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The effect of media exposure on contraceptive adoption across "poverty line"

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Abstract

Purpose – This study aims to explore the effect of mass media exposure on women contraceptive adoption. The intent was to show how factors affected contraceptive use, such as education, standards of living, etc., behave differently across the poverty line.

Design/methodology/approach – Logistic regression was used to test the effect of exposure of various mass media on contraceptive adoption. Indian Human Development Survey (2005) was used for the analysis. Analysis was performed to compare results across the poverty line.

Findings – Television exposure was found to be significant, and it had a strong effect on the likelihood that the family uses contraceptives. Newspaper readership was found significant above the poverty line and insignificant below.

Research limitations/implications – The present study only analyzes cross-sectional data. A longitudinal study would be better suited to determine how these factors affect contraceptive use over time.

Practical implications – The findings of this study can be useful in designing more effective media mix for the communications aimed at increasing contraceptive use in India.

Social implications – The findings show the divide between the population segments above and below the poverty line. Low education levels, affordability issues and son preferences are the major factors deterring contraceptive use at this level.

Originality/value – This is the first study to separately study the population samples across the poverty line. Compared to previous studies which focuses heavily on one media, this analysis includes other media variables and focuses on a variation of these factors across the poverty line.

Keywords Contraceptives' adoption, Media exposure

Paper type Research paper

Introduction

The importance of contraceptive use has grown along with the realization of the importance of "Family Planning". Family planning methods allow families to prevent unintended pregnancies and time the formation of their families (Tsui, 2010). Due to their far-reaching benefits, increased investments in promoting family planning have been focused upon by policymakers so as to reach toward the "Millennium Developments Goals" (Cates *et al.*, 2010). Apart from the overall development of the country's population and achievement of statistical goals, family planning has a much needed effect on alleviating the condition of the poor, especially in developing countries

like India (Merrick, 2002). Various studies have found that the use of contraceptives as a family planning tool has been successful in developing countries (Olenick, 2000; Retherford and Mishra, 1997). Their findings support the argument that contraceptives will be effective even with non-affluent populations. Additionally, mass media has been shown to have a great effect on the usage and adoption of family planning tools (Table I). However, even developing countries are not entirely made up of non-affluent households. A certain level of disparity exists among the segments of the population when it comes to the resources available and attitudes toward different ideas (Sanneving et al., 2013) It, therefore, presents a question that can the same promotional methods work evenly and effectively for the entire country? (Halbesleben, 2010)

Most of the studies on this subject have been conducted on a national level or on a data set representing the entire population (Jato and Simbakalia, 1999; Parr, 2001). A variable is usually added to differentiate between the households or individuals live above the poverty line (APL) and below the poverty line (BPL). However, the conditions for BPL populations are vastly different from those of the rest of the population. We argue that, even in developing countries, the analysis done on the entire population (or of a sample representing the entire population) does not show a complete picture of the phenomenon when it comes to the poorer segments of the population[1]. Poorer segments of the population present a stark difference when it comes to income, education levels, media access and, most importantly, use of contraceptives, as compared to the rest of the population (Sanneving et al., 2013). In this article, we present a point of view which analyses these populations separately and explores how media exposure affects them differentially and why such a manner of analysis is better than analyzing the entire population as a one.

To support our argument, we present an analysis which differs methodologically from existing/most studies on the subject. Instead of analyzing a sample representing the entire population and using a dummy variable to show the difference between being "above" and "below" the poverty line, we analyze the APL and BPL populations separately. We use data from Indian Human Development Survey (Desai, et al., 2005) for this purpose. In these analyses, we control for a number of other factors such as

Study	Country
Udry et al. (1972)	USA
Westoff and Rodriguez (1995)	Kenya
Valente and Saba (1998)	Bolivia
Kincaid (2000)	Philippines
Bankole (1996)	Nigeria
Gupta et al. (2003)	Uganda
Boulay et al. (2002)	Nepal
Retherford and Mishra (1997)	India
Mazharul Islam and Saidul Hasan (2000)	Bangladesh
Keller and Brown (2002)	USA
Olenick (2000)	India, Pakistan and Bangladesh
Kincaid (2000)	Philippines
Jato and Simbakalia (1999)	Tanzania
Parr (2001)	Ghana

Table I.
Selected studies exploring the effect of media on contraceptive use and family planning

education, religion and gender preference which might have a strong effect on influencing the adoption of contraceptives. We compare the effects of these factors in contraceptive adoption between APL and BPL families, identify significant differences across the two segments of populations and draw inferences on their basis. We point out the new and significant information provided through the separate analysis of the APL and BPL populations. Furthermore, we compare our results to a similar treatment on national-representative sample and a dummy variable to emphasize the differences in results and insights provided in either method.

The rest of the article is organized as follows. In the next section, we briefly discuss the relevant literature and identify factors affecting contraceptive adoption. We elaborate on the reasons for a separate study on BPL families. This is followed by a description of various control variables used in the analysis and their relevance. The remaining sections present the description of the data used, model used for analysis, results and discussion of the results. The last section presents our concluding remarks.

Literature review
Benefits from the use of contraceptives
Contraceptives help in providing gender equality by giving fundamental right of reproductive choice to women (Cleland *et al.*, 2012). The use of contraceptives plays a crucial role in reducing unwanted pregnancies, thereby saving several lives, especially in the cases where there is a high risk to maternal, perinatal or child survival (Cleland *et al.*, 2012). A global study estimated that fertility decline from 1990 to 2008 might have averted about 1.7 million maternal deaths; 73 per cent of this fertility decline was accounted for by contraceptive use (Ross and Blanc, 2012). It is estimated that 90 per cent of abortion deaths and 23.6 per cent of obstetric deaths per year can be prevented if women, not wanting to bear children, use contraceptives (Collumbien *et al.*, 2004).

At a macro level, contraceptive adoption results in lower fertility rates, leading to slower population growth, which then helps in social and economic advances, preservation of local environments, etc. (Cleland *et al.*, 2012). At the micro level, contraceptives provide a choice to the families to have fewer children, and therefore, have more resources to invest on improving their living standards (Cleland *et al.*, 2012).

Contraceptive adoption by BPL families
Family planning techniques are especially beneficial for the poor. Compared to richer segments of the population, contraceptive use has shown more success among the poor, especially in India (Mohanty and Pathak, 2009). With a smaller number of children, parents can make better human capital investments into each child, which results in better overall development (Canning and Schultz, 2012). A decline of fertility results in large benefits at aggregate levels of the community as well. It results in decline in available workforce, resulting in better wages and reduction of unemployment (Bailey, 2006). Therefore, it is important for poorer segments of the populations to avail family planning methods to ensure that poverty is not transmitted to the coming generations. However, such techniques or services are still unpopular or unavailable to these segments.

It has been found that, in many cases, especially in developing countries like India, the health services provided by the state are unable to benefit poor families, as they only reach the better-off groups (Mohanty and Pathak, 2009). This becomes even more

damaging when we take into account that the inequalities of health are always disadvantageous to the poor, and this gap appears to be widening rather than narrowing (Wagstaff, 2002).

A major hurdle in trying to increase adoption of such techniques is the lack of awareness about contraceptive methods (Bajwa *et al.*, 2012). Even the Indian Government realized this issue and made "spreading awareness about contraceptive" as one of its objective in its national family planning program (Saluja *et al.*, 2009). Although contraceptive usage has increased over a period of time, India is still behind the target it wants to achieve for a stable population (Saluja *et al.*, 2009). Therefore, policies and promotional methods targeted toward these segments of the population might help in improving the situation.

Role of mass media in contraceptive adoption
Past studies have suggested that mass media interventions are successful in changing and nurturing both public health activities and social and cultural norms (Saluja *et al.*, 2009). Family planning has been widely communicated through mass media messaging for some time, particularly in the developing world (Ryerson, 1994). These studies have found a relationship between "mass media exposure" and "reduction in fertility levels" at a national level (Hornik and McAnany, 2001a) and at an individual level (Westoff and Bankole, 1997). Past studies which explore the effect of mass media on fertility issues are listed in Table I.

Studies have found that women who view more family planning- and fertility-based messages on television, radio and print media are more likely to use contraceptives (Kincaid, 2000; Westoff and Bankole, 1997). In a study on data collected from 144 countries, it was found that television per capita accounted for 74 per cent of the variance in fertility (Hornik and McAnany, 2001b).

Mass media has been found to alter the contraceptive adoption behavior of customers through two different mechanisms. First, mass media increase awareness about the need for fertility control and help introduce available products and services (Hornik and McAnany, 2001b). Second, exposure to mass media, especially in the rural and poorer segments of the population, is able to bring about change in the attitude toward contraceptive usage (Bajwa *et al.*, 2012).

This process of attitude change takes place due to several factors which effect the perception about the ideal life:

- mass media glorify consumption by exposing the poor to a cosmopolitan view of life which might induce them to choose consumption over child bearing (Hornik and McAnany, 2001a); and

- many programs speak directly about fertility issues, and its role in modern nuclear families which then become aspirational for poor families, leading to a change in attitude (Jensen and Oster, 2009).

Both these factors hint of the conflict which families face between the story-lives projected to them via mass media and their real lives. In such situations, balance theory suggests that individuals who face a conflict in their existing attitudes, and the ones they experience through media messages, will attempt to reduce this discord (Barber and Axinn, 2004). Hence, an attitude change occurs as a result of their attempt to be

better aligned with the thinking and behavior portrayed by the characters in these media sources. Thus, we hypothesize that:

H1. Exposure to Newspapers has a positive effect on the adoption of contraceptives.

H2. Exposure to Radio has a positive effect on the adoption of contraceptives.

H3. Exposure to Television has a positive effect on the adoption of contraceptives.

Other factors which influence contraceptive adoption
Gender preference
The study by Das Gupta (1987) found a relationship between the use of contraceptives and boy child preference. He finds that the use of contraceptives becomes more likely when the families with a boy child preference reach a certain threshold level of the number of sons. This concept was explored by Clark (2000), and it is termed as Differential Stopping Behavior (DSB). Research on this topic claims that the fertility rates will increase if couples start practicing DSB, as couples who only have daughters will exceed their threshold level of desired children to attain their ideal number of sons.

Religion
Religion plays a crucial part in influencing economic, social and political development of a society. It also influences the acceptance or rejection of the various family planning techniques (Ramesh *et al.*, 1996). The data collected in India suggest that there is a lesser use of contraceptives and greater fertility among the Muslim population when compared to the other religion. Some studies attribute this fact to the lower socio-economic status of the Muslim population in India (Ghosh and Das, 1990). Other studies have contested that this behavior is due to the Islamic preaching which opposes family planning and the use of contraceptives (Mishra, 2004). Possible reasons also include the fact that Muslims get married at an early age, and the men are permitted to marry more than once. The lower status of women in their society can possibly contribute to this phenomenon (Bhagat and Unisa, 1991; Jeffery, 1997). It can also be an outcome of the minority status of the Muslims in India, and due to the certain psychological and political reasons arising out this status (Singh, 1988).

Education
The importance of family planning and keeping a healthy gap between the children is imparted through education or by various media, which can be interpreted and understood only if one can read and understand the content. The effect of women's education on the adoption of family planning methods and contraceptives has been widely researched. Past studies have suggested that women's education is positively related to contraceptive adoption (Kamal, 2000; Ringheim, 1993). Hence, we hypothesize that:

Education will have a positive effect on the adoption of contraceptives.

Role of husband
Majority of the family planning campaigns and initiatives are planned for the female population, keeping in mind that the target audience is the woman. However, in many countries and societies, the decision for the usage of contraceptives rests with the men in the family (Joesoef *et al.*, 1988; Kamal, 2000). The initiatives which exclude men are most

likely fail in their attempt to control the fertility among such societies. The decision to use contraceptives depends, to some extent, on the effective communication between the husband and wife. A family will be more willing to accept contraceptive measures if the husband agrees to such measures for family planning. The husband's approval for family planning is an important factor in this case.

Standard of living

The household's living standard is an indication of the economic status of that household. Greater income of an individual leads to a better standard of living, and, therefore, a better spending capacity on medical facilities. It can be argued that these households will be more likely to spend on contraceptives (Mishra, 2004). Income data in the IHDS data sets are spread out in a number of different variables, which must be combined to analyze them properly. At the same time, there are many instances where the income of the family does not appropriately reflect the living standards of the households. We therefore use the consumption data as a proxy for income by using it as an independent variable in our study.

Data and variables

For this analysis, we use the Desai, *et al.*, 2005, nationally representative, multi-topic survey conducted on 41,554 households over 33 States of India, via a multi-stage clustered sampling design (Desai and Vanneman, 2009). The researchers from University of Maryland and the National Council of Applied Economic Research (NCAER), New Delhi, jointly organized the surveys. This data collection included two, one-hour interviews in every household, covering topics in the field of health, education, fertility, gender relations, employment, social capital, economic status, marriage, family life, etc.

The IHDS data collection survey has a question on the usage of the contraceptives and the type of contraceptive used by the household. The usage of the contraceptive is indicated by a binary variable (coded 1 if yes, 0 otherwise). The data used for the study consisted of 29,086 responses for this question, of which 6,045 responses were from BPL, and the remaining responses came from APL households. The entries with the missing data were excluded to use only those households where the use of contraceptives was applicable and appropriate.

The dependent variable used in this analysis is "Are you and your husband currently using any methods to delay or prevent pregnancy?" using a dichotomous scale (1 = yes, 0 = no).

The operationalization of the independent variables is shown in Table II.

Overall, the same distribution of the variables are expected to closely match the national demographic has they are taken from a national sample frame and sampling probability.

However, our focus is on a separate analysis for APL and BPL segments of the population. In previous sections, we have given theoretical reasons justifying the need for a separate analysis. We now attempt to present quantitative evidence supporting this idea. Table III shows a chi-square statistic to show that the two populations, with respect to the individual variables, are different from each other. It shows the difference between the two segments. This difference will again be reflected in the individual regression analysis for the two segments.

Variable	Question asked	Categorization
Education[a]	Now, I would like to ask you some questions about the education of each member of your family	Uneducated = 0, Up to class 5 = 1, Up to class 10 = 3, Completed High school = 3, Graduate and above = 4
Religion	What is the religion of the head of the household?	Others = 0, Muslim =1
Family with son	How many sons live with you now? How many sons are alive but do not live with you now?	Do not have son = 0, Have son = 1
Husband has say in family size	Who has the most say in how many children you have (Husband)?	No = 0, Yes = 1
Consumption	Please tell me how much of these items have been consumed by this household in the past 30 days?	NA
Exposure to radio (women)	How often do the women in your household listen to the radio?	Never = 0, Sometimes & Regularly = 1
Exposure to print media (women)	How often do the women in your household read the newspaper?	Never = 0, Sometimes & Regularly = 1
Exposure to Television (women)	How often do the women in your household watch TV	Never = 0, Sometimes & Regularly = 1

Table II.
Operationalization of
independent
variables

Model estimation
We use logistic regression to formally test whether households where women are exposed to mass media channels, such as TV, radio and newspaper, will be more likely to use contraceptives. The dependent variable (usage of contraceptives) is a categorical variable which is dependent on predictor variables both continuous and categorical. This violates linearity assumption of normal regression. Logarithmic regression deals with this problem by using a logarithmic transformation on the outcome variable which allows us to model a non-linear relationship in a linear way (Hair *et al.*, 2010).

Table IV shows the results of the logistic regression on the BPL samples.

As shown in Table IV, the −2 log likelihood difference (7809.009) between a null (i.e. intercept only) and the logistic regression model indicated a significant fit ($\chi^2 = 553.659$; 12 df; $p < 0.05$) with a Cox and Snell $R^2 = 0.008$ and a Nagelkerke $R^2 = 0.117$.

A review of the odds ratios suggests the following inferences. All education variables are insignificant at this level, suggesting that at the BPL level, education of women does not affect much of a difference in the likelihood of using contraceptives. A possible reason for this could be that education among women is not that prevalent at this level. Religion, however, remains a significant factor. Families with a son, living with them or away, are almost four times more likely [(Exp (β) = 3.749] to use contraceptives than those without sons. This goes on to show that son preference is prevalent even at this level. It is interesting to know that, at this level, consumption level is significant as a

Variable	APL	BPL	χ^2 (df)	Significance
Education			1588.75 (5)	0.00
Uneducated	8614 (37.39%)	3798 (62.83%)		
Up to class 5	3449 (14.97%)	929 (15.37%)		
Up to class 10	7512 (32.6%)	1132 (18.73%)		
Up to class 12	1406 (6.1%)	105 (1.74%)		
Graduation not finished	169 (0.73%)	8 (0.13%)		
Graduate	1891 (8.21%)	73 (1.21%)		
Total	23041 (100%)	6045 (100%)		
Exposure to radio			117.06 (1)	0.00
Yes	9622 (41.76%)	2060 (34.08%)		
No	13419 (58.24%)	3985 (65.92%)		
Total	23041 (100%)	6045 (100%)		
Exposure to print			1337.73 (1)	0.00
Yes	8257 (35.84%)	692 (11.45%)		
No	14784 (64.16%)	5353 (88.55%)		
Total	23041 (100%)	6045 (100%)		
Exposure to television			1746.63 (1)	0.00
Yes	17758 (77.07%)	3009 (49.78%)		
No	5283 (22.93%)	3036 (50.22%)		
Total	23041 (100%)	6045 (100%)		
Contraceptive usage			69.0 (1)	0.00
Yes	13508 (58.63%)	3185 (52.69%)		
No	9533 (41.37%)	2860 (47.31%)		
Total	23041 (100%)	6045 (100%)		

Table III.
Descriptive statistics
and chi-square

predictor for usage of contraceptive likelihood. It suggests that as standards of living increase, contraceptive usage should increase along with it.

Media exposure, our variable of concern, shows strong significance in the cases of TV viewership alone. Women exposed to television show a 67 per cent higher chance [(Exp $(\beta) = 1.669$] of contraceptive use, supporting *H3*. Newspaper readership is insignificant, possibly because of the low literacy at this level, rejecting *H1*. The effect of radio exposure is significant but appears to cause a dip in the likelihood of contraceptive use, rejecting *H2*. A possible reason for this unexpected result might be that there are a number of cases, at this level, where women are only exposed to radio owing to a lack of other media sources, due to a lack of resources. This would suggest that their non-use of contraceptives is due to other factors such as a lack of resources, etc. and are being spuriously attributed to radio use.

Next, we compare these findings with the richer segment of the population, as represented by the sample set collected from households deemed APL. Table V presents the findings from this analysis.

As shown in Table V, the −2 log likelihood difference (29585.058) between a null (i.e. intercept only) and the logistic regression model indicated a significant fit (χ^2 = 1,667.346; 12 df; $p < 0.001$) with a Cox and Snell R^2 = 0.07 and a Nagelkerke R^2 = 0.094.

Variables in the equation	β	SE	Wald's statistic	Sig.	Odds ratio [Exp (β)]
Education					
Uneducated[a]			20.804	0.001	
Up to class 5	0.254	0.078	10.498	0.001	1.289
Up to class 10	0.262	0.078	11.179	0.001	1.300
High School	−0.103	0.215	0.228	0.633	0.903
Graduation not finished	−0.680	0.768	0.785	0.376	0.506
Graduate	0.371	0.266	1.955	0.162	1.450
Religion					
Others[a]					
Muslim	−0.645	0.077	71.100	0.000	0.525
Family with son					
No[a]					
Yes	1.322	0.079	282.628	0.000	3.749
Husband say in family size					
No[a]					
Yes	0.628	0.094	45.052	0.000	1.874
Consumption	0.001	0.000	7.233	0.007	1.001
Exposure to Radio					
No[a]					
Yes	−0.313	0.060	27.365	0.000	0.731
Exposure to Print Media					
No[a]					
Yes	0.099	0.099	1.000	0.317	1.104
Exposure to Television					
No[a]					
Yes	0.512	0.061	71.096	0.000	1.669
Constant	−1.964	0.142	190.437	0.000	0.140

Goodness-of-fit statistics	
−2 Log Likelihood	7809.009
Model χ^2 (df = 12)	553.659
Significance	0.026
Cox and Snell R^2	0.08752
Nagelkerke R^2	0.116807

Note: [a] Used as reference categories for β estimates

Table IV.
Logit results (BPL families)

A review of the odds ratios suggests the following inferences. Only two education variables are significant: "up to class 5" and "graduate". Surprisingly, it suggests that women who pursue education up to primary levels and then drop out are less likely to use contraceptives than the ones who do not even reach that level. A possible reason for this could be that, for APL families, women who drop out of schools after primary levels belong to families with extremely low access to economic resources or ones which

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Variables in the equation	β	SE	Wald's statistic	Sig.	Odds ratio [Exp (β)]
Education					
Uneducated[a]			50.031	0.000	
Up to class 5	0.253	0.043	34.356	0.000	1.288
Up to class 10	0.192	0.037	26.999	0.000	1.212
High School	0.167	0.067	6.246	0.012	1.182
Graduation not finished	0.569	0.177	10.294	0.001	1.766
Graduate	0.151	0.063	5.700	0.017	1.163
Religion					
Others[a]					
Muslim	−0.609	0.044	191.553	0.000	0.544
Family with son					
No[a]					
Yes	1.132	0.035	1063.116	0.000	3.103
Husband say in family size					
No[a]					
Yes	0.404	0.048	72.316	0.000	1.498
Consumption	0.000	0.000	0.235	0.628	1.000
Exposure to Radio					
No[a]					
Yes	0.016	0.029	0.295	0.587	1.016
Exposure to Print Media					
No[a]					
Yes	0.150	0.037	16.485	0.000	1.162
Exposure to Television					
No[a]					
Yes	0.344	0.036	93.319	0.000	1.411
Constant	−1.303	0.062	442.418	0.000	0.272
Goodness-of-fit statistics					
–2 Log Likelihood					29585.058
Model χ^2 *(df = 12)*					1667.346
Significance					0.000
Cox and Snell R^2					0.070
Nagelkerke R^2					0.094

Table V.
Logit results (APL households)

Note: [a]Used as reference categories for β estimates

subscribe to primitive thinking, both factors which could deter contraceptive use. The positive effect of women completing their graduate studies is expected. Religion remains a significant factor at this level. An interesting finding, especially in comparison to the analysis on BPL population done before, is that consumption is an insignificant factor. We have used consumption as a proxy for standards of living. This suggests that above the poverty line, standards of living, on average, do not have that much of an effect on

contraceptive use. Possibly, affording contraceptive use at this level is not as difficult as it is at the BPL levels.

Media variables, television viewership and newspaper exposure are significant, therefore supporting *H3* and *H1*. The difference from the BPL analysis for newspapers is expected, as illiteracy will be lesser above the poverty line than below. Radio exposure has insignificant effect on adoption behavior, thus rejecting *H2*. TV viewership appears to have a strong effect on contraceptive use, pushing it almost 41 per cent higher [(Exp $(\beta) = 1.411$] than without.

Findings

We began our discussion suggesting the notion that analyzing the effect of mass media on contraceptive use and adoption should be studied separately for above and below the poverty line. We argue that a single analysis using the entire population, using a dummy variable for describing whether the household is above or below the poverty line, is not sufficient to understand the problem. Our findings support this notion. A dual analysis model, as compared to the single analysis model, shows far more information about the individual factors and how they differ above and below the poverty line (see Table VI for full population model and Table VII for comparison of media variables).

Table VI shows the same analysis conducted on the entire data set, representing the entire population. Despite the use of a categorical variable to separate APL and BPL households, it is unable to show how the other variables will act differently in these two segments. From Tables IV and V we know that print media does not appear to be a significant player in increasing contraceptive usage in the BPL population, the opposite being the case for APL population. However, both models in Table VI show print media to be strongly significant, supporting *H2*. This provides a narrow vision of the manner in which the variables work. A separate analysis, like the one shown in Tables IV and V, remedies this problem. A similar case can be seen in the consumption variable (significant below poverty line, insignificant above poverty line, full population analysis shows insignificant). Variables such as the different levels of education also differ but a focused analysis will be required to analysis this difference. In this manner, a separate analysis also helps by indicating the factors which might require a deeper analysis.

In Table VII, we find that TV viewership shows a strong relationship to contraceptives use, among both APL and BPL populations, supporting *H3*. Comparing the two models, APL and BPL, we find that this effect differs significantly. The factor of TV viewership changes the probability of contraceptive adoption by 41 per cent ($e^{0.344} = 1.41$) for APL, whereas it is 67 per cent ($e^{0.512} = 1.41$) for BPL. This can suggest higher productivity of TV-based "contraceptive adoption" messages for BPL than for APL. However, this particular effect could have resulted not only from family planning-based social messages but also from exposure to soap operas and other television programs which deal with these issues.

Newspaper being a significant factor for APL, and insignificant for BPL appears intuitive, but its ramifications for the policymaker are immense. One possible reason for this could be the lower rate of literacy below the poverty line. Other media channels such as TV and radio are more easily interpretable for the illiterate masses. Most newspapers, on the other hand, would require at least a primary- to secondary-level education to interpret properly.

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Variables in the equation	Without poverty line dummy				With poverty line dummy			
	β	SE	Significance	Odds ratio [Exp (β)]	β	SE	Significance	Odds ratio [Exp (β)]
Education								
Uneducated[a]			0.000				0.000	
Up to class 5	0.263	0.038	0.000	1.300	0.259	0.038	0.000	1.295
Up to class 10	0.216	0.033	0.000	1.241	0.210	0.033	0.000	1.233
High School	0.162	0.063	0.010	1.175	0.156	0.063	0.014	1.169
Graduation not finished	0.524	0.171	0.002	1.688	0.519	0.171	0.002	1.680
Graduate	0.170	0.060	0.005	1.185	0.168	0.060	0.006	1.183
Religion								
Others[a]								
Muslim	−0.605	0.038	0.000	0.546	−0.602	0.038	0.000	0.548
Family with son								
No[a]								
Yes	1.158	0.032	0.000	3.183	1.159	0.032	0.000	3.187
Husband say in family size								
No[a]								
Yes	0.447	0.042	0.000	1.564	0.447	0.042	0.000	1.564
Consumption	0.000	0.000	0.206	1.000	0.000	0.000	0.583	1.000
Exposure to Radio								
No[a]								
Yes	−0.047	0.026	0.072	0.954	−0.047	0.026	0.072	0.954
Exposure to Print Media								
No[a]								
Yes	0.147	0.034	0.000	1.158	0.145	0.034	0.000	1.156
Exposure to Television								
No[a]								
Yes	0.400	0.030	0.000	1.492	0.390	0.030	0.000	1.477
Below poverty line	–	–	–	–	−0.083	0.033	0.011	0.920
Constant	−1.415	0.054	0.000	0.243	−1.379	0.056	0.000	0.252

Goodness-of-fit statistics		
−2 Log Likelihood	37452.825	37446.37
Model χ^2 (*df = 12*)	2230.895	2237.342
Significance	0.000	0.000
Cox and Snell R^2	0.073832	0.074038
Nagelkerke R^2	0.099176	0.099452

Table VI.
Logit results (entire population)

Note: [a]Used as reference categories for β estimates

Variables in the equation	Entire population without poverty dummy		Entire population with poverty dummy		Below poverty line population		Above poverty line population		Difference in coefficient	
	β	SE	β	SE	β(A)	SE	β(B)	SE	A:B	Chi-square for A:B
Exposure to radio										
No[a]										
Yes	−0.047	0.026	−0.047	0.026	−0.313***	0.060	0.016	0.029	−19.563	24.373***
Exposure to print media										
No[a]										
Yes	0.147***	0.034	0.145***	0.034	0.099	0.099	0.15***	0.037	0.66	0.233
Exposure to television										
No[a]										
Yes	0.4***	0.030	0.39***	0.030	0.512***	0.061	0.344***	0.036	1.488	5.626*
Below poverty line										
No[a]										
Yes			−0.083**	0.033						
Constant	−1.415	0.054	−1.378	0.056	−1.964	0.142	−1.303	0.062		

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; only media-based variables of the three models have been shown here

Table VII.
Comparison between media variables in all three models

Radio exposure is insignificant above the poverty line but significant below the poverty line, rejecting *H2* in both cases. The factor being insignificant above the poverty line is possible due to the popularity and accessibility of TV and newspapers, and the downward trend of radio audience in the poorer segments of the population. Lately, radio has become more popular among the well-to-do working, educated classes that listen to radio in their cars. Radio programs have also changed accordingly (Sarma, 1999). Conversely, the factor being significant below the poverty line is also understandable, as it is cheaper than TV and more easily interpretable than newspapers. However, the negative sign of the coefficient suggests that radio exposure actually reduces the chances of contraceptive use. This is counterintuitive. It is unreasonable to believe that exposure to radio programming would reduce contraceptive adoption and usage. However, it does suggest that radio programs are not helping change this behavior toward the positive side. Possible reason might be a lack of attitude-changing programs on this channel or a lesser attitude-changing effect of this media as compared to other media channels.

These findings are important, especially for policy-making because they suggest that, among the media channels, TV viewership alone seems to make a difference below the poverty line when it comes to effecting contraceptive use. It is important for policymakers to realize that public service announcements or explicitly socially oriented programming using different medias is not found very effective (Jensen and Oster, 2009). Contraceptive adoption requires change is attitude television that appears to be an effective form of persuasion because people emulate what they perceive to be desirable behaviors and attitudes, without the need for an explicit appeal (Jensen and Oster, 2009). Therefore, to ensure contraceptive adoption by BPL families, more efforts should be put in terms of television media.

Discussion and conclusion

Television media reach is growing in the rural and poorer segments of the population. Often referred to as part of the Bottom of Pyramid (Prahalad, 2006), these segments continue to patronize traditional forms of entertainment such as religious festivals, fairs, weekly markets, street-side shows, etc. However, the share of movies, television programs, Internet usage (albeit small) has increased. In most cases, an increased usage of these entertainment and information sources is aspirational, which suggests that as they become more affordable and accessible, in the times to come, their usage will increase.

Our results give evidence to the social effect of this growing phenomenon. In light of previous studies which suggest that television viewership can effect social attitude change (Hornik and McAnany, 2001a), we find that it is especially strong in BPL families of the Indian population over the APL population. The results show that TV viewership is a significant predictor of households using contraceptives. This finding is especially significant because of the following reasons. First, of the total data set of 6,045 households (BPL), we find that 3,009 households have a TV or some manner in which they can access a TV, which goes on to show that it is not a rare phenomenon. Second, in rural and remote areas, TV viewing is sometimes the only, or most important source of information of the outside world (Fernandes, 2000; Mankekar, 1993). This shows that, even in such cases, the effect on social change will strongly exist. Such programs are mostly designed and produced by individuals influenced by international standards or

a national cosmopolitan view. Such programs glorify values in modern thinking in terms of fertility, education and women's place in society. These may push people to question primitive thinking with regard to such issues. As reported by Johnson (2001), a man notes:

> Since TV has come to our village, women are doing less work than before. They only want to watch TV. So we [men] have to do more work. Many times I help my wife clean the house.

Additionally, it is possible that individuals who do not own a TV are still able to access TV programs in other people's homes, which might have TVs. Finally, given that women do not always have the freedom, or circumstances to move out of their homes, TV media is more readily available to them than access to health-care and educational sources. Another benefit of the television medium is that it can reach individuals who are illiterate, something which newspapers cannot.

When it comes to radio and newspaper, the results do not show a very strong effect on contraceptive adoption below the poverty line. Even above poverty line, the effect is not overwhelming. The insignificance of the effect of newspapers below poverty line should act as a confirmation that TV is perhaps the strongest means to spread social awareness in this segment. More exploration in this regard is required before its effectivity can be commented upon conclusively.

The possible ramifications of this study are manifold. It gives support to the idea that family planning-related policy design should look into the possibility of promoting the usage of TV for poorer segments of the population. Further increase of access to TV media and TV programs, through subsidized prices or government-funded projects, should be considered, especially focusing on poorer segments of the population. This also helps give insights which would help policymakers decide on media mix for social messages aimed at increasing contraceptive usage. Additionally, it pushes the idea of separate analysis for large segments of populations which might differ greatly on the basis of key factors which affect the analysis for other social initiatives.

Limitations

The present study only uses a cross-sectional data set. A longitudinal data set will allow a better determination of the effects various factors that we have used in our study. Contraceptive use contributes toward a long-term benefit to the individual and her family. A study over time will be better able to capture the effects we have analyzed in our study. Additionally, the present study does not inform about the type of programming in any of the channels. Different types of programming and genre of programs on these channels might have a differential effect over different causes and segments. Further exploration is required on this line of enquiry.

Note

1. The definition of "poor" we use in this study is households that fall below the poverty line, as specified by India Human Development Survey (IHDS) (Desai *et al.*, 2010).

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