

DISCUSSION PAPER SERIES

No. 10954

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WE USE TELEVISION TO FIGHT POVERTY?**

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***DEVELOPMENT ECONOMICS and
PUBLIC ECONOMICS***



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Discussion Paper No. 10954
November 2015
Submitted 17 November 2015

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MASS MEDIA AND SOCIAL CHANGE: CAN WE USE TELEVISION TO FIGHT POVERTY?[†]

Abstract

This paper explores the potential use of entertainment media programs for achieving development goals. I propose a simple framework for interpreting media effects that hinges on three channels: (i) information provision, (ii) role modeling and preference change, and (iii) time use. I then review the existing evidence on how exposure to commercial television and radio affects outcomes such as fertility preferences, gender norms, education, migration and social capital. I complement these individual country studies with cross-country evidence from Africa and with a more in-depth analysis for Nigeria, using the Demographic Health Surveys. I then consider the potential educational role of entertainment media, starting with a discussion of the psychological underpinnings and then reviewing recent rigorous evaluations of edutainment programs. I conclude by highlighting open questions and avenues for future research.

JEL Classification: J13 and O12

Keywords: edutainment, soap operas and television

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[†] Some of the work discussed in this paper is joint with Alberto Chong, Stefano DellaVigna and Suzanne Duryea, whom I thank for their inputs to this line of research. I acknowledge useful comments from seminar participants at the JEEA-FBBVA lectures 2015 in Chicago and Madrid. I am also grateful to Benedetta Brioschi and Martina Zanella for excellent research assistance.

1 Introduction

Recent years have seen a massive penetration of mass media in the developing world. Even traditionally remote communities nowadays have access to radio, television, and occasionally to the internet.

[Insert Figure 1]

Figure 1 corroborates this point. The left panel of the figure shows the evolution during the two decades from 1990 to 2010 of the share of households owning a TV set in a number of Sub-Saharan Africa countries.¹ While at the beginning of the period this share varies between 0 and 20 percent, by the end of the period it ranges from 10 to 50 percent, with several countries increasing their TV ownership rates by a factor of four or more. The right panel of the figure shows the evolution over the same period of the share of women with secondary education or higher, as a proxy for human capital accumulation in those countries. This variable also exhibits an increasing trend, but with a much flatter slope: increases in educational achievement are much slower to achieve, possibly due to the frictions and costs of adjusting supply factors. This comparison is obviously not meant to imply that one should offer poor households a television instead of accessible public education. The question is rather whether we can exploit the rapid spread of television and other media to reach large populations at low cost, with messages that are complementary to education and other social policies. In this paper I suggest that the answer is yes, based on rigorous empirical evidence that is increasingly emerging from economics and other social sciences.

I start by briefly proposing a framework for interpreting the effects of mass media (educational and not) on socioeconomic outcomes, where key channels of impact are (i) information provision, (ii) role modeling and preference change, and (iii) time use. I then review the existing evidence on how exposure to commercial television and radio affects outcomes that are not related to political accountability –a vast empirical literature exists on this, surveyed by Stromberg (2015)– but are socioeconomic in nature. These outcomes include fertility preferences and gender norms, education, migration and social capital. I complement these in-depth studies of individual countries with cross-country evidence for all African countries for which the Demographic and Health Surveys (DHS) are available, and with a more in-depth analysis for Nigeria. I next consider the potential educational role of entertainment media, starting with a discussion of the psychological basis for impact in relation to the social learning theory of Bandura (1976) and the notion of self-efficacy. While these elements have been incorporated in educational entertainment (or *edutainment*) productions since the 1970s, it is only in the past ten years that economists and social scientists have applied rigorous impact evaluation

¹The data underlying figure 1 come from various rounds of the Demographic Health Surveys (DHS).

techniques to estimate their effects. I review the existing evidence and highlight open questions and avenues for future research.

It should be noted that the evidence on the socioeconomic impacts of the media is not limited to developing countries (see e.g., DellaVigna and La Ferrara, 2015). However, focusing on the possibility to use the media to achieve development goals is particularly interesting for a number of reasons.

First, from a policy perspective there is a large debate on the effectiveness of foreign aid and a corresponding quest for policy interventions that promise a vast outreach at low cost. Edutainment is potentially one of these, given the minimal requirements it poses in terms of administrative capacity and supply infrastructure compared, for example, to social welfare programs.

Second, the incremental contribution of media such as television and radio is predicted to be highest in contexts where other sources of information (e.g., newspaper readership, formal education) are relatively less diffuse. Poor countries with low literacy rates clearly constitute an environment where the easily accessible ‘language’ of television and radio gives them a comparative advantage over other means of communication.

Third, the transforming role of media programs depends on how ‘innovative’ their content is. In the past, introduction of television in poor communities has resulted in exposure to lifestyles and values that were very different from the prevailing local customs, more so than in wealthier localities. The potential for exploiting educational content to progressively change social norms and behavior is therefore particularly high in environments that have been less exposed to economic and social transformation.

Finally, from a purely methodological point of view, researchers working on developing countries have a rich set of opportunities to exploit exogenous variation in order to estimate media impacts. First, the fact that in many places commercial television has only recently reached broad coverage allows to exploit the staggered introduction of TV to apply difference-in-differences strategies (provided of course that the necessary assumptions hold). Second, within foreign aid and national development strategies, many nongovernmental organizations are experimenting with innovative uses of the media. This constitutes an opportunity for partnership between these organizations and researchers to design rigorous evaluation strategies (e.g., randomized controlled trials). Such partnerships could help the organization improve the design of its products as well the research community to go beyond the state of the art.

The remainder of the paper is organized as follows. Section 2 briefly presents a framework for interpreting the effects of mass media on social outcomes. Section 3 discusses commercial television, while section 4 focuses on educational entertainment. Section 5 concludes.

2 Framework

Exposure to media can affect behavior through a variety of channels. First, it can provide new *information*, thus inducing people to update their beliefs. This channel could be particularly important in some developing countries, where exposure to written (or other) information sources may be limited. In a Bayesian setting, to the extent that the scarcity of information translates into individuals holding diffuse priors, even modest exposure to TV or radio may lead to substantial updates in beliefs and induce large changes in behavior.

A second channel through which media could change behavior is by changing individual *preferences*. This effect does not necessarily go through the provision of new information but may directly affect the desirability of certain actions. One such example would occur when the individual is already aware of certain facts (e.g., that smoking is bad for one’s health), but then seeing a popular character on TV who stops smoking may induce the viewer to try and do the same, e.g., because the viewer perceives that character as a role model. The behavioral change generated in this way may also be quantitatively large, the more so the greater the degree of empathy and identification with the characters in the program, as I discuss below. Both the information and the preference channel can be considered as part of the broad category of ‘persuasion’ effects (DellaVigna and Gentzkow, 2010).

A third mechanism through which the media can affect individual behavior is *time use*. Time spent in front of TV or listening to the radio is not allocated to other activities. As a consequence, the effect on the outcome of interest will depend on whether the activities that are ‘crowded out’ by the media are more or less conducive to the desired outcome. This channel was first highlighted in Dahl and DellaVigna (2009) in the context of movie violence, but it is generally relevant for any type of media content.

While the emphasis on one or more of these channels can be a useful way to categorize the existing literature (as I do below), a key aspect that runs through the different contributions is the importance of combining educational and entertainment content. The following simple model can help shed light on this aspect.

Consider an individual endowed with an amount T of time that can be divided among media consumption and other activities.² Let’s denote with h the time devoted to media consumption, so that $T - h$ is devoted to other activities. Programs broadcast by the media have a certain amount of educational content, which we denote with e .

Both media consumption and other non-media activities contribute to the production of a social outcome, for example a certain health choice, according to the following production function:

²For discrete choice models that stress the substitution effects between media consumption and other activities, see Dahl and DellaVigna (2009) and DellaVigna and La Ferrara (2015). The framework presented here is inspired by these models, but it differs by explicitly introducing an educational role for the media.

$$Y = m(e) \cdot h + (T - h). \quad (1)$$

The outcome of interest is a linear combination of the time devoted to the different activities, with the function $m(e)$ representing the relative productivity of time spent in front of television or listening to the radio, compared to other activities. I assume that $m(e)$ satisfies the following conditions: $m'(e) > 0$; $m''(e) \leq 0$; $\lim_{e \rightarrow 0} m'(e) = \infty$. The first two assumptions capture the intuition that, for given time devoted to the media, higher educational content translates into a higher level Y , at a decreasing rate. The third assumption is made for analytical convenience.

Individual preferences over the time spent on different types of activities are represented by the following utility function:

$$U(e, h) = \alpha(e) \ln(h) + \beta \ln(T - h). \quad (2)$$

with $\alpha'(e) < 0$; $\alpha''(e) < 0$; $\alpha(0) > 0$ and $\alpha(e) = 0$ for all $e > \bar{e}$, where $\bar{e} > 0$ represents the level beyond which the consumer is “saturated” by educational messages. The parameterization in (2) assumes that the utility derived from a certain amount of time spent in front of TV (or radio) is decreasing in the educational content of the programs. Although one could conjecture that small amounts of educational content may actually be liked by the consumers, the above representation parsimoniously captures the idea that the main reason why individuals consume media programs is entertainment and, to the extent that educational content displaces entertainment one, it reduces the marginal utility of media consumption.

For given level of educational content, the individual’s optimal allocation of time is given by the first order condition

$$\frac{\alpha(e)}{h} - \frac{\beta}{T - h} = 0.$$

The optimal amount of time devoted to media consumption is thus

$$h^* = \frac{\alpha(e)}{\alpha(e) + \beta} T. \quad (3)$$

Intuitively, the share of time devoted to the media increases with the relative magnitude of α compared to β . It is straightforward to see that

$$\frac{\partial h^*}{\partial e} = \frac{\beta T}{[\alpha(e) + \beta]^2} \alpha'(e) < 0,$$

i.e., the more educational the programs on TV, the less time the individual will devote to watching them.

From the point of view of a policymaker who wants to design an educational entertainment program to affect social outcome Y , what is then the optimal amount of educational content?

This can be obtained by differentiating (1) with respect to e taking into account (3), and equating the resulting expression to zero:

$$\frac{dY}{de} = m'(e) \frac{\alpha(e)}{\alpha(e) + \beta} T + m(e) \frac{\beta T}{[\alpha(e) + \beta]^2} \alpha'(e) = 0. \quad (4)$$

Note that the first addendum in (4) is positive and represents the productivity gains from a marginal increment in educational content (recall that higher e increases the level of social outcome Y for given time allocated to the media). The second addendum, instead, is negative and captures the fact that the higher the educational content, the lower the amount of time that the individual will spend in front of TV. Under the assumptions listed above, $dY/de > 0$ for $e \rightarrow 0$ and $dY/de < 0$ for $e \rightarrow \bar{e}$. The optimal amount of educational content e is thus implicitly defined by equation (4), which describes a sort of Laffer curve.

This extremely stylized framework captures several of the elements that will return throughout the discussion of the empirical evidence. The information and preference channel of media impact on outcome Y are embedded in the function $m(e)$. The time use channel, and the fact that to assess the impact of the media one needs to understand what other activities are crowded out, is incorporated in the production function (1). The fact that an excessive use of educational messages may generate resistance by the user is represented by the function $\alpha(e)$. Finally, the trade-off faced by the policymaker in designing the content of edutainment programs is shown in equation (4), which suggests that the optimal amount of educational content is positive but not too high. We next turn to empirical evidence on these aspects.

3 Effects of commercial television

In this section I discuss the effects of exposure to commercial media (most importantly, commercial television) on development outcomes. I start by reviewing a selected group of contributions that illustrate the workings of the three channels of impact highlighted above, and then move on to provide some new evidence for a cross section of African countries.

3.1 Lessons from the existing literature

A large number of studies, reviewed in DellaVigna and La Ferrara (2015), have documented the impact of commercial media on social and economic behavior. Here I focus on a portion of that literature that is particularly relevant for developing countries. I organize the discussion by assigning each paper to a specific channel of influence –information, preferences or time use. This classification is made for expositional purposes, but it should be clear that in many cases two, if not all three, channels may be responsible for the effects found. In particular, distinguishing between the information and the preference channels is empirically very difficult, typically due to data limitations, and most of the existing studies only identify a combination

of the two effects. At the same time, some studies are particularly suited to highlighting the workings of one channel, and this is the criterion I use to group them in the discussion.

Information

The first and most obvious role served by the media is that of providing information. This is evident when one thinks of the news, but information is also embedded in other media content, notably advertising and entertainment programs. When a viewer watches a TV show or a commercial, she gets exposed to a range of products, lifestyles, facts about people, places or behaviors, which will ultimately affect her choices.

A clear example of this is constituted by the penetration of foreign TV channels in certain countries and the effect that the information shown on television can have on migration. Braga (2007) studies how exposure to Italian television affected Albanians' immigration to Italy. This is an interesting case study, because for almost fifty years the Albanian media were controlled by the Communist party so information about the rest of the world, especially market economies, was very limited. Yet, due to geographic proximity many Albanians could receive the signal of Italian TV stations, which since the 1960s portrayed lifestyles and consumption patterns very different from those prevalent in Albania. To test whether this affected migration decisions, Braga uses the Albanian Living Standard Measurement Survey and calculates the shortest distance between the residence of the respondent and the closest Italian transmitter. She finds that indeed exposure to Italian television significantly increased migration to Italy as well as to other countries.

While this effect is likely attributed to a desire to improve one's living standards in response to the images and consumption patterns portrayed on TV, the effect of such exposure is not always univocal. Farré and Fasani (2013) perform a similar estimation for Indonesia, exploiting the phased-in penetration of private television and the variation in signal strength across districts due to topography. They find that exposure to TV reduces, instead of increasing, international migration. This opposite effect may be due to the different content of the programs, or to differences in ex ante expectations of viewers regarding the benefits of migration. For example, Albanian viewers may have held priors that were very negative vis-a-vis market economies and then updated those priors more favorably, while Indonesian viewers may have overestimated the benefits from migration, and then revised those expectations downwards after watching television. This suggests that to fully understand the effects of media exposure, empirical evaluations should properly elicit ex ante beliefs regarding the relevant variables that one wishes to influence.

Another example of how mass media may affect individual choices by providing information is given by community radios. These radios serve an important role in developing countries, by broadcasting content that is locally relevant and thus occupying an intermediate place between public radio stations and purely commercial ones. Very often community radios feature programs dedicated to topics in health or education, and thus directly provide their

listeners with information in these areas. Cheung (2012) studies the effects of a community radio in Cambodia that focused on issues related to education and women's empowerment. She exploits variation in radio signal coverage generated by topography as well as the differential expansion across areas over time, using a difference-in-differences strategy. She finds positive effects of radio coverage on children's school attendance as well as on women's decision making power, attitudes towards domestic violence and son preference.

Similar results are obtained by Keefer and Khemani (2011) in the context of Benin, where exposure to community radios is shown to significantly increase the share of literate children. The authors are able to narrow down the channel of influence to a change in parental behavior (e.g., buying more books for their children), as opposed to the increased accountability of local officials that may derive from information diffused by the radio. In fact, school inputs such as teacher absenteeism, teacher-pupil ratios and school infrastructure are unaffected.

Preferences

A second mechanism through which media exposure can affect development outcomes is by directly affecting people's preferences, e.g., through the use of role models that people may take as positive or negative examples to imitate (or not). This channel is especially likely to operate for outcomes that are typically influenced by social norms and culture, such as preferences regarding family size and gender roles. In these cases, portrayal of different models on television or in radio programs may alter the perception of certain values or behavior, and render them more easily acceptable – or even desirable.

This point is illustrated by considering the effects of soap operas (*novelas*) in Brazil over the past half-century. Brazilian *novelas* have enjoyed an enormous success in terms of viewership, cutting across social classes and covering a broad range of themes, from love and intrigue to social and political issues. Importantly, the goal of the main producer of these soap operas, Rede Globo, has always been first and foremost commercial success as opposed to an overt educational mission, and the consequences that its productions have had on socioeconomic outcomes have mostly been by-products of implicit models. La Ferrara, Chong and Duryea (2012) study the effect of Rede Globo's *novelas* on fertility in Brazil. The focus on this outcome is motivated by two facts. First, during the period of Globo's expansion across the country the total fertility rate sharply dropped from 6.3 in 1960 to 2.9 in 1991. Second, the plots of the *novelas* broadcast during this period involved unusually small families: the authors perform a content analysis on the content of over 100 prime time soap operas and find that, among main female characters younger than 50, 72 percent had no children and 20 percent had only one child. These characters were also emancipated along other dimensions: only 26 percent of them were married, 11 percent were divorced or separates and 28 percent were unfaithful to their partner. La Ferrara et al. (2012) thus hypothesize that small families portrayed on television may have implicitly become role models and contributed to reduce the demand for children in Brazil. They test this hypothesis using a difference-in-differences strategy that

exploits variation in the dates in which Globo entered different municipalities from the mid-1960s to the mid-1990s. Their results suggest that women living in areas covered by the Globo signal reduced their fertility by an amount comparable to the reduction that 1.6 more years of education would bring about. The effect is more pronounced for poorer and less educated women, i.e., those segments of the population who may rely relatively more on television than on written sources to learn the benefits of smaller families. While this effect is compatible both with a role model / preference story and with a time use story (more time spent in front of TV may imply less time spent with one's partner), the authors offer suggestive evidence that the content of these *novelas* mattered. First, parents living in areas covered by Globo were significantly more likely to name their children after the main character of the *novela* showing during the year in which the child was born. Second, the fertility decrease is larger in years following plots that featured stories of upward social mobility, and for women close in age to the main characters of the *novelas*. These results suggest that part of the effect was actually due to the inspirational content of the plot and to the empathy and identification of the viewer with the role models seen on TV.

The challenging function of *novela* content with respect to traditional roles and values is also reflected in the impact they had on family formation and dissolution. Using the same identification strategy described above, Chong and La Ferrara (2009) show that exposure to Globo programming led to higher rates of divorce and separation.

The effect of television on gender norms is also studied by Jensen and Oster (2009). The focus of their analysis is the introduction of cable television in five Indian states and the effect that exposure to this new content had on women's status in rural areas. The authors exploit the staggered introduction of cable across villages during 2001-2003 and find effects on both attitudinal and behavioral measures. One of the most striking results is the lower acceptability of domestic violence, measured by the number of instances in which it is acceptable for a man to beat his wife. Furthermore, women's decision making autonomy increases and this contributes to changes in intra-household allocation, resulting –among other things– in lower fertility and higher enrollment rates in school for children.

While the above contributions stress the centrality of role models and values portrayed on TV, the informational content of entertainment programs cannot be disregarded even on issues related to fertility. In a recent paper Kearney and Levine (2014) find that the MTV show *16 and Pregnant* contributed to a significant reduction in teen pregnancy rates in the United States during the months after its introduction.³ The main feature of this show was the extremely realistic description of the problems that young girls have to face when they get pregnant, from issues with their partners, to school, to sleep problems, to pain during

³The effect is identified through an instrumental variable strategy, where the ratings of the show across areas are instrumented with the ratings of other MTV shows in the four months before *16 and Pregnant* was introduced.

delivery. The interpretation of the authors is that this information, while theoretically known, may not have been internalized by the viewers until presented on TV. Indeed, Kearney and Levine document that the show triggered information seeking behavior, measured by spikes in Google searches and tweets containing terms such as “birth control”, “abortion”, and the name of the show. The combination of the new information and the (negative) role models on TV may have therefore persuaded young viewers to avoid unwanted pregnancies.

Overall, the above studies on the impact of commercial TV on fertility and gender outcomes credibly identify the channel of imitation (possibly intertwined with information provision). This is an important pre-condition for discussing the opportunity of tailoring content to development goals, as we shall see in the educational entertainment literature.

Time use

The third and last channel identified in our theoretical framework was time use: television and other media may affect behavior not only directly through the content of their programs, but indirectly by ‘distracting’ individuals from other activities. One of the clearest examples of this effect can be found in the long standing debate on whether watching television is detrimental for children’s education and cognitive development, e.g., because it crowds out study, sports and interaction with friends (Zavodny, 2006).

From an empirical point of view, answering this question is challenging because children who self-select into watching a lot of television may already have a low propensity for study or social interaction. Gentzkow and Shapiro (2008) overcome this identification challenge by exploiting the fact that during the 1940s and early 1950s TV licenses in the US were granted in waves: this allows the authors to find exogenous variation within the same cohort of students, years later, in the length of exposure to television. Gentzkow and Shapiro show that on average exposure to TV during the pre-school year did not have a negative effect on elementary school test scores. On the contrary, children whose native language was not English showed an *improvement* in their English test scores. This can be explained precisely through the time use channel discussed above. To the extent that the activities crowded out by television for these children were not intensive in the use of English (e.g., talking to their family members in another language, playing with children whose native language was not English), TV exposure actually helped improve these children’s command of the English language. This of course does not mean that television was overall useful, or that improvements in English translated to other subject areas (indeed, math scores were unaffected), but it clarifies that the effects of media exposure should always be assessed against the alternative use of time that individuals would make.

An example of how the latter point may translate into negative outcomes for society is given by Olken’s (2009) study of on social capital in Indonesia. In order to estimate the effect of the media on participation in social activities, the author exploits variation in the number of private TV channels during the 1990s and 2000s, as well as variation in signal

reception due to topography and other characteristics of the terrain (see the next section for a detailed explanation). He finds that villages where more TV channels were received had fewer social groups and lower participation in social activities. Of particular concern is the fact that, when disaggregating by type of group, the decrease in the number of groups and the lower attendance were registered not for religious groups, but for non-religious ones, such as rotating savings and credit associations. These associations serve an important role in developing country contexts, as they provide savings and insurance opportunities to their members, albeit in an informal way. The possibility that social isolation may result from greater TV exposure – a hypothesis originally advanced by Putnam (2000) in his famous “Bowling alone” book – thus bears significant economic, and not only social, consequences in developing countries. An important caveat then emerges regarding the opportunity to rely on television to convey educational messages, in contexts where this means of communication discourages social interaction.

3.2 Some new evidence

3.2.1 TV ownership and socioeconomic outcomes

As a complement to the empirical evidence reviewed above, I next analyze the relationship between exposure to television (proxied by TV ownership) and a number of socioeconomic outcomes using recent data for a large number of African countries. The data source used is the Demographic and Health Surveys (DHS), a series of nationally-representative surveys of women and men aged 15-49, and I use the latest round available for 21 countries.⁴ The advantage of using these data is that a key set of variables are defined consistently across surveys, which allows us to get a representative picture of the relationship of interest.

I estimate the following regression:

$$Y_{ic} = \alpha_c + \beta \cdot TV_{ic} + \gamma X_{ic} + \epsilon_{ic} \quad (5)$$

where i denotes the individual and c the country; α_c denotes country fixed effects; Y is a set of dependent variables including knowledge and behavior related to HIV-AIDS, fertility and contraceptive use, gender norms and domestic violence; TV is our key regressor of interest and is a dummy indicating whether the household where the individual lives owns a television. Control variables X include the age (and square) of the respondent, years of education, whether the respondent is in a union (married or living with a partner), current work status, household size, a continuous wealth index obtained through principal component analysis from durable

⁴The countries in the sample (and the years of the survey used) are: Benin (2011), Burkina Faso (2010), Cameroon (2011), Cote d’Ivoire (2011), Ethiopia (2011), Ghana (2008), Guinea (2012), Kenya (2008), Liberia (2013), Malawi (2010), Mali (2012), Mozambique (2011), Namibia (2013), Niger (2012), Nigeria (2013), Senegal (2010), Tanzania (2010), Uganda (2011), Zambia (2007), Zimbabwe (2010).

goods ownership and house characteristics, religion and urban status. Summary statistics for all variables are reported in Appendix Table A1. Unless otherwise stated, respondents are women, as this is the main sampling frame of the DHS. Equation (5) is estimated with OLS and standard errors are corrected for heteroskedasticity at the “cluster” level (which in rural areas typically coincides with a village). Results for dichotomous dependent variables are very similar when using Probit.

An important caveat about (5) is that the estimated parameter $\hat{\beta}$ should not be given a causal interpretation, because TV ownership may reflect unobserved household characteristics that are correlated with our outcomes of interest. In this respect, the following analysis is less compelling than the (better identified) case studies described above, but the goal is that of uncovering some interesting correlations in a large and comparable set of countries. This suggestive evidence can then serve as an indirect indication that some of the findings identified in the literature are not as context-specific as one may think. In the second part of this section I use a more rigorous identification strategy for one of the DHS surveys in the sample, to show that the results remain robust when exploiting exogenous sources of variation.

[Insert Table 1]

Table 1 reports estimates from a series of linear probability models that examine the relationship between TV ownership, knowledge and behaviors related to HIV. Column 1 shows that women living in households with a television are 0.7 percentage points more likely to have heard about AIDS. The effect is significant at the 1 percent level but small, since already 94 percent of the respondents without television have heard about AIDS. TV ownership is also positively associated with knowledge about drugs to avoid mother-to-child transmission during pregnancy (column 2) and with knowledge of a place where one can get tested (column 3). Most importantly, the greater awareness translates into actual behavior: column 4 shows that women exposed to TV are about 3 percentage points more likely to have tested for HIV, which represents roughly an 8 percent increase over the base mean for women without a TV.

Among the other controls listed in Table 1, age displays a positive (nonlinear) relationship with knowledge and HIV testing; education, working status, wealth and urban residence are also positively related to the various outcomes. Women who are married or living in a union also display more awareness, while the role of religion is heterogeneous. Compared to a residual category of animists and other religions, Christians are more aware of testing but less aware of mother-to-child transmission; Muslims are less aware of testing and less likely to have tested.

[Insert Table 2]

I next turn to fertility preferences and contraception. In column 1 of Table 2 the dependent variable is dummy taking value 1 if the woman wants to have another child (irrespective of the

timing), and zero otherwise. About 65 percent of the women in the sample report that they want another child, and TV ownership is not significantly associated with this preference. In column 2, instead, the dependent variable is an indicator for whether the husband wants more children than the wife. This variable is constructed comparing the number of children that the respondent wants to have with the number that her partner wants.⁵ The dependent variable in column 2 takes value 1 when the man wants strictly more children than the woman and 0 in all other cases. Exposure to TV decreases the likelihood that men want more children than their partners by 6.3 percentage points, a 13 percent decrease over the mean. This is an interesting result because it suggests that exposure to TV programs may reduce the gap in preferences between spouses, possibly leading to fewer births, as was the case in Brazil after exposure to small families in telenovelas. This interpretation is consistent with the results in column 3, where TV ownership is associated with 0.22 fewer births.⁶

In the last two columns of Table 2 we examine contraceptive use. Women who own a TV are 2.6 percentage points (or 15 percent) more likely to be currently using contraceptives. They are also 2 percentage points more likely to say that they used a condom during the last sexual intercourse. The latter effect is quite large, as it represents a 30 percent increase over the mean. It is also particularly interesting because condom use may reflect both reduced fertility preferences and greater awareness about the risks of unprotected sex in terms of HIV prevention.

[Insert Table 3]

The outcomes explored in Table 3 include a number of proxies for gender norms, including female autonomy, son preference, and experience or acceptability of domestic violence. In column 1 the outcome of interest is an indicator for whether the respondent is the main person who decides how the money she earns is spent. This variable is only defined for women who report that they are paid in cash for their work, and it is not significantly associated with TV ownership. In the next column the dependent variable is “Son preference”, an indicator for whether the respondent says that ideally she would like to have more sons than daughters. Also this variable is not significantly associated with TV ownership.

In the next three specifications the dependent variable is a dummy for whether the respondent has ever experienced emotional (column 3), sexual (column 4) or physical (column 5) violence. Based on DHS definitions, emotional violence comprises instances in which the spouse humiliated the respondent, threatened her with harm or insulted her/ made her feel bad. Sexual violence includes instances where the spouse physically forced the respondent to have sex or perform other sexual acts against her will. Finally, physical violence includes in-

⁵The number of observations in column 2 is lower because the outcome is only defined for couples where fertility preferences are recorded for both the man and the woman.

⁶Among the regressors in column 3 we do not include household size as it would be endogenous.

stances when the respondent was pushed, slapped, punched, kicked threatened with weapons, etc. As we can see from the table, the coefficient on the TV variable is negative in all cases, but it is only statistically significant for sexual violence. While these variables may suffer from problems of underreporting, it is interesting that the dimension most significantly correlated with TV exposure is sexual violence.

Columns 6 to 10 focus on attitudes towards, as opposed to actual experience of, domestic violence. The DHS include a number of questions on when wife beating may be justified, including instances when the wife goes out without telling her husband (column 6), argues with him (column 7), neglects the children (column 8), refuses to have sex with the husband (column 9), or burns the food (column 10). In all these cases, the coefficient on TV ownership is negative and significant at the 1 percent level, and the magnitude of the effect ranges between an 11 and a 15 percent decrease over the mean acceptability.

Overall, while difficult to interpret in a causal way, the results in tables 1 to 3 point to a systematic relationship between TV ownership and important socioeconomic outcomes, including knowledge and norms related to health, fertility and family relationships. To gain insight into the extent to which these correlations may be indicative of a causal effect of television on these outcomes, we turn to a more in depth analysis for one of the DHS included in the sample, i.e. the Nigerian Demographic and Health Survey (NDHS).

3.2.2 Signal strength and socioeconomic outcomes

While the decision to buy a television is likely correlated with household unobserved characteristics, one of the determinants of this decision is the availability of a strong enough TV signal to allow for good reception. The latter, in turn, depends on the location of TV antennas as well as on the topography of the territory. Following Olken (2009), I use the Irregular Terrain Model proposed by Hufford (2002) to calculate the signal loss between the location of the transmitters of the Nigerian Television Authority (NTA) –the biggest TV network in the country– and the location of the respondents of the 2008 NDHS. The location is approximated by the local government area (LGA) where the respondent lives.⁷ The underlying idea is that the rate at which the TV signal decays depends on the distance between the transmitter and the viewer, but also on the presence of mountains that may block the signal, the curvature of the surface, the frequency of the signal, etc. Inputting this information into ArcGIS software it is possible to calculate a predicted signal strength that should capture a plausibly exogenous component of TV exposure (conditional on geographic controls).

[Insert Figure 1]

⁷LGA's are local administrative units that are in charge of local public good provision and tax collection. Nigeria has 774 LGA's belonging to 36 states (plus the Federal Capital Territory of Abuja).

Figure 1 shows the variation in predicted signal strength across Nigerian LGA's. The red contours identify state borders. Darker colors represent better signal reception. As can be seen from the figure, although there is a geographic gradient, with Northwestern and Northeastern areas having relatively poorer reception, substantial variation remains within regions. I exploit this variation to estimate the following model:

$$Y_{igr} = \alpha_r + \beta \cdot TV\ signal_{gr} + \gamma X_{igr} + \delta Geo_{gr} + \epsilon_{igr} \quad (6)$$

where i denotes the individual, g the LGA, r the region. The variables Y and X are the same outcomes and controls introduced in (5); while α_r represents region fixed effects.⁸ $TV\ signal_{gr}$ is a continuous variable measuring signal strength and constructed as described above; it varies across LGA's, not individuals. To account for possible confounding effects of geography, which may correlate with signal strength, I control for some geographic variables (Geo_{gr}) including altitude, latitude and longitude. Estimation uses a linear probability model, correcting for heteroskedasticity at the "survey cluster" level. Results are largely unaffected with Probit estimates.

[Insert Table 4]

In table 4 I report estimates of the effect of signal strength on a number of outcomes. Each line in the table corresponds to a different dependent variable, and columns 1 and 2 report, respectively, the estimated coefficient and standard error of the variable $TV\ signal_{gr}$. The remaining controls (which are the same as in Tables 1, 2 and 3 plus geographic variables) are not shown for compactness.

The first block of outcomes related to HIV by and large confirms the results of the earlier analysis: improved TV signals are associated with better knowledge about drugs to avoid transmission during pregnancy and about a place to test. Actual behavior is also affected: a one standard deviation in signal strength increases the likelihood of having tested for HIV by 2 percentage points, which is a 13 percent increase over the mean. The only counterintuitive result here is the negative effect on the likelihood of having heard about AIDS.

When turning to fertility outcomes and contraception, we see that TV signal reception significantly reduces desired fertility for both women and for men: a one standard deviation increase leads to a reduction of approximately 2 percentage points in the likelihood that a woman wants more children, and that the husband wants more children than his wife. The number of births is also lower, though not significantly. The probability of having used a condom during the last intercourse increases by .5 percentage points for a one standard deviation increase in TV signal, which is roughly an 8 percent increase over the mean.

⁸Nigeria is divided into six regions: North West, North Central, North East, South East, South South, South West.

When analyzing gender norms, the coefficients of the proxies we used in the earlier analysis, i.e., whether the woman is the main decision-maker her salary, and whether she desires more sons than daughters, exhibit the expected signs but are not significant. On the other hand, two variables that are specific to and highly salient for Nigeria display large and significant effects. These variables relate to the practice of female genital cutting, which is quite widespread in our sample, as 45 percent of the (female) respondents are circumcised. A one standard deviation increase in signal strength reduces the likelihood of circumcision by 7.6 percentage points (a 17 percent decrease over the mean) and this effect is significant at the 1 percent level. The same increase in signal strength also significantly reduces the probability that a woman declares that she intends to have her daughter(s) circumcised, by 1.3 percentage points, which is 16 percent of the mean. These results are interesting because female genital cutting is a practice for which the modernizing effect of television may be particularly relevant in breaking away from tradition.

The last set of outcomes I consider are related to domestic violence. Here the effects of *TV signal* are qualitatively consistent with a reduction in domestic violence, but they are often insignificant and in one case the effect goes in the opposite direction. One possibility is that in the Nigerian context reporting bias may be particularly strong, and that the apparent positive effect of TV on the experience of sexual violence simply reflects an increased willingness to talk about it.

Overall both the analysis done with TV ownership and that performed with signal strength highlight a pattern of fairly systematic associations between health-related knowledge, fertility preferences and gender norms. This pattern is generated by exposure to commercial TV programs, without an explicit intention on behalf of the TV networks to affect these dimensions. The question to which I next turn is whether a deliberate focus on educational messages within entertainment programs may generate significant and long-lasting effects on these and other socioeconomic outcomes.

4 Educational Entertainment

4.1 Psychological foundations

Educational entertainment (EE, or *edutainment*) is “the process of purposely designing and implementing a media message to both entertain and educate, in order to increase audience members’ knowledge about an issue, create favorable attitudes, shift social norms, and change the overt behavior of individuals and communities” (Singhal and Rogers, 2004, p. 5). This definition clearly spells out the outcomes that EE strategies aim to affect: knowledge, individual attitudes, social norms, and ultimately behavior. To understand how such ambitious goals may be achieved, one needs to start from the psychological theories that inspired the first

edutainment productions.

The first pillar of EE is Albert Bandura's (1976) *social learning theory*. According to this theory individuals can learn from direct experience as well as from the experience of others. Media programs can exploit the reduced cost of learning from other's errors or accomplishments, and give individuals models that they can learn from at no personal cost.

The second pillar is the notion of *self-efficacy*, intended as the "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3) or, in other words, to exercise control on the factors that affect one's life. These beliefs are at the heart of individuals' motivation to set goals and strive to achieve them. By presenting models of characters who are similar to the target audience and who succeed in reaching their objectives, the media can induce individuals to perceive certain goals as attainable and can increase their motivation to act.

The application of these principles to EE productions was pioneered by Miguel Sabido (1981), a communication specialist and producer who in the 1970s worked for the Mexican network Televisa to produce several soap operas with social messages. The main feature of these productions, which still characterizes today's edutainment TV series, is the adoption of "differential modeling", whereby three types of characters –or models– are used to trigger social learning. The first type are *positive* models, who with their lifestyles portray virtuous behavior and get rewarded for their choices. The second type are *negative* models, who adopt detrimental behavior and serve as a clear indication of what the viewers should *not* do. Finally, the third and most important category is that of *transitional* models: these are individuals who during the course of the plot change their lifestyle and move from detrimental behaviors to virtuous ones. Transitional models are intended to be "inspirational" for the viewers, as they demonstrate that it is possible to change one's circumstances for the better.

In addition to role modeling, two key principles of edutainment are identification and exemplification. *Identification* consists in displaying situations and characters similar to the target audience, so that the latter can more easily adopt the perspective of the character and get absorbed in the storyline. This in turn reduces resistance (or "counterarguing") to the educational messages contained in the program and facilitates persuasion (Moyer-Guse, 2008). *Exemplification* requires that practical ways to deal with problems and to reach intended goals are shown in the story, to make it easier for viewers to follow the example without feeling overwhelmed. This is especially important when the content of the program intends to challenge established norms: in this case the characters act as "vicarious motivators" who show effective strategies for reacting to inequities and improving one's condition.

4.2 Existing evidence

The first EE soap opera is usually considered *Simplemente Maria* (“Simply Mary”), a Peruvian telenovela broadcast in 1969 featuring a maid who starts as a single mother who struggles to make a living, and then learns to sew and becomes a successful fashion designer. Although *Simplemente Maria* was a purely commercial production, the show had the unintended effect of spurring interest in sewing and adult literacy classes. Inspired by this success, Miguel Sabido worked with Televisa to systematically tackle a number of social problems through edutainment productions. His first EE telenovela, *Ven Conmigo* (“Come With Me”) was designed to improve education and motivate adults to register for literacy classes. *Acompáñame* (“Accompany Me”) targeted family planning, showing how families could be in harmony when planning their size. Both productions were considered a huge success, on the basis of ex post changes in contraceptive sales, visits to family planning clinics, and enrollment in adult literacy classes.

Major TV series later started to introduce subplots on specific health or social issues. For example, in 2001 the soap opera *The Bold and The Beautiful* introduced a one week-long subplot about HIV, giving information about channels of transmissions and prevention, and providing a toll free number at the end of the episodes that viewers could call if they needed help or more information. A spike in the number of calls received by this hotline was regarded as evidence of the positive impact of the program (Kennedy et al., 2004).

While this anecdotal or descriptive evidence has motivated practitioners’ interest in edutainment for many years, only recently social scientists have started to apply rigorous impact evaluation methods to estimate the impact of edutainment productions on relevant outcomes. Here I briefly discuss a few studies that yield particularly useful insights for development policy, following the same scheme used for the evidence on commercial television, i.e., grouping papers according to the main channel of influence (information, preferences or time use).

Information

One of the clearest examples of how edutainment can be used to provide information is in the area of financial literacy. Making financial decisions can be challenging, especially for individuals with low socioeconomic status. This has generated a growing interest in financial literacy programs, which however have had mixed success (see Hastings, Madrian and Skimmyhorn (2013) for a review). Embedding financial information into entertainment programs can be an innovative way of tackling the problem.

In a recent project, Berg and Zia (2013) teamed up with the National Debt Mediation Association (NDMA) in South Africa to design content that could be incorporated into the main plot of the popular soap opera *Scandal!*. At the time of the experiment, *Scandal!* had been running for eight years, with four weekly episodes. For a period of two months, the authors introduced a sub-plot featuring a woman who was over-borrowing through hire-purchase contracts, then gambling in an attempt to recover money, and falling into a debt trap. Eventually

the character sought help from NDMA and learnt how to manage her finances in a responsible way. The goal was to use this ‘role model’ to convey information on the consequences of financially irresponsible behavior, and practically show how to get out of debt. To empirically estimate the effects of this intervention, the main challenge was self-selection of the viewers into watching this soap opera –or specific episodes of it. Berg and Zia overcome this challenge using a symmetric encouragement design. A sample of just over 1,000 individuals was randomly allocated to treatment or control: individuals in the treatment group were assigned to watch *Scandal!*, while individuals in the control group were assigned to another soap opera that was showing at the same time as *Scandal!*. In order to induce individuals to watch the soap opera to which they were assigned, financial incentives were given: participants were told they would receive phone calls three to four times a week to answer questions about the soap opera; beyond a certain number of correct answers they would receive a monetary payment. During the calls also questions about financial knowledge were asked, in addition to a follow up questionnaire three months after the end of the treatment.

The results were quite interesting. The treatment significantly improved content-specific financial literacy (e.g., knowledge of hire purchase agreements), while it did not affect general financial literacy, consistent with the fact that the plot had focused on very specific issues related to debt. Also, the treatment reduced the use of hire-purchase by 20 percent and the incidence of gambling by 17 percent, and these effects were larger for respondents with low ex-ante financial literacy and education. The treatment also induced a significant shift in borrowing sources, with an increase in loans taken from formal banks. Some mixed evidence emerged with respect to reliance on NDMA. While in the short run the number of calls to an NDMA hotline increased, and respondents reported the intention to seek financial advice from formal sources, this effect disappeared after four months. Focus groups conducted by the authors revealed that a possible reason may have been the lack of emotional connections with the character acting as the NDMA agent, who was not part of the main plot.

Another very useful example of the effectiveness of entertainment television for providing information is the study by Dutta, Murgai, Ravallion, and van de Walle (forthcoming). The starting point for their intervention was low take-up of the National Rural Employment Guarantee Scheme (NREGS) in the state of Bihar, India. NREGS is the largest anti-poverty program in India, and it offers up to 100 days of work per year at the minimum wage to adult members of rural households. Workers are employed in unskilled manual tasks, mostly on local infrastructure projects. Despite being one of the poorest states in India, Bihar had a particularly low take-up of NREGS until very recently. Corruption and leakages did not seem to be entirely responsible for this phenomenon, hence it appeared that potential beneficiaries were misinformed about the rules and the benefits of the program. To remedy this information failure, Dutta et al. designed an edutainment intervention in the form of a 25 minutes movie. The movie tells the story of a temporary migrant who goes back to his village to see his family,

learns that he can work there through NREGS even though it is the lean season, and takes this opportunity to remain with his family instead of going back to the city. The goal of the intervention was to provide information on how the scheme works, who can participate and how to go about participating, and to do so not through a ‘dry’ and detached set of explanations, but rather through the life of a character with whom viewers could easily identify.

To estimate the impact of this EE intervention, Dutta et al. randomly assigned a sample of 40 villages to public screenings of the movie, and another 110 villages to a control group. They then conducted a follow-up survey in the same villages two to four months after the project. The results were to some extent unexpected. While there was a positive and significant impact on knowledge about the scheme (e.g., how many days one could work, wage level, etc.) and on perceptions that NREGS had increased employment and reduced out-migration, there was no impact on *actual* participation in the program, neither on the extensive nor on the intensive margin. The effect was also null on the number of work sites that opened in the village to offer work through NREGS. The authors explain these null effects as driven by lack of adjustment on the supply side, but this then raises the question of why informed villagers did not hold local authorities accountable demanding the creation of jobs. A possible answer lies in the discrepancy between individual and collective beliefs, and in the reluctance of individual respondents to take action in the absence of signals that other villagers would coordinate in the same direction. I return to this point in the next section, when discussing open questions on the scope for EE interventions.

Another result of the study by Dutta et al. which helps illustrate potential limitations of EE strategies is that awareness about entitlements was significantly improved for men, but treated women were actually *less* likely to report that NREGS could offer work to women. This is possibly due to the fact that the main character in the movie was a man, and hence treated women may have anchored their beliefs to what they saw on screen.

The state of Bihar has also been home to a recent edutainment experiment conducted by Banerjee, Barnhardt and Duflo (2015). These authors explore a variety of marketing solutions to increase consumption of double-fortified salt (DFS) as a remedy to widespread anemia.⁹ One of the solutions explored is a 26 minute movie shown during the intermission of a popular classic movie. The short EE production is modeled on local sitcoms and is meant to be entertaining, telling the story of a physically weak and not too tall man who would like his son to be strong. A nurse convinces his pregnant wife that DFS is important if she wants a healthy baby, and after initial resistance the man is convinced too. To estimate the impact of this intervention, Banerjee et al. randomly assigned 64 out of 200 villages to public screenings of the movie, and also experimented with a ‘pure information’ treatment arm in which households were given flyers informing about where DFS could be found. The results were quite striking: the EE movie increased take-up by 57 percent, and this was not simply a short run effect but it

⁹DFS is salt fortified with iron and iodine.

persisted until 7 to 16 months after the movie was shown. This outcome is even more striking given that it is estimated that only about 15 percent of the village population saw the movie. On the other hand, the flyer distribution had no effect on DFS consumption, suggesting that the lack of information that was initially responsible for low take-up was not about availability, but rather about the benefits and social acceptability of the new product.

As a last example of health-related information conveyed through an EE program, it is useful to consider one of the earliest edutainment productions in Africa: the radio soap opera *Twende na Wakati* (“Let’s Go with the Times”) aired in Tanzania twice a week from 1993 to 1999. This soap mostly conveyed information on HIV (transmission channels, how to prevent it, consequences of infection), together with broader messages on family planning and gender equality. Vaughan, Rogers, Singhal and Swalehe (2000) evaluate the effects of this program, exploiting the fact that one of the regions did not transmit it during the first two years. They find that the soap contributed to increasing knowledge about HIV and sexually responsible behavior (e.g., by inducing listeners to have fewer sexual partners and to use condoms).

Preferences

While information provision is an important element of edutainment, the greatest challenge (and the greatest potential) for this type of interventions lies in the ability to change people’s preferences and induce desired behaviors through conformity to positive role models. Two very recent studies explore this question from a novel angle, that is, whether media programs can be used to increase the aspirations of the poor. This focus is motivated by recent theories that highlight the potential for an “aspirations trap”: the poor may lack the “capacity to aspire”, perceiving certain goals as beyond their reach, hence they may not invest towards those goals and this in turn perpetuates their state of poverty (e.g., Genicot and Ray, 2015; Dalton et al., forthcoming). Interventions capable of changing people’s mental models about their opportunities and ways to achieve them are thus important to break these poverty traps.

Bernard, Dercon, Orkin and Taffesse (2014) implemented one such intervention in remote areas of rural Ethiopia. The authors prepared four short documentaries of 15 minutes each, in which people with a similar background to the target audience were telling stories about their lives. In particular, these people represented success stories of individuals who had set certain goals, worked hard to achieve them, and now were successful and satisfied with their lives. In the terminology of Alfred Bandura, the people in the documentaries constitute “vicarious motivators” who allow the viewers to experience what their lives could be like if they dared to ‘aspire’. The sample of this study includes just over 2,000 individuals and the evaluation design involves within-village randomization into three arms: a treatment arm where households were invited to watch the inspirational videos; a placebo arm where households were invited to watch a sitcom about rural life; and a pure control group.

The authors find significant effects of the intervention on aspirations and related psychological measures (e.g., the locus of control). This effect is sizeable immediately after the screenings

and persists after six months, albeit decreasing in magnitude. Most of the effect is driven by changes in parents' aspirations about their children's education, and indeed it translates into higher spending on children's education and an increase in enrolment of about 20 percent. This is all the more interesting as the documentaries did not explicitly stress formal education as an input into success: it is therefore plausible that the new mindset generated by exposure to the documentaries may have expanded people's aspirations beyond what they were concretely seeing.

A related experiment was conducted by Bjorvatn, Cappelen, Helgesson Sekeiz, Sørensen and Tungodden (2015) to test if EE programs could be used to foster entrepreneurship in Tanzania. The authors evaluate the edutainment show *Ruka Juu* ("Jump Up"), which was broadcast weekly on Tanzanian TV for eleven weeks during 2011. The show portrayed the lives of six young entrepreneurs, men and women, and included themes related to entrepreneurship, business skills and financial literacy. Working with about 2,000 students from 43 secondary schools in Dar es Salaam, Bjorvatn et al. implemented a randomized encouragement design: 21 schools were incentivized to watch *Ruka Juu* and the remaining 22 to watch a weekend movie. They then collected data on a wide set of outcomes both in the short run and in the long run, i.e., two years after the show. They found positive effects on entrepreneurial traits and occupational choice both in the short and in the long run. In particular, the show increased aspirations, inducing an increased ambition to become entrepreneurs and an increase in entrepreneurial traits measured through lab experiments: two years after the end of the show, treated individuals were 30 percent more likely to have started a business. This effect is not linked to increases in business knowledge, as the authors do not find consistent impacts on this dimension. An unintended effect of the program was the fact that it led to lower investment in education: treated students had higher failure rates in the final school exam, and fewer of them went on to study beyond secondary school. The authors discuss this result in the context of the perceived generally poor quality of secondary education in Tanzania, but also express the caveat that the relative emphasis on work of the show may have induced incorrect beliefs regarding the importance of education.

It is useful to contrast the results in Bjorvatn et al. (2015) with those in Bernard et al. (2014). In both cases the videos that were screened were showing success stories somewhat related to entrepreneurial activities (though with different emphasis), and in neither case there was explicit reference to education. Yet Bernard et al. find increased investment in children's education in response to the treatment, while Bjorvatn et al. find reduced educational performance for high school students. One possible interpretation is that the key decision makers in the two cases belonged to very different demographic groups: in Bjorvatn et al. it was the teenagers themselves, who may have been relatively myopic in reading the messages of the videos, while in Bernard et al. the audience was constituted by parents, who probably had more long term horizons.

Less related to aspirations and more related to social norms is the work by Paluck (2009) and Paluck and Green (2009), who investigate whether edutainment programs can help changing perceived norms. The context of study is Rwanda, a country where beliefs regarding the origin of violence and norms of trust and cooperation have been deeply affected by the genocide. The authors evaluate the impact of the radio soap opera *Musekweya* (“New Dawn”), which contained messages on the risks of blindly obeying authority and the importance of maintaining one’s independent judgment, as well as content on the origins of violence and how to avoid it. The evaluation strategy is a randomized experiment where some villages were assigned to collective sessions for listening to *Musekweya* and other villages were assigned to a placebo soap opera about HIV. The outcomes of interest include beliefs, ‘descriptive’ social norms (i.e., how people behave) and ‘prescriptive’ social norms (i.e., how people should behave). No impact was found on beliefs regarding the origins of violence and the nature of trauma. The effects of the soap opera were instead significant on prescriptive norms: listeners were more likely to state that intermarriage between ethnic groups should be allowed, that one should feel free to dissent, talk about trauma, and trust others. On the other hand, the program did not significantly alter *descriptive* norms, in the sense that the perceived incidence of mistrust remained the same as in the control communities. This result brings back the issue of coordination and collective action mentioned when discussing entitlements to public work in India, which I address in section 4.3.

Time use

The last channel of influence for EE programs that I consider is time use. Compared to the other two channels, this is relatively less important for edutainment because, contrary to commercial media programs, the emphasis here is on content, hence on direct manipulation of information and preferences. For this reason there is considerably less evidence that allows to assess what types of activities edutainment programs may crowd out and the relative benefits of watching or listening to these programs as compared to doing something else.

One study that could be read in this light, albeit not from a developing country, is the recent paper by Kearney and Levine (2015) on the effects of *Sesame Street* on labor market outcomes. *Sesame Street* can be considered one of the first edutainment programs, as since the 1970s it was broadcast with the objective of providing preschool training and reducing the gap between disadvantaged children and others in terms of grade readiness. To estimate the impact of the show, Kearney and Levine exploit supply constraints (specifically related to UHF technology) that initially limited access to the show to about two thirds of the US population. Using a difference-in-differences strategy across counties and cohorts they find that children who had access to the show had better school outcomes in terms of grade retention, while the effect on high school graduation, employment and wages was either insignificant or small. In other words, in the short run *Sesame Street* achieved the objective of improving school readiness, possibly by substituting children’s play time with more structured content:

curriculum-based segments were separated by puppet scenes, music and short videos, so as to retain the attention of young children, even those with low attention span. In terms of time use, while the show plausibly crowded out interaction with other children or adults, it did so for a limited amount of time and -most importantly- it focused on cognitive and affective goals (e.g., attention, self-esteem, but also dealing with different opinions through small fights and reconciliations among Sesame Street characters)- that may have been less emphasized in the children’s alternative use of time.

4.3 Open questions and way forward

The evidence surveyed so far suggests that educational entertainment constitutes a promising avenue for policymakers to reach a broad audience in a cost-effective way. A number of open questions remain, though, related to the mechanisms through which edutainment operates, the time dimension, the definition of content, and unintended effects. I address them in order.

Mechanisms

One of the distinctions I made in the framework of analysis was between the role of media programs as providers of information and their effect on preferences. Whether one or the other prevails matters for the design of edutainment programs: a preponderant informational role would suggest to incorporate relatively detailed and precise information. It would also suggest heterogeneous impacts of the program depending on the ex ante knowledge of the users, with the prediction (in a Bayesian setting) that the impact of edutainment should be strongest in settings where people were less informed about a certain topic to start with. On the other hand, a predominant role of preference change would call for emphasis on elements that are not pure information, such as the creation of characters and environments with whom the viewers can identify and empathize. In this view, the accurateness of the information may be sacrificed in favor of content that helps the target users feel ‘transported’ in the plot. Very little can be learnt from the existing studies on the relative importance of these two channels because separately identifying them is empirically very challenging due to lack of adequate experiments. More work on disentangling these aspects is needed in order to properly design edutainment programs.

Another issue on which the existing evidence is relatively silent is the role of beliefs and coordination in strategic interaction settings. When one of the goals of an educational media program is to foster collective action or to change an inefficient social norm, targeting beliefs at the individual level may not be enough. For example, I may learn from a soap opera that it is wrong to pay bribes to obtain a service, but if I expect that everyone else around me will continue to pay bribes, my behavior may be unaffected by the educational message simply because I do not want to be the only person left without the service. In these cases, the edutainment program should be capable at the same time of convincing the individual about

the importance of a certain behavior, and generating the conviction that other people will adjust their behavior. Going back to the studies by Dutta et al. (forthcoming) and Paluck (2009) cited above, one may conjecture that the reason why actual usage of NREGS did not increase in Bihar or perceived trust did not increase in Rwanda is that those edutainment interventions did not successfully shift expectations that other viewers or listeners would adjust their behavior. Of course this is only a conjecture, and the design of the above evaluations does not allow to test this hypothesis. An attempt in this direction is made in ongoing work by Banerjee, La Ferrara and Orozco (2015), who evaluate the effectiveness of the edutainment TV series *Shuga 3* produced by MTV for changing gender norms and reducing risky sexual behavior and domestic violence in Nigeria. The design of this randomized evaluation explicitly creates variation in expectations about other people’s behavior and in the size of one’s reference group exposed to the program to estimate the role of coordination and the extent of spillovers.

Time

Open questions related to time concern at least two aspects. The first is the duration of the program. Virtually all of the edutainment interventions on which we have experimental evidence involve a single movie or a limited number of episodes. This is typically dictated by methodological constraints, first of all the attempt to avoid contamination and be able to attribute the measured effects to the intervention itself as opposed to confounding factors. However, this also means that we know relatively little from rigorous studies about how long an EE program should run for. We also do not know at what frequency exposure to the program should be provided. Information may be easily forgotten and emotional connections with the story may become too tenuous if the episodes are spaced too much. At the same time, concentrating the various episodes in a short time span may have disadvantages as it takes time to learn and -even more- to change one’s preferences.

A second dimension along which time matters is the duration of the effects of EE interventions. Finding large effects immediately after an edutainment program may be of limited policy interest if these effects are not persistent. Most of the evaluations from which we can identify long term effects (surveyed in section 3) involve commercial TV programs and not edutainment. In fact, the typical time horizon of the edutainment evaluations surveyed above is between one and six months. Two exceptions are Kearney and Levine’s (2015) evaluation of Sesame Street and Bjorvatn et al.’s (2015) intervention on entrepreneurship in Tanzania. The fact that the long run evidence on commercial television is mostly identified off variation in geographic features or staggered entry of TV networks’ across areas, while the most recent evidence on EE programs in developing countries comes from randomized evaluations makes it non-trivial to account for differences in time span and external validity. Follow-up studies of randomized EE interventions would be particularly useful to understand whether the benefits of educational entertainment are long-lasting.

Content

Another crucial set of open questions relates to the content of EE programs. One is the relative balance of educational and entertainment material within a program. This question could be seen as somewhat analogous to the strategies of product placement used in advertising, where characters in a show or a movie are portrayed as consuming a certain product, but the strategy works better the less obvious the advertising function is. Research on commercial advertising also shows that too much repetition can be counterproductive (Pechmann and Stewart, 1988). In the case of edutainment, overt educational messages may generate resistance on behalf of the viewers, either in the form of explicit opposition (‘counterarguing’) or because the viewer gets tired. At the same time, a relative preponderance of entertainment material risks compromising the educational goals of the program, e.g., how much intrigue, betrayal and gossip are we willing to tolerate in a soap opera to get across health related messages?

A second aspect related to content concerns the dynamics of social change. Among the objectives of EE interventions is often that of changing deeply rooted values or norms. This was the case, for example, in the work by Paluck (2009) and Paluck and Green (2009). But accomplishing this is not a trivial task: challenging existing norms too explicitly may render the target recipients of the message defensive and undermine the educational effort. A right balance between ‘new’ and ‘traditional’ norms may be needed to make social change acceptable. This balance may be highly context-specific and, without experimentation with alternative modes of delivering the message, it is difficult to understand the optimal degree of disconnect from tradition.

More generally, the few existing experimental evaluations of EE programs find effects on different dimensions. In some cases (e.g., Dutta et al., forthcoming) an impact is found on beliefs but not on behavior; in other cases (e.g., Paluck, 2009) no impact is found on beliefs, but an impact is found on social norms. What underlies these differences it difficult to assess, given the variation in context, type of program, focus of the message. Holding constant these contextual factors and experimentally manipulating the content of EE programs seems important to learn how to deliver the desired message.

Unintended effects

Related to the aspect of content are the potential unintended effects of edutainment programs. The first is a consequence of the fact that the coverage of educational aspects is by necessity limited and possibly partial. This originates in the need to not overload the public with educational material and maintain the entertainment aspect, but it can have important consequences. Two examples come from the literature reviewed above. The edutainment movie shown by Bjorvatn et al. (2015) focused on success stories on young entrepreneurs but was silent on the role that education played in this success. As a result, while the intervention was effective in increasing entrepreneurship, it also led to worse educational outcomes for treated individuals, who may have perceived the education component as unimportant in those success stories. A second example comes from the work of Dutta et al. (forthcoming). The short

movie they screened to inform communities about the availability of the NREGS program featured as main character a male migrant. NREGS is designed to provide work for both men and women, and this is mentioned in the movie, but the fact that only a male character is shown getting work may have induced the false belief that the program was targeting men more than women. In fact, Dutta et al. find that women in treated villages were significantly less likely to say that NREGS could provide work for women compared to women in control villages. In settings where the information to deliver is relatively complex, edutainment programs cannot be trusted as the sole source of information and should be complemented with other approaches, in order to avoid the risk of inducing wrong beliefs simply due to the partial information contained in the EE program.

A different, more serious unintended effect can be the instrumental manipulation of content for propaganda purposes. This risk is particularly serious in countries with weak institutions. A notorious example of the instrumental use of the entertainment industry for propaganda purposes comes from North Korea, where Kim Jong-Il used movies to shape his image as a supernatural leader and to discredit foreigners. This strategy was so important for him that in 1978 he ordered the kidnapping of a famous South Korean actress and her film director and forced them to make inspirational movies for his nation. Citizens were obliged to go to the movies, and in villages that did not have theatres, movie screenings were done in factories or public buildings, often followed by speeches by party leaders (Fischer, 2015). Other examples of instrumental use of the media, notably radio, for propaganda purposes include Rwanda (Yanagizawa, 2014) and Serbia (DellaVigna et al., forthcoming). While the potential for manipulation is not specific of edutainment programs, one may be concerned that the possibility of marketing state intervention in programming as ‘educational’ may offer political elites an easy way to distort information. The question of the boundaries between what is educational and what is ideological is probably the most sensitive ethical issue that the edutainment agenda faces.

5 Conclusions

This paper has argued that mass media have the power to convey not only political information, but also values and modes of behavior that generate profound changes in development outcomes. These outcomes include family preferences and health, education and occupational choice, gender norms and social capital. While many examples of this impact come from commercial television or radio programs that do not have explicit educational purposes, researchers and policymakers are increasingly resorting to combining education and entertainment into so-called ‘edutainment’ productions. This can be an effective way of reaching a vast number of people at relatively low cost, with the goal of communicating socially and economically desirable behaviors. The relative scarcity of rigorous empirical evaluations of edutainment in-

terventions implies that there are still a number of open questions on how to adapt this strategy to different environmental conditions, and how to properly design content to avoid unintended effects. The open questions are bound to become even more as markets become saturated with media and new media substitute the traditional television and radio also in developing countries, as it is happening in high-income ones. In fact, some of the main contributors to the edutainment debate have started discussing how to exploit the digital revolution to reach new segments of the public (Singhal, 2013). In all cases, edutainment interventions should be seen as complements, not substitutes, to other forms of development policy. Overall an exciting agenda lies ahead, where the tools of economists, social psychologists and communication experts can be combined to progressively transform society.

6 References

References

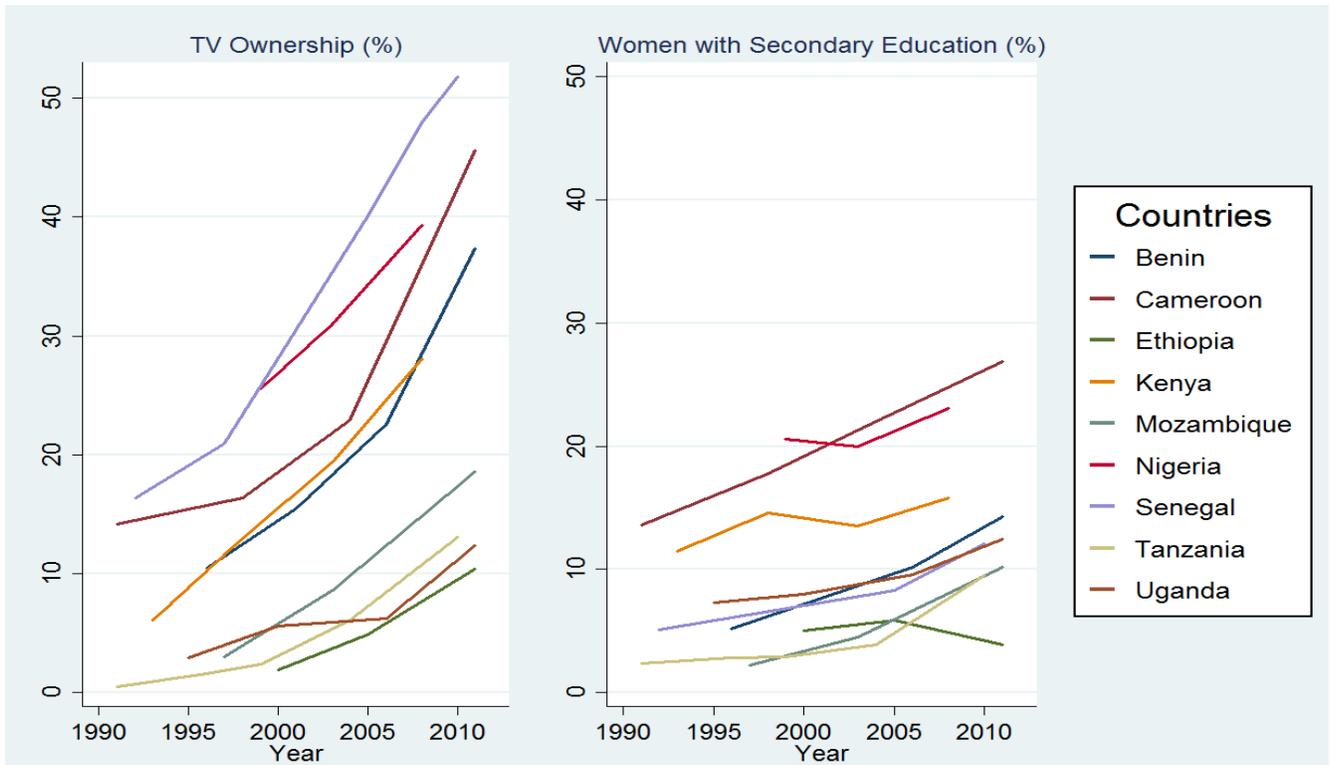
- [1] Bandura, A. (1976). *Social Learning Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- [2] Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. New York: Freeman.
- [3] Banerjee, A., S. Barnhardt and E. Duflo (2015), “Movies, Margins and Marketing: Encouraging the Adoption of Iron-Fortified Salt”, in D. Wise (ed.), *Insights in the Economics of Aging*, NBER.
- [4] Banerjee, A., E. La Ferrara and V. Orozco (2015), “Changing norms and behavior of young people in Nigeria: An evaluation of entertainment TV”, mimeo, Bocconi University.
- [5] Berg, G., and Zia, B. (2013). “Harnessing Emotional Connections to Improve Financial Decisions: Evaluating the Impact of Financial Education in Mainstream Media.” World Bank Policy Research Working Paper No. 6407.
- [6] Bernard, T., S. Dercon, K. Orkin, and A. S. Taffesse (2014), “The Future in Mind: Aspirations and Forward-Looking Behaviour in Rural Ethiopia”, CSAE Working Paper WPS/2014-16.
- [7] Bjorvatn, K., A. Cappelen, L. Helgesson Sekeiz, E. Sørensen, B. Tungodden (2015), “Teaching through television: Experimental evidence on entrepreneurship education in Tanzania”, mimeo, NHH Norwegian School of Economics.
- [8] Braga, M. (2007). “Dreaming Another Life: The Role of Foreign Media in Migration Decision – Evidence from Albania.” World Bank Working Paper.
- [9] Cheung, M. (2012). “Edutainment Radio, Women’s Status and Primary School Participation: Evidence from Cambodia”. Stockholm University, Working Paper.
- [10] Chong, A. and La Ferrara, E. (2009). “Television and Divorce: Evidence from Brazilian Novelas” *Journal of the European Economic Association: Papers & Proceedings* 7(2-3), 458-468.
- [11] Dahl, G. and DellaVigna, S. (2009). “Does Movie Violence Increase Violent Crime? ” *Quarterly Journal of Economics* 124(2), 677-734.
- [12] Dalton, P., S. Ghosal and A. Mani (forthcoming), “Poverty and aspirations failure”, *The Economic Journal*.

- [13] DellaVigna, S., and Gentzkow, M. (2010). “Persuasion: Empirical Evidence”, *Annual Review of Economics*, 2, 643-669.
- [14] DellaVigna, S., and E. La Ferrara (2015). “Economic and Social Impacts of the Media”, in Anderson, S., Strömberg, D., and Waldfogel, J. (eds.), *Handbook of Media Economics*, vol. 1. North-Holland, Amsterdam.
- [15] DellaVigna, S., R. Enikolopov, V. Mironova, M. Petrova and E. Zhuravskaya (forthcoming), “Cross-border Media and Nationalism: Evidence from Serbian Radio in Croatia”, *AEJ: Applied Economics*.
- [16] Dutta, P., Ravallion, M., Murgai, R., and van de Walle, D. (forthcoming). “Empowering Poor People through Public Information? Lessons from a Movie in Rural India”, *Journal of Public Economics*.
- [17] Farré, L., and Fasani, F. (2013). “Media Exposure and Internal Migration — Evidence from Indonesia.” *Journal of Development Economics* 102(C), 48-61.
- [18] Fischer, P. (2015). *A Kim Jong-Il Production: The Extraordinary True Story of a Kidnapped Filmmaker, His Star Actress, and a Young Dictator’s Rise to Power*. Flatiron Books.
- [19] Genicot, G. and D. Ray (2015), “Aspirations and Inequality”, mimeo, Georgetown University and NYU.
- [20] Gentzkow, M., and Shapiro, J.M. (2008). “Preschool Television Viewing and Adolescent Test Scores Historical Evidence from the Coleman Study.” *Quarterly Journal of Economics* 123(1), 279-323.
- [21] Hastings, J., B. Madrian and W. Skimmyhorn (2013). “Financial Literacy, Financial Education and Economic Outcomes.” *Annual Review of Economics*, January.
- [22] Hufford, G. (2002) *The ITS Irregular Terrain Model, Version 1.2.2: The Algorithm*. Institute for Telecommunication Sciences, National Telecommunications and Information Administration. <http://www.its.bldrdoc.gov/media/50674/itm.pdf>.
- [23] Jensen, R., and Oster, E. (2009). “The Power of TV: Cable Television and Women’s Status in India.” *The Quarterly Journal of Economics* 124(3), 1057-1094.
- [24] Kearney, M.S., and Levine, P.B. (2014). “Media Influences on Social Outcomes: The Impact of MTV’s 16 and Pregnant on Teen Childbearing.” NBER Working Paper No. 19795.

- [25] Kearney, M.S., and Levine, P.B. (2015). “Early Childhood Education by MOOC: Lessons from Sesame Street”. NBER Working Paper No. 21229.
- [26] Keefer, P., and Khemani, S. (2011). “Mass Media and Public Services: The Effects of Radio Access on Public Education in Benin.” Policy Research Working Paper Series 5559, The World Bank.
- [27] Kennedy, M. G., O’Leary, A., Beck, V., Pollard, W. E., and Simpson, P. (2004). “Increases in Calls to The CDC National STD and AIDS Hotline Following AIDS-related Episodes in a Soap Opera.” *Journal of Communication* 54(2), 287-301.
- [28] La Ferrara, E., Chong, A., and Duryea, S. (2012). “Soap Operas and Fertility: Evidence from Brazil.” *American Economic Journal: Applied Economics* 4(4), 1-31.
- [29] Moyer-Guse, E. (2008). “Toward a Theory of Entertainment Persuasion: Explaining the Persuasive Effects of Entertainment-Education Messages.” *Communication Theory*, 18 (3), 407–25.
- [30] Olken (2009). “Do TV and Radio Destroy Social Capital? Evidence from Indonesian Villages.” *American Economic Journal: Applied Economics* 1(4), 1-33.
- [31] Paluck, E.L. (2009), “Reducing intergroup prejudice and conflict using the media: A field experiment in Rwanda”, *Journal of Personality and Social Psychology*, 96, 574-587.
- [32] Paluck, E.L., and Green, D.P. (2009). “Deference, Dissent, and Dispute Resolution: A Field Experiment on a Mass Media Intervention in Rwanda.” *American Political Science Review* 103(4), 622-644.
- [33] Pechmann, C. and D. Stewart (1988), “A Critical Review of Wearin and Wearout”. *Current Issues and Research in Advertising*, 11, 285-330.
- [34] Putnam. (2000). *Bowling Alone: The Collapse and Revival of American Community*.
- [35] Sabido, M. (1981), *Towards the Social Use of Soap Operas*. Mexico City: Institute for Communication Research.
- [36] Singhal, A. (2013). “Fairy tale to digital games: the rising tide of edutainment education,” *Critical Arts: South-North Cultural and Media Studies*, 27(1): 1–8.
- [37] Singhal, A. and E. Rogers (2004), “The Status of Entertainment Education Worldwide”, in A. Singhal, M. Cody, E. Rogers and M. Sabido (eds.), *Entertainment-Education and Social Change*, Routledge, ch. 1.

- [38] Vaughan, P., Rogers, E., Singhal, A., and Swalehe, R. (2000). “Entertainment-education and HIV/AIDS Prevention: A Field Experiment in Tanzania.” *Journal of Health Communications* 5(1), 81-100.
- [39] Zavodny, M. (2006). “Does Watching Television Rot Your Mind? Estimates of The Effect on Test Scores”. *Economics of Education Review* 25(5), 565-573.

Figures and Tables



Source: Author's calculations on DHS data

Figure 1: Tv ownership and secondary education, 1990-2010

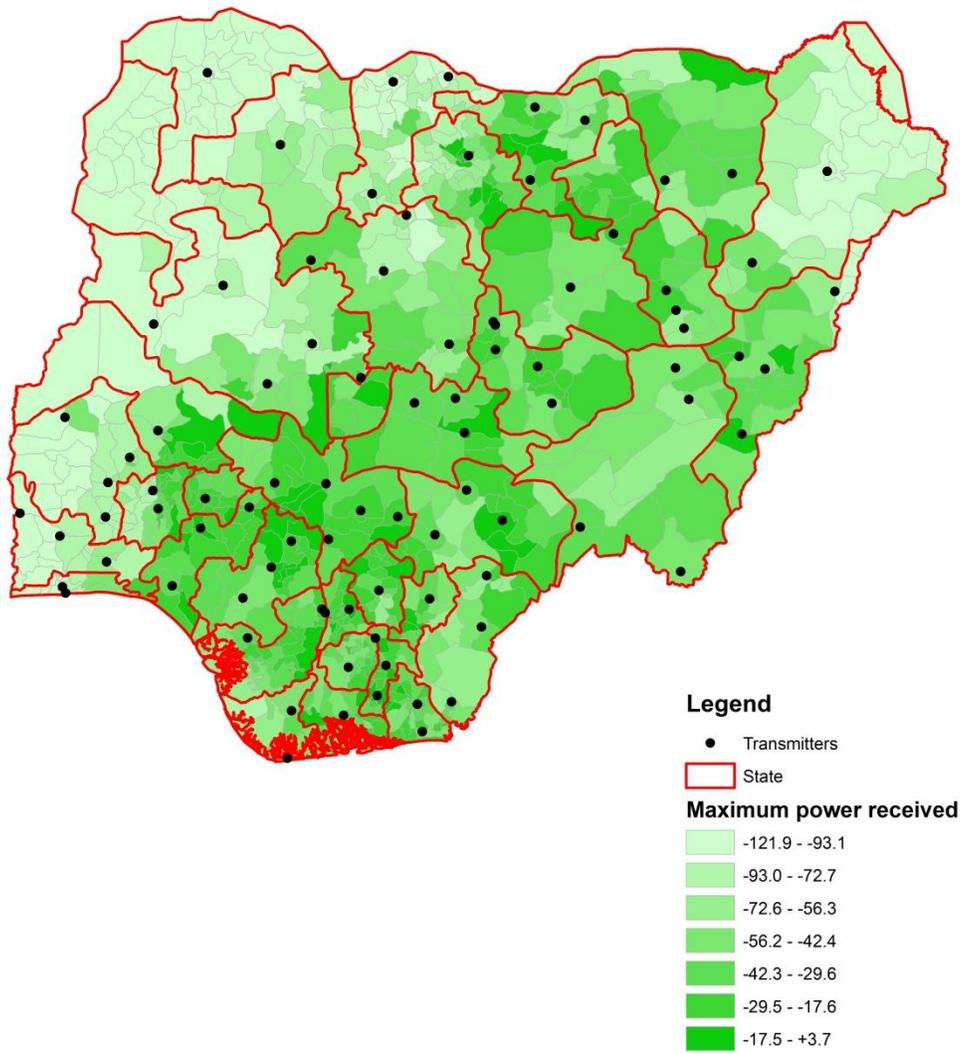


Figure 2: TV signal strength across Nigerian LGA's

Table 1: TV ownership and knowledge about HIV

<i>Dependent variable:</i>	<i>Heard about AIDS</i>	<i>Know drugs to avoid transmission during pregnancy</i>	<i>Know a place to test</i>	<i>Ever tested for AIDS</i>
	(1)	(2)	(3)	(4)
TV owner	0.0074*** (0.0020)	0.0263*** (0.0035)	0.0380*** (0.0038)	0.0293*** (0.0037)
Age	0.0045*** (0.0004)	0.0133*** (0.0009)	0.0296*** (0.0009)	0.0634*** (0.0010)
Age sq. ^(a)	-0.0628*** (0.0068)	-0.2021*** (0.0143)	-0.4519*** (0.0141)	-0.9912*** (0.0154)
Education (yrs)	0.0051*** (0.0003)	0.0076*** (0.0004)	0.0208*** (0.0004)	0.0235*** (0.0004)
In union	0.0017 (0.0014)	0.0075*** (0.0027)	0.0260*** (0.0028)	0.1243*** -0.0034
Working	0.0135*** (0.0020)	0.0122*** (0.0032)	0.0345*** (0.0033)	0.0335*** (0.0028)
Household size	0.0001 (0.0002)	-0.0001 (0.0003)	-0.0006 (0.0004)	-0.0009** (0.0003)
Wealth ^(b)	0.0063*** (0.0006)	0.0035*** (0.0008)	0.0085*** (0.0009)	0.0066*** (0.0008)
Catholic	0.0109*** (0.0026)	-0.0093** (0.0046)	0.0170*** (0.0055)	0.0134** (0.0056)
Other Christian	0.0101*** (0.0025)	-0.0224*** (0.0047)	0.0197*** (0.0054)	0.0104* (0.0054)
Muslim	-0.0056 (0.0040)	-0.0059 (0.0063)	-0.0607*** (0.0072)	-0.0430*** (0.0066)
Urban	0.0110*** (0.0022)	0.0401*** (0.0044)	0.0677*** (0.0051)	0.0799*** (0.0049)
Country FE	Yes	Yes	Yes	Yes
Obs.	234,254	166,352	222,803	240,643
R-squared	0.0713	0.0969	0.2483	0.2763
Mean dep. var. if TV=0	0.938	0.822	0.707	0.387

parentheses corrected for clustering

(a) Coefficient and standard error multiplied by 1000

(b) Coefficient and standard error multiplied by 100000

Table 2: TV ownership, fertility and contraception

<i>Dependent variable:</i>	<i>Woman wants another child</i>	<i>Man wants more children than woman</i>	<i>No. of births</i>	<i>Condom used last time</i>	<i>Currently use contraceptive</i>
	(1)	(2)	(3)	(4)	(5)
TV owner	0.0032 (0.0031)	-0.0632*** (0.0054)	-0.2177*** (0.0125)	0.0209*** (0.0026)	0.0261*** (0.0033)
Age	0.0102*** (0.0009)	0.0032** (0.0016)	0.2653*** (0.0044)	-0.0039*** (0.0007)	0.0334*** (0.0007)
Age sq. ^(a)	-0.5938*** (0.0140)	-0.0127 (0.0240)	-1.1717*** (0.0707)	0.0399*** (0.0107)	-0.5010*** (0.0118)
Education (yrs)	0.0050*** (0.0003)	-0.0130*** (0.0006)	-0.1078*** (0.0015)	0.0075*** (0.0003)	0.0144*** (0.0004)
In union	0.0558*** (0.0028)		0.7635*** (0.0119)	-0.2663*** (0.0040)	0.0954*** (0.0033)
Working	0.0064** (0.0025)	0.0091* (0.0047)	-0.0900*** (0.0108)	-0.0053*** (0.0018)	0.0337*** (0.0023)
Household size	-0.0061*** (0.0003)	0.0099*** (0.0006)		0.0002 (0.0002)	-0.0002 (0.0002)
Wealth ^(b)	0.0008* (0.0005)	-0.0040*** (0.0010)	-0.0128*** (0.0026)	-0.0005 (0.0005)	0.0032*** (0.0005)
Catholic	-0.0199*** (0.0046)	-0.0384*** (0.0074)	-0.0542*** (0.0174)	0.0154*** (0.0033)	0.0183*** (0.0041)
Other Christian	-0.0118*** (0.0042)	-0.0507*** (0.0065)	-0.0293* (0.0162)	0.0099*** (0.0029)	0.0297*** (0.0040)
Muslim	0.0463*** (0.0054)	0.0916*** (0.0081)	0.1000*** (0.0214)	-0.0015 (0.0029)	-0.0485*** (0.0045)
Urban	-0.0124*** (0.0036)	-0.0392*** (0.0065)	-0.3144*** (0.0159)	0.0297*** (0.0028)	0.0414*** (0.0039)
Country FE	Yes	Yes	Yes	Yes	Yes
Obs.	241,594	113,000	242,191	174,555	242,191
R-squared	0.3104	0.1452	0.6415	0.2325	0.1432
Mean dep. var. if TV=0	0.649	0.490	3.333	0.0699	0.178

Notes: Standard errors in parentheses corrected for clustering at the village level. *** p<0.01, ** p<0.05, * p<0.1

(a) Coefficient and standard error multiplied by 1000

(b) Coefficient and standard error multiplied by 100000

Table 3: TV ownership, gender norms and domestic violence

Dependent variable:	<i>Woman</i>		<i>Ever experienced:</i>			<i>Beating justified if:</i>				
	<i>decides on own money</i>	<i>Son preference</i>	<i>Emotional violence</i>	<i>Sexual violence</i>	<i>Physical violence</i>	<i>Goes out without telling</i>	<i>Argue</i>	<i>Neglects kids</i>	<i>Refuses sex</i>	<i>Burns food</i>
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
TV owner	-0.0074 (0.0066)	-0.0010 (0.0031)	-0.0103 (0.0067)	-0.0095** (0.0044)	-0.0043 (0.0036)	-0.0444*** (0.0041)	-0.0449*** (0.0042)	-0.0368*** (0.0043)	-0.0309*** (0.0035)	-0.0315*** (0.0033)
Age	0.0020 (0.0020)	0.0054*** (0.0008)	0.0091*** (0.0017)	0.0025* (0.0014)	0.0014 (0.0011)	-0.0037*** (0.0009)	-0.0061*** (0.0009)	-0.0050*** (0.0009)	-0.0004 (0.0008)	-0.0034*** (0.0007)
Age sq. ^(a)	-0.0177 (0.0288)	-0.0946*** (0.0129)	-0.1551*** (0.0258)	-0.0575*** (0.0214)	-0.0413*** (0.0157)	0.0429*** (0.0135)	0.0760*** (0.0135)	0.0564*** (0.0143)	0.0027 (0.0130)	0.0415*** (0.0113)
Education (yrs)	-0.0058*** (0.0007)	0.0011*** (0.0004)	-0.0018*** (0.0007)	-0.0015*** (0.0005)	-0.0017*** (0.0003)	-0.0095*** (0.0004)	-0.0104*** (0.0004)	-0.0086*** (0.0004)	-0.0103*** (0.0004)	-0.0080*** (0.0004)
In union		0.0137*** (0.0028)	-0.1137*** (0.0078)	-0.0626*** (0.0070)	-0.0473*** (0.0061)	0.0388*** (0.0029)	0.0336*** (0.0030)	0.0218*** (0.0030)	0.0320*** (0.0026)	0.0168*** (0.0024)
Working	0.0288*** (0.0104)	0.0003 (0.0026)	0.0548*** (0.0051)	0.0179*** (0.0043)	0.0079*** (0.0026)	-0.0082** (0.0036)	-0.0051 (0.0036)	-0.0033 (0.0037)	-0.0113*** (0.0032)	-0.0109*** (0.0028)
Household size	0.0016*** (0.0005)	0.0004 (0.0003)	0.0039*** (0.0009)	0.0037*** (0.0006)	0.0020*** (0.0005)	0.0025*** (0.0004)	0.0029*** (0.0004)	0.0022*** (0.0004)	0.0018*** (0.0004)	0.0019*** (0.0003)
Wealth ^(b)	0.0037*** (0.0012)	-0.0015** (0.0006)	-0.0009 (0.0017)	-0.0015 (0.0010)	0.0008 (0.0010)	-0.0005 (0.0010)	-0.0008 (0.0009)	-0.0011 (0.0008)	-0.0026*** (0.0008)	-0.0013* (0.0007)
Catholic	-0.0509*** (0.0095)	-0.0031 (0.0043)	-0.0045 (0.0096)	0.0193 (0.0119)	-0.0002 (0.0057)	0.0109** (0.0051)	0.0117** (0.0052)	0.0196*** (0.0054)	0.0146*** (0.0042)	0.0189*** (0.0044)
Other Christian	-0.0524*** (0.0096)	-0.0019 (0.0037)	-0.0097 (0.0082)	0.0004 (0.0110)	-0.0002 (0.0048)	0.0042 (0.0052)	0.0005 (0.0049)	0.0054 (0.0052)	0.0107** (0.0044)	0.0123*** (0.0047)
Muslim	0.0964*** (0.0111)	-0.0134*** (0.0048)	-0.1219*** (0.0105)	-0.0351*** (0.0119)	-0.0389*** (0.0056)	0.0197*** (0.0062)	0.0055 (0.0062)	-0.0086 (0.0063)	0.0495*** (0.0054)	0.0130** (0.0058)
Urban	0.0586*** (0.0079)	-0.0128*** (0.0038)	0.0276*** (0.0078)	0.0032 (0.0049)	0.0043 (0.0035)	-0.0625*** (0.0057)	-0.0457*** (0.0058)	-0.0475*** (0.0058)	-0.0533*** (0.0043)	-0.0505*** (0.0045)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	77,286	230,539	61,489	40,589	41,438	238,223	238,683	239,035	236,814	239,195
R-squared	0.1450	0.0439	0.1210	0.4717	0.3084	0.1760	0.1747	0.1586	0.2030	0.1410
Mean dep. var. if TV=0	0.612	0.215	0.297	0.216	0.0934	0.333	0.331	0.349	0.277	0.202

Notes: Standard errors in parentheses corrected for clustering at the village level. *** p<0.01, ** p<0.05, * p<0.1

(a) Coefficient and standard error multiplied by 1000

(b) Coefficient and standard error multiplied by 100000

Table 4: Signal power and socioeconomic outcomes

	Signal power		<i>No. Obs.</i>
	<i>Coeff.</i>	<i>Std. Dev.</i>	
<i>Dependent variables:</i>	(1)	(2)	(3)
HIV			
Heard about AIDS	-0.0376**	(0.0188)	32,231
Know drugs to avoid transmission during pregnancy	0.0827**	(0.0329)	14,771
Know a place to test	0.1718***	(0.0279)	27,556
Ever tested for AIDS	0.0663***	(0.0142)	31,758
Fertility and contraception			
Woman wants another child	-0.0468**	(0.0185)	32,067
Man wants more children than woman	-0.0508**	(0.0247)	15,329
No. of births	-0.1131	(0.0759)	32,249
Condom used last time	0.0165*	(0.0092)	24,648
Currently use contraceptive	0.0188	(0.0119)	32,249
Gender norms			
Woman decides on own money	0.0376	(0.0291)	12,623
Son preference	-0.0197	(0.0139)	32,249
Woman circumcised	-0.2539***	(0.0507)	17,897
Intends to have daughter(s) circumcised	-0.0418**	(0.0210)	7,820
Domestic violence			
Woman experienced:			
emotional violence	-0.0179	(0.0199)	18,612
sexual violence	0.0260***	(0.0091)	18,583
physical violence	-0.0077	(0.0061)	15,626
Beating justified if woman:			
goes out without telling husband	-0.0283	(0.0267)	31,298
argues	-0.0029	(0.0257)	31,072
neglects kids	-0.0484*	(0.0261)	31,214
refuses sex	-0.0218	(0.0255)	30,696
burns food	-0.0319	(0.0214)	31,087

Notes: Standard errors in parentheses corrected for clustering at the village level. *** p<0.01, ** p<0.05, * p<0.1

Every line in the table corresponds to a different regression. The table reports estimated coefficients and standard errors of the regressor "TV signal strength", with the number of observations in each regression.

Controls (not shown) are the same as in tables 1-3, plus altitude, latitude, longitude and region dummies.

Appendix Table A1: Summary statistics, full sample of DHS

	<i>Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>
Panel A: Dependent variables			
Heard about AIDS	257538	0.951	0.216
Ever tested for AIDS	263843	0.423	0.494
Know a place to test	244518	0.747	0.435
Know drugs to avoid transmission during pregnancy	182525	0.846	0.361
Condom used last time	192759	0.100	0.300
Currently use contraceptive	264719	0.208	0.406
No. of births	264719	2.945	2.806
Woman wants another child	264050	0.664	0.472
Man wants more children than woman	123071	0.456	0.498
Woman decides on own money	82956	0.624	0.484
Son preference	252396	0.217	0.412
Experienced emotional violence	67564	0.291	0.454
Experienced sexual violence	41639	0.184	0.387
Experienced physical violence	42243	0.081	0.273
Beating justified if			
goes out without telling	260962	0.295	0.456
argue	261368	0.293	0.455
neglects kids	261774	0.318	0.466
refuses sex	259234	0.243	0.429
burns food	262050	0.171	0.377
Panel B: Controls			
TV ownership	265315	0.339	0.473
Age	265561	28.56	9.54
Age sq.	265561	906.59	594.21
Education (yrs)	265449	4.661	4.650
In union	265555	0.672	0.469
Working	264949	0.551	0.497
Household size	265561	6.973	4.419
Wealth	265561	14232.3	237692.6
Catholic	243872	0.164	0.370
Other Christian	243872	0.313	0.464
Muslim	243872	0.362	0.480
Urban	265561	0.363	0.481

Appendix Table A2: Summary statistics, NDHS 2008

	<i>Obs.</i>	<i>Mean</i>	<i>Std. Dev.</i>
Panel A: Dependent variables			
Heard about AIDS	32954	0.858	0.349
Know drugs to avoid transmission during pregnancy	15081	0.619	0.486
Know a place to test	28133	0.541	0.498
Ever tested for AIDS	32486	0.149	0.356
Condom used last time	25157	0.062	0.240
Currently use contraceptive	32987	0.133	0.340
No. of births	32987	3.130	3.075
Woman wants another child	32782	0.686	0.464
Man wants more children than woman	15632	0.466	0.499
Woman decides on own money	12863	0.650	0.477
Son preference	32987	0.241	0.428
Woman circumcised	18284	0.455	0.498
Intends to have daughter(s) circumcised	7944	0.079	0.270
Experienced emotional violence	19002	0.224	0.417
Experienced sexual violence	18973	0.041	0.198
Experienced physical violence	15944	0.022	0.147
Beating justified if			
goes out without telling	31987	0.353	0.478
argue	31763	0.295	0.456
neglects kids	31907	0.333	0.471
refuses sex	31374	0.282	0.450
burns food	31779	0.180	0.384
Panel B: Controls			
TV signal strength	32987	-0.505	0.297
Age	32987	28.643	9.495
Age sq.	32987	910.6	590.1
Education (yrs)	32957	5.601	5.321
In union	32987	0.717	0.450
Working	32735	0.588	0.492
Household size	32987	6.410	3.812
Wealth	32976	-0.004	1.018
Catholic	32812	0.109	0.312
Other Christian	32812	0.413	0.492
Muslim	32812	0.460	0.498
Urban	32987	0.314	0.464
Altitude	32705	293.7	238.2
Latitude	32987	8.630	2.677
Longitude	32987	7.462	2.508