.6 percentage points higher probability for having the sole final say in children's schooling decision (or an increase of 44.6 percent from the control mean of 6.64) relative to that of the control group, i.e. women in non-exposed areas. Lastly, the probability to attend school is 6 percentage points higher for children aged 6-12 (or an increase of 7.4 percent from the control mean of 75.4 percent) in exposed areas relative to children aged 6-12 in non-exposed areas.

6.1.1 Heterogeneous Impact

Table 10 investigates the impact of radio edutainment exposure on school attendance by gender and age using specification (2). Both Panel A and Panel B divide the sample into a subsample of girls (column 2) and a subsample of boys (column 3). The former panel is based on a sample of children aged 6-12 while the latter panel is based on a sample of older children, aged 13-17. I find that both girls and boys in primary school age have on average a 5 and 7 percentage points higher probability to attend school when located in a coverage area compared with children in primary school age located in non-coverage area, respectively. There is no significant difference in the effect between the genders and both have quite similar level in the control areas i.e. girls and boys have on average 6.2 and 8.6 percent higher probability to attend school compared with the control means of 76.3 and 74.4 percent, respectively. However, I do not find any significant effect on older children. Given that one of the major goals of the WMC is to educate the public about children's right to schooling as well as to inform them about issues related to the drop-out rate in Cambodia, these results suggest that the Women's Station FM 102 has a direct impact on both younger girls and boys. Additionally, some of these estimated effects might also reflect improvements in the women's status itself.

An interesting part is therefore the mechanism behind the effect: how much of the effect was actually caused on account of increased status of the

mothers or caused by changed attitudes of both parents in the household after listening to the Women's Station FM 102. Using a similar specification as in Table 11, I interact the difference-in-difference estimator Coverage*Year2005 with mutually exclusive evens of the FS_Sch categorical variable to estimate the total treatment effect of each event on children's school attendance.[40] I find that children in treatment areas, after the exposure, living in a household where the woman has the sole final say in schooling decisions do not have a significant higher probability to attend school compared to children in households where women do not has the sole final say in these decisions. However, these estimations are based on a much smaller sample[41], if compared with that of column 1, Panel A of table 10, leaving much of the effect on school attendance unexplored in terms of finding the mechanism behind it. I will therefore leave this investigation to future research, and try not to separate these two effects in this paper.

To see whether radio is a pro-poor tool reaching the most marginalized individuals, I interact the difference-in-difference estimator Coverage*Year2005 with indicators of household income quintiles. The results presented in Table 11 are based on the same sample as in Panel A of Table 9 where q1 is a dummy for a household that belongs to the poorest income quintile and q5 is a dummy for a household that belongs to the richest income quintile. I find an impact on the poorest quintile, except on attitudes towards wife beating and son preference.

6.1.2 Robustness Checks

To rule out any selective movements of individuals between exposed and non-exposed villages after the time of exposure that could be driving the results, a robustness check is carried out and presented in Table12. However, the DHS data include only information about how long an individual has lived in their place of residence but lacks information about where and which village they have moved from. This limitation implies that I cannot observe whether individuals have switched "treatment" assignment between the survey years. I therefore re-estimate specification (2) on a subset of individuals who have reported that they have lived at least 5 years in the place of residence to investigate how the estimates change. Compared with Panel A.II of Table 9, the difference-in-difference estimates do not change much showing that the scope for bias due to selective mobility between villages is small. The ones that are notably smaller in magnitude and less significant include the effect

[40] Results are not shown here, but available upon request.

[41] The indicator for final say in schooling decisions, FS_Sch, is only available for 3,535 observations.

on the number of situations that married women has the sole final say and the probability that they have the final say in schooling decisions.

Since the coverage areas are around major cities, one concern would be that it is some characteristics typical for urban areas that are driving the results and not the radio exposure per se. To prove that this is not the case, Table 13 which runs specification (2) but adding the interaction term Coverage*Year2005*Urban to test for any significant differences between urban and rural areas. The table shows no evidence of significant differences between the areas given treatment, suggesting that it is not the individuals in urban areas driving this. On contrary, most of the effect comes from individuals in rural areas.

Although I think it is very unlikely, I cannot rule out that there are still some unobservable characteristics that are relevant for the outcome variables which have not been considered in this paper. There could still be some important pre-trends in other variables that affect both the coverage and the outcome variables. For example, the exposed areas could have a relative faster improvement in the women's status due to a faster trend in "modernity" as these areas are closer to major big cities compared to non-exposed areas. Controlling for an indicator of "modernity", a dummy for daily television watching, in all the specifications does not change the results.[42]

If individuals in covered areas have a higher probability to watch more televised contents then a related concern would be that it is this indicator for "modernity" that drives the results. The first column of Table 14 investigates this caveat by running the cross-sectional specification (1) while the second column runs the difference-in-difference specification (2). Both specifications are using a binary variable TV that takes the value one if the respondent watches TV almost every day and zero otherwise as the dependent variable. I do no find that the radio exposure increased the daily TV watching. If there had been some other unobserved factors related to increased TV watching such as trends in modernity that are driving the results, some of the effect would have been captured by these estimate. As they are insignificant and small, it is very unlikely that the effect was driven by such factors.

6.2 Impact on School Enrollment

A major threat to the validity of the results is if the transmitters were placed in areas that already had a higher growth path in enrollment, such that the changes we observe are not caused by the intervention and would have happened even in the absence of the intervention. To overcome this major

[42]Not shown here.

concern, Figure 6 illustrates visually that there are no preexisting differential trends in covered and non-covered schools before the intervention. To deal with time-constant unobserved heterogeneity problems, I look at within-school log enrollment, running a specification with school fixed effect on a balanced panel. The quantitative results from estimating specification 4 and 5 are presented in Table 15 where the dependent variable is the natural logarithm of primary enrollment, all grades 1-6 pooled together, and the standard errors are clustered at the school level.

Panel A is a placebo test using schools in coverage and non-coverage areas in school years 1998/99 and 1999/00, i.e. before the exposure to Women's Station FM 102. The school-fixed effect estimates for both girls' and boys' log enrollments are insignificant implying that the change in log enrollment in the absence of intervention was not significantly different between the two areas. The coefficients of Coverage*Year 1999 which are the FE estimates of interest are also small in size reassuring about the identification. Panel B shows the effects of the current coverage (columns 1-3) as described in specification (4) as well as the effect of both the current and future coverage (columns 4-6) as described in specification 5. Consistent with what Figure 6 illustrates, there is no significant effect in year 2001 and the effect is increasing with time. The within-school FE estimate in column (1) indicates that primary enrollment increased with 5.9 percent in coverage areas in 2002 compared with the reference period (i.e. the average change in log enrollment between 1999 and 2000). A year later in 2003 the average increase in enrollment is 7.3 percent higher than the reference period. The effect on the same sample of schools but for girls' enrollment (column 2) and boys' enrollment (column 3) is similar for both genders: about 4-5 percent increase in 2002 and 5-6 percent increase in 2003 compared with the reference period. When adding the Future coverage dummy interacted with year dummies, the FE estimates of interest do not change much (column 4-6 of Table 15) and the coefficients of the Future coverage and year interaction term are, as expected, insignificant.

These results confirm that there has been a significant effect on the schooling of children, consistent to what have been observed when looking at the probability to attend school at the individual level using the DHS. The main difference between these two indicators of schooling is that enrollment figures are reported by the schools themselves i.e. the principal in most cases, and can thus be subject to over-reporting, while the individual school attendance is self-reported by the households.[43] Thus, even when using different identi-

[43]Cheung and Perrotta (2011) stress the importance of considering different measures of school participation as the individual school attendance does not only capture the enrollment but also actual attendance since some children in Cambodia might be unable to enroll due to incomplete school records but still attend school.

fication strategies I find effects on both girls' and boys' schooling suggesting that the results on school participation are fairly robust.

7 Conclusion and Discussion

This paper uses two types of identification strategies to analyze the impact of being exposed to edutainment radio on various indicators of women's status as well as children's school participation. Both strategies show that these radio programs had a significant impact in improving the school attendance of the younger children. The effect is found both looking at individual attendance reports and at school-level enrollment data. The empirical investigation aims at dealing with possible trends in other factors that might drive the results and potential correlation between the outcome variables and the future radio coverage, coming to the conclusion that these issues are not a concern for the identification strategy.

The estimated effect from the school fixed effect results suggest that the enrollment of children in primary school increased, on average, 5.9 percent more the first year and then 7.3 percent more the second year after the exposure to the Women's Station FM 102 compared to the years before exposure. In terms of impact the estimated effect is relatively large. Based on the school census, there were in total 458,863 and 455,710 children enrolled in the coverage areas in 1998 and 1999, respectively. Taking the average of the two and multiplying it with the estimated effects of 5.9 percent and 7.3 percent, respectively, yields an approximate impact of 26,979 more children enrolled in primary school in year 2002 and 33,381 more children enrolled the following year. This can be related to the program impact of, for example, a Cambodian scholarship program in 2004-2006 given to poor girls in 6th grade, which yielded approximately 830 more children in school[44], and a large-scale Cambodian Food-For-Education (FFE) program in 2002-2003 that induced 54,883 more children in school due to the school feeding and deworming program.[45] In addition to its wide reach impact, this paper also showed that the radio station had a significant impact on the school participation for both rural and the poorest households suggesting that radio may also be a pro-poor choice.

However, comparisons between the different interventions should be made with caution as they do not have exactly the same purposes. For example,

[44] Filmer and Schady (2008)

[45] See more details in Cheung and Perrotta (2011). Unfortunately, I am unable to compare the costs of interventions, as I do not have information about the radio station's production cost.

the FFE program does not only promote children's schooling, it also contributes to the nutrition and health of the children as well as to their learning in classrooms. But if the main purpose is to get children into school then, from a policy perspective, using school interventions such as scholarship or school feeding programs may have a much more effective impact if complemented with edutainment radio informing the public about their advantages. If properly designed, edutainment radio could not only enhance and accelerate behavior changes (such as increased investment in children's human capital); they also attempt to promote changes in attitudes and social norms related to human capital investments (such as information about the importance of education as well as the returns to education). Changing such attitudes could therefore promote both a higher school entry rate as well as a lower drop-out rate if the radio station managed to affect the social norms leading to a longer stay in school. Moreover, if attitudes and norms change, the corresponding change in behavior might be sustained over time beyond the duration of the scholarship or school feeding intervention. However, this paper did not investigate the direct changes in attitude towards human capital investments but on the other hand showed that part of the change in schooling-related behavior is driven by deeper changes in attitudes and status of women.

Finally, suggestive evidence indicates that exposure to edutainment radio also had affected gender related attitudes. This is interesting in itself as many women's stations are today starting up with funds from international organizations such as the UN. Compared with the impact on primary school enrollment, the effect was not immediate as households might take the decision on investing in children's human capital the school year after. The impact on enrollment was greatest some two to three years after the exposure to these radio programs. In relation to changing gender related attitudes, convincing households to invest in children's schooling might be an easier task by enlightening the society about the importance of schooling for their future accumulated earnings. But trying to make structural adjustments by changing gender related attitudes in a society that is characterized by a patriarchal system might take a much longer time.

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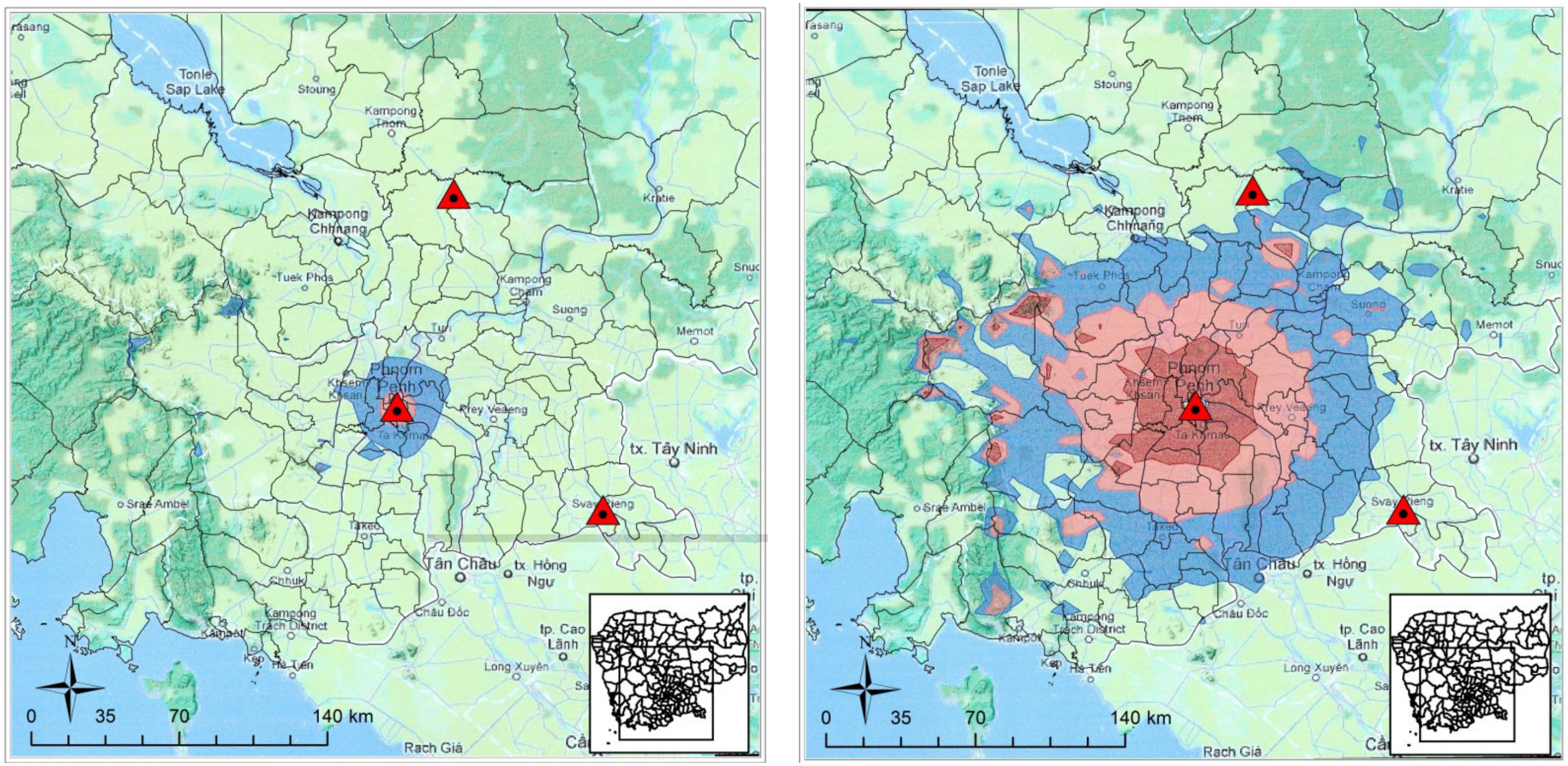
Figure 1: Radio coverage from the Phnom Penh antenna (PP1999 and PP2001)

Coverage from PP1999

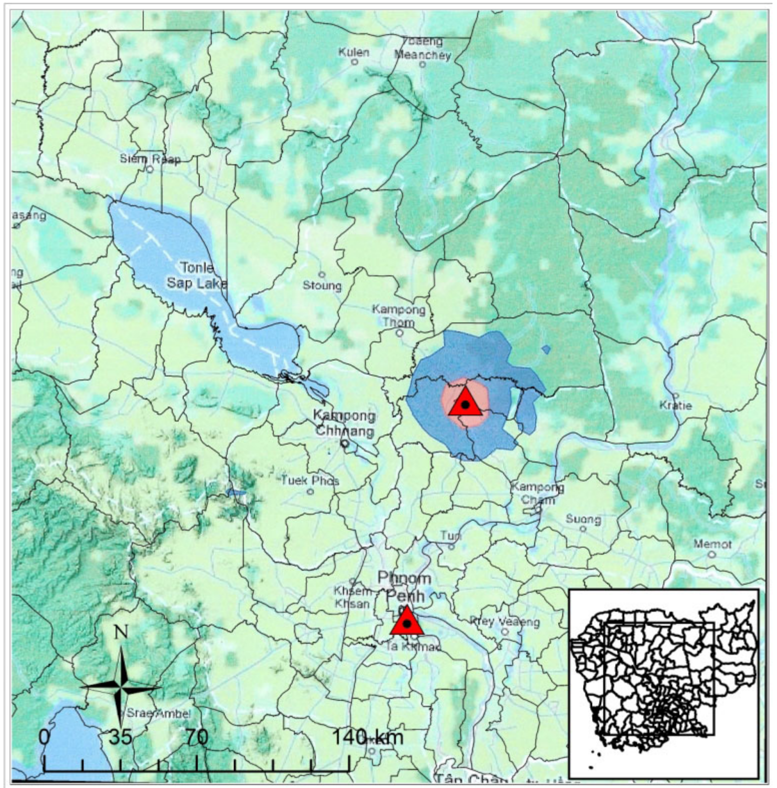
Coverage from PP2001



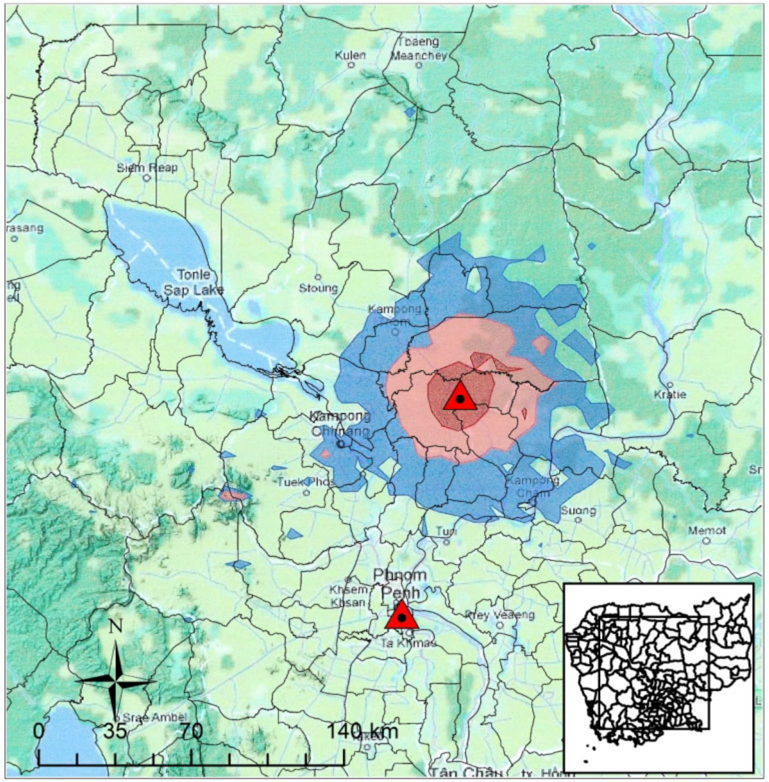
Note: The triangles are the location of the three radio transmitters: KT, PP and SR. Only the coverage from PP2001 is shown here where red color on the map refer to signal 1 (75-100 dBmyV/m), pink refer to signal 2 (60-75 dBmyV/m) and blue refer to signal 3 (45-60 dBmyV/m). Source: The radio coverage is created in CRC-COVLAB and imported in ArcGIS with administrative district boundaries from Global Administrative Unit Layers (GAUL).

Figure 2: Radio coverage from the Kampong Thom antenna (KT2000 and KT2006)

Coverage from KT2000



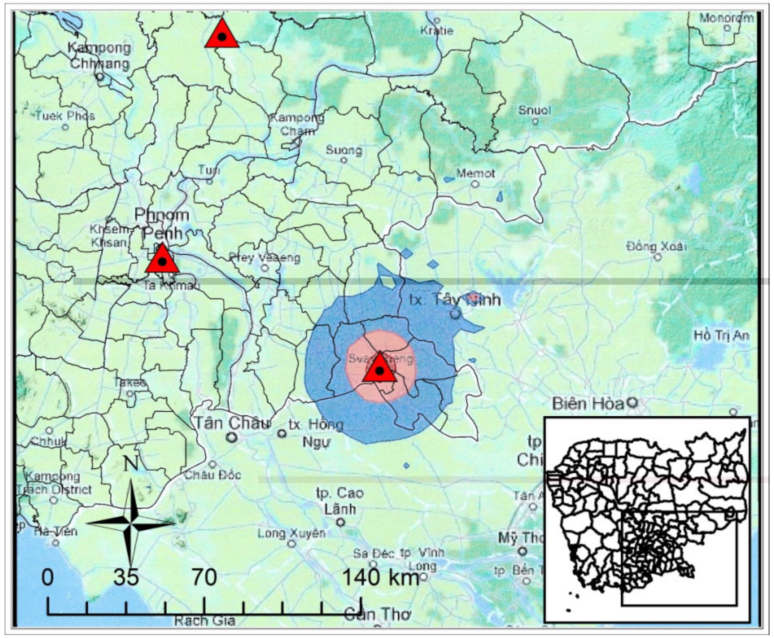
Coverage from KT2006



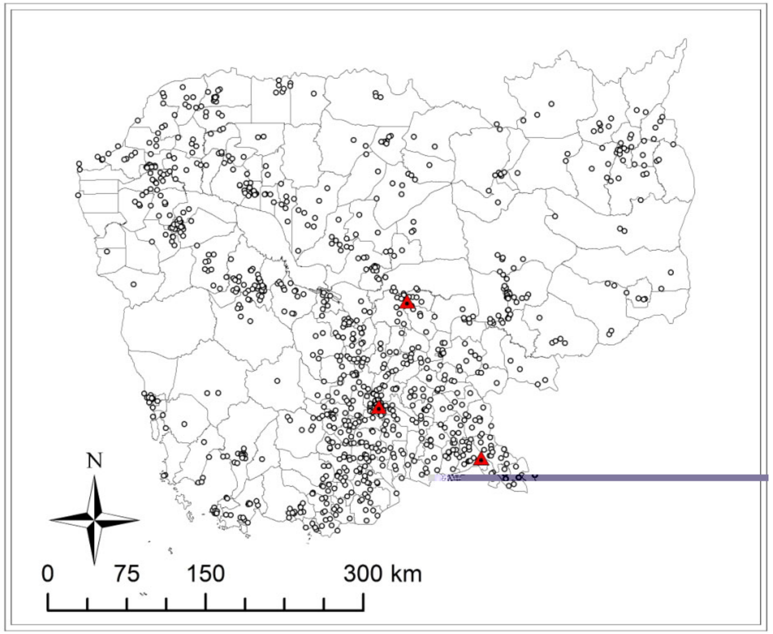
Note: The triangles are the location of the three radio transmitters: KT, PP and SR. Only the coverage from PP2001 is shown here where red color on the map refer to signal 1 (75-100 dBmyV/m), pink refer to signal 2 (60-75 dBmyV/m) and blue refer to signal 3 (45-60 dBmyV/m). Source: The radio coverage is created in CRC-COVLAB and imported in ArcGIS with administrative district boundaries from Global Administrative Unit Layers (GAUL).

Figure 3: Radio coverage from the Svay Rieng antenna (SR2001) and Administrative District Boundaries Map

Coverage from SR2001



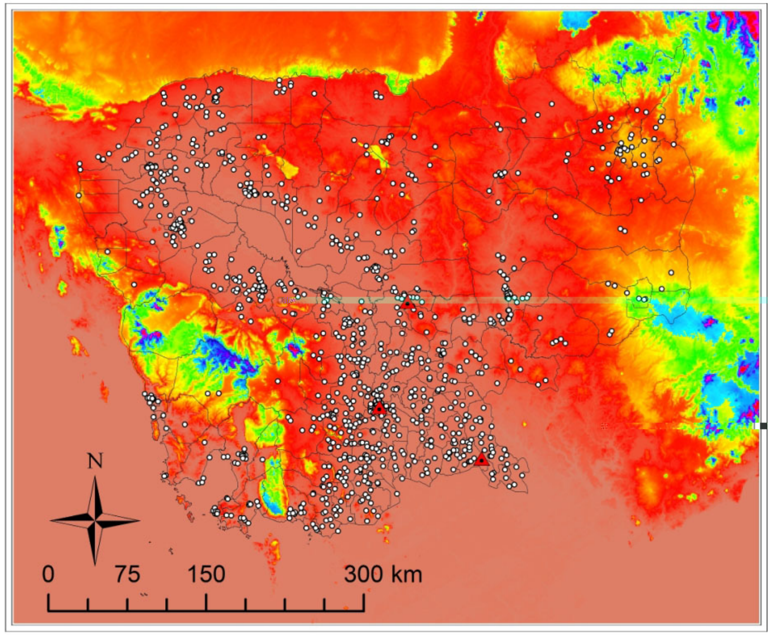
Administrative Boundaries Map



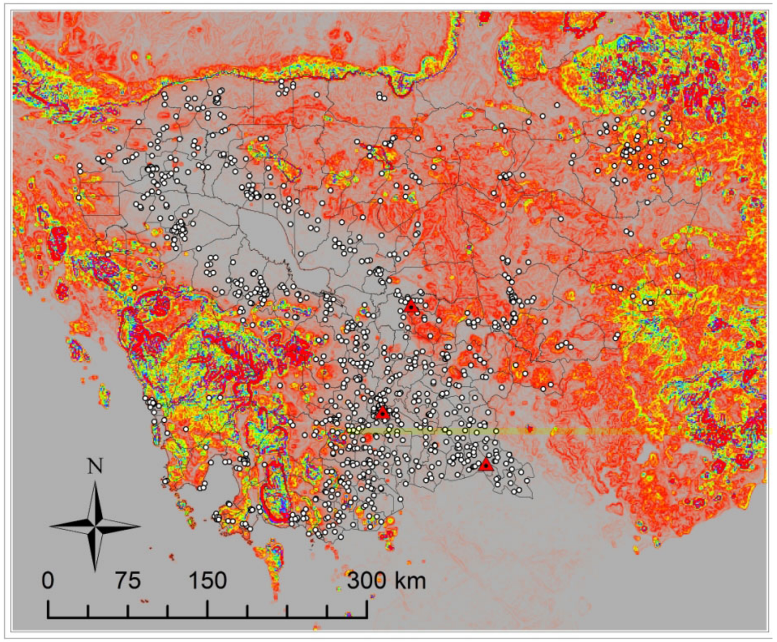
Note: The triangles are the location of the three radio transmitters: KT, PP and SR. Only the coverage from SR2001 is shown here where red color on the map refer to signal 1 (75-100 dBmyV/m), pink refer to signal 2 (60-75 dBmyV/m) and blue refer to signal 3 (45-60 dBmyV/m). Source: The radio coverage is created in CRC-COVLAB and imported in ArcGIS with administrative district boundaries from Global Administrative Unit Layers (GAUL) (left gure). Map from Global Administrative Unit Layers (GAUL) with district boundaries and GPS data from DHS imported to ArcGIS (right gure).

Figure 4: Elevation and slope maps of Cambodia

Elevation

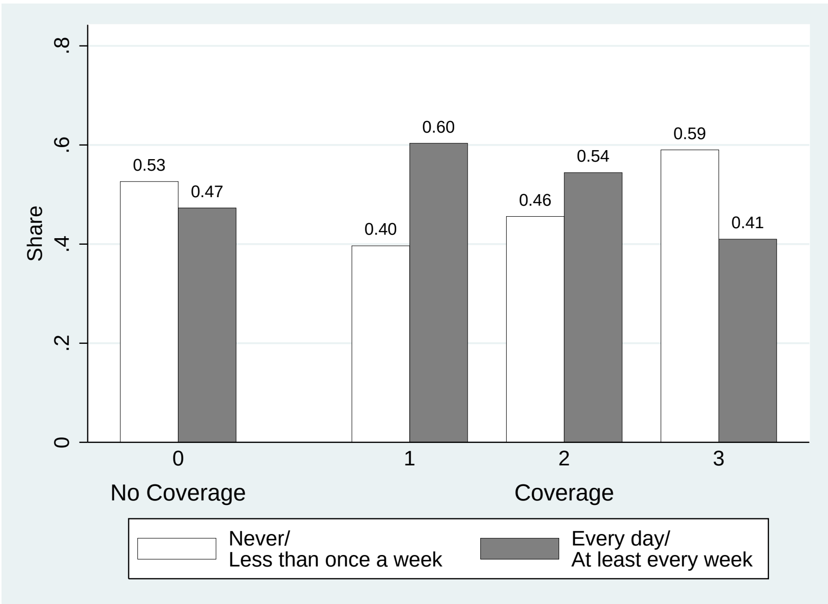


Slope



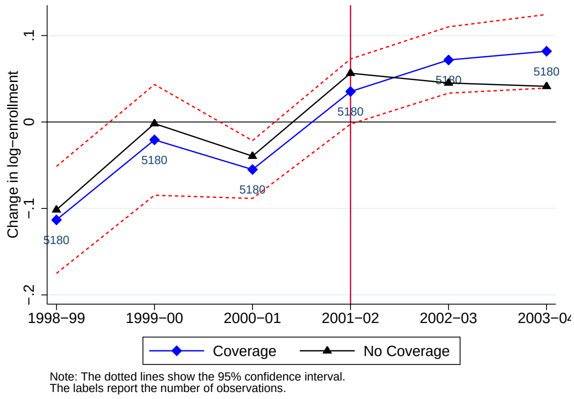
Note: A white dot is a DHS 2005 clusters/village, the triangles are the location of the three radio antennas: KT2000, PP2001 and SR2001. Source: Shuttle Radar Topography Mission and GPS data from DHS.

Figure 5: Pattern of radio listening by the signal strength

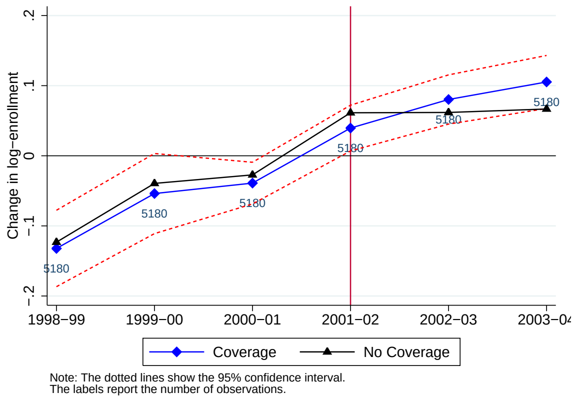


Note: Recoded from DHS 2005, the survey question is \Do you listen to the radio almost every day, at least once a week, less than once a week or not at all?". The number 0 on the x-axis refer to no signal, 1 refer to signal 1, 2 refer to signal 2 and 3 refer to signal 3.

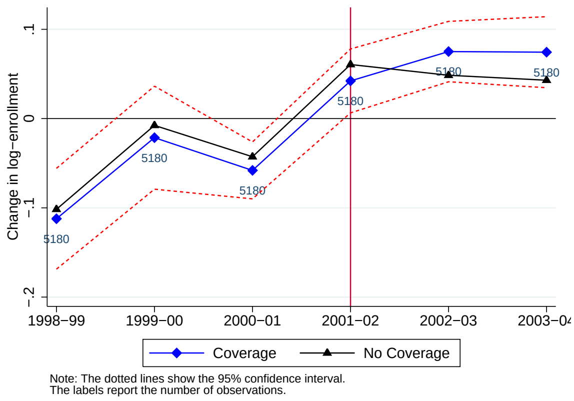
Figure 6: Trends in primary enrollment



(a) All



(b) Girls



(c) Boys

Note: Schools in non coverage areas are never exposed to the radio signals. Each estimate is a cross section regression in that year including district xed e ects. Robust standard errors clustered at the district level. Source: EMIS

Table 1: Defining the outcome variables

	Definition	Recoded from survey question
Sonpref	The desired share of sons in the household	”How many of these children (living children) would you like to be boys, how many would you like to be girls and for how many would the sex not matter?”
Wifebeat	The number of situations in which wife beating is justified	”Sometimes a husband is annoyed or angered by things which his wife does. In your opinion, is a husband justified in hitting or beating his wife in the following situations: a) if she goes out without telling him, b) if she neglects children, c) if she argues with him, d) if she refuses have sex with him, or e) if food is late or not well prepared?”
FinalSay	The number of decisions in which the respondent has a sole final say	”Who in your family usually has the final say on” ... a) making large household purchases?a) making large household purchases, b) making household purchases for daily needs, b) whether you should do work to earn money, c) your own health care, d) whether to use contraceptions, visits to family, friends, or relatives, e) any decisions about children’s schooling and f) deciding what to do with money husband earns?
FS_Sch	A dummy for having the sole final say in decisions about children’s schooling	”Who in your family usually has the final say on any decisions about children’s schooling?”
SchAtt	A dummy if a child aged 6-12 is attending school	”Did (NAME) attend school at any time during the previous school year?”

Table 2: Summary statistics for the dependent variables

(a) Before exposure

	mean	sd	min	max	obs
No Coverage					
Sonpref	0.490	0.135	0	1	7014
WifeBeat	0.804	1.336	0	5	1796
FinalSay	2.080	1.890	0	8	1139
FS_Sch	0.105	0.307	0	1	1139
SchAtt	0.826	0.379	0	1	5153
SchAtt_f	0.824	0.381	0	1	2452
SchAtt_m	0.829	0.376	0	1	2702
Coverage					
Sonpref	0.499	0.136	0	1	3851
WifeBeat	1.009	1.377	0	5	978
FinalSay	1.986	1.797	0	8	648
FS_Sch	0.0828	0.276	0	1	648
SchAtt	0.762	0.426	0	1	3214
SchAtt_f	0.771	0.420	0	1	1590
SchAtt_m	0.753	0.432	0	1	1624
Total					
Sonpref	0.494	0.136	0	1	10865
WifeBeat	0.897	1.358	0	5	2774
FinalSay	2.037	1.848	0	8	1787
FS_Sch	0.0949	0.293	0	1	1787
SchAtt	0.796	0.403	0	1	8367
SchAtt_f	0.798	0.401	0	1	4042
SchAtt_m	0.794	0.404	0	1	4326

Note: DHS 2000.

(b) After exposure

	mean	sd	min	max	obs
No Coverage					
Sonpref	0.478	0.133	0	1	8001
WifeBeat	1.318	1.312	0	4	2037
FinalSay	2.263	1.668	0	8	1182
FS_Sch	0.0664	0.249	0	1	1182
SchAtt	0.754	0.431	0	1	6478
SchAtt_f	0.763	0.425	0	1	3256
SchAtt_m	0.744	0.437	0	1	3222
Coverage					
Sonpref	0.477	0.131	0	1	3819
WifeBeat	1.237	1.355	0	4	979
FinalSay	2.626	1.720	0	8	566
FS_Sch	0.0906	0.287	0	1	566
SchAtt	0.780	0.415	0	1	3296
SchAtt_f	0.783	0.412	0	1	1666
SchAtt_m	0.776	0.417	0	1	1630
Total					
Sonpref	0.477	0.132	0	1	11820
WifeBeat	1.279	1.333	0	4	3016
FinalSay	2.438	1.703	0	8	1748
FS_Sch	0.0780	0.268	0	1	1748
SchAtt	0.766	0.423	0	1	9774
SchAtt_f	0.773	0.419	0	1	4922
SchAtt_m	0.760	0.427	0	1	4852

Note: DHS 2005.

Table 3: Summary statistics for the control variables

	mean	sd	min	max	count
No Coverage					
Elevation (1000 m)	0.0305	0.0502	0	0.675	7404
Slope (percent)	0.400	0.829	0	10.32	7404
Distance to nearest WMC transmitter (km)	147.8	81.11	1.201	328.6	7404
Distance to nearest Province Capital (km)	28.56	22.45	0.357	105.2	7404
Urban areas (0/1)	0.245	0.430	0	1	7404
Dummy for having electricity (0/1)	0.229	0.420	0	1	7404
Age	31.76	9.036	18	49	7404
Years of education	2.124	1.962	0	6	7404
Wealth quintile, poorest (0/1)	0.226	0.418	0	1	7404
Wealth quintile, poorer (0/1)	0.206	0.404	0	1	7404
Wealth quintile, middle (0/1)	0.172	0.377	0	1	7404
Wealth quintile, richer (0/1)	0.159	0.365	0	1	7404
Wealth quintile, richest (0/1)	0.238	0.426	0	1	7404
Coverage					
Elevation (1000 m)	0.0170	0.0173	0.00300	0.112	3999
Slope (percent)	0.196	0.255	0	1.607	3999
Distance to nearest WMC transmitter (km)	44.42	17.51	1.571	85.89	3999
Distance to nearest Province Capital (km)	27.35	13.58	0.550	60.12	3999
Urban areas (0/1)	0.0386	0.193	0	1	3999
Dummy for having electricity (0/1)	0.0361	0.186	0	1	3999
Age	32.33	8.914	18	49	3999
Years of education	2.278	1.922	0	6	3999
Wealth quintile, poorest (0/1)	0.246	0.431	0	1	3999
Wealth quintile, poorer (0/1)	0.222	0.415	0	1	3999
Wealth quintile, middle (0/1)	0.242	0.429	0	1	3999
Wealth quintile, richer (0/1)	0.220	0.415	0	1	3999
Wealth quintile, richest (0/1)	0.0695	0.254	0	1	3999
Total					
Elevation (1000 m)	0.0245	0.0397	0	0.675	11403
Slope (percent)	0.309	0.648	0	10.32	11403
Distance to nearest WMC transmitter (km)	101.8	80.18	1.201	328.6	11403
Distance to nearest Province Capital (km)	28.02	19.03	0.357	105.2	11403
Urban areas (0/1)	0.153	0.360	0	1	11403
Dummy for having electricity (0/1)	0.143	0.350	0	1	11403
Age	32.01	8.986	18	49	11403
Years of education	2.192	1.946	0	6	11403
Wealth quintile, poorest (0/1)	0.235	0.424	0	1	11403
Wealth quintile, poorer (0/1)	0.213	0.409	0	1	11403
Wealth quintile, middle (0/1)	0.203	0.402	0	1	11403
Wealth quintile, richer (0/1)	0.186	0.389	0	1	11403
Wealth quintile, richest (0/1)	0.163	0.369	0	1	11403

Note: DHS 2000.

Table 4: Summary statistics for the control variables

	mean	sd	min	max	count
No Coverage					
Elevation (1000 m)	0.0373	0.0565	0	0.691	8254
Slope (percent)	0.526	1.148	0	15.30	8254
Distance to nearest WMC transmitter (km)	163.7	70.07	35.52	331.3	8254
Distance to nearest Province Capital (km)	32.91	36.54	0.363	269.8	8254
Urban areas (0/1)	0.205	0.404	0	1	8254
Dummy for having electricity (0/1)	0.203	0.403	0	1	8254
Age	31.87	9.457	18	49	8254
Years of education	2.278	1.976	0	11	8254
Wealth quintile, poorest (0/1)	0.218	0.413	0	1	8254
Wealth quintile, poorer (0/1)	0.224	0.417	0	1	8254
Wealth quintile, middle (0/1)	0.192	0.394	0	1	8254
Wealth quintile, richer (0/1)	0.183	0.387	0	1	8254
Wealth quintile, richest (0/1)	0.183	0.387	0	1	8254
Coverage					
Elevation (1000 m)	0.0167	0.0164	0.00200	0.0960	3951
Slope (percent)	0.200	0.254	0	2.119	3951
Distance to nearest WMC transmitter (km)	43.13	18.76	1.387	84.45	3951
Distance to nearest Province Capital (km)	28.90	14.71	0.703	62.76	3951
Urban areas (0/1)	0.0530	0.224	0	1	3951
Dummy for having electricity (0/1)	0.112	0.316	0	1	3951
Age	32.53	9.237	18	49	3951
Years of education	2.614	1.880	0	12	3951
Wealth quintile, poorest (0/1)	0.188	0.390	0	1	3951
Wealth quintile, poorer (0/1)	0.213	0.410	0	1	3951
Wealth quintile, middle (0/1)	0.249	0.432	0	1	3951
Wealth quintile, richer (0/1)	0.230	0.421	0	1	3951
Wealth quintile, richest (0/1)	0.120	0.325	0	1	3951
Total					
Elevation (1000 m)	0.0275	0.0437	0	0.691	12205
Slope (percent)	0.371	0.865	0	15.30	12205
Distance to nearest WMC transmitter (km)	106.3	79.77	1.387	331.3	12205
Distance to nearest Province Capital (km)	31.00	28.40	0.363	269.8	12205
Urban areas (0/1)	0.133	0.339	0	1	12205
Dummy for having electricity (0/1)	0.160	0.367	0	1	12205
Age	32.19	9.358	18	49	12205
Years of education	2.438	1.938	0	12	12205
Wealth quintile, poorest (0/1)	0.204	0.403	0	1	12205
Wealth quintile, poorer (0/1)	0.219	0.413	0	1	12205
Wealth quintile, middle (0/1)	0.219	0.414	0	1	12205
Wealth quintile, richer (0/1)	0.205	0.404	0	1	12205
Wealth quintile, richest (0/1)	0.153	0.360	0	1	12205

Note: DHS 2005.

Table 5: Summary statistics of schools

Year	No Coverage			Coverage			Total		
1998	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	335.8	399.0	4024	439.9	474.9	1043	357.2	417.8	5067
Girl enrollment	153.2	186.3	4024	199.6	221.1	1043	162.7	194.8	5067
Boy enrollment	182.6	214.4	4024	240.3	255.5	1043	194.5	224.7	5067
Year	No Coverage			Coverage			Total		
1999	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	376.5	409.4	4212	470.8	359.5	968	394.1	402.2	5180
Girl enrollment	172.5	190.0	4212	215.0	166.1	968	180.5	186.5	5180
Boy enrollment	204.0	220.9	4212	255.8	195.7	968	213.7	217.3	5180
Year	No Coverage			Coverage			Total		
2000	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	402.2	417.7	4212	509.0	372.2	968	422.1	411.7	5180
Girl enrollment	187.7	196.5	4212	236.7	173.3	968	196.9	193.3	5180
Boy enrollment	214.4	222.9	4212	272.4	201.3	968	225.2	220.2	5180
Year	No Coverage			Coverage			Total		
2001	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	432.7	424.7	4212	539.6	375.4	968	452.7	418.0	5180
Girl enrollment	201.3	199.3	4212	250.3	177.8	968	210.4	196.4	5180
Boy enrollment	231.5	227.1	4212	289.3	199.9	968	242.3	223.4	5180
Year	No Coverage			Coverage			Total		
2002	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	435.5	415.5	4212	548.0	373.8	968	456.5	410.4	5180
Girl enrollment	203.7	196.3	4212	255.1	174.9	968	213.3	193.5	5180
Boy enrollment	231.8	220.9	4212	292.8	201.2	968	243.2	218.6	5180
Year	No Coverage			Coverage			Total		
2003	mean	sd	obs	mean	sd	obs	mean	sd	obs
Total enrollment	434.2	400.5	4212	545.1	357.6	968	455.0	395.1	5180
Girl enrollment	204.6	190.9	4212	257.3	170.7	968	214.5	188.4	5180
Boy enrollment	229.6	211.2	4212	287.8	188.8	968	240.5	208.4	5180

Note: EMIS.

Table 6: Regression Analysis with the determinants of radio coverage

	(1) Before exposure Coverage	(2) After Exposure Coverage
Elevation (1000 m)	-0.294	-0.988**
	(0.408)	(0.473)
Slope (percent)	-0.012	-0.010
	(0.014)	(0.011)
Dummy for having electricity (0/1)	0.002	-0.002
	(0.005)	(0.004)
Distance to nearest WMC transmitter (km)	-0.003*	-0.001***
	(0.001)	(0.000)
Distance to nearest Province Capital (km)	-0.001	-0.003***
	(0.001)	(0.000)
Age	-0.000	0.000
	(0.000)	(0.000)
Years of education	0.001	0.000
	(0.001)	(0.000)
Wealth quintile, poorer (0/1)	0.001	0.002
	(0.003)	(0.005)
Wealth quintile, middle (0/1)	0.005	0.004
	(0.003)	(0.007)
Wealth quintile, richer (0/1)	0.007	0.004
	(0.005)	(0.006)
Wealth quintile, richest (0/1)	0.004	0.009
	(0.005)	(0.007)
Observations	11403	12205
R^2	0.962	0.986
Districts	154	164
Clusters	418	480

Note: The dependent variable is Radio Coverage from KT2000, PP2001 and SR2001 transmitters. Column (1) is based on DHS 2000, before the exposure, and column (2) is based on DHS 2005, after the exposure. Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ects.

Table 7: Orthogonality of the dependent variables before radio coverage

Panel A:	Dependent variable is Radio coverage from KT2000, PP2001 and SR2001 stations using DHS 2000 data.				
Indep. var:	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
	0.009	0.002	0.002	0.006	-0.004
	(0.008)	(0.002)	(0.001)	(0.009)	(0.004)
Observations	10865	2774	1787	1787	8367
R^2	0.955	0.957	0.958	0.958	0.960
Districts	154	154	154	154	151
Clusters	418	418	413	413	407
Panel B:	Dependent variable is Radio Coverage from KT2006 station using DHS 2005 data.				
Indep. var:	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
	(1)	(2)	(3)	(4)	(5)
	0.007	0.004	0.001	-0.000	-0.001
	(0.007)	(0.002)	(0.001)	(0.006)	(0.003)
Observations	11820	3016	1748	1748	9774
R^2	0.689	0.725	0.731	0.731	0.719
Districts	164	164	162	162	163
Clusters	480	480	473	473	478

Note: Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 8: Results from cross-section identification

Panel A:	Placebo using DHS 2000				
	(1)	(2)	(3)	(4)	(5)
	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
Coverage	0.020	0.437	0.620	0.030	-0.024
	(0.013)	(0.273)	(0.380)	(0.068)	(0.061)
Observations	10865	2774	1787	1787	8367
R^2	0.031	0.299	0.207	0.125	0.272
Districts	154	154	154	154	151
Clusters	418	418	413	413	407
Panel B:	Results using DHS 2005				
	(1)	(2)	(3)	(4)	(5)
	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
Coverage	0.009	-0.164	0.987*	0.266***	0.117**
	(0.016)	(0.298)	(0.561)	(0.089)	(0.045)
Observations	11820	3016	1748	1748	9774
R^2	0.035	0.179	0.315	0.178	0.368
Districts	164	164	162	162	163
Clusters	480	480	473	473	478

Note: Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ects, individual and geographical controls.

Table 9: Difference-in-difference estimates

Panel A.I:	Simple DD with District FE				
	(1)	(2)	(3)	(4)	(5)
	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
Coverage * Year 2005	-0.010**	-0.303***	0.459***	0.062***	0.067***
	(0.005)	(0.100)	(0.144)	(0.021)	(0.019)
Year 2005	-0.012***	0.550***	0.169*	-0.038***	-0.052***
	(0.003)	(0.064)	(0.087)	(0.013)	(0.012)
Coverage	0.003	-0.253	-0.547*	-0.033	-0.060
	(0.008)	(0.224)	(0.287)	(0.041)	(0.051)
Observations	22685	5790	3535	3535	18141
R^2	0.025	0.156	0.160	0.085	0.055
Districts	174	174	173	173	174
Clusters	538	538	536	536	536
Panel A.II:	E ect of current radio coverage				
	(1)	(2)	(3)	(4)	(5)
	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
Coverage * Year 2005	-0.011**	-0.296***	0.461***	0.056***	0.060***
	(0.005)	(0.106)	(0.146)	(0.021)	(0.016)
Year 2005	-0.015**	0.563***	-0.361	-0.079***	-0.208***
	(0.006)	(0.129)	(0.224)	(0.026)	(0.024)
Coverage	0.003	-0.278	-0.442	-0.050	-0.064*
	(0.008)	(0.247)	(0.311)	(0.044)	(0.037)
Observations	22685	5790	3535	3535	18141
R^2	0.026	0.163	0.180	0.097	0.305
Districts	174	174	173	173	174
Clusters	538	538	536	536	536
Panel B:	E ect of future radio coverage				
	(1)	(2)	(3)	(4)	(5)
	Sonpref	Wifebeat	FinalSay	FS_Sch	SchAtt
Coverage * Year 2005	-0.011**	-0.287***	0.475***	0.057***	0.061***
	(0.005)	(0.107)	(0.148)	(0.021)	(0.016)
Future	0.012	0.433	0.616	0.064	0.049
	(0.014)	(0.429)	(0.496)	(0.079)	(0.058)
Year 2005	-0.015**	0.568***	-0.364	-0.080***	-0.207***
	(0.006)	(0.128)	(0.225)	(0.026)	(0.024)
Coverage	0.007	-0.117	-0.226	-0.027	-0.045
	(0.011)	(0.282)	(0.405)	(0.054)	(0.048)
Observations	22685	5790	3535	3535	18141
R^2	0.026	0.163	0.180	0.097	0.305
Districts	174	174	173	173	174
Clusters	538	538	536	536	536

Note: Panel A.II provides the simple di erence in di erence estimates with districts xed e ects without any individual or geographical controls while Panel A.II includes both district and month xed e ects, individual and geographical controls. Panel B tests for impact of future coverage adding a dummy for villages located in future coverage areas with the same set of controls as in Panel A.II. Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Impact on school attendance by gender and age

Panel A:	Children aged 6-12		
	(1) All	(2) Girls	(3) Boys
Coverage * Year 2005	0.060***	0.050**	0.070***
	(0.016)	(0.020)	(0.021)
Year 2005	-0.208***	-0.186***	-0.223***
	(0.024)	(0.030)	(0.031)
Coverage	-0.064*	-0.047	-0.080**
	(0.037)	(0.046)	(0.040)
Observations	18141	8964	9178
R^2	0.305	0.304	0.324
Districts	174	174	174
Clusters	536	535	536
Panel B:	**Children aged 13-17**		
	(1) All	(2) Girls	(3) Boys
Coverage * Year 2005	0.012	0.027	-0.004
	(0.020)	(0.026)	(0.024)
Year 2005	0.113***	0.151***	0.082**
	(0.031)	(0.043)	(0.036)
Coverage	-0.008	0.052	-0.039
	(0.050)	(0.068)	(0.049)
Observations	14073	6760	7313
R^2	0.218	0.280	0.218
Districts	174	174	174
Clusters	536	534	536

Note: Dependent variable is school attendance (0/1), DHS 2000 and 2005. Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 11: Effects by household income

	(1) Sonpref	(2) Wifebeat	(3) FinalSay	(4) FS_Sch	(5) SchAtt
Coverage * Year 2005 * q1	-0.007	-0.070	0.635***	0.108***	0.071***
	(0.008)	(0.157)	(0.234)	(0.039)	(0.023)
Coverage * Year 2005 * q2	-0.010	-0.196	0.429*	0.020	0.098***
	(0.007)	(0.146)	(0.227)	(0.038)	(0.020)
Coverage * Year 2005 * q3	-0.008	-0.369**	0.186	0.016	0.053***
	(0.007)	(0.147)	(0.203)	(0.028)	(0.020)
Coverage * Year 2005 * q4	-0.018***	-0.463***	0.589***	0.078**	0.025
	(0.006)	(0.156)	(0.211)	(0.033)	(0.021)
Coverage * Year 2005 * q5	-0.014*	-0.488***	0.487	0.061	0.034
	(0.008)	(0.162)	(0.296)	(0.050)	(0.022)
Observations	22685	5790	3535	3535	18141
R^2	0.027	0.165	0.181	0.100	0.306
Districts	174	174	173	173	174
Clusters	538	538	536	536	536

Note: q1 and q5 are a dummies for a housholds belonging to the poorest and richest quintiles, respectively. Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 12: Selective migration between exposed and non-exposed villages

	(1) Sonpref	(2) Wifebeat	(3) FinalSay	(4) FS_Sch	(5) SchAtt
Coverage * Year 2005	-0.010*	-0.291***	0.375**	0.037*	0.067***
	(0.005)	(0.109)	(0.152)	(0.022)	(0.016)
Year 2005	-0.014**	0.542***	-0.380*	-0.069***	-0.209***
	(0.006)	(0.133)	(0.223)	(0.026)	(0.024)
Coverage	0.000	-0.241	-0.404	-0.044	-0.077**
	(0.009)	(0.239)	(0.342)	(0.050)	(0.031)
Observations	20518	5261	3251	3251	16719
R^2	0.028	0.164	0.183	0.094	0.311
Districts	173	173	172	172	174
Clusters	538	537	533	533	544

Note: These regressions include only respondents who lived in the same place for at least 5 years. Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 13: Testing for differences between urban and rural areas

	(1) Sonpref	(2) Wifebeat	(3) FinalSay	(4) FS_Sch	(5) SchAtt
Coverage * Year 2005 * Urban	0.009	-0.027	0.148	0.050	0.024
	(0.014)	(0.361)	(0.548)	(0.065)	(0.037)
Coverage * Year 2005	-0.012**	-0.294***	0.450***	0.052**	0.058***
	(0.005)	(0.108)	(0.148)	(0.022)	(0.017)
Observations	22685	5790	3535	3535	18141
R^2	0.026	0.163	0.180	0.097	0.305
Districts	174	174	173	173	174
Clusters	538	538	536	536	536

Note: Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 14: Testing for a ”modernity” factor - daily tv watching

	(1) Cross-section	(2) DD
Coverage * Year 2005		-0.031
		(0.021)
Year 2005		0.089***
		(0.031)
Coverage	-0.046	-0.002
	(0.074)	(0.038)
Observations	11815	22675
R^2	0.268	0.261
Districts	164	174
Clusters	480	538

Note: The dependent variable TV is de ned as a dummy if the repondent watches TV almost every day. Column (1) is based on the cross-section speci cation (1) and column (2) is based on the di erence-in-di erence speci cation (2). Standard errors clustered at the village level in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All the regressions include district and month xed e ect, individual and geographical controls.

Table 15: Effects of women's radio on school enrollment

Panel A: Effects before expoure

	(1) All	(2) Girls	(3) Boys
Coverage * Year 1999	-0.002	-0.005	-0.003
	(0.007)	(0.008)	(0.008)
Observations	10134	10134	10134
R^2	0.047	0.050	0.030
Schools	5067	5067	5067

Panel B: Effects of current and future radio exposure

	(1) All	(2) Girls	(3) Boys	(4) All	(5) Girls	(6) Boys
Coverage * Year 2001	0.026	0.016	0.021	0.026	0.016	0.021
	(0.017)	(0.016)	(0.016)	(0.017)	(0.016)	(0.016)
Coverage * Year 2002	0.059***	0.044**	0.049**	0.058***	0.044**	0.049**
	(0.021)	(0.019)	(0.019)	(0.021)	(0.019)	(0.019)
Coverage * Year 2003	0.073***	0.059***	0.055***	0.073***	0.060***	0.056***
	(0.022)	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)
Future * Year 2001				0.031	0.013	0.034
				(0.040)	(0.037)	(0.037)
Future * Year 2002				0.013	-0.002	0.014
				(0.038)	(0.034)	(0.033)
Future * Year 2003				0.034	0.018	0.051
				(0.064)	(0.056)	(0.058)
Observations	25900	25900	25900	25900	25900	25900
R^2	0.006	0.012	0.008	0.006	0.012	0.008
Schools	5180	5180	5180	5180	5180	5180

Note: Standard errors clustered at the school in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The dependent variable is the natural logarithm of primary enrollment. All the regressions include school and year xed e ects. Panel A include 5067 primary schools regressed over two years and Panel B include 5180 primary schools regressed over 5 years.